

2024 ICOMES

International Congress on Obesity and Metabolic Syndrome hosted by KSSO

Integrating Cutting-Edge Insights in Obesity Management

Sep. 5 (Thu) ~ Sep. 7 (Sat)
CONRAD Seoul Hotel, Korea



다음 세대를 위한 체중 관리

만 12세 이상 만 18세 미만의 청소년 비만 적응증 승인



본 모델들은 비만 환자의 일상을 표현하기 위한 가상의 환자입니다.

삭센다® 제품 정보



[효능·효과]

청소년(만12세 이상)

- 이 약은 아래와 같은 만 12세 이상의 청소년 환자의 체중관리를 위해 건강한 영양상태 유지 및 신체 활동 증대의 보조제로서 투여할 수 있다.
- 초기 체질량지수(BMI)가 성인의 30kg/m² 이상에 해당하는 비만 환자, 및
 - 체중이 60kg을 초과하는 환자

Reference. 삭센다® 펜주 6mg/mL (리라글루티드). 국내제품설명서. Available via: <https://nedrug.mfds.go.kr/pbp/CCBBB01/getItemDetailCache?cacheSeq=201705815aupdateTs2024-06-01%2017:44:00.0b>. Accessed on July 10, 2024.

※ 본 자료는 보건의료전문가를 대상으로 전문적인 내용을 전달하고자 제작되었습니다.

※ 환자대기실, 의료기관 복도 등 일반 대중의 접근이 가능한 공개된 장소에 비치하는 행위는 전문의약품 대중광고로 간주될 수 있음을 주의하여 주시기 바랍니다.



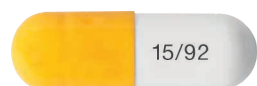
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펜주6mg/mL(리라글루티드)

A New Choice of Obesity Treatment

* Of 2487 patients, 994 were assigned to placebo, 498 to phentermine 7.5 mg plus topiramate 46 mg, and 995 to phentermine 15 mg plus topiramate 92 mg; 979, 488, and 981 patients, respectively, were analysed. At 56 weeks, change in bodyweight was -1.4 kg (least-squares mean -1.2%, 95% CI -1.8 to -0.7), -8.1 kg (-7.8%, -8.5 to -7.1; p<0.0001), and...



-10.2kg

1, a,*

(-9.8%, -10.4 to -9.3 ; p < 0.0001) in the patients assigned to placebo, phentermine 7.5 mg plus topiramate 46 mg, and phentermine 15 mg plus topiramate 92 mg, respectively.



The dosage and administration of Qsymia capsules due to individual countries' regulatory requirements in Korea is as below. Alvogen Korea does not recommend the use of any product in any different manner than as described in the approved Prescribing Information. Before prescribing Qsymia capsule, please see the local full prescribing information available from the manufacturers.

Start treatment with Qsymia 3.75 mg/23 mg (phentermine 3.75mg/topiramate 23 mg extended-release) daily for 14 days; after 14 days increase to the recommended dose of Qsymia 7.5 mg/46 mg (phentermine 7.5 mg/topiramate 46mg extended-release) once daily.

Evaluate weight loss after 12 weeks of treatment with Qsymia 7.5 mg/46 mg.

If a patient has not lost at least 3% of base line body weight on Qsymia 7.5 mg/46 mg, discontinue Qsymia or escalate the dose, as it is unlikely that the patient will achieve and sustain clinically meaningful weight loss at the Qsymia 7.5 mg/46 mg dose.

To escalate the dose : Increase to Qsymia 11.25 mg/69 mg (phentermine 11.25 mg/topiramate 69 mg extended-release) daily for 14 days; followed by dosing Qsymia 15 mg/ 92 mg (phentermine 15 mg/92 mg extended-release) once daily.

Evaluate weight loss following dose escalation to Qsymia 15 mg/92 mg after an additional 12 weeks of treatment.

If a patient has not lost at least 5% of baseline body weight on Qsymia 15 mg/92 mg, discontinue Qsymia as directed, as it is unlikely that the patient will achieve and sustain clinically meaningful weight loss with continued treatment.

Qsymia[®] capsule

3.75mg/23mg, 7.5mg/46mg, 11.25mg/69mg, 15mg/92mg



3.75 mg / 23 mg

7.5 mg / 46 mg

11.25 mg / 69 mg

15 mg / 92 mg

* Qsymia 3.75 mg/23 mg and Qsymia 11.25 mg/69 mg are for titration purposes only.

QSYMIA[®] capsule (phentermine and topiramate extended-release)
3.75 mg / 23 mg, 7.5 mg / 46 mg, 11.25 mg / 69 mg, 15 mg / 92 mg

[INDICATIONS AND USAGE] Qsymia is a combination of phentermine, a sympathomimetic amine anorectic, and topiramate extended release, an antiepileptic drug, indicated as an adjunct to a reduced calorie diet and increased physical activity for chronic weight management in adults with an initial body mass index (BMI) of : · 30 kg/m² or greater (obese) or · 27 kg/m² or greater (overweight) in the presence of at least one weight related comorbidity such as hypertension, type 2 diabetes mellitus, or dyslipidemia. The safety and effectiveness of Qsymia in combination with other products intended for weight loss, including prescription and over the counter drugs, and herbal preparations, have not been established. **[DOSAGE AND ADMINISTRATION]** · Take orally once daily in morning. Avoid administration in evening to prevent insomnia. · Recommended starting dosage is 3.75 mg/23 mg (phentermine mg/topiramate mg) daily for 14 days; then increase to 7.5 mg/46 mg daily. · Escalate dosage based on weight loss in adults or BMI reduction in pediatric patients. See the Full Prescribing Information for details regarding discontinuation or dosage escalation. · Gradually discontinue 15 mg/92 mg dosage to prevent possible seizure. · Do not exceed 7.5 mg/46 mg dosage for patients with moderate or severe renal impairment or patients with moderate hepatic impairment. **[CONTRAINDICATION]** · Pregnancy · Glaucoma · Hyperthyroidism · Taking or within 14 days of stopping monoamine oxidase inhibitors · Known hypersensitivity to any component of QSYMIA or idiosyncrasy to sympathomimetic amines **[WARNING AND PRECAUTIONS]** · **Embryo-Fetal Toxicity:** Can cause fetal harm. In patients who can become pregnant, a negative pregnancy test is recommended before initiating QSYMIA and monthly during therapy; advise use of effective contraception. QSYMIA is available through a limited program under a Risk Evaluation and Mitigation Strategy (REMS). · **Increase in Heart Rate:** Monitor heart rate, especially in those with cardiac or cerebrovascular disease. · **Suicidal Behavior and Ideation:** Monitor for depression or suicidal thoughts. Discontinue QSYMIA if symptoms develop. · **Risk of Ophthalmologic Adverse Reactions:** Acute myopia and secondary angle closure glaucoma have been reported. Immediately discontinue QSYMIA if symptoms develop. Consider QSYMIA discontinuation if visual field defects occur. · **Mood and Sleep Disorders:** Consider dosage reduction or discontinuation for clinically significant or persistent mood or sleep disorder symptoms. · **Cognitive Impairment:** May cause disturbances in attention or memory, or speech/language problems. Caution patients about operating automobiles or hazardous machinery when starting treatment. · **Slowing of Linear Growth:** Consider dosage reduction or discontinuation if pediatric patients are not growing or gaining height as expected. · **Metabolic Acidosis:** Measure electrolytes before and during treatment. If persistent metabolic acidosis develops, reduce dosage or discontinue QSYMIA. · **Decrease in Renal Function:** Measure creatinine before and during treatment. For persistent creatinine elevations, reduce dosage or discontinue QSYMIA. · **Serious Skin Reactions:** QSYMIA should be discontinued at the first sign of a rash, unless the rash is clearly not drug-related. See full prescribing information for Qsymia before prescribing. * For more product information, please contact Alvogen Korea, www.alvogenkorea.com (02-2047-7700; A collect call) · For more product information, please refer to the product license in the online medicine library of the Ministry of Food and Drug safety, (http://drug.mfds.go.kr/html/index.jsp)

Study Design

a. CONQUER was a randomised, double-blind, placebo-controlled study undertaken in 93 centres in the USA in 56-week phase 3 trial. This study randomly assigned overweight or obese adults (aged 18–70 years), with a body-mass index of 27–45 kg/m² and two or more comorbidities (hypertension, dyslipidaemia, diabetes or prediabetes, or abdominal obesity) to placebo, once-daily phentermine 7.5 mg plus topiramate 46.0 mg, or once-daily phentermine 15.0 mg plus topiramate 92.0 mg in a 2:1:2 ratio in 93 centres in the USA. Primary endpoint were the mean percentage change in bodyweight and the proportion of patients achieving at least 5% weight loss. Secondary outcomes were weight loss, proportion of patients achieving at least 10% weight loss, and change in waist circumference.

b. SEQUEL was a double-blind, placebo-controlled, 52-wk extension of the CONQUER study. Placebo-controlled, double-blind, 52-wk extension study; volunteers at selected sites continued with original randomly assigned treatment [placebo, 7.5 mg phentermine/46 mg controlled-release topiramate (7.5/46), or 15 mg phentermine/92 mg controlled-release topiramate (15/92)] to complete a total of 108 wk. All subjects participated in a lifestyle-modification program. The CONQUER study had 2 predefined, coprimary endpoints, which were retained as the primary outcome measures in the SEQUEL extension study: mean percentage weight loss and percentage of subjects achieving ≥ 5% weightloss from baseline (week 0 of CONQUER) to week 108. Secondary endpoints included the following: weight loss in kilograms; percentage of subjects achieving ≥ 10%, ≥ 15%, or ≥ 20% weight loss; and change in waist circumference from baseline to week 108.

Reference 1. Kishore M Gadde et al. *Lancet* 2011; 377: 1341–52. 2. Qsymia Regulatory Permission by KFDA, Available at <https://nedrug.mfds.go.kr/pp/CCBB01/getItemDetail?itemSeq=201905405>, accessed January 8, 2020. 3. W Timothy Garvey et al. *Am J Clin Nutr* 2012;95:297–308.

Perfect LDL-C management with Rosuzet



- **Korea's First** Fixed Dose Combination of Rosuvastatin + Ezetimibe¹
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* **LDL-C:** Low Density Lipoprotein Cholesterol. **CV(Cardiovascular) Outcome:** 3-year composite of cardiovascular death, major cardiovascular events, or non-fatal stroke

References 1. Ministry of Food and Drug Safety Integrated Medicine Information System. 2. Kim BK, Hong SJ, Lee YJ, et al. Long-term efficacy and safety of moderate-intensity statin with ezetimibe combination therapy versus high-intensity statin monotherapy in patients with atherosclerotic cardiovascular disease (RACING): a randomised, open-label, non-inferiority trial. *Lancet*. 2022 Jul 30;400(10349):380-390. 3. Cumulative Prescription Data from UBIST in 2022.

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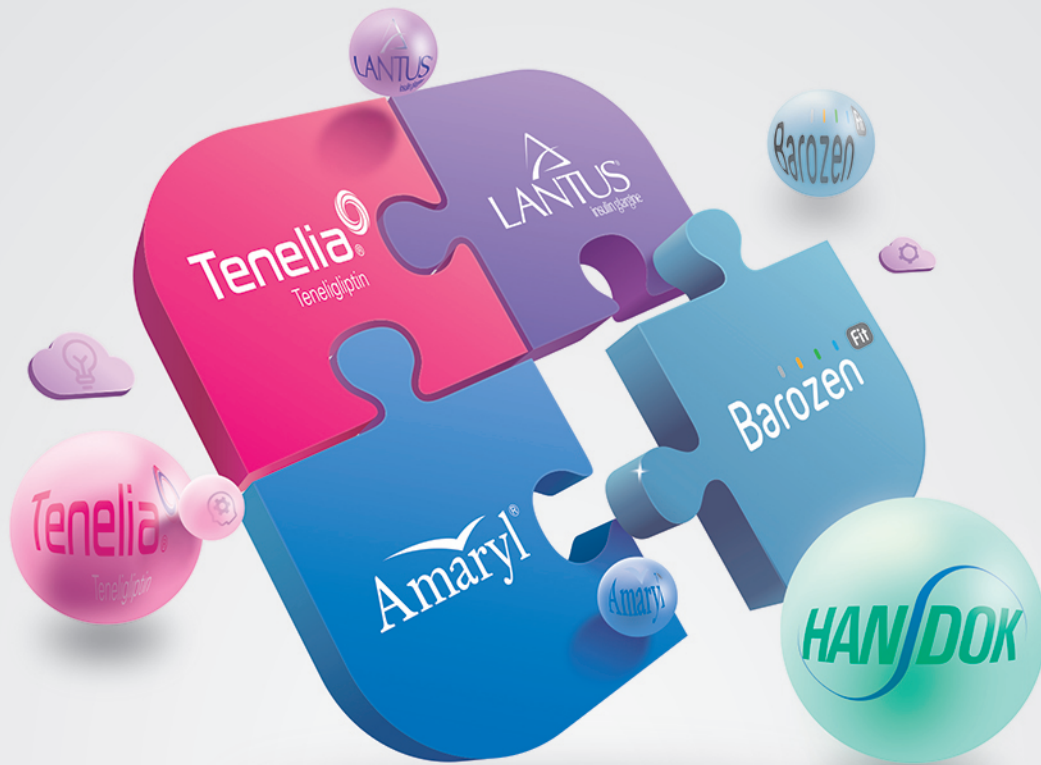
12~16세 청소년 대상
유효성 및 안전성 입증⁴



[References]

1. Karhunen L et al. *Int J Obes Relat Metab Disord*. 2000 Dec.
2. Wirth A. *Diabetes Obes Metab*. 2005 Jan.
3. Torgerson JS et al. *Diabetes Care*. 2004 Jan.
4. Chanoine JP et al. *JAMA*. 2005 Jun.

Various Solution for Diabetes



Amaryl®

3제 병합요법 시 혈당조절을 위한 중요한 옵션¹



SU

Tenelia®
Teneligliptin

10명 중 약 7명의 환자 목표혈당 [HbA1c<7.0%] 도달^{2,†}



DPP-4 Inhibitor

LANTUS®
Insulin glargine

다양한 임상시험을 통해 확인된 우수한 효과와 안전성 프로파일³⁻⁹



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자유로운* 보정, 실시간 혈당측정 관리¹⁰



CGM

*보정주기는 초기 2번은 12시간, 이후는 24시간입니다.

†Secondary endpoint 해당

Study Design²: We assessed the 24-week efficacy and safety of teneligliptin, a novel dipeptidyl peptidase-4 inhibitor, in Korean patients with type 2 diabetes mellitus (T2DM) that was inadequately controlled with diet and exercise. The present study was designed as a multicentre, randomized, double-blind, placebo-controlled, parallel-group, phase III study. Patients (n = 142) were randomized 2 : 1 into two different treatment groups as follows: 99 received teneligliptin (20 mg) and 43 received placebo.

Primary endpoint result: Teneligliptin significantly reduced the HbA1c level from baseline compared with placebo after 24 weeks.

References 1. Arai K et al. Diabetes Technol Ther. 2013;Apr;15(4):335-341. 2. Hong S et al. Diabetes Obes Metab. 2016;May;18(5):528-32. 3. Bretzel R.G. et al. Lancet, 2008; 371: 1073-1084. 4. Blicke J.F. et al. Diab. Obes. Metabolism, 2009; 11: 379-386. 5. Yki-Järvinen H. et al. Diabetologia, 2006; 49 (3): 442-451. 6. Swinnen S.G. et al. Diabetes Care, 2010; 33: 1176-1178. 7. Riddle M.C. et al. Diabetes Care, 2003; 26 (11): 3080-3086. 8. Aschner P. et al. Lancet, 2012; 379: 2262-2269. 9. Gerstein H. et al. Diabet Med., 2006; 23: 736-742. 10. 바로젠 Fit 제품 허가증 (최종 개정일 2024-04-04)

Product Information



테넬리아®정 20mg



아마릴®정 1, 2, 4mg



란투스®주술로스타



란투스®주바이알



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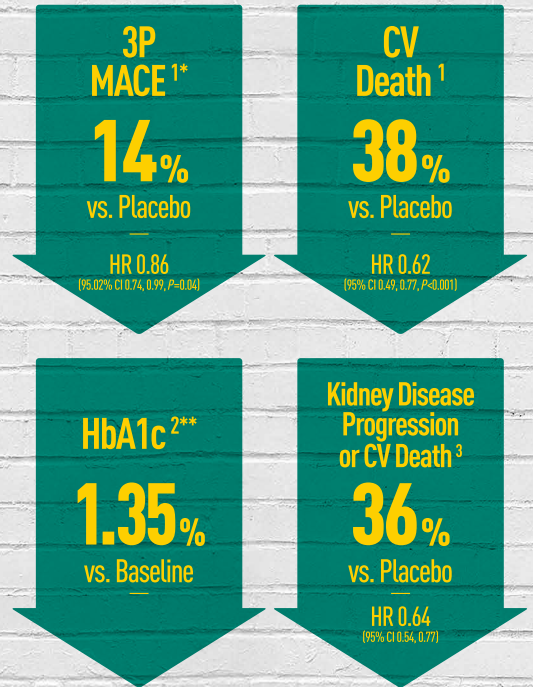
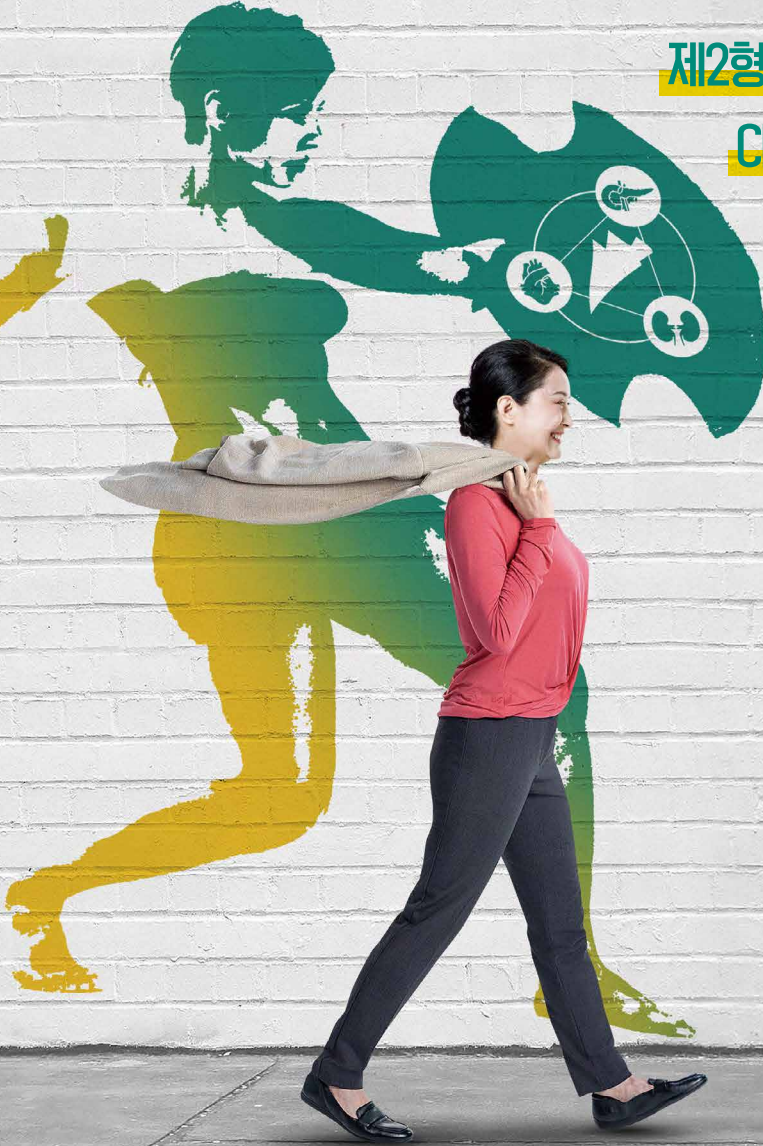
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*Pooled empagliflozin group (empagliflozin 10mg and 25mg) Change from baseline in HbA1c at week 24 in empagliflozin 10mg q.d.

3P-MACE, 3-point major adverse cardiovascular event; CI, confidence interval; CRM, cardio-renal metabolic; CV, cardiovascular; HbA1c, glycated hemoglobin; HR, hazard ratio; q.d., once daily.

References 1. Zinman B, et al. *N Engl J Med.* 2015;373(22):2117-2128 and supplementary data. 2. Hadjadj S, et al. *Diabetes Care.* 2016;39:1718-1728. 3. Herrington WG, et al. *N Engl J Med.* 2023;388(2):117-127.

Product Information

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A clinical study to investigate the pharmacokinetics/pharmacodynamics and safety/tolerability of Evogliptin in hemodialysis patients¹

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[신장기능에 따른 당뇨병 약물 용량 조절²]

eGFR (mL/min/1.73m ²)	CKD stage 1-2	CKD stage 3a	CKD stage 3b	CKD stage 4	ESRD
	≥60	59-45	44-30	29-15	<15
DPP-4 inhibitors					
Evogliptin	5 mg* (단, 환자의 상태 관찰에 따름)				
Linagliptin	5 mg				
Gemigliptin	50 mg				
Teneligliptin	20 mg				
Anagliptin	200 mg			100 mg	100 mg
Sitagliptin	100 mg	50 mg		25 mg	
Saxagliptin	5 mg ²⁾		2.5 mg		
Vildagliptin	100 mg ¹⁾	50 mg			
Alogliptin	25 mg ¹⁾	12.5 mg		6.25 mg	

* CKD Stage 1 환자에서 ESRD 환자에 이르기까지 전체 신장에 환자에서 용량 조절없이 사용이 가능합니다(단, 환자의 상태 관찰에 따름).

용량 조절 불필요.

¹⁾ eGFR ≥50 mL/min/1.73 m² 용량 조절 불필요.

²⁾ eGFR >45 mL/min/1.73 m² 용량 조절 불필요.

eGFR, estimated glomerular filtration rate; CKD, chronic kidney disease; ESRD, End-stage renal disease; DPP-4, dipeptidyl peptidase-4



강력한 혈당 강화³



높은 목표혈당 도달률³



24시간 적정혈당 유지⁴

[References] 1. 임상시험 결과보고서 [DA1229_ESRD_I_CSR_Final(Versio 1.0), 2022.08.17]. 2. 각 의약품 허가사항 근거(2023.04) 3. Kim GR, et al. Diabetes Obes Metab 2020;22(9):1527-1536. 4. Gu N, et al. Drug Des Devel Ther 2014;8:1709-1721.

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이노엔, 다파엔

※ 다파엔정은 제2형 당뇨병 환자의 혈당 조절을 위한 단독요법과 병용요법 및 만성 심부전, 만성 신장병을 효능·효과로 허가받았습니다.

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심혈관 위험인자 개선
(체중, 혈압, 지질)

【제품명】 엔블로정 0.3mg, 엔블로멧서방정 0.3/1000mg **【원료약품 및 분량】** -1정중- 엔블로정 0.3mg 주성분: 이나보글리플로진 0.3mg, 메트포르민염산염 1000mg; 첨가제: D-만니톨, 피크먼트블렌드PB-130012주황색, 전호화전분, 탱크, 콜로이드성아산화규소, 크로스카멜로오스나트륨, 히프로멜로오스, 카르복시메틸셀룰로오스나트륨, 스테아르산마그네슘, 미결정셀룰로오스 **【성상】** 흰색과 옅은 분홍색의 타원형 서방성 이층정제, 엔블로멧서방정 0.3/1000mg 주성분: 이나보글리플로진 0.3mg, 메트포르민염산염 1000mg; 첨가제: D-만니톨, 피크먼트블렌드PB-130012주황색, 전호화전분, 탱크, 콜로이드성아산화규소, 크로스카멜로오스나트륨, 히프로멜로오스, 카르복시메틸셀룰로오스나트륨, 스테아르산마그네슘, 미결정셀룰로오스 **【효능·효과】** 엔블로정 0.3mg 제2형 당뇨병 환자의 혈당조절을 향상시키기 위해 식사요법 및 운동요법의 보조제로 투여한다. 엔블로멧서방정 0.3/1000mg 이 약은 이나보글리플로진과 메트포르민의 병용투여가 적합한 제2형 당뇨병 환자의 혈당조절을 향상시키기 위해 식사요법 및 운동요법의 보조제로 투여한다. **【용법·용량】** 엔블로정 0.3mg 제2형 당뇨병 단독요법 및 추가 병용요법. 이 약의 권장 용량은 단독요법 및 다른 혈당 강하제와의 추가 병용요법에 대하여 1일 1회 0.3mg이다. 이 약은 식사와 관계없이 투여할 수 있다. 엔블로멧서방정 0.3/1000mg 이 약은 이나보글리플로진 0.3mg과 서방성 메트포르민염산염 1000mg을 투여하는 환자에게 식사와 함께 1일 1회 1정을 투여한다. 서방성 특성을 유지하기 위해 이 약은 뜨거운 음료나 차를 마시거나 씹지 말고 삼켜야 한다. 이 약이 불완전하게 용해되어 대변으로 배설 될 수 있다. **【금기】** 1) 이나보글리플로진 및/또는 메트포르민염산염 또는 비구아니드계 약물, 또는 이 약의 구성 성분에 대해 과민반응 병력이 있는 환자, 2) 엔블로정 0.3mg 구제 여과율(eGFR)이 30 mL/min/1.73m² 미만인 환자, 말기 신질환 또는 투석 중인 환자, 엔블로멧서방정 0.3/1000mg 중등도(stage3b) 이상의 신장에 환자(크레아티닌 청소율<45mL/min 또는 사구체 여과율 <45 mL/min/1.73m²) 신기능에 영향을 줄 수 있는 급성상태, 3) 제1형당뇨병, 유산산중, 혼수를 수반하거나 그렇지 않은 당뇨병 케톤산증을 포함하는 급성 또는 만성 대사성 산증환자 및 케톤산증의 병력이 있는 환자, 4) 당뇨병성 전혼수(엔블로멧 서방정 0.3/1000mg에 한함), 5) 급성 및 불안정형 심부전 환자(엔블로멧 서방정 0.3/1000mg에 한함), 6) 방사선 요오드 조영 물질을 정맥 내 투여하는 검사를 받는 환자(엔블로멧 서방정 0.3/1000mg에 한함), 7) 중증 감염증 또는 중증의 위상성 전신장애 환자(엔블로멧 서방정 0.3/1000mg에 한함), 8) 수술을 받는 환자(음식과 수액의 섭취에 제한이 없는 가벼운 수술은 제외)(엔블로멧 서방정 0.3/1000mg에 한함), 9) 영양불량상태, 기아상태, 쇠약상태, 뇌하수체기능부전 또는 부신기능부전환자(엔블로멧 서방정 0.3/1000mg에 한함), 10) 엔블로 0.3mg 중등도 및 중증의 간장애 환자, 엔블로멧 서방정 0.3/1000mg 간 기능장애, 폐경색, 중증의 폐기능 장애 환자 및 기타 저산소혈증을 동반하기 쉬운 상태 환자, 과도한 알코올 섭취자, 탈수증, 설사 구토 등의 위장장애 환자, 11) 태반 기능 부전, 자간전증 및 자궁 내 성장 지연 위험이 있는 임신부(엔블로멧 서방정 0.3/1000mg에 한함) **【신중투여】** 1) 체역량 감소 및 신기능 장애가 있는 환자에서의 투여, 2) 심부전, 3) 유산산중과 저혈당 발생위험이 있는 환자, 4) 케톤산중, 5) 오로감염 및 생식기 감염, 6) 탈수를 일으킬 가능성이 있는 환자, 7) 간장애 환자(엔블로정 0.3mg에 한함) **【저장방법】** 기밀용기, 실온(1~30°C) 보관 **【사용기간】** 제조일로부터 24개월 **【포장 단위】** 엔블로 정 0.3mg: 30 정/상자(10정/PTPX3),56 정/상자(14정/PTPX4),30 정/병,300 정/병 엔블로멧 서방정 0.3/1000mg: 30정/병, 300정/병 [제조사/판매사] (주) 대웅제약/ 충청북도 청주시 흥덕구 오송읍 오송생명2로1

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Ref) 1) Kwak SH et al. *Diabetes Obes Metab.* 2023;10.1111/dom.15046.
2) Han KA et al. *Diabetes Metab J.* 2023;10.4093/dmj.2022.0315.



엔블로정 0.3mg
의약품통합정보시스템 QR코드



엔블로멧 서방정 0.3mg
의약품통합정보시스템 QR코드



MANAGE YOUR PATIENT WITH CRM BENEFIT

더 넓은 범위의 **당뇨병** 환자들을 위해
더 넓어진 CRM 혜택의 **자디앙[®]** 을
지금 고려해 주세요!¹⁻³

3P
MACE^{1*}

14%
vs. Placebo

HR 0.86
(95.02% CI 0.74, 0.99, P=0.04)

CV
Death¹

38%
vs. Placebo

HR 0.62
(95% CI 0.49, 0.77, P<0.001)

HbA1c^{2**}

1.35%
vs. Baseline

Kidney Disease
Progression
or CV Death³

36%
vs. Placebo

HR 0.64
(95% CI 0.54, 0.77)

※ HCP 대상으로 제작된 홍보물이며 가공 또는 복사 및 배포를 금합니다.

※ 자디앙[®]의 만성 심부전, 만성 콩팥병의 적응증은 10mg에 한합니다.

※ 자디앙[®]은 제2형 당뇨병 환자의 심혈관계 사망 및 주요 심혈관질환의 위험 감소를 목적으로 국내에서 승인받지 않았습니다.

*Pooled empagliflozin group (empagliflozin 10mg and 25mg) Change from baseline in HbA1c at week 24 in empagliflozin 10mg q.d.

3P-MACE, 3-point major adverse cardiovascular event; CI, confidence interval; CRM, cardio-renal metabolic; CV, cardiovascular; HbA1c, glycated hemoglobin; HR, hazard ratio; q.d., once daily.

References 1. Zinman B, et al. *N Engl J Med*. 2015;373(22):2117-2128 and supplementary data. 2. Hadjadj S, et al. *Diabetes Care*. 2016;39:1718-1728. 3. Herrington WG, et al. *N Engl J Med*. 2023;388(2):117-127.

Product Information

※ 제품에 대한 자세한 사항은 QR 코드로 연결되는 허가사항을 통해 확인 부탁드립니다.

자디앙 경 10mg



자디앙 경 25mg



에스글리토 경 10/5mg



에스글리토 경 25/5mg



자디앙듀오 경 5/500mg



자디앙듀오 경 5/850mg



자디앙듀오 경 5/1000mg



자디앙듀오 경 12.5/500mg



자디앙듀오 경 12.5/850mg



자디앙듀오 경 12.5/1000mg



Welcome Message for ICOMES 2024

Dear Esteemed Colleagues,

We are pleased to welcome you to the **International Congress on Obesity and Metabolic Syndrome 2024 (ICOMES 2024)**, themed **'Integrating Cutting-Edge Insights in Obesity Management.'** The conference will take place from September 5 (Thursday) to September 7 (Saturday), 2024, at the CONRAD Seoul, Korea.

Held annually, ICOMES gathers professionals from diverse fields to develop comprehensive strategies for diagnosing and treating obesity, aiming to improve the quality of life for those affected. Over the past decade, ICOMES has grown into one of Asia's largest obesity-focused conferences, striving to lead the region and influence the global community.

Thanks to your steadfast support, the Scientific Committee has worked diligently to develop a scientific program developing an **'Integrating Cutting-Edge Insights'** encompassing the latest research in obesity management.

This year, we are honored to introduce a distinguished group of Plenary & Keynote Lecture speakers who will share their invaluable expertise: Joel K. Elmquist (USA), William Evans (USA), Jean-Pierre Després (Canada), Michael A. Nauck (Germany), Michael D. Jensen (USA), W. Timothy Garvey (USA).

We hope all participants will deepen their knowledge of obesity understanding and treatment through engaging discussions with distinguished speakers and fellow colleagues.

ICOMES serves as a vital platform to shape a brighter future for patients worldwide. We encourage you to actively engage, network, and spark transformative discussions that will drive significant advancements in obesity-related research and patient care.

We eagerly anticipate your active participation and presence at ICOMES 2024.

Thank you.

Sincerely,

 *Sung- Rae Kim*
Sung-Rae Kim
Korean Society for the Study of Obesity

 *Cheol- Young Park*
Cheol-Young Park
Korean Society for the Study of Obesity

Organization

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Organization

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	Jae Hyun Kim	Seoul National University	Pediatrics
	Min Chul Lee	CHA University	Sports Medicine
Sewon Lee	Incheon National University	Sport Science	

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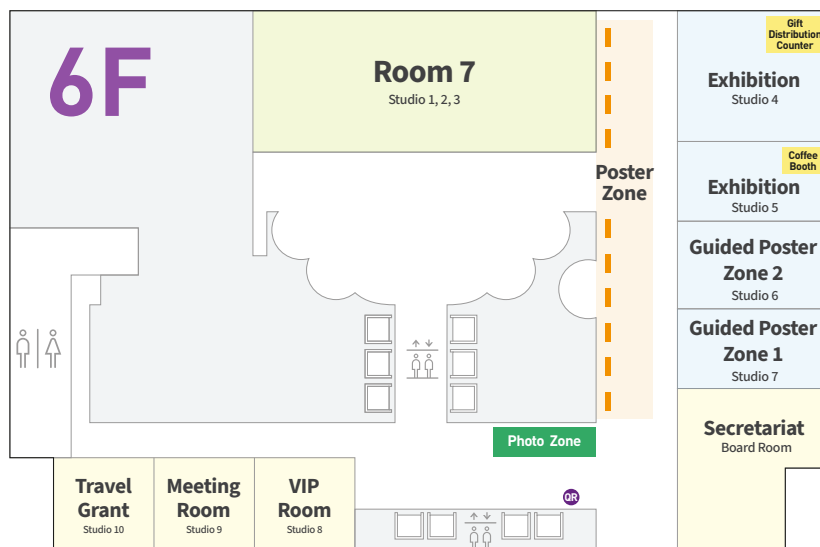
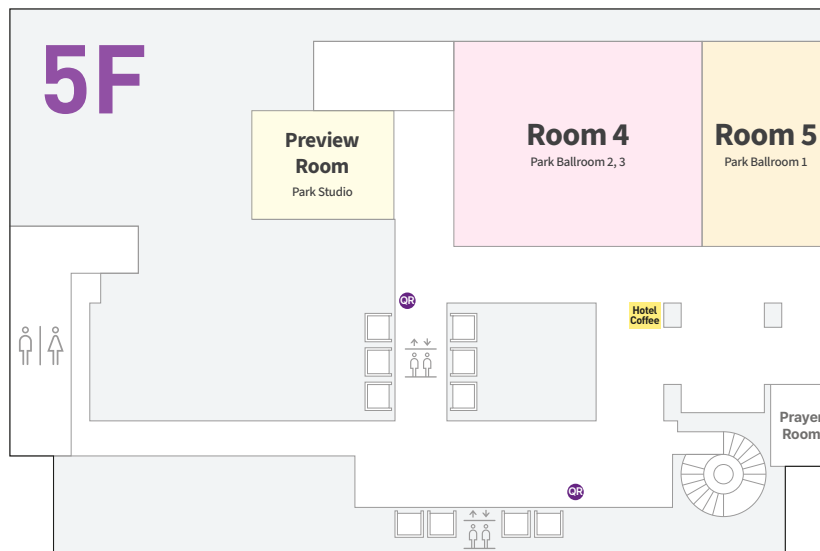
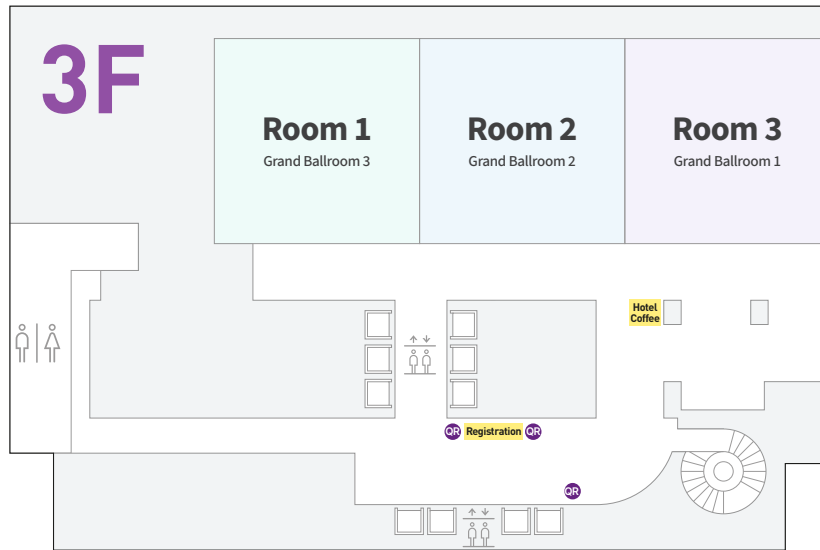
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Poster Exhibition 341

Floor Plan



Time/Location	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 7
DAY 1 2024.9.5 (Thursday)							
15:00-16:30		Joint Symposium -JKT (Clinical) New Clinical Insights into the MASLD	Best Articles in JOMES (K)				
16:30-18:00	Symposium on Health Insurance Coverage for Obesity Treatment (K)	Joint Symposium -JKT (Basic) Novel Mechanisms and Therapeutic Approaches for MASLD	Joint Symposium KSSO-KSoLA-KDA (K)				
18:00-18:10	Break						
18:10-18:40	Satellite Symposium 1	Satellite Symposium 3					
18:40-19:10	Satellite Symposium 2	Special Session for Publication					
19:10-21:00			Welcome Reception				
DAY 2 2024.9.6 (Friday)							
07:30-08:20	Breakfast Symposium 1	Breakfast Symposium 2	Breakfast Symposium 3				
08:20-08:30	Break						
08:30-09:10	Keynote Lecture 1 SF-1 Targets in the Hypothalamus: Novel Pathways Regulating Energy Balance and Metabolism Joel K. Elmquist (UT Southwestern Medical Center, USA)						
09:10-09:20	Break						
09:20-10:50	Symposium 1 Precision Medicine for Obesity and Diabetes	Symposium 2 Gut, Brain, and Obesity	Symposium 3 Possibilities and Prospects of Digital Therapeutics for Metabolic Diseases	Symposium 4 International Collaboration 1	Sponsored Session 1 SELECT the Outcome Beyond Weight Loss		
10:50-11:00	Break						
11:00-11:10	Opening Ceremony						
11:10-11:50	Plenary Lecture 1 GLP-1 Based Therapy of Obesity Michael A. Nauck (Ruhr-University Bochum, Germany)						
11:50-12:00	Break						
12:00-12:50	Luncheon Symposium 1	Luncheon Symposium 2	Luncheon Symposium 3	Luncheon Symposium 4			
12:50-13:00	Break						
13:00-14:00	Special Scientific Lecture 1 Nutrients-Stimulated Hormone-Based Pharmacotherapy for the Treatment of Obesity: Sparks from the Pipeline! Ania Jastreboff (Yale University, USA)			Oral presentation 1	Oral presentation 2	Guided Poster Presentation 1	
14:00-15:30	Symposium 5 Current Perspectives on Health Inequity in Obesity	Symposium 6 Holistic Approach to Obesity Management: Exploring Exercise, Metabolism, and Muscle Health	Symposium 7 Lipid Remodeling and Adipocyte Biology in Metabolic Health and Disease	Symposium 8 Medical Condition Change After Bariatric Surgery	Sponsored Session 2 Obesity Management with Combination Phentermine Plus Topiramate from Strategy to Practice		
15:30-15:40	Break						
15:40-16:20	Plenary Lecture 2 Management of Youth Type 2 Diabetes: New Pharmacotherapeutic Modalities Silva Arslanian (University of Pittsburgh, USA)						
16:20-16:30	Break						
16:30-18:00	Symposium 9 Obesity and Cardiovascular Health	Symposium 10 Obesity and Cancer	Symposium 11 Perspectives in Digital Nutrition Care for Obesity	Symposium 12 Childhood Obesity is a Chronic Disease Demanding Specific Health Care	Joint Symposium KSSO-EASO Comprehensive Approaches to Understanding and Managing Obesity and Related Metabolic Health Issues		
18:00-18:05	Break						
18:05-18:40	EASO Presidential Lecture Management of Obesity in Older Adults Volkan Yumuk (Istanbul University-Cerrahpaşa, Turkey)						
18:40~							Congress Banquet *Invited Only

Time/Location	Room 1	Room 2	Room 3	Room 4	Room 5	Room 6	Room 7
DAY 3							
2024.9.7 (Saturday)							
07:30-08:20	Breakfast Symposium 4	Breakfast Symposium 5	Breakfast Symposium 6				
08:20-08:30	Break						
08:30-09:10	Keynote Lecture 2 Cardiometabolic Health: Importance of Lifestyle Vital Signs Jean-Pierre Després (VITAM - Research Centre on Sustainable Health, Canada)						
09:10-09:20	Break						
09:20-10:50	Symposium 13 Obesity Related Comorbidity-Fatty Liver	Symposium 14 Understanding Aging Skeletal Muscle and Dynamics	Symposium 15 Diet Quality and Weight Regulation	Symposium 16 International Collaboration 2	Sponsored Session 3 Exploring the CGM Use for Wellness Beyond Glycemic Control-Potential and Worries		
10:50-11:00	Break						
11:00-11:40	Presidential Lecture Obesity and Fatty Liver: Common but Ignored Cheol-Young Park (Sungkyunkwan University, Korea)						
11:40-11:50	Break						
11:50-12:40	Luncheon Symposium 5	Luncheon Symposium 6	Luncheon Symposium 7	Luncheon Symposium 8			
11:40-11:50	Break						
12:50-13:50	Special Scientific Lecture 2 Clinical Implication of GLP-1 Receptor Agonists and SGLT2 Inhibitors from a Cardiometabolic Perspective Soo Lim (Seoul National University, Korea)			Oral Presentation 3	Oral Presentation 4	Guided Poster Presentation 2	
13:50-14:30	Plenary Lecture 3 How Muscle Mass and Metabolism Affects Energy Metabolism and Functional Capacity William Evans (University of California, Berkeley, USA)						
14:30-15:10	Keynote Lecture 3 Human Adipose Tissue Metabolism: What Happens with Obesity Michael D. Jensen (Mayo College of Medicine, USA)						
15:10-15:20	Break						
15:20-16:50	Symposium 17 Incretin Therapy from MARS, Bariatric Surgery from VENUS	Symposium 18 Cracking the Neural Code: Understanding Obesity through the Hypothalamus, Brain Stem, and Vagus Pathways	Symposium 19 Expanding Horizons in Pediatric Obesity	Symposium 20 Exercise and Cardiometabolic Dysfunction	Joint Symposium KSSO-TOS Real Word Experience of Anti-Obesity Medications		
16:50-17:00	Break						
17:00-17:40	Plenary Lecture 4 Current and Future Second-Generation Medications for Adiposity-Based Chronic Disease: an Era of Drug Discovery that Constitutes a Landmar in the History of Medicine W. Timothy Garvey (University of Alabama at Birmingham, USA)						
17:40-18:00	Closing & Award Ceremony						

ICOMES 2024

International Congress on Obesity and Metabolic Syndrome hosted by KSSO

Integrating Cutting-Edge Insights in Obesity Management

DAY 1

September 5, Thursday

Joint Symposium -JKT (Clinical)

New Clinical Insights into the MASLD

Chairpersons

Kyoung-Kon Kim

Gachon University, Korea

Wen-Yuan Lin

China Medical University, Taiwan

Speakers

Jae Seung Lee

Yonsei University, Korea

Chun-Jen Liu

National Taiwan University, Taiwan

Masato Furuhashi

Sapporo Medical University, Japan



Jae Seung Lee

Yonsei University, Korea

• Education

Period	Affiliation	Position
– 2018-2024	Department of Medicine, The Graduate School, Yonsei University, Seoul, Korea	Ph.D.
– 2004-2010	Yonsei University College of Medicine, Seoul, Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	Department of Internal Medicine, Severance Hospital	Clinical Assistant Professor
– 2014-2020	Department of Internal Medicine, Severance Hospital	Residency and Fellowship
– 2011-2014	Republic of Korea Army (ROKA), Korea	Military Medical Officer
– 2010-2011	Severance Hospital, Yonsei University College of Medicine	Internship

• Committee Memberships

- The Academic Committee of the KASL
- The Research Committee of the KASL
- The Publication Committee of the Korean Association of Clinical Ultrasound
- The Multidisciplinary Committee of the Korean Liver Transplantation Society

• Publications

- Lee JS, Jung CY, Lee JI, Ahn SH, Kim BS, Kim SU. Comparison of decline in renal function between patients with chronic hepatitis B with or without antiviral therapy. *Aliment Pharmacol Ther.* 2023 Jul;58(1):99-109. doi: 10.1111/apt.17532. Epub 2023 Apr 28. PMID: 37114501
- Lee JS, Lee HW, Kim BK, Park JY, Kim DY, Ahn SH, Jang JY, Park SY, Lee HW, Lee CK, Kim SU. Comparison of FibroScan-Aspartate Aminotransferase (FAST) Score and Other Non-invasive Surrogates in Predicting High-Risk Non-alcoholic Steatohepatitis Criteria. *Front Med (Lausanne).* 2022 Apr 14;9:869190. doi: 10.3389/fmed.2022.869190. PMID: 35492369; PMCID: PMC9048204
- Lee JS, Lee HW, Lim TS, Min IK, Lee HW, Kim SU, Park JY, Kim DY, Ahn SH, Kim BK. External Validation of the FSAC Model Using On-Therapy Changes in Noninvasive Fibrosis Markers in Patients with Chronic Hepatitis B: A Multicenter Study. *Cancers (Basel).* 2022 Jan 29;14(3):711. doi: 10.3390/cancers14030711. PMID: 35158982; PMCID: PMC8833581
- Lee JS, Sinn DH, Park SY, Shin HJ, Lee HW, Kim BK, Park JY, Kim DY, Ahn SH, Oh JH, Lee JI, Kim SU. Liver Stiffness-Based Risk Prediction Model for Hepatocellular Carcinoma in Patients with Nonalcoholic Fatty Liver Disease. *Cancers (Basel).* 2021 Sep 11;13(18):4567. doi: 10.3390/cancers13184567. PMID: 34572795; PMCID: PMC8472221
- Baatarkhuu O, Lee JS (Co-primary), Amarsanaa J, Kim DY, Ahn SH, Naranzul N, Enkhtuya D, Choijamts N, Batbayar P, Otgonbayar R, Saruul BU, Gantuul C, Gegeebadrakh B, Tuvshinbayar N, Badamsuren D, Ulzmaa G, Otgonbold J, Han KH. Efficacy and safety of ledipasvir/sofosbuvir in 5,028 Mongolian patients infected with genotype 1 hepatitis C virus: A multicenter study. *Clin Mol Hepatol.* 2021 Jan;27(1):125-135

Joint Symposium-JKT (Clinical)

Noninvasive Approaches to Monitor Liver Fibrosis in Metabolic-Associated Steatotic Liver Disease

Jae Seung Lee (Yonsei University, Korea)

Metabolic dysfunction-associated steatotic liver disease (MASLD), previously known as nonalcoholic fatty liver disease (NAFLD), is one of the most prevalent causes of chronic liver disease. MASLD covers a spectrum ranging from simple steatosis without inflammation to more severe conditions like steatohepatitis, fibrosis, cirrhosis, and, ultimately, end-stage liver disease. Approximately 25–40% of patients with MAFLD progress to metabolic dysfunction-associated steatohepatitis (MASH), a more severe form characterized by aggressive histological features, including necroinflammatory activity, which increases the risk of liver fibrosis. Identifying patients with advanced inflammation and significant fibrosis is crucial, given their higher risk of progressing to cirrhosis and hepatocellular carcinoma.

Currently, liver biopsy is considered the gold standard for evaluating the severity of steatohepatitis, usually quantified by the NAFLD activity score (NAS), which includes histological assessments of steatosis, ballooning, lobular inflammation, and fibrosis stages ranging from 0 to 4. However, liver biopsy is often impractical due to its invasive nature, cost, sampling errors, and variability between observers.

Consequently, there has been a significant effort to develop noninvasive methods to estimate the histological grade of steatosis, inflammation, and fibrosis using blood-based markers, laboratory test-based scoring systems, and imaging techniques like vibration-controlled transient elastography (VCTE) and magnetic resonance imaging (MRI). Ongoing research aims to determine the superiority of specific tests or to optimize sequential algorithms that provide the most accurate assessment of fibrosis staging.

This lecture will review the currently available noninvasive methods for assessing liver fibrosis.



Chun-Jen Liu

National Taiwan University, Taiwan

• Education

Period	Affiliation	Position
– 2003	Graduate Institute of Clinical Medicine, National Taiwan University College of Medicine	Ph.D.
– 1992	Medicine, National Taiwan University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Division of Gastroenterology & Hepatology (NTUH)	Director
– 2019	Hepatitis Research Center (NTUH)	Director
– 2018	Department of Internal Medicine, National Taiwan University College of Medicine	Professor
– 2011	Graduate Institute of Clinical Medicine, National Taiwan University College of Medicine	Professor

• Committee Memberships

- Taiwan Association for the Study of the Liver (TASL)

• Publications

- Liu CJ, Chuang WL, Sheen IS, Wang HY, Chen CY, Tseng KC, Chang TT, Massetto B, Yang JC, Yun C, Knox SJ, Osinusi A, Camus G, Jiang D, Brainard DM, McHutchison JG, Hu TH, Hsu YC, Lo GH, Chu CJ, Chen JJ, Peng CY, Chien RN, Chen PJ. Efficacy of ledipasvir and Sofosbuvir Treatment of HCV Infection in Patients Coinfected with HBV. *Gastroenterology* 2018;154:989-997
- Liu CJ, Chuang WL, Lee CM, Yu ML, Lu SN, Wu SS, Liao LY, Chen CL, Kuo HT, Chao YC, Tung SY, Yang SS, Kao JH, Liu CH, Su WW, Lin CL, Jeng YM, Chen PJ, Chen DS. Peginterferon alfa-2a plus ribavirin for the treatment of dual chronic infection with hepatitis C and B viruses. *Gastroenterology* 2009;136:496-504
- Liu CJ, Lee PH, Lin DY, Wu CC, Jeng LB, Lin PW, Mok KT, Lee WC, Yeh HZ, Ho MC, Yang SS, Lee CC, Yu MC, Hu RH, Peng CY, Lai KL, Chang SC, Chen PJ. Heparanase inhibitor PI-88 as adjuvant therapy for hepatocellular carcinoma after curative resection: A randomized phase II trial for safety and dose-finding. *J Hepatol* 2009;50:958-968
- Liu CJ, Lo SC, Kao JH, Tseng PT, Lai MY, Ni YH, Yeh SH, Chen PJ, Chen DS. Transmission of occult hepatitis B virus by transfusion to adult and pediatric recipients in Taiwan. *J Hepatol* 2006;44:39-46
- Liu CJ, Chen PJ, Lai MY, Kao JH, Chang CF, Wu HL, Shau WY, Chen DS. A prospective study characterizing full-length hepatitis B virus genomes during acute exacerbation. *Gastroenterology* 2003;124:80-90

Joint Symposium-JKT (Clinical)

Effects of Exercise Intervention in Subjects with Steatotic Liver Disease

Chun-Jen Liu (National Taiwan University, Taiwan)

The objective of this trial was to compare cardiorespiratory fitness and metabolic parameters between individuals diagnosed with metabolic dysfunction-associated steatotic liver disease (MASLD) and matched controls, and to examine the effect of exercise intervention on cardiorespiratory fitness and metabolic derangement. Methods: Individuals diagnosed with MASLD and age-, sex-, body mass index (BMI)-matched healthy volunteers were assessed through cardiopulmonary exercise testing (CPET), biochemical analyses, body composition assessments, and exercise habit surveys. Results: The study included 24 individuals with MASLD (mean age: 45.8 years, standard deviation [SD]: 8.9) and 12 matched controls (mean age: 45.4 years, SD: 6.2). Individuals with MASLD displayed more severe liver steatosis, higher triglyceride levels, worse glycemic profiles, and larger waist circumference compared to the controls (all $p < 0.05$). They also showed significantly lower cardiorespiratory performance compared to the controls. Multiple regression analysis identified MASLD was an independent predictor of diminished cardiorespiratory fitness. After 24-week exercise, metabolic derangements improved; and cardiorespiratory fitness also improved. Conclusions: Individuals with MASLD exhibited lower cardiorespiratory fitness and poorer metabolic profiles. Exercise improved cardiorespiratory performance.



Masato Furuhashi

Sapporo Medical University, Japan

• Education

Period	Affiliation	Position
– 2002	Sapporo Medical University	Ph.D.
– 1995	Sapporo Medical University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-Present	Sapporo Medical University	Professor
– 2015	Sapporo Medical University	Assistant Professor
– 2013	Sapporo Medical University	Instructor
– 2004	Harvard School of Public Health	Postdoctoral Fellow
– 1995	Sapporo Medical University	M.D.

• Committee Memberships

- Japanese Society of Internal Medicine
- Japan Society for the Study of Obesity
- Japan Diabetes Society
- Japan Endocrine Society
- American Heart Association

• Publications

- Furuhashi M. *J Atheroscler Thromb* 26: 216-232, 2019
- Furuhashi M, et al. *Arterioscler Thromb Vasc Biol* 36: 825-834, 2016
- Furuhashi M, et al. *Nat Rev Drug Discov* 7: 489-503, 2008
- Furuhashi M, et al. *J Clin Invest* 118: 2640-2650, 2008
- Furuhashi M, et al. *Nature* 447: 959-965, 2007

Joint Symposium-JKT (Clinical)

MASLD and Cardio-Renal-Metabolic Syndrome

Masato Furuhashi (Sapporo Medical University, Japan)

New nomenclature of steatotic liver disease (SLD) including metabolic dysfunction-associated SLD (MASLD), MASLD and increased alcohol intake (MetALD), and alcohol-associated liver disease (ALD) has recently been proposed. We investigated the interrelationships among the new nomenclature of SLDs including MASLD, MetALD and ALD as well as the former nomenclature of nonalcoholic fatty liver disease (NAFLD) and metabolic dysfunction-associated fatty liver disease (MAFLD) and explored patient populations categorized within each classification using machine learning (ML) models (*J Gastroenterol Hepatol* 2024). In Japanese individuals who received annual health checkups including abdominal ultrasonography (n=15,788, men/women: 10,250/5,538, mean age: 49 years), the numbers of individuals with SLD, MASLD, MetALD, ALD, NAFLD and MAFLD were 5,603 (35.5%), 4,227 (26.8%), 795 (5.0%), 324 (2.1%), 3,982 (25.8%) and 4,946 (31.3%), respectively. Clustering analyses using t-distributed stochastic neighbor embedding and K-Means to visually represent interconnections in SLDs uncovered 5 cluster formations. MASLD and NAFLD mainly shared 3 clusters including 1) low alcohol intake with relatively low-grade obesity, 2) obesity with dyslipidemia and 3) dysfunction of glucose metabolism. Both MetALD and ALD displayed one distinct cluster intertwined with alcohol consumption. MAFLD widely shared all of the 5 clusters. In ML-based analyses using algorithms of random forest and extreme gradient boosting and receiver operating characteristic curve analyses, fatty liver index (FLI), calculated by body mass index, waist circumference and levels of γ -glutamyl transferase and triglycerides, was selected as a useful feature for SLDs. Next, we showed the associations of SLDs with an increase in blood pressure (*Hypertens Res* 2023) and the development of chronic kidney disease (CKD) (*Nephrol Dial Transplant* 2023, *Hepatol Res* 2024) and ischemic heart disease (IHD) (*J Am Heart Assoc* 2023). Furthermore, we investigated the relationships of FLI with the development of several diseases and showed that a high level of FLI was an independent predictor for new onset of diabetes mellitus (*Sci Rep* 2021), hypertension (*J Am Heart Assoc* 2021), CKD (*Sci Rep* 2021) and IHD (*Hepatol Res* 2022) during a 10-year follow-up period as well as the validation of FLI in Japan (*Endocr J* 2022). Moreover, ML models incorporating hemoglobin A1c and FLI provided an accurate and straightforward approach for predicting the development of diabetes mellitus (*Diabet Epidemiol Manag* 2024). In addition, the development of hypertension can be simply and accurately predicted by ML models using systolic blood pressure, age and FLI as selected features (*Clin Exp Hypertens* 2024). Lastly, as a possible target for the novel therapy of MASLD, we introduce fatty acid-binding protein 4 (FABP4) (*Nature* 2007, *J Diabetes Investig* 2022), which is mainly expressed in adipocytes and macrophages and acts as an adipokine (*Nat Rev Drug Discov* 2008, *J Atheroscler Thromb* 2019).

Best Articles in JOMES (K)

Chairpersons

You-Cheol Hwang

Kyung Hee University, Korea

Yong-Ho Lee

Yonsei University, Korea

Speakers

Su-Min Jeong

Seoul National University, Korea

Jung Eun Lee

Seoul National University, Korea

Yun-A Shin

Dankook University, Korea

Jieun Lee

Inje University, Korea



Su-Min Jeong

Seoul National University, Korea

• Education

Period	Affiliation	Position
- 2022	Dept. of Family Medicine, Graduate School of Medicine, Seoul National University	Ph.D.
- 2017		M.S.
- 2011	Dept. of Clinical Medical Sciences, Graduate School of Medicine, Seoul National University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2022-Present	Department of Medicine, Seoul National University College of Medicine Department of Family Medicine, Seoul National University Health Service Center	Assistant Professor
- 2021-2022	Department of Family Medicine, Seoul National University Hospital Dept. of Family Medicine, Samsung Medical Center	Clinical Assistant Professor
- 2019-2021	Department of Family Medicine, Seoul Metropolitan Government-Seoul National University Boramae Medical Center	Clinical Assistant Professor
- 2018-2020	Dept. of Nutrition, Harvard T.H. Chan School of Public Health	Visiting Scientist

• Committee Memberships

- Secretary of Committee of Big Data

• Publications

- 2023 Obesity Fact Sheet: Prevalence of Obesity and Abdominal Obesity in Adults, Adolescents, and Children in Korea from 2012 to 2021
- Association between breakfast frequency and metabolic syndrome among young adults in South Korea
- Smoking behavior change and risk of cardiovascular disease incidence and mortality in patients with type 2 diabetes mellitus
- Different correlation of body mass index with body fatness and obesity-related biomarker according to age, sex and race-ethnicity
- Associations of reproductive factors with incidence of myocardial infarction and ischemic stroke in postmenopausal women: a cohort study

Best Articles in JOMES (K)

2023 Obesity Fact Sheet: Prevalence of Obesity and Abdominal Obesity in Adults, Adolescents, and Children in Korea from 2012 to 2021

Su-Min Jeong (Seoul National University, Korea)

The Obesity Fact Sheet, published annually by the Korean Society for the Study of Obesity since 2015, aims to enhance understanding of the domestic obesity situation using the most up-to-date data, presented in infographic form. The 2023 Obesity Fact Sheet was published to present the trend of obesity prevalence across all age groups to date. Based on the 2023 Fact Sheet, the article titled "2023 Obesity Fact Sheet: Prevalence of Obesity and Abdominal Obesity in Adults, Adolescents, and Children in Korea from 2012 to 2021" was published in JOMES last year.

To determine the obesity prevalence among adults aged 20 and older, data from the National Health Insurance Service's national health examinations from 2012 to 2021 were included. For assessing obesity prevalence among children and adolescents aged 6-19, data from the Korea National Health and Nutrition Examination Survey (2012-2021) were used. Childhood and adolescent obesity were defined as having a body mass index (BMI) at or above the 95th percentile adjusted for sex and age based on the 2017 growth chart for children and adolescents.

In 2021, the overall obesity prevalence among adults was 38.4% (49.2% for men and 27.8% for women), an increase of 1.27 times from 30.2% in 2012. The prevalence of severe obesity (BMI ≥ 35 kg/m²) showed a notable increase, rising from 0.35% to 1.21% in men (3.46 times increase) and from 0.42% to 0.97% in women (2.31 times increase) between 2012 and 2021. Severe obesity prevalence increased sharply, particularly among young adults. Similarly, the obesity prevalence among children and adolescents rose from 9.7% in 2012 to 19.3% in 2021, with a marked increase especially among boys.

In this '2023 Obesity Fact Sheet: Prevalence of Obesity and Abdominal Obesity in Adults, Adolescents, and Children in Korea from 2012 to 2021, we will review the latest obesity trends based on the recently published 2023 Obesity Fact Sheet, discuss the causes of the increasing obesity prevalence, and explore potential ways to improve increasing obesity prevalence.



Jung Eun Lee

Seoul National University, Korea

• Education

Period	Affiliation	Position
– 2005	Harvard T. H. Chan School of Public Health Nutrition and Epidemiology	D.Sc.
– 2005	Harvard T. H. Chan School of Public Health Epidemiology	M.S
– 2000	Seoul National University Food and Nutrition	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	Seoul National University	Professor
– 2016-2020	Seoul National University	Associate Professor
– 2010-2016	Sookmyung Women's University	Assistant/ Associate Professor
– 2009-2010	Brigham and Women's Hospital	Associate Epidemiologist
– 2009-2010	Harvard Medical School	Instructor

• Committee Memberships

- Director of the Korean Cancer Association
- Director of Academic Nutrition, Korean Obesity Society

• Publications

- Provideo SMP, Abris GP, Lee H, Okekunle AP, Gironella GM, Capanzana MV, Chung GH, Hong S, Yu SH, Lee CB, Lee JE. Comparison of cardiovascular disease risk factors among FILWHEL (2014-2016), NNS (2013) and KNHANES (2013-2015) women. *BMC Womens Health*. 2023 Mar 30;23(1):149
- Jin T, Kang G, Song S, Lee H, Chen Y, Kim SE, Shin MS, Park YH, Lee JE. The effects of dietary self-monitoring intervention on anthropometric and metabolic changes via a mobile application or paper-based diary: a randomized trial. *Nutr Res Pract*. 2023 Dec;17(6):1238-1254
- Okekunle AP, Youn J, Song S, Chung GE, Yang SY, Kim YS, Lee JE. Predicted pro-inflammatory hs-CRP score and non-alcoholic fatty liver disease. *Gastroenterol Rep (Oxf)*. 2023 Oct 11;11:goad059
- Kim HS, Lee H, Provideo SMP, Chung GH, Hong S, Yu SH, Lee JE, Lee CB. Association between Sleep Duration and Metabolic Disorders among Filipino Immigrant Women: The Filipino Women's Diet and Health Study (FILWHEL). *J Obes Metab Syndr*. 2023 Sep 30;32(3):224-235
- Lee H, Kim H, Provideo SMP, Kang M, Chung GH, Lee JW, Hong S, Yu SH, Lee CB, Lee JE.
- Associations of Dietary Intakes of Total and Specific Types of Fat with Blood Lipid Levels in the Filipino Women's Diet and Health Study (FILWHEL). *Glob Heart*. 2023 Jun 12;18(1):29

Best Articles in JOMES (K)

Association between Sleep Duration and Metabolic Disorders among Filipino Immigrant Women: The Filipino Women's Diet and Health Study (FiLWHEL)

Jung Eun Lee (Seoul National University, Korea)

Background Sleep plays a complex role in metabolic regulation, and the underlying linkage has not been clearly defined. We investigated the association between sleep duration and metabolic disorders in Filipino immigrants in Korea.

Methods We analyzed 410 participants from the 2014 to 2016 baseline population of the Filipino Women's Diet and Health Study. Usual sleep duration was self-reported, and anthropometric parameters were measured directly. Blood glucose, lipid, and insulin levels were examined from fasting serum samples. We used general linear models to acquire least squares (LS) means and logistic regression models to calculate odds ratios to test the cross-sectional association between sleep duration and metabolic markers with 95% confidence intervals (CIs).

Results We found a statistically significant linear association between increased sleep duration and elevated triglycerides, total cholesterol, and low-density lipoprotein cholesterol (LDL-C). LS means (95% CI) of <5, 5–6, 7–8, and >8 hours of sleep were 81.74 (71.43 to 93.54), 85.15 (76.65 to 94.59), 86.33 (77.84 to 95.75), and 105.22 (88.07 to 125.71), respectively, for triglycerides (P trend=0.049) and 174.52 (165.02 to 184.57), 180.50 (172.79 to 188.55), 182.51 (174.83 to 190.53), and 190.16 (176.61 to 204.74), respectively, for total cholesterol (P trend= 0.042). For LDL-C, the LS means (95% CI) were 97.34 (88.80 to 106.71), 100.69 (93.73 to 108.18), 104.47 (97.35 to 112.10), and 109.43 (96.94 to 123.54), respectively (P trend=0.047). Statistical significance persisted after additional adjustment for body mass index. The association with triglycerides was limited to current alcohol drinkers (P interaction=0.048).

Conclusion Longer sleep duration was associated with increased triglyceride, total cholesterol, and LDL-C levels. The association with triglycerides was more pronounced among moderate alcohol drinkers.



Yun-A Shin

Dankook University, Korea

• Education

Period	Affiliation	Position
– 2003-2008	Seoul National University, Graduate School of Physical Education, Exercise Physiology major	Doctorate
– 1990-1996	Ewha Womans University, Department of Sports Science	B.A., M.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	NSCA-Korea / Korea Coaching Association Chungnam Center	President
– 2020-Present	Korean Society for The Study of Obesity/ Korean Academy of Kinesiology	Vice President
– 2008-Present	Dankook University, Department of Exercise Prescription and Rehabilitation	Professor

• Committee Memberships

- National Research Foundation of Korea

• Publications

- Physical Activity Time is the most important of Mortality Risk Reduction in Middle Aged. Yun-A Shin *et al.*(2022). The Society for Transdisciplinary Studies
- The Effects of Obesity and Physical Activity on Dyslipidemia in Persons with Type 2 Diabetes. Yun-A Shin *et al.* (2022). Korean Academy of Kinesiology
- Moderate-Intensity Exercise Preserves Bone Mineral Density and Improves Femoral Trabecular Bone Microarchitecture in Middle-Aged Mice. SY Lee, YA Shin *et al.* (2022). Korean Society for Bone and Mineral Research
- Grip Strength Measurement in the Right Hand Better Predicts Mortality Regardless of Dominant Hand. YA Shin *et al.* (2021). Exercise Science
- Trabecular bone microarchitecture improvement is associated with skeletal nerve increase following aerobic exercise training in middle-aged mice. SY Lee, YA Shin *et al.* (2021). Frontiers

Best Articles in JOMES (K)

Effects of Cardiorespiratory Fitness on Cardiovascular Disease Risk Factors and Telomere Length by Age and Obesity

Yun-A Shin (Dankook University, Korea)

Background: This study investigates differences in telomere length according to obesity, cardiovascular disease (CVD) risk factors, and fitness level in South Korean males.

Methods: The subjects of this study were males in their 10s to 50s (n=249). We measured obesity indices, CVD risk factors, leukocyte telomere length (LTL), and cardiorespiratory fitness (CRF). Correlation and regression analyses were performed to analyze the data.

Results: Measurement of participants' obesity indices, CVD risk factors, and maximum oxygen intake and analysis of their correlations with LTL revealed that LTL and CRF decreased with age and the levels and numbers of obesity indices and CVD risk factors increased. The LTL showed differences in whether subjects exhibited obesity or dyslipidemia and by CRF level. When all the variables that influence the LTL were adjusted, the LTL became shorter as the age and low-density lipoprotein cholesterol (LDL-C) level increased, and it became longer as the maximum rate of oxygen utilization (VO₂ max) increased. When the age and CVD risk factors influencing the LTL were adjusted according to obesity and CRF for the obese group, the LTL became shorter as the age and LDL-C level increased (P<0.01).

Conclusion: We found that obesity influenced the LTL by increasing the levels of CVD risk factors and decreasing CRF, whereas maintaining high CRF could alleviate the effects of obesity and CVD risk factors according to age while maintaining and influencing the elongation of LTL.

Keywords: Obesity, Cardiovascular disease risk factors, Cardiorespiratory fitness, Male, Telomere length, Age, Disease



Jieun Lee

Inje University, Korea

• Education

Period	Affiliation	Position
– 2018-Present	Seoul National University College of Medicine	Ph.D.
– 2011-2013	Seoul National University College of Medicine	M.A.
– 1999-2005	Seoul National University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2017-Present	Inje University Ilsan Paik Hospital	Assistant professor
– 2012-2013	Seoul National University Children's Hospital	Clinical Fellow
– 2008-2012	Seoul National University Children's Hospital	Resident
– 2005-2006	Seoul National University Hospital	Intern

• Committee Memberships

- Korean Pediatric Society
- Korean Society of Pediatric Endocrinology
- Asia Pacific Paediatric Endocrine Society
- Korean Diabetes Association
- International Society for Pediatric and Adolescent Diabetes

• Publications

- Temporal trends of the prevalence of abdominal obesity and metabolic syndrome in Korean children and adolescents between 2007-2020. *J Obes Metab Syndr* 2023;32(2):170-178
- Comparison of Lipid-Derived Markers for Metabolic Syndrome in Youth: Triglyceride/HDL Cholesterol Ratio, Triglyceride-Glucose Index, and non-HDL Cholesterol. *Tohoku J Exp Med*. 2022 Jan;256(1):53-62
- Endocrine comorbidities of pediatric obesity. *Clin Exp Pediatr*. 2021 Dec;64(12):619-627
- Diabetes in Adolescence, Appropriate Transition to Adult Clinic. *J Korean Diabetes* 2021;22(2):77-84

Best Articles in JOMES (K)

Temporal Trends of the Prevalence of Abdominal Obesity and Metabolic Syndrome in Korean Children and Adolescents between 2007 and 2020

Jieun Lee (Inje University, Korea)

Introduction

Background

- Increasing prevalence of obesity in children and adolescents worldwide
- Obesity can lead to complications such as metabolic syndrome (MS), a risk factor for adult obesity and cardiovascular diseases
- Waist circumference (WC) and waist-height ratio (WHtR) are better indicators of abdominal obesity and MS compared to body mass index (BMI)

Objectives

- Investigate trends in the prevalence of abdominal obesity and MS in Korean children and adolescents
- Compare prevalence rates using two references:
 - REF2007: 2007 Korean National Growth Chart
 - REF2022: Newly published WC and WHtR reference values (2022)

Methods

- Data source: Korea National Health and Nutrition Examination Survey (KNHANES) from 2007 to 2020
- Participants:
 - 21,652 children aged 2 to 18 years for abdominal obesity analysis
 - 9,592 adolescents aged 10 to 18 years for MS analysis
- Measurements:
 - WC: measured at the midpoint between the lowest rib and the iliac crest
 - WHtR: calculated as WC divided by height
 - MS components: central obesity, hyperglycemia, hypertriglyceridemia, low HDL-C, elevated blood pressure

Key Results

- Trends in WC and WHtR
 - Both WC and WHtR showed an increasing trend over the years
 - Higher WC z-scores in girls; no significant sex difference in WHtR z-scores
- Prevalence of Abdominal obesity
 - Increased from 8.86% (REF2007) to 14.71% (REF2022)
- Prevalence of MS
 - National cholesterol education program (NCEP) definition: increased from 3.39% (REF2007) to 4.78% (REF2022)
 - International diabetes federation (IDF) definition: increased from 2.29% (REF2007) to 3.10% (REF2022)

Conclusion

- Increased in prevalence: both abdominal obesity and MS prevalence increased from 2007 to 2020
- Underestimation in previous reports: higher prevalence rates using REF2022 indicate that previous reports underestimated the true prevalence
- Future recommendations: ongoing monitoring and follow-up using REF2022 for accurate assessment and intervention

Joint Symposium KSSO-KSoLA-KDA (K)

Chairpersons

Soo Lim

Seoul National University, Korea

Woo Je Lee

University of Ulsan, Korea

Speakers

Seo Young Kang

Eulji University, Korea

Dong-Hyuk Cho

Korea University, Korea

Jae-Han Jeon

Kyungpook National University, Korea

Panel Discussion

Jong-Chan Youn

The Catholic University of Korea, Korea

Jun Sung Moon

Yeungnam University, Korea

Eun Young Lee

The Catholic University of Korea, Korea



Seo Young Kang

Eulji University, Korea

• Education

Period	Affiliation	Position
– 2020	University of Ulsan College of Medicine	Ph.D.
– 2017	University of Ulsan College of Medicine	M.M.
– 2013	Eulji University School of Medicine	B.M.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	International Healthcare Center, Uijeonbgu Eulji Medical Center	Director
– 2023-Present	Department of Family Medicine, Uijeonbgu Eulji Medical Center, Eulji University School of Medicine	Assistant Professor
– 2022-2023	International Healthcare Center, Asan Medical Center	Clinical Assistant Professor
– 2019-2022	International Healthcare Center, Asan Medical Center	Clinical Instructor
– 2017-2019	Department of Family Medicine, Asan Medical Center	Fellow
– 2014-2017	Department of Family Medicine, Asan Medical Center	Resident
– 2013-2014	Asan Medical Center	Intern

• Publications

- Kang SY. Nutrition counseling and tailored dietary intervention for patients with obesity. *Archives of Obesity and Metabolism* 2023;2(1):11-16
- Kang SY, Park HS. Gender differences in comorbidities and attitudes regarding weight control among young adults with obesity in Korea. *Obesity Facts* 2022;15(4):581-589
- Kang SY, Kim YS. Relationships between fasting glucose levels, lifestyle factors, and metabolic parameters in Korean adults without diabetes mellitus. *Journal of Diabetes* 2022;14(1):52-63
- Kang SY, Kim YJ, Jang W, Son KY, Park HS, Kim YS. Body mass index trajectories and the risk for Alzheimer’s disease among older adults. *Scientific Reports* 2021;11(1):3087
- Kang SY, Kim YJ, Park HS. Trends in the prevalence of non-alcoholic fatty liver disease and its future predictions in Korean men, 1998–2035. *J Clin Med* 2020;9(8):2626

Joint Symposium KSSO-KSoLA-KDA (K)

Interim Report for 2024 Update of Clinical Practice Guidelines for Obesity by the Korean Society for the Study of Obesity

Seo Young Kang (Eulji University, Korea)

A revised version of the Clinical Practice Guidelines for Obesity by the Korean Society for the Study of Obesity will be published at the end of 2024. In this session, the interim updates of this guideline will be discussed. The updated guideline consists of 15 sections including diagnosis of obesity, evaluation before obesity treatment, diet therapy, exercise therapy, behavioral therapy, pharmacotherapy, surgical therapy, obesity in older adults, obesity in children and adolescents, obesity in women, obesity in patients with psychiatric disorder, weight maintenance after weight reduction, metabolic syndrome, obesity treatment using information and communication technology (ICT) based intervention, and obesity-related health functional food.

For diagnosis of obesity, a statement regarding obesity diagnosis using body fat mass was added (Obesity can be diagnosed by measuring body fat mass, but additional data considering cost and utility are needed; C, Class III). Furthermore, a statement regarding applicability of diagnostic criteria for obesity among Asian population on Koreans was added (Diagnostic criteria for obesity based on BMI for Asians can be applied to Koreans; B, IIa).

In the previous diet therapy section, low calorie diet was introduced as one of the diet therapy options. In the updated version, low calorie diet was mentioned as a basis of weight reduction (Low-calorie diet is the basic diet for weight reduction, and very low calorie diet should be implemented under medical supervision; A, Class I). Furthermore, a statement regarding intermittent fasting was added (Intermittent fasting has a weight loss effect similar to that of a calorie-restricted diet, and its use for a certain period of time may be considered depending on individual's characteristics and medical conditions; A, Class IIb).

For pharmacotherapy of obesity, efficacy, safety, dosage, as well as major clinical trial results of Semaglutide were added. Heart failure was added to the table for selecting anti-obesity drugs according to comorbidities. In the surgical therapy section, the level of evidence and the grade of recommended were promoted to A, Class I from B, Class IIa for the statement "In patients with a BMI ≥ 35 kg/m² or patients with a BMI ≥ 30 kg/m² with obesity-related comorbidity, bariatric surgery is recommended when weight reduction fails with non-surgical treatment."

In obesity in children and adolescents section, face-to-face educational consultation with experts and family-centered comprehensive lifestyle modification were emphasized based on the 2023 guideline of American Academy of Pediatrics. In obesity treatment using ICT-based intervention section, a statement for pediatric patients were added (ICT-based interventions can be considered as part of a comprehensive strategy for weight reduction in obese children and adolescents; B, IIb).

In this revised version, a new section regarding obesity-related health functional food was added. In this section, mechanism for weight loss, efficacy, and safety of commonly used health functional foods including garcinia, conjugated linoleic acid, green tea and green tea extract, arginine, probiotics, caffeine, and chitosan were described. Due to the lack of firm evidence, the following two statements were made: 1) It is not recommended to use health functional foods for weight loss purposes for which the evidence is not clear (C, Class III), 2) It is not recommended to use health functional food combination therapy for the purpose of weight loss for which the evidence is not clear (C, Class III).



Dong-Hyuk Cho

Korea University, Korea

• Education

Period	Affiliation	Position
– 2015-2019	Korea University College of Medicine	Ph.D.
– 2010-2012	Korea University College of Medicine	M.S.
– 2001-2008	Korea University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-Present	Department of Cardiology, Korea University Anam Hospital, Seoul, Korea	Associate Professor
– 2022	Department of Cardiology, Yonsei University Wonju College of Medicine, Wonju, Gangwon, Korea	Associate Professor
– 2021-2022	Department of Cardiology, Yonsei University Wonju College of Medicine, Wonju, Gangwon, Korea	Assistant Professor
– 2020-2021	Department of Cardiology, Yonsei University Wonju College of Medicine, Wonju, Gangwon, Korea	Clinical Assistant Professor
– 2018-2020	Department of Cardiology, Korea University Anam Hospital, Seoul, Korea	Clinical Assistant Professor

• Committee Memberships

- The Korean Medical Association
- The Korean Association of Internal Medicine
- The Korean Society of Circulation
- The Korean Society of Echocardiography
- The Korean Society of Cardiometabolic Syndrome

• Publications

- Cho DH, Thom SR, Ko SM, Cha YS. Practical recommendations in the evaluation and management of cardiac injury of carbon monoxide poisoning. *JACC Heart Failure* 2024 (Accepted)
- Cho DH, Park SM. Epicardial Adipose Tissue and Heart Failure, Friend or Foe? *Diabetes & Metabolism Journal* 2024;48(3):373-384
- Cho DH, Son JW, Kim YI, Lim JH, Ko SM, Cha YS. Clinical and Echocardiographic Predictors for the Presence of Late Gadolinium Enhancement on Cardiac Magnetic Resonance Imaging in Patients with Carbon Monoxide Poisoning. *Diagnostics* 2024, 14(1), 60
- Cho JY, Cho DH, JC Youn, D Kim, BS Yoo, SM Kang. Korean Society of Heart Failure Guidelines for the Management of Heart Failure: Definition and Diagnosis. *Korean Circ J.* 2023 Apr;53(4):195-216
- Cho DH, Kim YG, Choi JM, Kim HD, Kim MN, Shim JM, Choi JI, Kim YH, Shim WJ, Park SM, Atrial Cardiomyopathy with Impaired Functional Reserve in Patients with Paroxysmal Atrial Fibrillation. *J Am Soc Echocardiogr* 2023;36:180-8

Joint Symposium KSSO-KSoLA-KDA

The Impact of Anti-Obesity Agents on Dyslipidemia

Dong-Hyuk Cho (Korea University, Korea)

New obesity medications, including GLP-1 RAs and GLP-1/GIP dual agonists, have shown remarkable results, reducing body weight by 15-20% compared to baseline in obese patients. These drugs have also demonstrated improvements in CVOT outcomes in patients with diabetes or obesity, enhanced the quality of life in patients with HFpEF, alleviated OSA, and improved NASH, likely due to their effectiveness in addressing obesity, the root cause of these conditions. In this lecture, I will review how these obesity treatments not only manage weight but also improve dyslipidemia markers. I will discuss the extent to which key dyslipidemia indicators are improved in major studies, the differences between the drugs, and the remaining unmet needs.



Jae-Han Jeon

Kyungpook National University, Korea

• Education

Period	Affiliation	Position
- 2014	Kyungpook National University	Ph.D.
- 2009	Kyungpook National University	M.S.
- 2005	Kyungpook National University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2022-Present	Kyungpook National University	Associate Professor
- 2017	Kyungpook National University	Assistant Professor

• Committee Memberships

- Korean Society for the Study of Obesity
- Korean Diabetes Association
- Korean Endocrine Society

• Publications

- Diabetes Primes Neutrophils for Neutrophil Extracellular Trap Formation through Trained Immunity. *Research (Wash D C)*. 2024;7:0365
- Comprehensive overview of the role of mitochondrial dysfunction in the pathogenesis of acute kidney ischemia-reperfusion injury: a narrative review. *J Yeungnam. Med Sci*. 2024; 41(2):61-73
- Impact of Hyperglycemia on Immune Cell Function: A Comprehensive Review. *Diabetol Int* 2024
- Mitochondrial dysfunctions in T cells: focus on inflammatory bowel disease. *Front Immunol*. 2023 Sep 22;14:1219422
- Inhibition of pyruvate dehydrogenase kinase 4 ameliorates kidney ischemia-reperfusion injury by reducing succinate accumulation during ischemia and preserving mitochondrial function during reperfusion. *Kidney Int*;104(4):724-739

Joint Symposium KSSO-KSoLA-KDA (K)

The Impact of Anti-Obesity Agents on Glucose Metabolism

Jae-Han Jeon (Kyungpook National University, Korea)

The global rise in obesity has led to a concurrent increase in type 2 diabetes, necessitating the exploration of effective treatments. Anti-obesity agents, designed primarily to reduce body weight, have shown potential benefits on glucose metabolism. This study investigates the mechanisms by which these agents influence glucose homeostasis. In this session, I would like to review various classes of anti-obesity drugs, including GLP-1 receptor agonists, SGLT-2 inhibitors, central nervous system stimulants, as well as orlistat and phentermine, assessing their impact on insulin sensitivity, glucose uptake, and overall metabolic health. Orlistat, a lipase inhibitor, and phentermine, an appetite suppressant, are particularly examined for their roles in altering glucose metabolism. Through a comprehensive analysis of clinical trials and experimental studies, we aim to elucidate the dual role of these agents in managing both obesity and hyperglycemia. The findings underscore the importance of considering glucose metabolism in the development and prescription of anti-obesity therapies.

Joint Symposium -JKT (Basic)

Novel Mechanisms and Therapeutic
Approaches for MASLD

Chairpersons

Ki Woo Kim

Yonsei University, Korea

Jun Wada

Okayama University, Japan

Speakers

Hisanori Goto

Kanazawa University, Japan

Chia-Wen Lu

National Taiwan University, Taiwan

Eun Hee Koh

University of Ulsan, Korea



Hisanori Goto

Kanazawa University, Japan

• Education

Period	Affiliation	Position
- 2014	Kanazawa University School of Medicine, College of Medical, Pharmaceutical and Health Sciences	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2021-Present	Kanazawa University Hospital	Assistant professor
- 2020	Kanazawa University Hospital	Medical Staff
- 2016	Kyoto University Hospital	Medical Staff
- 2015	National Hospital Organization Kyoto Medical Center	Resident
- 2014	Kyoto University Hospital	Resident

• Publications

- *Commun Biol.* 25:2:76
- *Diabetes Care.* 45(9):2064-2075
- *Diabetes.* 72(9):1297-1306
- *Am J Pathol.* 194(5):693-707
- *Endocrinology.* 165(7):bqae059

Joint Symposium-JKT (Basic)

Molecular Pathophysiology Underlying MASH Complicated by Diabetes

Hisanori Goto (Kanazawa University, Japan)

Obesity is a significant contributor to MASLD/MASH. Additionally, it has been suggested that diabetes may exacerbate MASLD in East Asian individuals. However, the mechanisms by which diabetes promotes liver inflammation and fibrosis remain unclear. In our longitudinal liver biopsy study of diabetic MASLD subjects, increases in HbA1c, but not BMI were significantly associated with the progression of liver fibrosis (Saori S et al., Diabetes 2023). Gene set enrichment analyses suggest the coordinated downregulation of genes involved in central liver sinusoidal endothelial cells (LSECs) during the progression of liver fibrosis.

To further explore the molecular mechanisms by which diabetes exacerbates steatohepatitis, we established a novel murine model of "diabetic steatohepatitis (DiSH)" (Abuduyimiti T, Goto H, et al., Am J Pathol, 2024). Male C57BL/6J mice were fed a 60% high-fat diet (HFD). Liver inflammation and fibrosis were induced using carbon tetrachloride (CCl₄), and insulinopenic diabetes was induced by streptozotocin (STZ). The DiSH model (HFD+CCl₄+STZ) group exhibited more advanced liver steatosis, hepatocyte ballooning, and regenerative nodules than the non-diabetic MASH model (HFD+CCl₄) group.

Single-cell RNA-seq analyses revealed a decrease in LSEC clusters in the DiSH model. Pathway analysis of genes with altered expression in LSECs due to the induction of a diabetic state revealed a coordinated increase in the expression of genes linked to senescent phenotype, oxidative stress response, capillary formation, leukocyte migration, and apoptosis in diabetes. Genes involved in ligand-receptor interactions in RAGE/TLR4 signaling were also coordinately upregulated in diabetes. Morphological findings also suggested LSEC injury in the DiSH model. These findings indicate that diabetes may injure LSECs via RAGE/TLR signaling during the development of DiSH. These results imply that diabetic vascular complications underlie DiSH pathology.

At the symposium, we will discuss experimental strategies to test this hypothesis and therapeutic strategies aimed at protecting vascular endothelial cells.



Chia-Wen Liu

National Taiwan University, Taiwan

• Education

Period	Affiliation	Position
– 2023	Graduate Institute of Clinical Medicine, National Taiwan University College of Medicine	Ph.D.
– 2013	Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University	M.Sc.
– 2007	College of Medicine, National Cheng Kung University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Department of Family Medicine, College of Medicine, National Taiwan University	Clinical Associate Professor
– 2019	Department of Family Medicine, College of Medicine, National Taiwan University	Clinical Assistant Professor
– 2016	Department of Family Medicine, College of Medicine, National Taiwan University	Clinical Lecturer
– 2013	Department of Family Medicine, National Taiwan University Hospital	Attending Physician

• Committee Memberships

- Taiwan Association of Family Medicine
- Taiwan Medical Association for the Study of Obesity
- Taiwan Medical Association for Comprehensive Care of Chronic Diseases
- Taiwan Medical Association of Human Nutrition
- Taiwan Academy of Hospice Palliative Medicine

• Publications

- Lu CW, Yang KC, Chi YC, Wu TY, Chiang CH, Chang HH, et al. Adiponectin-leptin ratio for the early detection of lean non-alcoholic fatty liver disease independent of insulin resistance. *Ann Med.* 2023;55(1):634-42
- CW Lu, YC Lee, CH Chiang, HH Chang, WS Yang, KC Huang. Independent Dose–Response Associations between Fetuin-A and Lean Nonalcoholic Fatty Liver Disease. *Nutrients.* 2021, 13(9), 2928
- Chen PY, Lee YH, Chiang CH, Chang HH, Lu CW*, Huang KC. Sex Differences and Positive Dose-Response Relationships between Serum Osteocalcin Levels and Low Muscle Strength. *Gerontology.* 2023 Jun;69(9):1056-1064. (*equal contribution)
- Shen YH, Lee YH, Lee YC, Chang HH, Huang KC, Lu CW. Changes in Circulating Galectin-1 among Adults with Obesity Participating in a Diet and Exercise Program. (Accept)
- CW Lu, YC Lee, CS Kuo, CH Chiang, HH Chang, KC Huang. Association of Serum Levels of Zinc, Copper, and Iron with Risk of Metabolic Syndrome. *Nutrients.* 2021, 13(2), 548

Joint Symposium-JKT (Basic)

Effects of Exercise Intervention in Obese Mice with Steatotic Liver Disease

Chia-Wen Liu (National Taiwan University, Taiwan)

This lecture was intended to share the effects of various exercise modalities on obesity treatment and liver health in high-fat diet-induced obese mice from our team. The exercise interventions included aerobic exercise (AE), resistance exercise (RE), high-intensity interval training (HIIT), and vibration training (VT). Each regimen was conducted over eight weeks: AE involved treadmill running, RE focused on weight-bearing ladder climbing, and HIIT incorporated alternating high and low-intensity treadmill running intervals. Additionally, the study examined the impact of swimming at different temperatures (25°C and 32°C) on obesity treatment.

Metabolic improvements were also observed, with AE significantly reducing total cholesterol (TCHO), low-density lipoprotein (LDL), and triglycerides (TG), and improving glucose tolerance as measured by OGTT. Both AE and VT groups showed improvements in fasting glucose levels, although these changes were not statistically significant. In terms of body composition, AE and VT groups experienced significant reductions in body weight and fat percentage, with AE also increasing lean mass percentage.

The results demonstrated that most of the exercise modalities reduced liver weight and improved liver function, as evidenced by decreased GPT levels. AE notably increased irisin levels, enhancing insulin sensitivity and improving HOMA-IR. Liver proteomic analysis indicated that obesity induced mitochondrial dysfunction, which was mitigated by AE through the regulation of the PKA pathway. Furthermore, western blot analysis revealed significant changes in the expression of liver proteins such as Fetuin A, Galectin-1, and Cathepsin S.



Eun Hee Koh

University of Ulsan, Korea

• Education

Period	Affiliation	Position
– 2007	University of Ulsan, Korea	Ph.D.
– 2005	University of Ulsan, Korea	M.S.
– 1999	College of Medicine, Inje University, Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2020–Present	Internal Medicine, College of Medicine, University of Ulsan	Professor
– 2015-2019	Internal Medicine, College of Medicine, University of Ulsan	Associate Professor
– 2015-2016	Baylor College of Medicine	Visiting Researcher
– 2009-2013	Endocrinology and Metabolism, Asan Medical Center	Clinical Assistant Professor

• Committee Memberships

- Committee of Research, Korean Diabetes Association

• Publications

- Sang H, Lee KN, Jung CH, Han K, Koh EH. Association between organochlorine pesticides and nonalcoholic fatty liver disease in the National Health and Nutrition Examination Survey 2003-2004. *Sci Rep.* 2022 8;12(1):11590
- Hong CH, Ko MK, Kim JH, Cho H, Lee CH, Yoon JE, Yun JY, Baek IJ, Lee KU, Fernández-Checa JC, Choi JW, Kim S, KoH EH. Sphingosine 1-Phosphate Receptor 4 Promotes Nonalcoholic Steatohepatitis by Activating NLRP3 Inflammasome. *Cell Mol Gastroenterol Hepatol* 2022;13(3):925-947
- Koh EH, Yoon JE, Ko MS, Leem J, Yun JY, Hong CH, Cho YK, Lee SE, Jang JE, Baek JY, Yoo HJ, Kim SJ, Sung CO, Lim JS, Jeong W, Back SH, Baek I, Torres S, olsona-Vilarrasa E, Rosa LC, Garcia-Ruiz C, Feldstein A, Fernandez-Checa J, Lee KU. Sphingomyelin synthase 1 mediates hepatocyte pyroptosis to trigger non-alcoholic steatohepatitis. *GUT* 2021 70(10):1954-1964
- Ko MS, Yun JY, Baek IJ, Jang JE, Hwang JJ, Lee SE, Heo SH, Bader DA, Lee CH, Han J, Moon JS, Lee JM, Hong EG, Lee IK, Kim SW, Park JY, Hartig SM, Kang UJ, Moore DD, Koh EH, Lee KU. (co-corresponding author). Mitophagy deficiency increases NLRP3 to induce brown fat dysfunction in mice. *Autophagy.* 2021 17(5):1205-1221
- Lee YH, Jang HJ, Kim S, Choi SS, Khim KW, Eom HJ, Hyun J, Shin KJ, Chae YC, Kim H, Park J, Park NH, Woo CY, Hong CH, Koh EH, Nam D, Choi JH. Hepatic MIR20B promotes nonalcoholic fatty liver disease by suppressing PPARA. *Elife.* 2021 29;10:e70472

Joint Symposium-JKT (Basic)

Therapeutic Approaches for Non-Alcoholic Steatohepatitis Utilizing Diverse Metabolites

Eun Hee Koh (University of Ulsan, Korea)

Nonalcoholic fatty liver disease (NAFLD) has become a major health issue worldwide. Approximately 10–20% of patients with NAFLD develop non-alcoholic steatohepatitis (NASH), an advanced stage of NAFLD that may subsequently progress to liver cirrhosis and hepatocellular carcinoma. The mechanism by which simple steatosis progresses to NASH and liver fibrosis is not completely understood, and an effective treatment for halting the progression of NASH is yet to be discovered. Lipotoxic hepatocyte death may be the primary lesion that causes liver inflammation and fibrosis. Damage-associated molecular patterns released from dying hepatocytes may activate hepatic macrophages, and secretion of proinflammatory and fibrogenic cytokines from macrophages promotes hepatic stellate cells activation. Sphingolipids are ubiquitous building blocks of eukaryotic cell membranes and their metabolites regulate a wide range of cellular processes that are important in immunity, inflammation, and inflammatory disorders. Separate lines of evidence have suggested that changes in sphingolipid metabolism are an important cause of metabolic diseases. In the liver, increased intracellular ceramide, the prototype sphingolipid and the precursor of complex sphingolipids, induces lipotoxic hepatocellular cell death by multiple mechanisms.

Previous studies proposed the two-hit hypothesis for NASH, suggesting that excessive triglyceride accumulation in the liver increases the susceptibility of the liver to injuries mediated by other stimuli such as oxidative stress or pro-inflammatory cytokines. However, subsequent studies have shown that triglyceride accumulation is not harmful by itself to hepatocytes and may actually protect against lipotoxicity. In recent studies, we show that the changes in ceramide/sphingolipid metabolism, which are well-known mediators of hepatocyte injury, are inter-related. In this presentation, I will introduce the role of sphingolipid metabolism in hepatocyte injury and macrophage activation with inflammasome activation.

Satellite Symposium 1

Chairperson

Suk Chon

Kyung Hee University, Korea

Speaker

Eun Young Lee

The Catholic University of Korea, Korea



Eun Young Lee

The Catholic University of Korea, Korea

• Education

Period	Affiliation	Position
– 2022	Washington University in St Louis	Visiting Scholar
– 2014	Yonsei University College of Medicine	M.D., Ph.D.
– 2011	Yonsei University College of Medicine	B.S.
– 2006	Yonsei University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	The Catholic University of Korea	Associate Professor
– 2019-2022	The Catholic University of Korea	Assistant Professor
– 2015-2018	Yonsei University College of Medicine	Clinical Assistant Professor
– 2011-2014	Yonsei University College of Medicine	Research Fellow
– 2007-2011	Yonsei University College of Medicine	Residency

• Committee Memberships

- Korean Diabetes Association
- Korean Endocrine Society
- Korean Society for the Study of Obesity

• Publications

- Lee EY, Hughes JW. Rediscovering Primary Cilia in Pancreatic Islets. *Diabetes Metab J* 2023 Apr 28
- Kim WJ, Lee SJ, Lee E, Lee EY, Han K. Risk of Incident Dementia According to Glycemic Status and Comorbidities of Hyperglycemia: A Nationwide Population-Based Cohort Study. *Diabetes Care* 2022;45:134–141
- Kim MJ, Lee EY, You YH, Yang HK, Yoon KH, Kim JW. Generation of iPSC-derived insulin-producing cells from patients with type 1 and type 2 diabetes compared with healthy control. *Stem Cell Res.* 2020 Oct;48:101958
- Lee EY, Han K, Kim DH, Park YM, Kwon HS, Yoon KH, Kim MK, Lee SH. Exposure-weighted scoring for metabolic syndrome and the risk of myocardial infarction and stroke: a nationwide population-based study. *Cardiovasc Diabetol.* 2020 Sep 29;19(1):153
- Lee EY, Lee YH, Yi SW, Shin SA, Yi JJ. BMI and All-Cause Mortality in Normoglycemia, Impaired Fasting Glucose, Newly Diagnosed Diabetes, and Prevalent Diabetes: A Cohort Study. *Diabetes Care.* 2017 Aug;40(8):1026-1033

Satellite Symposium 1

Insulin Therapy Optimization: Unlocking the Potential for Better Diabetes Treatment

Eun Young Lee (The Catholic University of Korea, Korea)

Diabetes mellitus imposes significant challenges in achieving optimal glycemic control, necessitating continuous advancements in treatment strategies. This abstract explores key aspects of insulin therapy optimization to enhance diabetes management. Firstly, limitations in glycemic control underscore the need for tailored treatment options. Advances in basal insulin formulations have played a pivotal role in achieving stable glycemic profiles while minimizing hypoglycemia. Among these, insulin U300 emerges as an ideal basal insulin due to its extended duration of action and lower risk of nocturnal hypoglycemia. Secondly, combining basal insulin with glucagon-like peptide-1 receptor agonists (GLP-1RAs) offers a well-balanced approach for patients with type 2 diabetes. The insulin glargine and lixisenatide fixed-ratio combination demonstrates synergistic effects, promoting weight loss and improving glycemic control with reduced cardiovascular risk. Furthermore, the integration of digital solutions is transforming insulin therapy optimization. Smart connected insulin pens and caps offer real-time data capture and analysis, empowering patients and healthcare providers to make informed decisions and adjust insulin regimens promptly. In conclusion, optimizing insulin therapy through innovative formulations and digital technologies holds promise for advancing diabetes care. Tailored approaches, such as utilizing insulin U300 and combining basal insulin with GLP-1RAs, are pivotal in achieving safer and more effective glycemic control. Embracing digital solutions enhances patient engagement and fosters personalized diabetes management, ultimately unlocking the potential for better outcomes in diabetes treatment.

Satellite Symposium 3

Chairperson

Bom Taeck Kim
Ajou University, Korea

Speaker

Jung Hwan Park
Hanyang University, Korea



Jung Hwan Park

Hanyang University, Korea

• Education

Period	Affiliation	Position
– 2022	Washington University in St Louis	Visiting Scholar
– 2014	Yonsei University College of Medicine	M.D., Ph.D.
– 2011	Yonsei University College of Medicine	B.S.
– 2006	Yonsei University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	The Catholic University of Korea	Associate Professor
– 2019-2022	The Catholic University of Korea	Assistant Professor
– 2015-2018	Yonsei University College of Medicine	Clinical Assistant Professor
– 2011-2014	Yonsei University College of Medicine	Research Fellow
– 2007-2011	Yonsei University College of Medicine	Residency

• Committee Memberships

- Korean Diabetes Association
- Korean Endocrine Society
- Korean Society for the Study of Obesity

• Publications

- Lee EY, Hughes JW. Rediscovering Primary Cilia in Pancreatic Islets. *Diabetes Metab J* 2023 Apr 28
- Kim WJ, Lee SJ, Lee E, Lee EY, Han K. Risk of Incident Dementia According to Glycemic Status and Comorbidities of Hyperglycemia: A Nationwide Population-Based Cohort Study. *Diabetes Care* 2022;45:134–141
- Kim MJ, Lee EY, You YH, Yang HK, Yoon KH, Kim JW. Generation of iPSC-derived insulin-producing cells from patients with type 1 and type 2 diabetes compared with healthy control. *Stem Cell Res.* 2020 Oct;48:101958
- Lee EY, Han K, Kim DH, Park YM, Kwon HS, Yoon KH, Kim MK, Lee SH. Exposure-weighted scoring for metabolic syndrome and the risk of myocardial infarction and stroke: a nationwide population-based study. *Cardiovasc Diabetol.* 2020 Sep 29;19(1):153
- Lee EY, Lee YH, Yi SW, Shin SA, Yi JJ. BMI and All-Cause Mortality in Normoglycemia, Impaired Fasting Glucose, Newly Diagnosed Diabetes, and Prevalent Diabetes: A Cohort Study. *Diabetes Care.* 2017 Aug;40(8):1026-1033

Satellite Symposium 3

Clinical Value of EPA (Icosapentate Ethyl)

Jung Hwan Park (Hanyang University, Korea)

Eicosapentaenoic acid (EPA), an omega-3 fatty acid predominantly found in fish oils, has garnered significant attention for its clinical benefits across a range of health conditions. This lecture reviews the current evidence regarding the clinical value of EPA, focusing on its impact on cardiovascular health. Clinical studies have demonstrated that EPA can effectively reduce triglyceride levels, contributing to a decreased risk of cardiovascular events. Additionally, its anti-inflammatory properties have shown promise in managing conditions such as rheumatoid arthritis and inflammatory bowel disease. Emerging research also suggests that EPA may offer neuroprotective effects, potentially benefiting patients with depression and cognitive decline. While the therapeutic potential of EPA is supported by a growing body of evidence, further research is needed to refine dosage recommendations and elucidate mechanisms of action. Overall, EPA represents a valuable adjunct in the management of various clinical conditions, underscoring the need for continued exploration into its optimal use in clinical practice.

Satellite Symposium 2

Chairperson

Changhyun Lee

Seoul Happiness Clinic, Korea

Speaker

Se Hee Min

University of Ulsan, Korea



Se Hee Min

University of Ulsan, Korea

• Education

Period	Affiliation	Position
– 2016-2021	Seoul National University College of Medicine	Ph.D.
– 2014-2016	Seoul National University College of Medicine	M.S.
– 2005-2011	Korea University College of Medicine	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	Asan Medical Center	Assistant professor
– 2018-2021	Asan Medical Center	Clinical instructor
– 2016-2018	Seoul National University Hospital	Fellowship

• Publications

- Duodenal Dual-Wavelength Photobiomodulation Improves Hyperglycemia and Hepatic Parameters with Alteration of Gut Microbiome in Type 2 Diabetes Animal Model, 2023, Cells
- Mitochondrial-encoded MOTS-c prevents pancreatic islet destruction in autoimmune diabetes, 2022, Cell Reports
- Mitohormesis in Hypothalamic POMC Neurons Mediates Regular Exercise-Induced High-Turnover Metabolism. Cell Metabolism. 2021

Satellite Symposium 2

Reappraisal of TZD to Control Diabetes: Pioglitazone

Se Hee Min (University of Ulsan, Korea)

Thiazolidinediones (TZDs) are a class of antidiabetic medications that have been subject to reappraisal in recent years due to their complex effects on glycemic control, cardiovascular health, and overall metabolic function. Originally introduced for their insulin-sensitizing properties, TZDs, such as pioglitazone, improve insulin sensitivity in peripheral tissues and reduce hepatic glucose production. However, their association with weight gain, fluid retention, and potential cardiovascular risks has prompted a reevaluation of their role in diabetes management. Recent studies have highlighted the dual effects of TZDs on inflammation and lipid metabolism, suggesting that their benefits may extend beyond glycemic control to include improvements in cardiovascular outcomes and reduced inflammation. Additionally, emerging evidence indicates that the long-term use of TZDs may mitigate the progression of diabetes-related complications. This lecture reviews the current understanding of TZDs in diabetes management, discussing their pharmacological mechanisms, safety profiles, and the clinical implications of their reappraisal. Ultimately, the reexamination of pioglitazone calls for a balanced perspective, recognizing their potential benefits while carefully weighing the risks, thus guiding clinicians in optimizing treatment strategies for patients with type 2 diabetes. Further research is essential to clarify the long-term impact of TZDs on health outcomes in diverse patient populations.

Special Session for Publication

Chairperson

You-Cheol Hwang
Kyung Hee University, Korea

Speaker

Claire Greenhill
Springer Nature, UK



Claire Greenhill

Springer Nature, UK

• Education

Period	Affiliation	Position
- 2007	University of Kent at Canterbury	M.Sc.
- 2006	Durham University	B.Sc.

• Affiliations / Experience

Period	Affiliation	Position
- 2015-Present	Nature Reviews Endocrinology	Chief Editor
- 2010-2015	Nature Reviews Endocrinology and Nature Reviews Gastroenterology & Hepatology	Assistant Editor, Associate Editor and then Senior Editor

Special Session for Publication

Publishing at Nature Reviews

Claire Greenhill (Springer Nature, UK)

This talk will cover the publication process at Nature Reviews Endocrinology, including an outline of the team structure, journal strategy, decision making processes and editorial processes. The talk will also cover the key features of an excellent review articles.

ICOMES 2024

International Congress on Obesity and Metabolic Syndrome hosted by KSSO

Integrating Cutting-Edge Insights in Obesity Management

DAY 2

September 6, Friday

Breakfast Symposium 1

Chairperson

Kiyoung Lee
Gachon University, Korea

Speaker

Jae-Han Jeon
Kyungpook National University, Korea



Jae-Han Jeon

Kyungpook National University, Korea

• Education

Period	Affiliation	Position
- 2014	Kyungpook National University	Ph.D.
- 2009	Kyungpook National University	M.S.
- 2005	Kyungpook National University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2022	Kyungpook National University	Associate Professor
- 2017	Kyungpook National University	Assistant Professor

• Committee Memberships

- Korean Society for the Study of Obesity
- Korean Diabetes Association
- Korean Endocrine Society

• Publications

- Diabetes Primes Neutrophils for Neutrophil Extracellular Trap Formation through Trained Immunity. *Research (Wash D C)*. 2024;7:0365
- Comprehensive overview of the role of mitochondrial dysfunction in the pathogenesis of acute kidney ischemia-reperfusion injury: a narrative review. *J Yeungnam Med Sci*. 2024; 41(2):61-73
- Impact of Hyperglycemia on Immune Cell Function: A Comprehensive Review. *Diabetol Int* 2024
- Mitochondrial dysfunctions in T cells: focus on inflammatory bowel disease. *Front Immunol*. 2023 Sep 22;14:1219422
- Inhibition of pyruvate dehydrogenase kinase 4 ameliorates kidney ischemia-reperfusion injury by reducing succinate accumulation during ischemia and preserving mitochondrial function during reperfusion. *Kidney Int*;104(4):724-739

Breakfast Symposium 1

The Ideal Combination therapy for T2D Including Dapagliflozin

Jae-Han Jeon (Kyungbook National University, Korea)

Effective management of type 2 diabetes (T2D) requires innovative and comprehensive therapeutic approaches. Combination therapy has become essential in the treatment of T2D, offering enhanced benefits that single-agent therapies cannot achieve. Dapagliflozin, a selective sodium-glucose cotransporter-2 (SGLT-2) inhibitor, stands out as a promising component in these combination regimens. Dapagliflozin reduces blood glucose levels by promoting urinary glucose excretion, functioning independently of insulin.

When used in combination with other antidiabetic agents, such as metformin, GLP-1 receptor agonists, and DPP-4 inhibitors, dapagliflozin has shown superior efficacy in glycemic control. This combination therapy not only enhances insulin sensitivity but also aids in weight reduction and improves overall metabolic health. Moreover, dapagliflozin offers cardiovascular and renal benefits, making it an attractive option for patients with T2D, particularly those with comorbid conditions.

Clinical trials and real-world studies have demonstrated that the inclusion of dapagliflozin in combination therapy results in better glucose management and a lower risk of hypoglycemia compared to many other treatments. This multifaceted approach addresses various pathophysiological aspects of T2D, providing a more effective and holistic treatment strategy.

Breakfast Symposium 2

Chairperson

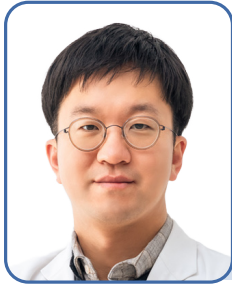
Chul Sik Kim

Yonsei University, Korea

Speaker

Young Sang Lyu

Chosun University, Korea



Young Sang Lyu

Chosun University, Korea

• Education

Period	Affiliation	Position
- 2019-2021	Internal medicine, Chosun University	Ph.D.
- 2017-2019	Internal medicine, Chosun University	M.S.
- 2005-2011	Chosun university College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2021-Present	Division of Endocrinology & Metabolism, Chosun University	Assistant Professor

• Publications

- 2024 Efficacy and safety of enavogliflozin vs. dapagliflozin as add-on therapy in patients with type 2 diabetes mellitus based on renal function: a pooled analysis of two randomized controlled trials. *Cardiovasc Diabetol.* 2024 Feb 15;23(1):71
- 2023 Comparison of SGLT2 inhibitors with DPP-4 inhibitors combined with metformin in patients with acute myocardial infarction and diabetes mellitus. *Cardiovasc Diabetol.* 2023 Jul 22;22(1)
- 2021 Clinicopathologic characteristics of papillary thyroid cancer originated from isthmus, *World J Surg*
- 2020 Efficacy and Safety of Treatment with Quadruple Oral Hypoglycemic Agents in Uncontrolled Type 2 Diabetes Mellitus: A Multi-Center, Retrospective, Observational Study. *dmj.*2020.0107
- 2020 Impact of Social Jetlag on Weight Change in Adults: Korean National Health and Nutrition Examination Survey 2016-2017. *Int J Environ Res Public Health* 2020 Jun 18;17(12):4383

Breakfast Symposium 2

Efficacy and Safety of Naltrexone-Bupropion in Korean Adults with Obesity: Post-Marketing Surveillance Study

Young Sang Lyu (Chosun University, Korea)

The combination of naltrexone and bupropion is an FDA-approved medication for long-term use in individuals with obesity. This combination is widely used worldwide and has been demonstrated to have modest weight loss effects through various randomized controlled trials (RCTs). Despite its widespread use, there are few studies analyzing the effects and side effects of naltrexone-bupropion, and none have focused specifically on Asian populations. Our study investigates the efficacy and safety of naltrexone-bupropion in Korean individuals with obesity using post-marketing surveillance. This study is significant as it is the first to analyze the effects of naltrexone-bupropion in a Korean population, providing valuable data that was previously unavailable. The study found that naltrexone-bupropion is both effective and safe for inducing significant weight loss in Korean individuals with obesity. Significant weight loss was observed in Korean individuals with obesity, with the greatest benefits noted in younger individuals without comorbidities. Adverse events were predominantly mild, confirming the need for personalized titration to maximize therapeutic outcomes and manage side effects. The study highlights the importance of personalized titration to maximize the therapeutic outcomes of naltrexone-bupropion. Naltrexone-bupropion can be considered an effective adjunct to obesity management strategies, particularly in a Korean population. In this presentation, I will explain the safety and efficacy of naltrexone-bupropion based on a recently analyzed post-marketing survey.

Breakfast Symposium 3

Chairperson

Sang Yeoup Lee

Pusan National University, Korea

Speaker

Ga Eun Nam

Korea University, Korea



Ga Eun Nam

Korea University, Korea

• Education

Period	Affiliation	Position
- 2015	Korea University College of Medicine	M.D., Ph.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2021-Present	Korea University Guro Hospital	Associate Professor
- 2018-2021	Korea University Anam Hospital	Clinical Associate Professor, Clinical Assistant Professor
- 2016-2018	Sahmyook Medical Center	Chief
- 2011-2015	Korea University Ansan Hospital	Clinical Assistant Professor, Clinical Instructor

• Publications

- Park JC, Nam GE, Yu J, McWhorter KL, Liu J, Lee HS, Lee SS, Han K. Association of Sustained Low or High Income and Income Changes With Risk of Incident Type 2 Diabetes Among Individuals Aged 30 to 64 Years. *JAMA Network Open* 2023;6:e2330024. (co-first author)
- 2. Shin J, Han K, Jung JH, Park HJ, Kim W, Huh Y, Kim YH, Kim DH, Kim SM, Choi YS, Cho KH, Nam GE. Age at menopause and risk of heart failure and atrial fibrillation: a nationwide cohort study *Eur Heart J* 2022;43:4148-4157. (corresponding author)
- 3. Yoo JE, Han K, Kim B, Park SH, Kim SM, Park HS, Nam GE. Changes in Physical Activity and the Risk of Dementia in Patients With New-Onset Type 2 Diabetes: A Nationwide Cohort Study. *Diabetes Care* 2022;45:1091-1098. (corresponding author)
- 4. Nam GE, Kim W, Han K, Lee CW, Kwon Y, Han B, Park S, Park JH, Kim YH, Kim DH, Kim SM, Choi YS, Cho KH, Park YG. Body

Breakfast Symposium 3

CV Risk Management of High-Risk Patients with Rozetel/ Rozetelpine SPCs

Ga Eun Nam (Korea University, Korea)

In this lecture, I will discuss the need for an integrated approach to reducing cardiovascular disease risk, the clinical implication of medication adherence, and the benefits of fixed-dose combinations. I will also introduce Rozetel/Rozetelpine: the first combination of Rosuvastatin, Ezetimibe, and Telmisartan (or Amlodipine) for managing dyslipidemia and hypertension.

Keynote Lecture 1

Chairperson

Min-Seon Kim

University of Ulsan, Korea

Speaker

Joel K. Elmquist

UT Southwestern Medical Center, USA



Joel K. Elmquist

UT Southwestern Medical Center, USA

• Education

Period	Affiliation	Position
– 1994-1996	Harvard Medical School	Advisor
– 1993	Iowa State University	Ph.D.
– 1992	Iowa State University	D.V.M.
– 1985-1988	College of Agriculture	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-Present	UT Southern Medical Center	Vice Chair of Research
– 2011-Present	UT Southern Medical Center	Distinguished Chair in Medical Science
– 2006-Present	UT Southern Medical Center	Professor
– 2006-Present	UT Southern Medical Center	Director
– 2006-Present	UT Southern Medical Center	Maclin family Professor in Medical Science, in Honor of Dr. Roy A. Brinkley

• Committee Memberships

- Journal of Neuroscience
- NIH IPOD Study Section
- American Diabetes Association
- NIH NIDDK Advisory Council
- Life Sciences Institute Advisory Board – University of Michigan

• Publications

- Ursino G, Ramadori G, Höfler A, Odouard S, Teixeira PDS, Visentin F, Veyrat-Durebex C, Lucibello G, Firnkens R, Ricci S, Vianna CR, Jia L, Dirlwanger M, Klee P, Elmquist JK, Roth J, Vogl T, Schwitzgebel VM, Jornayvaz FR, Boland A, Coppari R. Hepatic non-parenchymal S100A9-TLR4-mTORC1 axis normalizes diabetic ketogenesis. *Nat Commun.* 13(1):4107. doi: 10.1038/s41467-022-31803-5. PMID: 35840613; PMCID: PMC9287425
- Speakman JR, Elmquist JK. Obesity: an evolutionary context. *Life Metab.* 1(1):10-24. doi: 10.1093/lifemeta/loac002. PMID: 36394061; PMCID: PMC9642988
- Tan S, Santolaya J, Wright TF, Liu Q, Fujikawa T, Chi S, Bergstrom CP, Lopez A, Chen Q, do Vale GD, McDonald JG, Jia D, Elmquist JK, Sifuentes-Dominguez L, Burstein E. An enteroendocrine-microbial axis in the large intestine controls host metabolism. *Res Sq [Preprint]*. rs.3.rs-3112286. doi: 10.21203/rs.3.rs-3112286/v1. PMID: 37461519; PMCID: PMC10350199

Keynote Lecture 1

SF-1 Targets in the Hypothalamus: Novel Pathways Regulating Energy Balance and Metabolism

Joel K. Elmquist (UT Southwestern Medical Center, USA)

The brain plays a critical role in regulating food intake, body weight and blood glucose levels. Dysfunction of this regulation results in obesity and diabetes. Key signals act on collection of neurons within the hypothalamus to regulate food intake and body weight and glucose homeostasis. However, the inherent complexity of these circuits has made it extremely difficult to identify the key neurons that regulate these processes. Over the past several years the ability to manipulate gene expression in a neuron-specific fashion has become feasible. We will describe some our recent findings using mouse models that allow neuron-specific manipulation of genes in the ventral medial hypothalamus. We will explore the role of these circuits during periods of food availability and following metabolic challenges. We will discuss recent findings that provide evidence how distinct hypothalamic cell groups including the ventral medial nucleus of the hypothalamus (VMH) regulate energy balance and glucose homeostasis. We will also discuss the use of a novel Drosophila platform to identify novel transcriptional targets in the VMH that link physiological challenges and alterations in metabolism.

Symposium 1

Precision Medicine for Obesity and Diabetes

Chairpersons

Leonie Kaye Heilbronn

University of Adelaide, Australia

Soon-Jib Yoo

The Catholic University of Korea, Korea

Speakers

Jean-Pierre Després

VITAM – Research Centre on Sustainable Health, Canada

Yoon Jung Park

Ewha Womans University, Korea

Joonyub Lee

The Catholic University of Korea, Korea

Panel Discussion

Yoon Jeong Cho

Daegu Catholic University, Korea

Hun Jee Choe

Hallym University, Korea



Jean-Pierre Després

VITAM – Research Centre on Sustainable Health, Canada

• Education

Period	Affiliation	Position
– 1984-1986	University of Toronto, Toronto, ON, Canada	Ph.D.
– 1982-1984	Université Laval, Québec, QC, Canada	M.Sc.
– 1980-1982	Université Laval, Québec, QC, Canada	Ph.D.
– 1978-1980	Université Laval, Québec, QC, Canada	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2012-Present	Department of Kinesiology Faculty of Medicine Université Laval, Québec, QC, Canada	Full Professor
– 2004-2012	Department of Social and Preventive Medicine – Kinesiology Faculty of Medicine Université Laval, Québec, QC, Canada	Full Professor
– 1996-2004	Department of Food Sciences and Nutrition Faculty of Agricultural sciences and Nutrition Université Laval, Québec, QC, Canada	Full Professor
– 2000-2004	Human Nutrition, Lipidology and Prevention of Cardiovascular Diseases Université Laval, Québec, QC, Canada	Chair Professor
– 1994-1996	Department of Physical Education Faculty of Education Sciences Université Laval, Québec, QC, Canada	Professor

• Committee Memberships

- American College of Sports Medicine
- American Diabetes Association
- American Heart Association
- Association francophone pour le savoir (Acfas)

• Publications

- Adiposity, type 2 diabetes and atherosclerotic cardiovascular disease risk: Use and abuse of the body mass index. Arsenault BJ, Carpentier AC, Poirier P, Després JP. *Atherosclerosis*. 117546 PMID: 38692978
- Cardiovascular-Kidney-Metabolic Health: A Presidential Advisory From the American Heart Association.
- Ndumele CE, Rangaswami J, Chow SL, Neeland IJ, Tuttle KR, Khan SS, Coresh J, Mathew RO, Baker-Smith CM, Carnethon MR, Despres JP, Ho JE, Joseph JJ, Kernan WN, Khera A, Kosiborod MN, Lekavich CL, Lewis EF, Lo KB, Ozkan B, Palaniappan LP, Patel SS, Pencina MJ, Powell-Wiley TM, Sperling LS, Virani SS, Wright JT, Rajgopal Singh R, Elkind MSV; American Heart Association. *Circulation*. 148(20):1606-1635. PMID: 37807924
- BMI versus obesity subtypes in the era of precision medicine. Després JP. *Lancet Diabetes Endocrinol*. 11(6):382-384. PMID: 37068507
- Cardiometabolic Health Outcomes Associated With Discordant Visceral and Liver Fat Phenotypes: Insights From the Dallas Heart Study and UK Biobank. Tejani S, McCoy C, Ayers CR, Powell-Wiley TM, Després JP, Linge J, Leinhard OD, Petersson M, Borga M, Neeland IJ. *Mayo Clin Proc*. 97(2):225-237. PMID: 34598789
- Management of Obesity in Cardiovascular Practice: JACC Focus Seminar. Després JP, Carpentier AC, Tchernof A, Neeland IJ, Poirier P. *J Am Coll Cardiol*. 78(5):513-531. PMID: 34325840

Symposium 1

Obesity Phenotypes and Precision Medicine

Jean-Pierre Després (VITAM – Research Centre on Sustainable Health, Canada)

The rapid growth in the worldwide prevalence of obesity is a key factor involved in the epidemic proportions reached by chronic societal diseases such as type 2 diabetes. However, the remarkable heterogeneity observed among individuals with a diagnosis of obesity based on the most widely used anthropometric variable, the body mass index (BMI), remains a puzzling challenge to clinical practice. A revolution in the study of obesity has been the development of imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) which made possible the noninvasive measurement of the amount of total body fat and more importantly of its regional distribution. These cardiometabolic imaging studies have all highlighted the remarkable individual variation in regional adipose tissue distribution, particularly visceral and ectopic adiposity (fat accumulation in normally lean tissues such as the liver, the heart, the skeletal muscle, the renal sinus, the pancreas, etc.), even among persons matched for a similar BMI or amount of total body fat. These studies have also consistently reported that individuals with an excess of visceral adipose tissue (VAT) were those characterized by the highest cardiometabolic risk. Excess visceral adiposity has also been found to be frequently accompanied by increased levels of fat in ectopic depots such as the liver, heart, skeletal muscle and pancreas. It is now commonly agreed upon that excessive VAT and ectopic fat deposition may reflect the relative inability of subcutaneous adipose tissue to expand and act as a protective metabolic sink, leading to the concept of dysfunctional adipose tissue. In line with this hypothesis, preferential accumulation of gluteal-femoral subcutaneous adipose tissue has even been reported to be protective against the development of type 2 diabetes and cardiovascular disease. On that basis, subcutaneous vs. visceral obesities can be considered as two extremes of a continuum of adiposity phenotypes with cardiometabolic risk ranging from low to high.

Thus, the heterogeneity of obesity phenotypes represents a challenge to the evaluation of cardiometabolic risk associated with a given BMI in clinical practice. We have proposed that simple tools could be used to better appreciate its heterogeneity. In this regard, there is overwhelming evidence that measuring waist circumference (in addition to the BMI) is a relevant step to characterize body fat distribution. Another important modulator of cardiometabolic risk is cardiorespiratory fitness. A high level of cardiorespiratory fitness is also associated with a lower accumulation of VAT compared to BMI-matched, poorly fit individuals. Food-based nutritional quality and level of physical activity are also two key behaviors that substantially modulate cardiometabolic risk at any BMI level.

It is proposed that it is no longer acceptable to assess the health risk of obesity on the basis of the BMI alone. As different forms of obesity exist, the first step in clinical practice should be to properly phenotype patients with overweight and obesity by also measuring simple markers of regional adiposity (waist circumference) and of lifestyle habits (physical activity and food-based dietary questionnaires). In the context of personalized medicine, precision lifestyle medicine should be applied to the field of obesity. Obesity is not a homogeneous entity and we should rather refer to “obesities”.



Yoon Jung Park

Ewha Womans University, Korea

• Education

Period	Affiliation	Position
– 2008	Molecular Nutrition, Division of Nutritional Science, Cornell University, NY, USA	Ph.D.
– 1998	Department of Nutritional Science & Food Management, Ewha Womans University	M.S.
– 1996	Department of Nutritional Science & Food Management, Ewha Womans University,	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2011-Present	Department of Nutritional Science & Food Management, Ewha Womans University,	Professor
– 2008-2011	Div. of Epigenomics & Cancer Risk Factors, German Cancer Research Institute, Heidelberg, Germany	Postdoctoral Fellow (Roman Herzog research fellow)

• Committee Memberships

- Journal of Nutrition and Health
- The Korean Nutrition Society
- Korean Dietary Reference Intake (KDRI, Protein & Amino acids)
- Food & Nutrition Committee, The Korean Society of Lipidology and Atherosclerosis
- Academic advisory committee, The Korean Society for Gerontology

• Publications

- Shon J, Han Y, Song S, et al. Anti-obesity effect of butyrate links to modulation of gut microbiome and epigenetic regulation of muscular circadian clock, *J Nutritional Biochemistry*, 2024 Feb 2:109590
- Lyu J, Park YJ. Associations of meal timing and sleeping duration with incidence of obesity in Korean adults: A prospective cohort study, *J Nutrition, Health & Aging*, 2024 Apr 1;28(6): 100220
- Song S, Shon J, Yang W, et al. Short-term effects of weight-loss meal replacement programs with various macronutrient distributions on gut microbiome and metabolic parameters: A pilot study, *Nutrients*, 2023 Nov 10, 15:4744
- Lee HJ, Shon J, Park YJ. Association of NAFLD with FGF21 Polygenic Hazard Score, and Its Interaction with Protein Intake Level in Korean Adults, *Nutrients*, 2023 May 19, 15:2385
- Lutsik P, Baude A, Mancarella D, et al. Globally altered epigenetic landscape and delayed osteogenic differentiation in H3.3-G34W-mutant giant cell tumor of bone, *Nature Communication*, 2020 Oct 27; 11:5414

Symposium 1

Nutrigenomics of Obesity & Weight Control: Macronutrient Ratios

Yoon Jung Park (Ewha Womans University, Korea)

Over the past decades, nutritional research has undergone a significant transformation. The focus has shifted from merely preventing nutritional deficiencies in populations to designing optimal nutritional recommendations tailored to individual needs, known as personalized nutrition. This shift has been greatly accelerated by advances in nutrigenomics, which have elucidated the molecular mechanisms underlying individual differences in dietary responses. In particular, metabolic regulation and weight control have become key targets for precision guidance using multi-omics technologies. Recent evidence highlights the critical role of macronutrient ratios in obesity and weight control, a topic that has been the subject of long-standing debate. Large-scale meta-analyses of human studies and comprehensive rodent studies have revealed the complexity of optimizing macronutrient ratios. Factors such as meal timing, and the source and composition of macronutrients, must also be considered. Although the underlying mechanisms are not fully understood, new potential factors, such as the microbiome, have been explored. This lecture will review recent evidence, enhancing our understanding of how macronutrient ratios and their related factors regulate obesity and weight maintenance.



Joonyub Lee

The Catholic University of Korea, Korea

• Education

Period	Affiliation	Position
– 2017-2021	Graduate School of Medical Science and Engineering (GSMSE), KAIST, Daejeon, Republic of Korea	Ph.D.
– 2015-2017	Graduate School of Medicine, The Catholic University of Korea, Seoul, Korea	M.S.
– 2006-2012	College of Medicine, The Catholic University of Korea, Seoul, Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Seoul St. Mary's Hospital, Catholic Medical Center, Korea	Assistant Professor
– 2023-2024	Seoul St. Mary's Hospital, Catholic Medical Center, Korea	Clinical Assistant Professor

• Committee Memberships

- Korean Society for the Study of Obesity Committee of Research
- Korean Endocrinology Society Committee of the Future Endocrinologist Sustainability

• Publications

- PRMT1 Is Required for the Maintenance of Mature β -Cell Identity. *Diabetes*. 2020;69(3):355-68
- Multiparity increases the risk of diabetes by impairing the proliferative capacity of pancreatic β cells. *Experimental & Molecular Medicine* (accepted)
- Risk of developing chronic kidney disease in young-onset Type 2 diabetes in Korea. *Scientific Reports* 2023;13:10100
- Risk of Cause-Specific Mortality across Glucose Spectrum in Elderly People: A Nationwide Population-Based Cohort Study. *Endocrinol Metab (Seoul)* 2023; doi: 10.3803/EnM.2023.1765
- Efficacy and Safety of Alogliptin-Pioglitazone Combination for Type 2 Diabetes Mellitus Poorly Controlled with Metformin: A Multicenter, Double-Blind Randomized Trial. *Diabetes Metab J* 2024; doi: 10.4093/dmj.2023.0259

Symposium 1

Precision Diabetes Care through Integrative Life-Log Data

Joonyub Lee (The Catholic University of Korea, Korea)

Diabetes is a prevalent yet often inadequately managed chronic disease. Achieving proper glycemic control in diabetic patients is challenging due to the intricate interplay of various factors, including diet, exercise, and medication. Advancement in digital technology provides physicians to access to comprehensive life-log data presenting the possibility of developing a new paradigm of diabetic care. The concept of a “digital twin” involves creating a virtual counterpart to simulate and evaluate a particular environment, subsequently offering feedback to the actual entity. Recently, our group has initiated a research project to develop digital twin technology for patients with insulin-dependent diabetes mellitus (IDDM). In this ongoing study, we enrolled 36 IDDM patients from Seoul St. Mary’s Hospital and Yeungnam University Hospital in South Korea. Each patient was provided with EOPatch (EOflow) insulin pumps, CareSens Air (i-SENS) continuous glucose monitors, Dofit pro band (Mediplus Solution) activity tracker, and a food tag AI (KT). Along with the EMR data, four types of continuous life-log variables were obtained through the Korea Health Partners’ patient-physician communication app. This data was then processed using a recurrent neural network employing the Long Short-Term Memory algorithm. In this presentation, I will share some of the preliminary results of our research, which predicted IDDM patients’ glucose levels with reasonable accuracy. Additionally, we’ll explore how we simulated individual life-log variables to observe potential fluctuations in glucose levels in these patients.

Symposium 2

Gut, Brain, and Obesity

Chairpersons

Wen-Yuan Lin

China Medical University, Taiwan

Kae Won Cho

Soonchunhyang University, Korea

Speakers

Chih-Yen Chen

National Yang Ming Chiao Tung University, Taiwan

Teppei Fujikawa

UT Southwestern Medical Center, USA

Ki Woo Kim

Yonsei University, Korea

Panel Discussion

Obin Kwon

Seoul National University, Korea

Jaemin Lee

DGIST, Korea



Chih-Yen Chen

National Yang Ming Chiao Tung University, Taiwan

• Education

Period	Affiliation	Position
– 2006	Institute of Clinical Medicine, National Yang-Ming University School of Medicine, Taipei, Taiwan	Ph.D.
– 1992	School of Medicine, Taipei Medical University, Taipei, Taiwan	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 1999-2001	The Brain-Gut Interaction Laboratory, under the guidance of Professor Yvette Taché, CURE / DDRC & UCLA, Los Angeles, California, USA	Post-Doctoral Fellowship
– 1996-1998	Department of Medicine, Taipei Veterans General Hospital, Taipei, Taiwan	Chief Resident
– 1992-1996	Department of Medicine, Taipei Veterans General Hospital, Taipei, Taiwan	Rotating Resident

• Committee Memberships

- Chinese Taipei Society for the Study of Obesity (CTSSO)
- Taiwan Association for the Study of Intestinal Diseases (TASID)
- Taiwan Association of Institutional Review Boards (TAIRB)

• Publications

- Guo JY, Chen HH, Lee WJ, Chen SC, Lee SD, Chen CY*. Fibroblast growth factor 19 and fibroblast growth factor 21 regulation in obese diabetics, and non-alcoholic fatty liver disease after gastric bypass. *Nutrients* 14(3): 645
- Wang W, Fann CSJ, Yang SH, Chen HH, Chen CY*. Weight loss and metabolic improvements in obese patients undergoing gastric banding and gastric banded plication: A comparison. *Nutrition* 57: 290-299
- Lee WJ, Chen CY*, Chong K, Lee YC, Chen SC, Lee SD. Changes in postprandial gut hormones after metabolic surgery: a comparison of gastric bypass and sleeve gastrectomy. *Surg Obes Relat Dis* 7(6): 683-690
- Chen CY, Asakawa A, Fujimiya M, Lee SD, Inui A. Ghrelin gene products and the regulation of food intake and gut motility. *Pharmacol Rev* 61(4): 430-481
- Chen CY, Inui A, Asakawa A, Fujino K, Kato I, Chen CC, Ueno N, Fujimiya M. Des-acyl ghrelin acts by CRF type 2 receptors to disrupt fasted stomach motility in conscious rats. *Gastroenterology* 129: 8-25

Symposium 2

Gut Hormone and Brain in Obesity

Chih-Yen Chen (National Yang Ming Chiao Tung University, Taiwan)

Obesity is a major health challenge, and its health risks have been targeted by wide attention. Obesity is primarily a disease of subcortical brain regions which is characterised by the pathognomonic symptoms of excessive hunger and/or reduced satiation after a meal and the pathognomonic sign of increased adiposity. Overcoming obesity is a great task. Benefits are approaching those of gastric bypass, and offer effective prevention of obesity, type 2 diabetes mellitus, and metabolic dysfunction-associated steatotic liver disease (MASLD). Level 1A evidence shows that gastric bypass induces fat loss and improved glucose homeostasis. Obesity is associated with significant disruption in endocrine function, manifesting in changes of gut hormone secretion and insulin secretion, affecting many organ functions in humans. Gut hormones impact food intake, energy balance, and aging process. Plasma levels of gut hormones serve as biomarkers for obesity and related comorbidity in our body.

Gut hormones target brain and adipose tissue. Recent studies imply that hormones, especially gut hormones, may play important roles in improvement of obesity and diabetes remission after bariatric surgery. Four possible mechanisms had been proposed, including the starvation-followed-by-weight loss hypothesis, the ghrelin hypothesis, the lower intestinal (hindgut) hypothesis, and the upper intestinal (foregut) hypothesis. However, no single one of these theories necessarily precludes the others. Ghrelin, obestatin, nesfatin-1, cholecystokinin, gastric inhibitory peptide, glucagon-like peptide-1 (GLP-1), peptide YY, pancreatic polypeptide, and amylin, all have been shown to be involved in the changes of their respective plasma levels and energy balance after bariatric surgery. These gastroenteropancreatic hormones either acts via vagal afferent nerve or blood circulation, or both, on the arcuate nucleus of the hypothalamus (NPY/AgRP and POMC/CART neurons), and the subsequent neuroendocrine changes further regulate food intake, glucose homeostasis, and energy partition and expenditure. In functional magnetic resonance imaging (fMRI) studies, changes in blood oxygen level-dependent (BOLD) signal, enhanced satietygut hormone responses after gastric bypass has been proposed to be a causative mechanism by which anatomical alterations of the gut in obesity surgery modify behavioral and brain reward responses to food cues. Advances in drug development have already lead GLP-1 receptor agonist (Semaglutide) to treat obesity. On the other hand, a longer-acting amylin-analog, cagrilintide, would have even more pronounced weight-loss benefits, and will come to the market. The therapymanipulating gut hormones enables us to bridge the gap between lifestyle therapy and bariatric



Teppei Fujikawa

UT Southwestern Medical Center, USA

• Education

Period	Affiliation	Position
– 2003	Kyoto University	Ph.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	UT Southwestern Medical Center	Assistant Professor
– 2017-2020	UT Health San Antonio	Assistant Professor
– 2014-2017	UT Southwestern Medical Center	Instructor
– 2008-2013	UT Southwestern Medical Center	Postdoctoral Fellow

• Publications

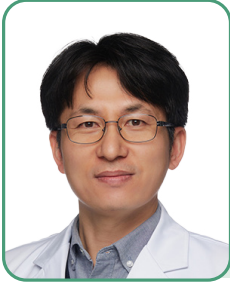
- Yoshida T, Fujitani M, Farmer S, Harada A, Shi Z, Lee JJ, Tinajero A, Singha AK, Fujikawa T. VMHdm/cSF-1 Neuronal Circuits Regulate Skeletal Muscle PGC1-alpha via the Sympathoadrenal Drive. *Mol Metab.* 101792. Epub 20230824. doi: 10.1016/j.molmet.101792. PMID: 37633515 *Selected as Cover Figure <https://www.sciencedirect.com/journal/molecular-metabolism/vol/77>
- Fujikawa T. Central regulation of glucose metabolism in an insulin-dependent and -independent manner. *J Neuroendocrinol.* e12941. doi: 10.1111/jne.12941
- Singha, A., Palavicini, JP., Pan, M., Farmer, S., Sandoval, D., Han, X., Fujikawa, T. Leptin Receptors in RIP-Cre25Mgn neurons Mediate Anti-Dyslipidemia Effects of Leptin in Insulin-Deficient Mice. *Frontiers Endocrinology.* 11:588447
- Singha, A.K., Yamaguchi, J., Gonzalez, N.S., Ahmed, N., Toney, G.M., Fujikawa, T. Glucose-Lowering by Leptin in the Absence of Insulin Does Not Fully Rely on the Central Melanocortin System in Male Mice. *Endocrinology*
- Fujikawa, T., Castorena, C.M., Pearson, M., Kusminski, C.M., Ahmed, N., Battiprolu, P.K., Kim, K.W., Lee, S., Hill, J.A., Scherer, P.E., Holland, L.W., and Elmquist, J.K., SF-1 Expression in the Hypothalamus is Required for Beneficial Metabolic Effects of Exercise. *eLife*

Symposium 2

Decoding VMH Regulation of Food Intake in Adults

Teppey Fujikawa (UT Southwestern Medical Center, USA)

NR5A1, also known as steroidogenic factor-1 (SF-1), is expressed in the ventromedial hypothalamic nucleus (VMH) within the central nervous system (CNS). Deletion of Nr5a1 in the VMH (VMH^{Nr5a1}) in the prenatal or adolescent stage alters energy homeostasis upon high-fat feeding and disrupts metabolic adaptations to exercise, without affecting food intake. There is a conundrum concerning the role of VMH in regulating food intake. The classic studies using VMH-lesion showed that the VMH is key to the regulation of food intake. Intriguingly, a majority of studies investigating effects of deletion of genes in the VMH using Sf-1-BAC-Cre mice suggest that the VMH does not regulate food intake. Recent studies using optogenetics and chemogenetics, however, demonstrate that manipulation of VMH neuronal activities can alter food intake. These “discrepancies” among studies outlined above likely stem from the timing of genetic manipulation, specifically whether it occurs during developmental including adolescent or adult stages. We hypothesize that NR5A1 in the VMH in adults plays a key role in the regulation of food intake. To decipher the role of VMH^{Nr5a1} in the regulation of food intake, we ablated Nr5a1 in the VMH in adults using an adeno-associated virus approach. We found that mice lacking Nr5a1 in the VMH in adults (Adult-VMH^{ΔNr5a1}) increase food intake and gain body weight substantially. This is in stark contrast to the prenatal or adolescent manipulation of Nr5a1. Using electrophysiological and RNA omics approaches, we found that deletion of VMH Nr5a1 in adults has profound effects on transcriptional regulation in the hypothalamus, leading to decreases in VMH neuronal activities. These studies highlight the functional differences of NR5A1 in the VMH between adolescents and adults.



Ki Woo Kim

Yonsei University, Korea

• Education

Period	Affiliation	Position
- 2009-2013	UT-Southwestern Medical Center, Dallas, TX	Postdoctoral Fellow
- 2004-2009	UT-Southwestern Medical Center, Dallas, TX	Ph.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2023-Present	Yonsei University College of Dentistry	Professor
- 2018-2022	Yonsei University College of Dentistry	Associate Professor
- 2013-2018	Yonsei University Wonju College of Medicine	Assistant, Associate Professor

• Publications

- Astrocytic FoxO1 in the Hypothalamus Regulates Metabolic Homeostasis by Coordinating Neuropeptide Y Neuron Activity. Doan KV, Tran LT, Yang DJ, Ha TTA, Mai TD, Kim SK, DePinho RA, Shin DM, Choi YH, Kim K. W. *Glia*. 71(12): 2735-2752. doi: 10.1002/glia.24448. Epub
- Mitochondria-derived peptide SHLP2 regulates energy homeostasis through the activation of hypothalamic neurons. Kim SK, Tran LT, NamKoong C, Choi HJ, Chun HJ, Lee YH, Cheon M, Chung C, Hwang J, Lim HH, Shin DM, Choi YH, Kim K.W. *Nat. Commun*. 14(1):4321. doi: 10.1038/s41467-023-40082-7
- Primary cilia regulate adaptive responses to fasting. Yang DJ, Tran LT, Yoon SG, Seong JK, Shin DM, Choi YH, and Kim KW. *Metab. Clin. Exp*. 135:155273. doi: 10.1016/j.metabol.2022.155273
- Ventromedial Hypothalamic Primary Cilia Control Energy and Skeletal Homeostasis. Sun JS, Yang DJ, Kinyua AW, Yoon SG, Seong JK, Kim J, Moon SJ, Shin DM, Choi YH, and Kim KW. *J. Clin. Invest*. 131(1):e138107. doi: 10.1172/JCI138107
- FoxO1 regulates leptin-induced mood behavior by targeting tyrosine hydroxylase Metabolism. Son DH, Doan KV, Yang DJ, Sun JS, Kim SK, Kang N, Kang JY, Paik JH, DePinho RA, Choi YH, Shin DM, Kim K.W. *Metab. Clin. Exp*. 91:43-52

Symposium 2

A Microbiota-Derived Short Chain Fatty Acid Targets the Hypothalamus and Regulates Energy Balance

Ki Woo Kim (Yonsei University, Korea)

The microbiota-derived short-chain fatty acid (SCFA) butyrate is known to act beyond the gut to influence host metabolism, including its central nervous system regulation of appetite and energy homeostasis. However, mechanistic insights into central butyrate metabolic actions are undetermined. Here we showed that butyrate directly modulates primary cilia of the agouti-related peptide (AgRP) neurons in the hypothalamic arcuate nuclei to promote its anorexigenic and metabolic effects on glucose homeostasis. Butyrate treatment, either via peripheral or central administration, markedly increased histone acetylation and ciliogenesis in the hypothalamus, suppressing food intake to benefit whole-body metabolism. Disruption of primary cilia in the entire hypothalamus or specifically in the AgRP neurons, but not in the pro-opiomelanocortin (POMC) or ventromedial hypothalamus (VMH) neurons, abolished butyrate metabolic effects. Mechanistically, deletion of primary cilia impaired cellular expression of the butyrate receptor, GPR41/FFAR3, in the AgRP neurons and eradicated its inhibitory action on these neurons.

Symposium 3

Possibilities and Prospects of Digital Therapeutics for Metabolic Diseases

Chairpersons

Won-Young Lee

Sungkyunkwan University, Korea

Jung Hwan Kim

Eulji University, Korea

Speakers

Sang Youl Rhee

Kyung Hee University, Korea

Hyung Jin Choi

Seoul National University, Korea

Min Kyu Han

Kakao Healthcare Corp., Korea

Panel Discussion

Young Sang Lyu

Chosun University, Korea

Byoungduck Han

Korea University, Korea



Sang Youl Rhee

Kyung Hee University, Korea

• Education

Period	Affiliation	Position
– 2006-2008	Kyung Hee University	Ph.D.
– 2003-2005	Kyung Hee University	M.Sc.
– 1995-2001	Kyung Hee University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2011-Present	Kyung Hee University	Professor
– 2018-2019	Scripps Research Translational Science	Visiting Scholar

• Committee Memberships

- Committee of IT Integrated Management of Metabolic Syndrome
- Committee of Clinical Practice Guideline

• Publications

- Park S, *et al.* Efficacy of information and communication technology interventions for the management of diabetes mellitus: An umbrella review and evidence map
- Lee Y, *et al.* Weight Management Health Note, a Mobile Health Platform for Obesity Management Developed by the Korean Society for the Study of Obesity
- Kim S, *et al.* Association between antidiabetic drugs and the incidence of atrial fibrillation in patients with type 2 diabetes: A nationwide cohort study in South Korea
- Park S, *et al.* Real-World Evidence of a Hospital-Linked Digital Health App for the Control of Hypertension and Diabetes Mellitus in South Korea: Nationwide Multicenter Study
- Kim S, *et al.* Effectiveness of Information and Communications Technology-Based Interventions for Obesity and Metabolic Syndrome

Symposium 3

Possibility of Digital Therapeutics for Treatment and Management of Metabolic Diseases

Sang Youl Rhee (Kyung Hee University, Korea)

The field of digital therapeutics for metabolic diseases, including obesity, prediabetes, and diabetes mellitus, is evolving with significant advancements in technology and patient care. This new frontier in healthcare leverages digital platforms to deliver personalized, adaptive treatment solutions that cater to the unique health profiles of individuals. Central to this approach is the utilization of digital tools that support disease monitoring and management, enhancing the accuracy and effectiveness of treatments.

These technologies are shaping the future of metabolic disease management by facilitating better patient engagement and adherence to treatment protocols. Digital therapeutics also integrate seamlessly into patients' daily lives, empowering them to take an active role in their health management. Furthermore, the use of telemedicine services expands access to healthcare professionals and specialized care, making medical advice more accessible to patients regardless of their location.

However, the expansion of digital therapeutics also brings to light critical challenges such as safeguarding patient data and ensuring that all patients have equitable access to these new technologies. Addressing these concerns is essential for the responsible development and deployment of digital therapeutics. This lecture will delve into both the opportunities and challenges presented by digital therapeutics in the management of metabolic diseases, advocating for a balanced approach that maximizes benefits while minimizing risks.



Hyung Jin Choi

Seoul National University, Korea

• Education

Period	Affiliation	Position
– 2013	Seoul National University	Ph.D.
– 2011	Seoul National University	M.S.
– 2002	Seoul National University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2015-Present	Seoul National University	Professor
– 2012-2015	Chungbuk National University Hospital	Clinical Assistant Professor
– 2010-2012	Seoul National University Hospital	Endocrinology Fellow
– 2009-2010	Korea National Institute of Health	Resercher (Public Health Doctor)
– 2003-2007	Seoul National University Hospital	Internal Medicine Resident

• Committee Memberships

- Korean Society for the Study of Obesity
- Korean Endocrine Society
- Korean Society for Brain and Neural Sciences
- Homeostasis Section of Korean Society for Brain and Neural Sciences

• Publications

- GLP-1 Increases Cognitive Satiating via Hypothalamic Circuits in Mice and Humans, Science (in revision)
- Hypothalamic neuronal activation in non-human primates drives naturalistic goal-directed eating behavior, Neuron
- Lateral Hypothalamic Leptin Receptor Neurons Drive Hunger-gated Food-seeking and Consummatory Behaviours, Nature Communications
- Machine-learning analysis identifies digital behavioral phenotypes for engagement and health outcome efficacy of mHealth interventions for obesity: post-hoc analyses of a randomized trial, Journal of Medical Internet Research
- Multidimensional Cognitive Behavioral Therapy for Obesity Applied by Psychologists Using a Digital Platform: Open-Label Randomized Controlled Trial, JMIR mHealth and uHealth

Symposium 3

Psychological Basis for the Effectiveness of Digital Therapeutics for Metabolic Diseases

Hyung Jin Choi (Seoul National University, Korea)

Obesity and eating behavior issues arise from a complex interplay of behavioral, cognitive, emotional, motivational, and anthropometric factors. Addressing these multifaceted aspects is essential for effective weight control and behavior change. Cognitive structuring and emotional regulation are critical for engagement in digital therapeutics (DTx).

Personalized DTx, which provide tailored feedback based on individual data from multiple domains, are more effective for long-term lifestyle changes. However, most current app-based interventions use generic strategies, limiting engagement and efficacy. Tailored feedback, leveraging real-time and baseline multifactorial measures, can enhance DTx's effectiveness.

Advanced digital technologies in behavioral medicine offer new opportunities for accessible and effective daily interventions. Monitoring and managing both physical and mental health are crucial for successful obesity DTx. Implementing a health coach system and conducting adequate randomized controlled trials (RCTs) with active placebos, grounded in evidence-based psychological theories, are recommended.

Adapting to digital transformation requires new policies at various levels, including community, city, government, and industry, to support the integration and effectiveness of DTx in combating obesity.



Min Kyu Han

Kakao Healthcare Corp., Korea

• Education

Period	Affiliation	Position
- 2011-2014	Graduate School of Public Health, Seoul National University	M.A.
- 1988-2005	Doctor of Medicine at Seoul National University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2022-Present	Kakao Healthcare Corp	Director
- 2021-2022	Jiahui Health (Shanghai)	Family Physician
- 2016-2021	SK (Hynix) International Medical Center	Director
- 2014-2015	Department of Family Medicine, Seoul National University Hospital	Assistant Professor
- 2012-2014	Department of Family Medicine, Seoul National University Hospital	Clinical Fellow

• Committee Memberships

- KIC Program Committee
- Korean Association of Family Medicine
- Korean Society for the Study of Obesity

• Publications

- Lowering Barriers to Health Risk Assessments in Promoting Personalized Health Management. J. Pers. 316. <https://doi.org/10.3390/jpm14030316>
- A Mobile-Based Comprehensive Weight Reduction Program for the Workplace (Health-On): Development and Pilot Study. - JMIR Mhealth Uhealth
- Importance of Active Participation in Obesity Management Through Mobile Health Care Programs: Substudy of a Randomized Controlled Trial. - JMIR Mhealth Uhealth
- Assessment of Association between Metabolic Syndrome and Serum Uric Acid Level in Subjects Who Visited the Health Promotion Center. - Korean J Fam Pract

Symposium 3

Suggestions for Integrating Digital Therapeutics into Conventional Medical Settings

Min Kyu Han (Kakao Healthcare Corp., Korea)

The integration of digital therapeutics into conventional medical settings presents a transformative opportunity to enhance patient care and clinical outcomes. Digital therapeutics leverage technology to deliver evidence-based therapeutic interventions directly to patients, offering a new dimension to healthcare that complements traditional methods. This lecture will explore effective strategies for incorporating digital therapeutics into existing medical practices, emphasizing the synergy between technological innovation and conventional healthcare.

Key topics will include the use of patient-generated health data (PGHD) to personalize treatments, the role of precision medicine in improving therapeutic efficacy, and the importance of patient-reported outcomes (PROs) in monitoring and adjusting treatment plans. By harnessing real-time data and patient feedback, healthcare providers can tailor interventions more precisely, leading to better adherence and improved health outcomes.

The discussion will also cover the challenges and solutions in integrating these technologies, such as data privacy concerns, the need for interoperability between digital and traditional systems, and the importance of training healthcare professionals to effectively utilize these tools. Through case studies and practical examples, attendees will gain insights into the successful adoption of digital therapeutics in various medical settings.

Ultimately, this lecture aims to provide a comprehensive framework for seamlessly blending digital therapeutics with conventional medical practices, paving the way for a more efficient, personalized, and patient-centered healthcare system.

Symposium 4

International Collaboration 1

Chairpersons

Kun-Ho Yoon

The Catholic University of Korea, Korea

Michele Mae Ann Yuen

Queen Mary Hospital, Hong Kong, China

Speakers

Michael D. Jensen

Mayo College of Medicine, USA

Michael A. Nauck

Ruhr-University Bochum, Germany

Gary Sweeney

York University, Canada

Sae Won Kim

ProGen Co. Ltd., Korea



Michael D. Jensen

Mayo College of Medicine, USA

• Education

Period	Affiliation	Position
– 1982-1985	Mayo Graduate School of Medicine	Fellow
– 1980-1982	Mayo Graduate School of Medicine	Resident
– 1980	St. Luke's Hospital of Kansas City	Resident
– 1979	U.M.K.C. School of Medicine	Medical Student

• Affiliations / Experience

Period	Affiliation	Position
– 1985-Present	Mayo Clinic	Consultant

• Committee Memberships

- North American Association for the Study of Obesity/The Obesity Society
- American Society for Nutrition
- NIH Integrative Physiology of Obesity and Diabetes Study Section
- NIH Clinical and Integrative Diabetes and Obesity
- NHLBI Expert Panel to Update the Report on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults
- NIDDK DDK-E, beginning October

• Publications

- Jensen MD, Haymond MW, Rizza RA, Cryer PE, Miles JM: Influence of body fat distribution on free fatty acid metabolism in obesity. *J. Clin. Invest.* 83:1168-1173
- Jensen MD: Gender differences in regional fatty acid metabolism before and after meal ingestion. *J. Clin. Invest.* 96:2297-2303
- Levine JA, Eberhardt NL, Jensen MD. Role of Non-exercise Activity Thermogenesis (NEAT) in Resistance to Fat Gain in Humans. *Science* 283: 212-214
- Nielsen S, Guo ZK, Johnson CM, Hensrud DD, Jensen MD. Splanchnic Lipolysis in Human Obesity. *J. Clin. Invest.* 113: 1582 - 1588
- Tchoukalova, Y, Votruba, SB, Tchkonja, T, Giorgadze, N, Kirkland, JL, Jensen, MD. Regional differences in cellular mechanisms of adipose tissue gain with overfeeding. *PNAS* 107(42):18226-31

Symposium 4

Sex Differences in Adipose Tissue Metabolism as It Relates to Risk of Diabetes

Michael D. Jensen (Mayo College of Medicine, USA)

From an epidemiological perspective, it is known that there are differences in insulin resistance, diabetes and CVD risk between males and females. Because obesity is a common denominatory risk factor, it is important to understand how adiposity difference between adult males and females. There are major sex differences in body composition/cellularity, and this is accompanied by significant sex differences in adipose tissue fatty acid release as well as adipose tissue fatty acid storage. Women have more body fat and more adipocytes than men at any given BMI.

Insulin resistance is a well-recognized risk factor for diabetes, but it is important to recognize that there are different measures of insulin resistance for different tissues. HOMA-IR, which is a composite of insulin and glucose concentrations, estimates whole body insulin resistance with respect to glucose metabolism. A low value indicates the individual is more insulin sensitive with respect to glucose metabolism. ADIPO-IR is a measure of adipose tissue insulin resistance with regards to lipolysis – it is the product of insulin and FFA concentrations; again, a low value indicates the individual is more insulin sensitive with respect to adipose tissue lipolysis. Except for plasma glucose concentrations, which statistically speaking cannot be employed as a predictor of diabetes, insulin resistance with respect to glucose metabolism (HOMA-IR) the best predictor of future Type 2 Diabetes. After adjusting for age, sex, family history of diabetes, ethnicity, physical activity, and smoking status, greater baseline ADIPO-IR predicts a greater risk of incident dysglycemia. Of interest, the normal values for ADIPO-IR are different in adult males and females.

The issue of insulin resistance, and the sex differences surrounding it, is important because diabetes is more prevalent in men than in women, especially in middle-aged populations. Peak in diabetes prevalence occurs age 65-69 in men and 70-79 years of age in women. Women with diabetes have a greater relative cardiovascular disease risk than men with diabetes. Could this relate to the issue of lipotoxicity? It is known that fatty acids act as both a fuel for cells and as signaling molecules. Fatty acids in the circulation can arise from adipose tissue (FFA), from meals (chylomicrons) and in the form of lipoproteins (VLDL). Women have greater FFA release relative to energy needs, but very modestly greater plasma FFA concentrations. Both men and women with upper body/visceral obesity (which is more common in men) typically have subnormal suppression of FFA after meals; this can cause insulin resistance in other tissues via lipotoxicity. It has been reported that greater postprandial chylomicronemia are a risk factor for metabolic diseases and adipose a main site for meal fatty acid storage. There are differences in the adipose depot storage of both meal fatty acids and FFA, with women having greater storage capacity than men, e.g. the efficiency of meal fat storage in subcutaneous fat is greater in women than men. There are interesting adipose depot meal fat storage differences between the sexes, also. The greater clearance of chylomicrons by adipose tissue in women maintains lower postprandial triglyceride concentrations, which likely protects lean tissue from potentially lipotoxic effects of meal-derived fatty acids. We've also found that the efficiency of FFA storage in subcutaneous fat in women is greater than men.

This greater recycling of FFA back into adipose tissue allows increase lipolysis in women without as much of an increase in FFA concentrations. In summary, fat storage capacity is greater in women than men, probably related to both more body fat, greater numbers of adipocytes and (in leg fat) greater lipogenic machinery per adipocyte. Compared with men, adipose tissue in women appears to sequester fatty acids and serves as "overflow" storage site for non-oxidized fatty acids, serving to protect lean tissue.



Michael A. Nauck

Ruhr-University Bochum, Germany

• Education

Period	Affiliation	Position
– 1975-1980	University Freiburg	M.S
– 1973-1975	Heinrich Heine University Düsseldorf	M.S

• Affiliations / Experience

Period	Affiliation	Position
– 2015-Present	Head of Clinical Research, Ruhr-University Bochum, St. Josef-Hospital	Research Position
– 2000-2015	Diabetes Centre Bad Lauterberg	Head Physician
– 1993-2000	Ruhr-University Bochum, Knappschafts-Krankenhaus	Consultant
– 1981-1993	University Göttingen, Gastroenterology and Endocrinology	Physician in Training
– 1980-1981	University Göttingen, Biochemistry	Scientist

• Committee Memberships

- ADA/EASD Guideline Writing Group
- Working Group (ADA/EASD/Diabetes UK/ Endocrine Society) Diabetes Remission

• Publications

- Drucker DJ, Nauck MA. The incretin system: glucagon-like peptide-1 receptor agonists and dipeptidyl peptidase-4 inhibitors in type 2 diabetes. *Lancet*. 368:1696-705
- Nauck M, Stöckmann F, Ebert R, Creutzfeldt W. Reduced incretin effect in Type 2 (non-insulin-dependent) diabetes. *Diabetologia*. 29:46-54
- Nauck MA, Heimesaat MM, Ørskov C, Holst JJ, Ebert R, Creutzfeldt W. Preserved incretin activity of glucagon-like peptide 1 [7-36 amide] but not of synthetic human gastric inhibitory polypeptide in patients with type-2 diabetes mellitus. *J Clin Invest*. 91(1):301-7
- Nauck MA, Kleine N, Ørskov C, Holst JJ, Willms B, Creutzfeldt W. Normalization of fasting hyperglycaemia by exogenous glucagon-like peptide 1 (7-36 amide) in type 2 (non-insulin-dependent) diabetic patients. *Diabetologia*. 36(8):741-4
- Nauck MA, Müller TD. Incretin hormones and type 2 diabetes. *Diabetologia*

Symposium 4

The Role of GIP/or Glucagon Receptor Agonism in the Treatment of Obesity

Michael A. Nauck (Ruhr-University Bochum, Germany)

In recent years, GLP-1 receptor agonists (GLP-1 RA) have been characterized as highly effective weight loss agents for subjects with and without diabetes mellitus, and liraglutide, as well as semaglutide have been approved for the treatment of obesity. Currently, dual or triple agonists not only activating GLP-1 receptor agonists are under development or even have been approved (the dual GIP/GLP-1 receptor agonists tirzepatide). What is the contribution of stimulating GIP or glucagon receptors in addition to those for GLP-1?

In rodent animals, intracerebroventricular and peripheral administration of long-acting GIP agonists (not of the native GIP molecule) reduce food (energy) intake and body weight in animals expressing a functional GIP receptor (not in those without), indicating that GIP reduces body weight in a receptor-dependent manner. This is in contrast to the earlier findings that GIP receptor knock-out mice are protected from weight gain induced by high-fat feeding, indicating an obesogenic role for GIP. Along these lines, genetic studies indicate lower body weight in those with loss-of-function polymorphisms of the GIP receptor. In human studies, exogenous administration of GIP did not reduce ad libitum energy intake, a robust effect observed with GLP-1. Rather, the reduction in energy intake observed with GLP-1 alone was in part counteracted by the additional administration of GIP. To complicate matters more, GIP receptor antagonists have led to weight reduction in animal studies, especially in combination with GLP-1 receptor agonists. At present, it seems to be difficult to come up with firm conclusions regarding the role of GIP in regulating body weight in human subjects. GIP receptor agonism may mitigate nausea and vomiting elicited by GLP-1 RAs due to central nervous mechanisms.

Stimulation of the glucagon receptor has some limited effects reducing appetite and food intake, but also leads to increased energy expenditure. For subjects with diabetes mellitus, glucagon receptor agonism had been thought to potentially lead to deleterious rises in glycaemia. However, recent findings suggest intra-islet elevations of glucagon may stimulate insulin secretion and help lower plasma glucose.

As a consequence, dual agonists interacting with GLP-1 and glucagon receptors (e.g., survodutide) appear to provide more weight loss than selective GLP-1 receptor agonists do.

The GIP/GLP-1/glucagon triple receptor agonist retatrutide elicits the greatest weight loss (compared to single and dual agonists), and in animal experiments retatrutide-induced weight loss is not accompanied by a reduction in energy expenditure like weight loss associated with caloric restriction.



Gary Sweeney

York University, Canada

• Education

Period	Affiliation	Position
- 1994	University of Glasgow	Ph.D.
- 1990	University of Glasgow	B.Sc

• Affiliations / Experience

Period	Affiliation	Position
- 2001-Present	York University Toronto	Professor
- 1996	Hospital for Sick Children Toronto	Fellow

• Committee Memberships

- Faculty search committee
- Innovation & Partnerships Working Group
- Heart & Stroke Foundation of Canada
- Canadian Institutes of Health Research

• Publications

- *Molecular Metabolism* (2024) May;83:101921
- *Clinical and Translational Science* 2024 Mar;17(3):e13758
- *Diabetes* (2021) 70(1):51-61
- *EMBO Reports* (2019) 20(10):e47911
- *Proc Natl Acad Sci U S A.* 2018 115(7):1576-1581

Symposium 4

Treatment of Metabolic Syndrome Complications with Adiponectin Therapeutics

Gary Sweeney (York University, Canada)

A strong negative correlation between circulating adiponectin levels and cardiometabolic diseases has been well-documented. Research has shown that adiponectin has cardioprotective, insulin sensitizing and direct beneficial metabolic effects. Thus, therapeutic approaches to enhance adiponectin action are widely considered to be desirable and adiponectin mimetic drug discovery projects have been incorporated in pipelines of major pharma in recent years. The complexity of adiponectin structure and function means that recombinant adiponectin itself is less than ideal as a therapeutic. This lecture will review our research on the physiological effects and molecular mechanisms of action of adiponectin in cardiometabolic tissues. Scenarios where enhancing adiponectin action would be of most clinical value will be reviewed. Recent progress on discovery of adiponectin-based therapeutics will be summarized and recent data to test the effects of the peptide ALY688 in cellular and preclinical animal models will be presented. Preliminary data indicate that ALY688, which will enter phase I clinical trials soon, is a promising new drug candidate for use in cardiometabolic disease and beyond.

Keywords: adiponectin, metabolism, signal transduction, autophagy, therapeutic.



Sae Won Kim

ProGen Co. Ltd., Korea

• Education

Period	Affiliation	Position
– 2007-2014	Pohang University of Science and Technology (POSTECH)	Ph.D.
– 2003-2007	Johns Hopkins University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	ProGen Co., Ltd.	Director
– 2023-Present	Yonsei University, College of Medicine	Adjunct Professor
– 2023-2023	SL MetaGen, Inc.	Chief Business Officer
– 2014-2023	SL BiGen, Inc.	Chief Scientist

• Publications

- Hwang I, Jin HT, Kang MC, Kim TY, Sung YC, Kim SW. Generation and functional characterization of a multigene-modified NK101 cell line exerting diverse mechanisms of antitumor action. *OncolImmunology* 2022;11(1):2014655
- Kim SW, Park HW, Kim H, Lee S, Choi SY, Park Y, Lee SW. Evaluating Antitumor Activity of Kiatomab by Targeting Cancer Stem Cell-Specific KIAA1114 Antigen in Mice. *Immune Network* 2019 Nov 19;19(6):e43
- Yang HG, Kang MC, Kim TY, Hwang I, Jin HT, Sung YC, Eom KS, Kim SW. Discovery of a novel natural killer cell line with distinct immunostimulatory and proliferative potential as an alternative platform for cancer immunotherapy. *Journal for ImmunoTherapy of Cancer* 2019; 7(1):138
- Kim SW, Yang HG, Kang MC, Lee S, Namkoong H, Lee SW, Sung YC. KIAA1114, a full-length protein encoded by the trophinin gene, is a novel surface marker for isolating tumor-initiating cells of multiple hepatocellular carcinoma subtypes. *Oncotarget* 2014; 5(5):1226-40
- Kim SW, Kim SJ, Park SH, Yang HG, Kang MC, Choi YW, Kim SM, Jeun SS, Sung YC. Complete regression of metastatic renal cell carcinoma by multiple injections of engineered mesenchymal stem cells expressing dodecameric TRAIL and HSV-TK. *Clinical Cancer Research* 2013; 19(2):415-27

Symposium 4

PG-102, a Bispecific GLP-1/GLP-2 Receptor Agonist for the Treatment of Obesity and Type 2 Diabetes

Sae Won Kim (ProGen Co. Ltd., Korea)

PG-102 is a first-in-class, 'heterodimeric' Fc-fusion protein dual agonist targeting GLP-1R and GLP-2R simultaneously. PG-102 has an experimentally optimized receptor potency balance with GLP-1-favored agonism suitable for obesity and type 2 diabetes (T2D) treatment and GLP-2, albeit with weaker activity, sufficient to reduce intestinal permeability and (gut-derived) chronic low-grade inflammation.

PG-102 is currently being investigated in phase 1b multiple ascending dose trial in Korea and has shown following benefits to date: (i) less frequent dosing; (ii) favorable safety and tolerability profile; (iii) avoidance of lean mass loss (in obesity); (iv) outstanding glucose-lowering effects (in T2D); and (v) amelioration of metabolic endotoxemia. First, the phase 1a single-ascending dose (SAD) trial investigating PG-102 in healthy volunteers revealed distinct pharmacokinetic (PK) profile with delayed Tmax (72-96 hours) and high area under the curve (AUClast). PK modeling projected potential for monthly dosing, proposing its capacity to increase patient compliance and adherence. Second, PG-102 demonstrated favorable safety and tolerability profile, as shown by lower incidence of gastrointestinal side effects compared to competing drugs in similar clinical settings (phase 1a in healthy volunteers). Third, in the preclinical model of diet-induced obese (DIO) mice, PG-102 exhibited more fat mass loss and less lean mass loss than semaglutide, while inducing similar degree of body weight loss. Of note, increasing PG-102 dose resulted in greater reductions in fat mass, but lean mass remained unchanged. Fourth, in obese, diabetic db/db mice, PG-102 exerted superior glucose-lowering effects than semaglutide, tirzepatide and retatrutide, due to its stronger capacity to protect pancreatic beta cells and enhance glucose uptake. Lastly, in both DIO and STAMTM mouse models (for metabolic dysfunction-associated steatohepatitis), PG-102 treatment lowered serum LPS and liver enzyme (ALT or AST) levels by increasing intestinal permeability. These results suggest PG-102 can control low-grade systemic inflammation which drives various types of metabolic comorbidities.

Based on above-mentioned patient-centric and efficacy-focused benefits, we believe that PG-102 can gain a footing in the highly competitive GLP-1 receptor agonist market. ProGen plans to further explore safety, tolerability and clinical efficacy of PG-102 in upcoming phase 2 obesity and type 2 diabetes trials.

Sponsored Session 1

SELECT the Outcome Beyond Weight Loss

Chairpersons

Jae-Heon Kang

Sungkyunkwan University, Korea

Sang Yong Kim

Chosun University, Korea

Speakers

Filip K. Knop

Novo Nordisk/ University of Copenhagen, Denmark

Sang Yeoup Lee

Pusan National University, Korea

Darae Kim

Sungkyunkwan University, Korea



Filip K. Knop

Novo Nordisk/ University of Copenhagen, Denmark

• Education

Period	Affiliation	Position
– 2007	University of Copenhagen, Denmark	Ph.D.
– 2002	University of Copenhagen, Denmark	MD

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Novo Nordisk	Senior Medical Officer
– 2019-Present	Gentofte Hospital, University of Copenhagen	Professor, Consultant Endocrinologist
– 2018-Present	Steno Diabetes Center Copenhagen	Professor, Consultant Endocrinologist
– 2016-Present	Department of Clinical Medicine, University of Copenhagen	Professor
– 2015-2018	Gentofte Hospital, University of Copenhagen	Consultant Endocrinologist

• Committee Memberships

- Member of Several National and International Committees.

• Publications

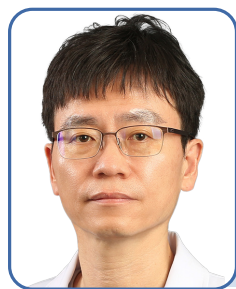
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- Kootte RS, Levin E, Salojärvi J, Smits LP, Hartstra AV, Udayappan SD, Hermes G, Bouter KE, Boekschoten M, Holst JJ, Knop FK et al. Improvement of insulin sensitivity after lean donor feces in metabolic syndrome is driven by baseline intestinal microbiota composition. *Cell Metabolism* 2017 Oct 3;26(4):611-619

Sponsored Session 1

SELECTing the Clinical Outcome of Semaglutide 2.4mg from its Physiological Benefits

Filip K. Knop (Novo Nordisk/ University of Copenhagen, Denmark)

Glucagon-like peptide 1 (GLP-1) receptor (GLP-1R) agonists (GLP-1RA) are used in the management of type 2 diabetes and overweight or obesity affecting a broad range of metabolic pathways associated with glucose metabolism, appetite, energy homeostasis, and inflammation. The GLP-1RA semaglutide, 94% homologous to human GLP-1 has a half-life of ~1 week after subcutaneous delivery enabling weekly dosing. Similar to native GLP-1, semaglutide exerts a wide variety of effects through activation of GLP-1Rs expressed in the gastrointestinal tract, heart, kidneys and brain. Semaglutide, administered subcutaneously once a week at a dose of 2.4 mg induces weight loss in people living with obesity and reduces cardiovascular risk in individuals with overweight/obesity and established cardiovascular disease. Several lines of evidence suggest that semaglutide-induced weight loss is mediated through direct interaction with GLP-1Rs in the brainstem, septal nuclei, hypothalamus and circumventricular organs. This directly and indirectly affects the activity of neural pathways involved in food preference, reward, appetite and satiety thereby reducing food intake and body weight. In terms of semaglutide's cardioprotective mode of action, semaglutide has pleiotropic direct and indirect effects on several physiological functions and cardiovascular risk factors, including circulating lipids, blood pressure and systemic low-grade inflammation, ultimately reducing the risk of cardiovascular events in individuals with overweight/obesity and established cardiovascular disease. This presentation will focus on the translation of GLP-1 physiology to therapeutic benefits of semaglutide in individuals living with overweight/obesity and high risk of cardiovascular disease.



Sang Yeoup Lee

Pusan National University, Korea

• Education

Period	Affiliation	Position
– 2001-2004	Pusan National University School of Medicine	Ph.D.
– 1995-1997	Pusan National University School of Medicine	M.Sc.
– 1986-1993	Pusan National University School of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Pusan National University School of Medicine	Vice President of Medical Affairs
– 2005-Present	Department of Medical Education, Pusan National University School of Medicine	Professor
– 2000-Present	Depart. of Family Medicine, Pusan National University Yangsan Hospital	Professor
– 2000-2005	Depart. of Family Medicine, Pusan National University School of Medicine	Professor
– 2007-2008	Endocrine Research Unit, Mayo Clinic, MN, USA	Visiting Scientist

• Committee Memberships

- Section of Family Medicine and Primary Care, Frontiers in Public Health
- Section of Family Medicine and Primary Care, Frontiers in Medicine
- The Korea Association of Medical Colleges
- Yangsan-si Mom Café Community

• Publications

- Lee SR, Cho YH, Park EJ, Lee Y, Choi JI, Kwon RJ, Son SM, Lee SY. The association between reproductive period and handgrip strength in postmenopausal women: A nationwide cross-sectional study. *Menopause*. 2024;31(1):25-32
- Lee HY, Yune SJ, Lee SY, Im S, Kam BS. The impact of repeated item development training on the prediction of medical faculty's item difficulty index. *BMC Med Educ*. 2024;24:599
- Kadowaki T, Isendahl J, Khalid U, Lee SY, Nishida T, Ogawa W, Tobe K, Yamauchi T, Lim S; STET 6 investigators. Semaglutide once a week in adults with overweight or obesity, with or without type 2 diabetes in an east Asian population (STEP 6): a randomised, double-blind, double-dummy, placebo-controlled, phase 3a trial. *Lancet Diabetes Endocrinol* 2022;10(3):193-206
- Tak YJ, Lee SY. Long-Term Efficacy and Safety of Anti-obesity Treatment: Where Do We Stand? *Curr Obes Rep* 2021;10(1):14-30
- Cho YH, Lee SY, Lee C, Park J, So Y, Kim SG, Kim KY. Effect of Schisandra chinensis Baillon extracts with regular exercise on muscle strength and muscle mass in older adults: a randomized, double-blinded, placebo-controlled trial. *AJCN* 2021;113(6):1140-1146

Sponsored Session 1

STEPping Forward: Managing Weight for East Asian Population with Obesity

Sang Yeoup Lee (Pusan National University, Korea)

Obesity is a global health concern, with the prevalence of obesity increasing worldwide. Various health complications are associated with overweight and obesity, including type 2 diabetes, prediabetes, hypertension, and cardiovascular disease, with the prevalence of these comorbidities increasing with higher BMI.

The WHO defines obesity as a BMI of 30 kg/m² or higher. However, due to differences in body composition and characteristics between Asian and non-Asian populations, the Korean Society for the Study of Obesity (KSSO) and the Japanese Society for the Study of Obesity define obesity in Japanese and Korean people as a BMI of 25 kg/m² or higher. Consistent with WHO guidelines for the Asia-Pacific region, the KSSO also categorizes obesity into class 1 (BMI 25–29.9 kg/m²), class 2 (BMI 30–34.9 kg/m²), and class 3 (BMI ≥35 kg/m²). Moreover, the Working Group on Obesity in China defines overweight as a BMI of 24.0 kg/m² or higher and obesity as 28.0 kg/m² or higher.

In STEP 6, adults from East Asia with obesity from South Korea and Japan, with or without type 2 diabetes, given semaglutide 2.4 mg once a week, had superior and clinically meaningful reductions in body weight and greater reductions in abdominal visceral fat area compared with placebo, representing a promising treatment option for weight management in this population. In STEP 7, for adults from East Asia in China, Hong Kong, Brazil, and South Korea who were overweight or obese, with or without type 2 diabetes, once-weekly subcutaneous semaglutide 2.4 mg as an adjunct to lifestyle intervention was superior to placebo in reducing body weight.

These findings align with the results of previous clinical trials, mostly conducted in global populations, with semaglutide 2.4 mg in participants with overweight or obesity, with or without type 2 diabetes.



Darae Kim

Sungkyunkwan University, Korea

• Education

Period	Affiliation	Position
- 2012-2017	Yonsei University Graduate School	Ph.D.
- 2004-2010	Yonsei University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2018-Present	Division of cardiology, Samsung Medical Center	Assistant Professor
- 2015-2018	Division of cardiology, Internal medicine, Severance Hospital, Yonsei University College of Medicine	Fellow/Clinical Instructor
- 2011-2015	Internal medicine, Severance Hospital, Yonsei University College of Medicine	Residency
- 2010-2011	Severance Hospital, Yonsei University College of Medicine	Intern

• Committee Memberships

- Korean Society of Heart Failure
- Korean Society of Echocardiography
- Korean Society of Circulation
- Korean Association of Internal Medicine

• Publications

- Prognostic Implications of Left Atrial Stiffness Index in Heart Failure Patients With Preserved Ejection Fraction, *JACC Cardiovasc Imaging*. 2023 Apr;16(4):435-445
- Impacts of Pre-transplant Panel-Reactive Antibody on Post-transplantation Outcomes: A Study of Nationwide Heart Transplant Registry Data *Korean Circ J*. 2024 Jun;54(6):325-335
- Three year post heart transplant outcomes of desensitized durable mechanical circulatory support patient *J. Heart Lung Transplant*. 2023 Oct;42(10):1408-1414
- Dapagliflozin attenuates diabetes-induced diastolic dysfunction and cardiac fibrosis by regulating SGK1 signaling, *BMC Med*. 2022 Sep 7;20(1):309

Sponsored Session 1

SELECTing the Future: Cardiovascular Outcome in Patients with Obesity/Overweight without Type 2 Diabetes

Darae Kim (Sungkyunkwan University, Korea)

This presentation focuses on the substantial cardiovascular risks posed by obesity, explored through the lens of the SELECT trial. This includes an in-depth analysis of clinical endpoints, illustrated with practical examples of atherosclerotic cardiovascular disease (ASCVD) and heart failure (HF).

The lecture highlights the SELECT trial, a significant study investigating the effects of semaglutide, a GLP-1 receptor agonist, on cardiovascular outcomes in this high-risk population. Semaglutide has previously shown efficacy in weight management and improving cardiovascular risk factors in patients with type 2 diabetes. The SELECT trial expands this research to patients with obesity but without diabetes, focusing on its potential to reduce major adverse cardiovascular events (MACE) such as non-fatal myocardial infarction, non-fatal stroke, and cardiovascular death.

Preliminary results from the SELECT trial are promising, indicating that semaglutide significantly lowers the incidence of MACE in the target population. The lecture emphasizes the trial's design, methodology, and key findings, providing insights into how semaglutide can be integrated into clinical practice to enhance cardiovascular outcomes. This session underscores the critical need for effective therapeutic interventions in managing cardiovascular risks associated with obesity.

Plenary Lecture 1

Chairperson

Jeong Taek Woo
Kyung Hee University, Korea

Speaker

Michael A. Nauck
Ruhr-University Bochum, Germany



Michael A. Nauck

Ruhr-University Bochum, Germany

• Education

Period	Affiliation	Position
- 1975-1980	University Freiburg	M.S
- 1973-1975	Heinrich Heine University Düsseldorf	M.S

• Affiliations / Experience

Period	Affiliation	Position
- 2015-Present	Head of Clinical Research, Ruhr-University Bochum, St. Josef-Hospital	Research Position
- 2000-2015	Diabetes Centre Bad Lauterberg	Head Physician
- 1993-2000	Ruhr-University Bochum, Knappschafts-Krankenhaus	Consultant
- 1981-1993	University Göttingen, Gastroenterology and Endocrinology	Physician in Training
- 1980-1981	University Göttingen, Biochemistry	Scientist

• Committee Memberships

- ADA/EASD Guideline Writing Group
- Working Group (ADA/EASD/Diabetes UK/ Endocrine Society) Diabetes Remission

• Publications

- Drucker DJ, Nauck MA. The incretin system: glucagon-like peptide-1 receptor agonists and dipeptidyl peptidase-4 inhibitors in type 2 diabetes. *Lancet*. 368:1696-705
- Nauck M, Stöckmann F, Ebert R, Creutzfeldt W. Reduced incretin effect in Type 2 (non-insulin-dependent) diabetes. *Diabetologia*. 29:46-54
- Nauck MA, Heimesaat MM, Ørskov C, Holst JJ, Ebert R, Creutzfeldt W. Preserved incretin activity of glucagon-like peptide 1 [7-36 amide] but not of synthetic human gastric inhibitory polypeptide in patients with type-2 diabetes mellitus. *J Clin Invest*. 91(1):301-7
- Nauck MA, Kleine N, Ørskov C, Holst JJ, Willms B, Creutzfeldt W. Normalization of fasting hyperglycaemia by exogenous glucagon-like peptide 1 (7-36 amide) in type 2 (non-insulin-dependent) diabetic patients. *Diabetologia*. 36(8):741-4
- Nauck MA, Müller TD. Incretin hormones and type 2 diabetes. *Diabetologia*

Plenary Lecture 1

GLP-1 Based Therapy of Obesity

Michael A. Nauck (Ruhr-University Bochum, Germany)

Glucagon-like peptide-1 is an insulinotropic gut hormone produced in entero-endocrine L-cells predominantly found in the distal small and large intestines. In 1993, this incretin hormone was discovered to lower plasma glucose in subjects with type 2 diabetes, and this was the basis for using GLP-1 receptor agonists for the therapy of type 2 diabetes. In 1992, µg amounts of GLP-1, when administered intracerebroventricularly, reduced energy intake in rodents. In 1998, appetite and ad libitum energy intake in healthy human subjects were reduced while receiving an intravenous infusion of GLP-1. In clinical trials in type 2 diabetes patients, body weight was consistently lowered, by 1-2 kg with exenatide b.i.d. and liraglutide, but now by 5-10 kg with semaglutide (selective GLP-1 receptor agonist) and tizapatide (a GIP/GLP-1 dual receptor agonist). Weight loss with the same agents is greater in non-diabetic obese subjects, and they are approved for the treatment of obesity in the absence of diabetes mellitus.

GLP-1 receptor agonists like liraglutide and semaglutide specifically enter small areas of the brain, which are equipped with GLP-1 receptors and are involved in the regulation of energy balance (intake and expenditure), like the arcuate nucleus in the hypothalamus. GLP-1 receptors are found on anorexigenic POMC/CART neurons, and inhibit orexigenic Agouti-related peptide/ NPY neurons, with projections to the brain stem.

Weight loss in response to GLP-1 RA therapy in non-diabetic subjects probably is greater, because there is no reduction in HbA1c, such that there is no reduction in glucosuria (energy loss through urinary excretion).

Since the main (or even only) effect of GLP-1 receptor agonists is the reduction in food (energy) intake due to reduced appetite and increased satiety, weight lost as the consequence of GLP-1 RA therapy will be regained after discontinuing treatment. There is substantial inter-individual variability regarding the extent of weight loss, such that some subjects lose a lot, and others very little body weight, which we cannot predict.

Obesity associated medical problems can meaningfully be addressed by GLP-1 RA treatment: Cardiovascular events are reduced in obese subjects with pre-existing CV disease (semaglutide, SELECT), and symptoms of obstructive apnoea syndrome can be improved (tirzepatide).

In most countries, medications inducing body weight reduction are not reimbursed by health insurance companies, such that patients will have to pay out of their own pockets. The impressive weight-reducing effectiveness with proven medical benefits for well-defined subgroups will spark a discussion leading to the characterization of sub-populations, in whom there is a clearly positive benefit/risk relationship.

Luncheon Symposium 1

Chairperson

Hyung Joon Yoo
CM Hospital, Korea

Speaker

Bukyung Kim
Kosin University, Korea



Bukyung Kim

Kosin University, Korea

• Education

Period	Affiliation	Position
– 2012-2016	Kosin University, Graduate School	Ph.D.
– 2008-2011	Kosin University, Graduate School	M.D.
– 1998-2004	Kosin University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Kosin University College of Medicine	Professor
– 2022-2023	University of Massachusetts Chan Medical School	Visiting Professor
– 2012	Aju University Hospital	Fellow
– 2007-2010	Kosin University Gospel Hospital	Resident

• Committee Memberships

- Committee of Publication, Korean Endocrinology Society
- Direct of CDC, Korean Society of Bone and Mineral Research
- Lifetime Membership, Korean Society for the Study of Obesity

• Publications

- IFN γ -IL12 axis regulates intercellular crosstalk in metabolic dysfunction-associated steatotic liver disease. Randall H. Friedline, Hye Lim Noh, Sujin Suk, Mahaa Albusharif, Sezin Dagdeviren, Suchaorn Saengnipanthkul, Bukyung Kim *et al. Nature Commucation.* (2024) 15:5506
- Protective Effects of Melatonin in High-Fat Diet-Induced Hepatic Steatosis via Decreased Intestinal Lipid Absorption and Hepatic Cholesterol Synthesis. Hyungjune Ku, Yeonji Kim, Alvin Lyle Kim, Garam Lee, Youngsik Choi, Bukyung Kim. *Endocrinology and Metabolsim.* DOI:<https://doi.org/10.3803/EnM.2023.1672672>
- Melatonin Protects Bone Microarchitecture against Deterioration due to High-Fat Diet-Induced Obesity. Bukyung Kim, YeonJi Kim, Jae Hyun Kim, Kwangkuk Park, Hyungjune Ku, Young-Sik Choi. *Journal of Bone and Metabolism.* 2023;30(1):69-75
- Momordica charantia (bitter melon) efficacy and safety on glucose metabolism in Korean prediabetes participants: a 12-week, randomized clinical study. Bukyung Kim, Hak Sung Lee, Hye-Jin Kim, Hyolynn Lee, In-young Lee, Soyoun Ock, Sukyoung Kwon, Sang-Soo Kang, Youngsik Choi. *Food Science and Biotechnology* (2023) 32:697–704
- Changes of Guidelines in the Management of Obese Patients With Diabetes in the Metabolic Surgery Perspective. Bukyung Kim, Kyungwon seo. *Journal of Metabolic and Bariatric Surgery.* 2022; 11(2): 13–19

Luncheon Symposium 1

Optimal Combination Therapy for Diabetes Management

Bukyung Kim (Kosin University, Korea)

Recent guidelines for diabetes treatment recommend early combination therapy. In addition, when selecting anti-diabetic drugs, it is recommended not simply to consider the blood sugar-lowering effect, but to take a holistic approach that considers the patient's underlying disease, demographic characteristics, and lifestyle habits. From this perspective, SGLT2i is an anti-diabetes agent that should be considered as a priority in many aspects.

Enavogliflozin is a newly developed potent SGLT-2 inhibitor. In healthy adults, the enavogliflozin 0.3mg had higher urinary glucose excretion than dapagliflozin 10mg. the potent effect of enavogliflozin could be explained by its selective and competitive inhibition of SGLT-2 compared to that of other SGLT-2 inhibitors. The strong affinity of enavogliflozin for the kidneys and its prolonged inhibitory effect on SGLT-2 may further contribute to its notable glucose-lowering efficacy.

In this lecture, we will take a close look at the results of enavogliflozin's phase 3 clinical study and pooled analysis results. This new potent SGLT2 inhibitor, Enavogliflozin, would be a good treatment option for optimal diabetes treatment.

Luncheon Symposium 2

Chairperson

Kyung-Soo Kim

The Catholic University of Korea, Korea

Speaker

Joonyub Lee

The Catholic University of Korea, Korea



Joonyub Lee

The Catholic University of Korea, Korea

• Education

Period	Affiliation	Position
– 2017-2021	Graduate School of Medical Science and Engineering (GSMSE), KAIST, Daejeon, Republic of Korea	Ph.D.
– 2015-2017	Graduate School of Medicine, The Catholic University of Korea, Seoul, Korea	M.S.
– 2006-2012	College of Medicine, The Catholic University of Korea, Seoul, Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Seoul St. Mary's Hospital, Catholic Medical Center, Korea	Assistant Professor
– 2023-2024	Seoul St. Mary's Hospital, Catholic Medical Center, Korea	Clinical Assistant Professor

• Committee Memberships

- Korean Society for the Study of Obesity Committee of Research
- Korean Endocrinology Society Committee of the Future Endocrinologist Sustainability

• Publications

- PRMT1 Is Required for the Maintenance of Mature β -Cell Identity. *Diabetes*. 2020;69(3):355-68
- Multiparity increases the risk of diabetes by impairing the proliferative capacity of pancreatic β cells. *Experimental & Molecular Medicine* (accepted)
- Risk of developing chronic kidney disease in young-onset Type 2 diabetes in Korea. *Scientific Reports* 2023;13:10100
- Risk of Cause-Specific Mortality across Glucose Spectrum in Elderly People: A Nationwide Population-Based Cohort Study. *Endocrinol Metab (Seoul)* 2023; doi: 10.3803/EnM.2023.1765
- Efficacy and Safety of Alogliptin-Pioglitazone Combination for Type 2 Diabetes Mellitus Poorly Controlled with Metformin: A Multicenter, Double-Blind Randomized Trial. *Diabetes Metab J* 2024; doi: 10.4093/dmj.2023.0259

Luncheon Symposium 2

Evogliptin : A New Era in Diabetes Treatment and Clinical Outcomes

Joonyub Lee (The Catholic University of Korea, Korea)

Type 2 diabetes mellitus (T2DM) is a complex chronic disorder characterized by pathophysiological changes across multiple organs, including pancreatic islets, adipose tissue, liver, muscle, kidney, and brain. These changes contribute to insulin resistance and decreased insulin secretion, which in turn contribute to the development and progression of T2DM. A number of oral hyperglycemic agents targeting different organs to treat patients with T2DM are currently available. DPP-IV inhibitors, for instance, enhance glucose-stimulated insulin secretion from pancreatic β -cells by increasing serum incretin levels. Similarly, SGLT2 inhibitors prevent glucose reabsorption in proximal renal tubules, thereby promoting renal glucose excretion. Combining different classes of oral hypoglycemic agents at the early stage of hyperglycemia may offer enhanced therapeutic opportunities for T2DM management. This is supported by several studies, including the VERIFY study, which demonstrated that an early combination of metformin with vildagliptin yields more durable long-term clinical benefits than metformin alone. The EDICT study showed that a regimen combining metformin, pioglitazone, and exenatide provides superior and sustained glycemic control compared to a sequential therapy that begins with metformin, followed by sulfonylurea and insulin glargine. This presentation will explore the advantages of using a combination of DPP-IV and SGLT2 inhibitors subsequent to metformin therapy in the management of T2DM.

Luncheon Symposium 3

Chairperson

Yong Sung Kim
Design Hospital, Korea

Speaker

Jun Hwa Hong
Eulji University, Korea



Jun Hwa Hong

Eulji University, Korea

• Education

Period	Affiliation	Position
– 2015	Eulji University	Ph.D.
– 2008	Eulji University	M.Sc.
– 2004	Eulji University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– Present	Eulji University Hospital, Korea	Associate Professor
– 2023	Eulji University Hospital, Korea	Assistant Professor
– 2017	Kyungpook National University Hospital, Korea	Clinical Assistant Professor
– 2015	Chungnam National University Hospital	Fellowship

• Committee Memberships

- The Korean Society for the Study of Obesity
- The Korean Endocrine Society
- The Korean Diabetes Association
- The Daejeon Chungcheong Division of Korean Endocrine Society

• Publications

- Comparison of therapeutic efficacy and safety of sitagliptin, dapagliflozin, or lobeglitazone adjunct therapy in patients with type 2 diabetes mellitus inadequately controlled on sulfonylurea and metformin: third agent study. *Diabetes Res Clin Pract.* 2023 Aug 11;110872. doi: 10.1016/j.diabres.2023.110872
- Comparison of the effects of gemigliptin versus glimepiride on cardiac function in patients with type 2 diabetes uncontrolled with metformin: The gemi-heart study. *Diabetes Obes Metab.* 2023 Aug;25(8):2181-2190. doi: 10.1111/dom.15095. Epub 2023 May 3
- A randomized, active-controlled, parallel, open-label, multicenter, phase 4 study to compare the efficacy and safety of pregabalin sustained release tablet and pregabalin immediate release capsule in type II diabetic patients with peripheral neuropathic pain. *Medicine (Baltimore).* 2023 Apr 25;102(17):e33701
- Effects of Virtual Reality Exercise Program on Blood Glucose, Body Composition, and Exercise Immersion in Patients with Type 2 Diabetes. *Int. J. Environ. Res. Public Health* 2023, 20(5), 4178
- SGLT-2 inhibitors and GLP-1 receptor agonists in metabolic dysfunction-associated fatty liver disease: Trends *Endocrinol Metab.* 2022 Jun;33(6):424-442. doi: 10.1016/j.tem.2022.03.005. Epub 2022 Apr 28

Luncheon Symposium 3

The Earlier Use of SGLT2i, The Better Clinical Outcome in Obese T2D

Jun Hwa Hong (Eulji University, Korea)

Many pharmacotherapies are now available for glycaemic control in type 2 diabetes (T2D); however, the management of T2D remains complex and challenging, in part due to the limiting side effects of current therapies as well as the variable pathogenesis and progressive natural history of T2D. Thus, the quest to develop therapeutic agents with novel mechanisms of action that might fulfill the unmet needs of the currently available therapies continues. While several novel therapies for T2D are indeed on the horizon, dipeptidyl peptidase-4 inhibitors (DPP4is) and sodium-glucose cotransporter type 2 inhibitors (SGLT2is) are the most recently introduced novel classes of antihyperglycaemic drugs.

Combination therapy with SGLT2i and DPP4i is both efficacious and safe. In particular, a marked additional glucose-lowering effect is evident when SGLT2i is combined with or added to DPP4i. Additional benefits of combination therapy are cardiorenal protection and metabolic improvement of both class of drugs. This combination therapy is The harmony for holistic treatment of type 2 diabetes.

Luncheon Symposium 4

Chairperson

Hyun Ho Shin

Asan Chungmu Hospital, Korea

Speaker

Kyoung Min Kim

Yonsei University, Korea



Kyoung Min Kim

Yonsei University, Korea

• Education

Period	Affiliation	Position
– 2009-2012	College of Medicine, Yonsei University, Korea	Ph.D.
– 2006-2008	College of Medicine, Yonsei University, Korea	M.S.
– 1998-2004	College of Medicine, Yonsei University, Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	Yongin Severance Hospital/ Yonsei University College of Medicine	Associate Professor
– 2019-2020	San Francisco Coordinating Center, California Pacific Medical Center Research Institute, UCSF, USA	Associate Scientist
– 2013-2020	Internal Medicine, Seoul National University Bundang Hospital, Korea	Assistant Professor
– 2010-2013	Internal Medicine, Yonsei University College of Medicine, Severance Hospital	Clinical Research Assistant Professor
– 2009-2010	Internal Medicine, Yonsei University College of Medicine, Severance Hospital	Clinical Fellow (Endocrinology)
– 2005-2009	Internal Medicine, Yonsei University College of Medicine, Severance Hospital	Residency

• Committee Memberships

- Korean Society of Health Informatics and Statistics
- Korean Society of Bone Metabolism and Research
- Korean Sarcopenia Research Group
- Big Data Committee, International Federation of Musculoskeletal Research
- Korean Endocrine Society, Korean Diabetic Association

• Publications

- Lee S, MH Yu, N Hong, KJ Kim, HK Kim, Y Rhee, M Lee, KM Kim. Association of Sodium-Glucose Cotransporter 2 inhibitor use with risk of osteoporotic fracture among older women: A nationwide, population-based cohort study. *Diabetes Res Clin Pract.* 2024 May 18, 111712 e-pub
- Kim KM, Kim KJ (Co-first*), Han K, Rhee Y. Associations Between Physical Activity and the Risk of Hip Fracture Depending on Glycemic Status: A Nationwide Cohort Study. *J Clin Endocrinol Metab.* 2024 Feb 20;109(3):e1194-e1203
- Hong N, Cho SW, Shin S, Lee S, Jang SA, Roh S, Lee YH, Rhee Y, Cummings SR, Kim H, Kim KM. Deep-Learning-Based Detection of Vertebral Fracture and Osteoporosis Using Lateral Spine X-Ray Radiography, *Journal of Bone and Mineral Research*, 2023 Apr 10
- Kim KM, Lui LY, Cummings SR. Recent Fall and High Imminent Risk of Fracture in Older Men and Women, Recent fall and imminent risk of fracture, *Age Ageing.* 2022 Jun 1;51(6):afac141
- Kim KM, Nerlekar Ridhima, Tranah GJ, Browner WS, Cummings SR. Higher red cell distribution width and poorer hospitalization-related outcomes in elderly patients. *J Am Geriatr Soc.* 2022;70:2354–2362. PMID: 3550625
- Kim KM, Lui LY, Browner WS, Cauley JA, Ensrud KE, Kado DM, Orwoll ES, Schousboe JT, Cummings SR; Osteoporotic Fractures in Men (MrOS) Study Research Group. Association between variation in red cell size and multiple aging-related outcomes. *J Gerontol A Biol Sci Med Sci.* 2021 Jun 14;76(7):1288-1294. doi: 10.1093/gerona/glaa217. PMID: 32894755
- Jang SA, Kwon SJ, Kim CS, Park SW, Kim KM(Correspondence). Association Between Low Serum Phosphate Level and Risk of Falls in Hospitalized Patients Over 50 Years of Age: A Retrospective Observational Cohort Study. *Clin Interv Aging.* 2022 Sep 8;17:1343-1351

Luncheon Symposium 4

Real World Evidence of Phentermine Plus Topiramate ER in Korean : Efficacy and Safety

Kyoung Min Kim (Yonsei University, Korea)

Obesity is a critical public health issue, associated with significant morbidity and healthcare system burden. Phentermine/topiramate extended release (ER) has emerged as a key pharmacological intervention in obesity management. This lecture explores the clinical application of phentermine/topiramate ER, focusing on its efficacy and safety through patient case studies and real-world data from Korea.

The presentation will highlight diverse cases of obese patients, each demonstrating unique aspects of weight management using phentermine/topiramate ER. These cases will showcase the drug's impact on weight reduction, health improvements, and potential side effects across various obesity-related comorbidities.

Complementing individual cases, recent analyses of real-world data from Korea will provide broader insights into the drug's use in obesity treatment. This comprehensive view, derived from observational studies and post-marketing surveillance, will offer valuable perspectives on the drug's effectiveness, safety profile, and role in obesity management strategies.

While advances in anti-obesity pharmacotherapy are promising, obesity treatment remains challenging due to limited therapeutic options and frequent adverse reactions. However, the combination of recent clinical experiences and Korean data is expected to provide new insights into the optimal use of phentermine/topiramate ER for successful weight management.

Special Scientific Lecture 1

Chairperson

Cheol-Young Park
Sungkyunkwan University, Korea

Speaker

Ania Jastreboff
Yale University, USA



Ania Jastreboff

Yale University, USA

• Education

Period	Affiliation	Position
– 2012	Yale University Graduate School of Arts and Science	Ph.D.
– 2002	University of Maryland School of Medicine	M.D.
– 1998	Bucknell University	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Yale Obesity Research Center	Director
– 2020-Present	Yale Center for Weight Management	Co-Director
– 2020-Present	Yale University, USA	Associate Professor
– 2014-2020	Yale University, USA	Assistant Professor
– 2011-2014	Yale University, USA	Instructor

• Committee Memberships

- The Obesity Society (TOS)
- American Association of Clinical Endocrinology (AACE)
- and American College of Endocrinology
- American Diabetes Association (ADA)
- The Endocrine Society
- Lawson Wilkins Pediatric Endocrine Society

• Publications

- Kahn SE, Deanfield JE, Jeppesen OK, Emerson SS, Boesgaard TW, Colhoun HM, Kushner RF, Lingvay I, Burguera B, Gajos G, Horn DB, Hramiak IM, Jastreboff AM, Kokkinos A, Maeng M, Matos ALSA, Tinahones FJ, Lincoff AM, Ryan DH; SELECT Trial Investigators. Effect of Semaglutide on Regression and Progression of Glycemia in People With Overweight or Obesity but Without Diabetes in the SELECT Trial. *Diabetes Care*. 2024 Aug 1;47(8):1350-1359. doi: 10.2337/dc24-0491. PMID: 38907683; PMCID: PMC11282386
- Lu Y, Liu Y, Jastreboff AM, Khera R, Ndumele CD, Rodriguez F, Watson KE, Krumholz HM. Eligibility for Cardiovascular Risk Reduction Therapy in the United States Based on SELECT Trial Criteria: Insights From the National Health and Nutrition Examination Survey. *Circ Cardiovasc Qual Outcomes*. 2024 Jan;17(1):e010640. doi: 10.1161/CIRCOUTCOMES.123.010640. Epub 2023 Nov 11. Erratum in: *Circ Cardiovasc Qual Outcomes*. 2024 Jan;17(1):e000126. doi: 10.1161/HCQ.000000000000126. PMID: 37950677; PMCID: PMC10782930
- Jastreboff AM, Kushner RF. New Frontiers in Obesity Treatment: GLP-1 and Nascent Nutrient-Stimulated Hormone-Based Therapeutics. *Annu Rev Med*. 2023 Jan 27;74:125-139. doi: 10.1146/annurev-med-043021-014919. PMID: 36706749
- Gossman M, Butsch WS, Jastreboff AM. Treating the Chronic Disease of Obesity. *Med Clin North Am*. 2021 Nov;105(6):983-1016. doi: 10.1016/j.mcna.2021.06.005. PMID: 34688422
- Jastreboff AM, Kaplan LM, Frías JP, Wu Q, Du Y, Gurbuz S, Coskun T, Haupt A, Milicevic Z, Hartman ML; Retatrutide Phase 2 Obesity Trial Investigators. Triple-Hormone-Receptor Agonist Retatrutide for Obesity - A Phase 2 Trial. *N Engl J Med*. 2023 Aug 10;389(6):514-526. doi: 10.1056/NEJMoa2301972. Epub 2023 Jun 26. PMID: 37366315

Special Scientific Lecture 1

Nutrients-Stimulated Hormone-Based Pharmacotherapy for the Treatment of Obesity: Sparks from the Pipeline!

Ania Jastreboff (Yale University, USA)

Symposium 5

Current Perspectives on Health Inequity in Obesity

Chairpersons

Young Seol Kim

Kyung Hee University, Korea

Kyung-Hee Park

Hallym University, Korea

Speakers

Peter Bergsten

Uppsala University, Sweden

Seul Ki Choi

University of Seoul, Korea

Seunghyun Yoo

Seoul National University, Korea

Panel Discussion

Kyunghee Jung-Choi

Ewha Womans University, Korea

Sang Min Park

Seoul National University, Korea



Peter Bergsten

Uppsala University, Sweden

• Education

Period	Affiliation	Position
– 2019	University of Auckland, Auckland, New Zealand	Distinguished Visitor
– 1995	Mayo Clinic, Rochester, MN, USA	Visiting Researcher
– 1992	Uppsala University, Uppsala, Sweden	Associate Professor
– 1992	University of Cambridge, UK	Postdoctoral Fellow
– 1989	NIDDK, NIH, USA	International Fellow

• Affiliations / Experience

Period	Affiliation	Position
– 2016-Present	Dept of Women's and Children's Health, Uppsala University	Adjunct Professor
– 2016-Present	Academic Children's Hospital, Uppsala	Adjunct Professor
– 2008-Present	Dept of Medical Cell Biology, Uppsala University	Professor
– 1997-2007	Uppsala University	Associate Professor
– 1992-1997	Uppsala University	Assistant Professor

• Committee Memberships

- Swedish Foundation for Strategic Research, Multidisciplinary Research Center
- European Childhood Obesity Group
- EU Horizon Europe Health
- Uppsala Health Summit
- Swedish Innovation Agency

• Publications

- Pixner T, Chaikouskaya T, Lauth W, Zimmermann G, Mörwald K, Lischka J, Furthner D, Awender E, Geiersberger S, Maruszczak K, Forslund A, Anderwald, CH, Cadamuro J, Weghuber D, **Bergsten P**. Rise in fasting and dynamic glucagon levels in children and adolescents with obesity is moderate in subjects with impaired fasting glucose but accentuated in subjects with impaired glucose tolerance or type 2 diabetes. *Front Endocrinol (Lausanne)*. 2024 Jul 4;15:1368570. doi: 10.3389/fendo.2024.1368570
- Stenlid R, Cerenius SY, Wen Q, Küçükemre Aydin B, Manell H, Chowdhury A, Kristinsson H, Ciba I, Giessing ES, Mörwald K, Gomahr J, Verena Heu, Weghuber D, Forslund A, **Bergsten P**. Adolescents with obesity treated with exenatide maintain endogenous GLP-1, reduce DPP-4, and improve glycemic control. *Front Endocrinol (Lausanne)*. 2023 Nov 1;14:1293093. doi: 10.3389/fendo.2023.1293093. eCollection 2023
- Ciba I, Dahlbom M, Manell H, Mörwald K, Roomp K, Weghuber D, **Bergsten P**, Forslund A. Studies in children with obesity in two European treatment centres show a high prevalence of impaired glucose metabolism in the Swedish cohort. *Acta Paediatr*, doi: 10.1111/apa.17030, 2023
- Wen Q, Chowdhury A, Aydin B, Shekha M, Stenlid R, Forslund A, **Bergsten P**. Metformin restores prohormone processing enzymes and normalizes aberrations in secretion of proinsulin and insulin in palmitate-exposed human islets. *Diabetes Obes Metab*, doi: 10.1111/dom.15270, 2023
- Aydin BK, Stenlid R, Ciba I, Cerenius SY, Dahlbom M, **Bergsten P**, Nergårdh R, Forslund A. High levels of FSH before puberty are associated with increased risk of metabolic syndrome during pubertal transition. *Pediatr Obes*. Aug;17(8):e12906. doi: 10.1111/ijpo.12906, 2022

Symposium 5

“Turning the Tide” – A Swedish Primary Care-Based Multidisciplinary Center for Primary Obesity Prevention

Peter Bergsten (Uppsala University, Sweden)

Bergsten, P¹, Aydin, BK¹, Izindre, AL², Dahlin, T³, Nyman, M³, Sørensen, TIA^{4,5}, Seidell, JC⁶, Williams J⁷

¹Department of Medical Cell Biology, Uppsala University, Uppsala, Sweden

²Municipality of Storfors, Sweden

³MedMod AB, Stockholm, Sweden

⁴Department of Public Health, University of Copenhagen, Copenhagen, Denmark

⁵Center for Childhood Health, Denmark

⁶Vrije Universiteit Amsterdam, Amsterdam, The Netherlands

⁷WHO Europe, Copenhagen, Denmark

Introduction: Childhood obesity has surged, leading to early onset of related complications. Reversing obesity is challenging and interventions leading to sustained reduction are needed; thus, early detection and effective, sustainable interventions are crucial. Primary prevention would be key to reversing the childhood obesity epidemic and associated disorders.

Methods: The Swedish Foundation for Strategic Research has granted a six-year project to establish a research center, the “Turning the Tide” (TTT) center, focusing on primary care-based primary obesity prevention. TTT aims to provide a model for sustainable obesity prevention across the lifespan, using controlled studies and multidisciplinary collaboration between primary health care and societal stakeholders. Specifically, TTT will develop a tool whereby municipalities will use child health data to follow interventions, which will take a systems approach involving multiple actors in society long-term.

Results: TTT will develop novel tools and methods for risk assessment, economic modeling, multidisciplinary community-based work, tailored interventions and secondary use of health data. For primary prevention of childhood obesity, children with risk of obesity will be identified through health data supplied by primary child health care, controlled studies will be conducted in real-life municipality settings engaging multiple actors to define conditions for systems transformation towards prevention with sustained reductions in obesity rates.

Conclusion: The TTT project lays the foundation, onto which additional efforts including national governmental commitment are needed, to achieve the goal of sustained childhood obesity reduction at the end of the TTT project in 2030.

Funding: This study was funded by the European Commission’s Seventh Framework Programme (Beta-JUDO project, 2012-2018; grant number 279153), the Swedish Innovation Agency Vinnova (ECHO project, 2020-2023; grant number 2020-02417) and the Swedish Foundation for Strategic Research (TTT project, 2024-2030; grant number CMP22-0014).



Seoul Ki Choi

University of Seoul, Korea

• Education

Period	Affiliation	Position
– 2016	Department of Health Promotion, Education, and Behavior,	Ph.D.
– 2009	University of South Carolina	M.P.H.
– 2007	Graduate School of Public Health, Seoul National University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-Present	University of Seoul	Assistant Professor
– 2019-2022	Korea Institute for Health and Social Affairs	Associate Research Fellow
– 2016-2019	University of South Carolina	Postdoctoral Fellow

• Publications

- Kim SA, Choi SK. Regional disparities in food security and depression among single-person households in the Republic of Korea. *BMC Public Health*
- Kim JH, Yoon J, Choi SK. Value and meaning of dietary management based on the agrifood voucher in the Republic of Korea. *Journal of Korean Society of Food Culture*, 37(5), 410-417
- Choi SK, Chun H, Choi EJ. Review of recent digital health literacy programs in Europe and the United States, *Korean Journal of Health Education and Promotion*, 39(4), 15-28
- Song E, Park E, Choi SK. Unmet needs among patients with hypertension or diabetes during the COVID-19 pandemic by household income. *Health and Social Welfare Review*, 42(3), 246-259
- Hwang J, Choi SK. A review of international health literacy initiatives: Policy implications for improving the nation's health. *Alcohol & Health Behavior Research*, 22(1), 57-70

Symposium 5

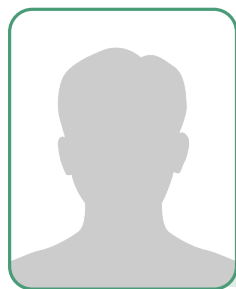
The Food Insecurity - Obesity Paradox and Strategies to Address Food Insecurity

Seul Ki Choi (University of Seoul, Korea)

Food insecurity is defined as “a household-level economic and social condition of limited or uncertain access to adequate food.” (U.S. Department of Agriculture, Economic Research Service, n.d.). Food insecurity is associated with poor dietary intake; however, previous research have reported that food insecure individuals, particularly adult women in developed countries, are more likely to be obese than food secure individuals. Understanding this phenomenon, known as a food insecurity-obesity paradox, is essential for developing effective interventions that address both food insecurity and obesity.

This presentation will review existing hypotheses explaining the relationship between food insecurity and obesity and discuss whether the coexistence of food insecurity and obesity is a paradox. Most hypotheses reviewed commonly suggested that the coexistence of obesity and food insecurity is a result of systematic social disadvantages. These cumulative disadvantages result in poorer dietary quality and fat storage as an adaptive strategy among food insecure populations. Furthermore, adverse outcomes of food insecurity, such as poor academic performance and physical and mental health challenges may limit opportunities and exacerbate these disadvantages.

Given this mechanism, food provision which is a common intervention for food insecure individuals may be insufficient in addressing the complex issue of food insecurity and obesity. This presentation will explore potential strategies targeting social determinants of health as comprehensive solutions to eliminate food insecurity and its detrimental health outcomes, including obesity.



Seunghyun Yoo

Seoul National University, Korea

• Education

Period	Affiliation	Position
– 2001	Tulane University	Ph.D.
– 1997	Tulane University	M.P.H.
– 1994	Ewha Womans University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2008-Present	Seoul National University	Professor
– 2005-2008	University of Pittsburgh	Professor
– 2003-2005	University of Pittsburgh	Research Professor
– 2000-2003	Tulane University	Researcher

• Committee Memberships

- Korean Society for Health Education & Promotion
- Korean Society for Rural Medicine & Community Health
- Korean Association of Health & Medical Sociology
- International Society for Urban Health

• Publications

- Kim DH, Lee EHL, Jeong JY, Lee J, Yoo S. Daily life activities of young adults with obesity living in highly accessible and compact urban environments in Seoul, South Korea: a spatiotemporal qualitative study protocol. *BMJ Open*, 14: e080895
- Kim DH, Lee J, Yoo S. Neighborhood environments for a healthy lifestyle among young single-person households experiencing housing poverty in Seoul, South Korea: A spatiotemporal qualitative study protocol. *BMJ Open*, 14: e077234
- Kim J, Yoo S, Kim DH, Lee J, Cheon Y. A scoping review of qualitative geographic information systems in studies addressing health issues. *Social Science & Medicine*, 314: 115472
- Kim DH, Kang H & Yoo S. Environment-stratified Age-Period-Cohort effects on the prevalence of walking among older adults. *Journal of Aging & Physical Activity*, 30(1): 18-24
- Choe S-A, Yoon N-H, Kim H & Yoo S. Gender-differences in predictors for time to metabolic syndrome resolution: a secondary analysis of a randomized controlled trial study. *PLOS ONE*, 15(6): e0234035

Symposium 5

Managing Weight in Urban Neighborhoods: Qualitative Case Studies

Seunghyun Yoo (Seoul National University, Korea)

Obesity, a major global health problem, is attributed to the complex interactions of multiple factors at the individual and environmental levels. While social and cultural environments interact with individuals to create and reinforce social norms, living situations, and lifestyles, the built environment also creates both opportunities for and barriers to healthy weight management. Urban built environments may have a similar mix of resources for diet and physical activity, but the use and experience of these resources may vary by city neighborhood.

To explore and describe the complex interactions of weight management in the urban environment, qualitative approaches are used to focus on the context and dynamics of such interactions. In addition, multiple qualitative measures, including visual tools and spatio-temporal approaches, are attempted to generate more detailed, contextualized description of how overweight/obese urban residents perceive and interact with their neighborhood environments.

This study presents multi-method qualitative case studies conducted in urban neighborhoods in Korea since 2015. Different types of qualitative methods were used to explore the characteristics of urban neighborhood environments and the experiences of overweight/obese adult residents related to weight management. Qualitative multi-methods such as time charting, photo diaries, photo elicitation interviews, mapping, GPS tracking, and walking tours were considered in the case studies in combination with in-depth interviews and focus groups. Content analysis, constant comparison, and thematic analysis were used to analyze the data. This study presents findings in terms of urban lifestyles, neighborhood assets for weight management, perceived and objective accessibility of urban resources by age group and neighborhood, and attitudes and practices toward weight management.

Symposium 6

Holistic Approach to Obesity Management:
Exploring Exercise, Metabolism, and Muscle Health

Chairpersons

Yun-A Shin

Dankook University, Korea

Minchul Lee

CHA University, Korea

Speakers

Yuho Kim

University of Massachusetts-Lowell, USA

Sechang Oh

R Professional University of Rehabilitation, Japan

Young-Min Park

Incheon National University, Korea

Panel Discussion

Hyo Youl Moon

Seoul National University, Korea

Kwangseok Hong

Chung-Ang University, Korea



Yuho Kim

University of Massachusetts-Lowell, USA

• Education

Period	Affiliation	Position
– 2011-2015	Syracuse University	Ph.D.
– 2008-2011	Utah State University	M.S.
– 2005-2007	Kyung Hee University	M.P.Ed.
– 1998-2005	Kyung Hee University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2017-2020	National Institutes of Health	Postdoc Fellow
– 2015-2017	York University	Postdoc Fellow

• Committee Memberships

- American Physiological Society
- Frontiers in Physiology
- American Physiological Society
- American College of Sports Medicine
- American Heart Association

• Publications

- Y Kim, HA Parry, TB Willingham, G Alspaugh, E Lindberg, CA Combs, JR Knutson, CK Bleck, B Glancy Postnatal development of muscle mitochondria-organelle interactions. *Journal of Physiology*. 602(5):891-912
- Y Kim, P Ajayi, CKE Bleck, B Glancy 3D remodeling of the cellular energy distribution system during postnatal heart development. *Philosophical Transactions of The Royal Society B*. 337(1864): 20210322
- TB Willingham, Y Kim, E Lindberg, CKE Bleck, B Glancy. The unified myofibrillar matrix for force generation in muscle. *Nature Communications*. 11:3722
- Y Kim, E Lindberg, CKE Bleck, B Glancy. Endothelial cell nanotube insertions into cardiac and skeletal myocytes during coordinated tissue development. *Cardiovascular Research*. 116(2): 260-1
- Y Kim, DS Yang, P Katti, B Glancy. Composition of the muscle mitochondrial reticulum during postnatal development. *Journal of Physiology*. 597(10):2707-2727

Symposium 6

Exercise-Induced Mitochondrial Controls in Skeletal Muscle

Yuho Kim (University of Massachusetts-Lowell, USA)

In skeletal muscle, mitochondria are highly connected through intermitochondrial junctions and crosstalk with other subcellular organelles such as the sarcoplasmic reticulum and lipid droplets. These interactions support muscle energetics, metabolism, and overall cellular homeostasis. Along with their structural role, mitochondrial function is fine-tuned by mechanisms controlling quantity (biogenesis) and quality (dynamics and turnover).

During chronic muscle activity, such as exercise training, mitochondria initially undergo adjustments in quality control mechanisms (mitophagy), followed by an increase in the number of healthy mitochondria (mitochondrial biogenesis). In trained muscles, mitochondrial volume and connectivity also expand, thereby enhancing mitochondrial oxidative capacity.

In contrast, aging leads to the fragmentation and damage of mitochondria in skeletal muscle. Exercise has proven effective in mitigating or even reversing age-related mitochondrial dysfunction. Despite reduced basal aerobic capacity compared to younger muscles, chronic muscle activity not only promotes mitochondrial biogenesis and fusion but also boosts mitochondrial oxidative function in aging muscles. These beneficial effects of exercise on age-related mitochondrial dysfunction can be further extended to obesity and its combination with aging, where mitochondria have been recognized as a key organelle in the pathogenesis and therapeutic target of sarcopenia and sarcopenic obesity.



Sechang Oh

R Professional University of Rehabilitation, Japan

• Education

Period	Affiliation	Position
– 2011-2014	Sports Medicine, University of Tsukuba, Ibaraki, Japan	Ph.D.
– 2009-2011	Health and Sport sciences, University of Tsukuba, Ibaraki, Japan	M.Sc.
– 2005-2007	Physical Education, Chung-Ang University, Seoul, Korea	M.Sc.
– 1998-2005	Physical Education, Chung-Ang University, Seoul, Korea	B.Sc.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-Present	Rehabilitation, R Professional University of Rehabilitation, Ibaraki	Professor
– 2019-2021	Medical Science, University of Tsukuba, Ibaraki	Assistant Professor
– 2016-2019	Medical Science, University of Tsukuba, Ibaraki	Research Fellow
– 2016-2019	Center of Sports Medicine and Health Sciences, Tsukuba University Hospital, Ibaraki	Chief Research / Technical Fellow
– 2014-2016	The Japan Society for the Promotion of Science, Tokyo	International Research Fellow

• Committee Memberships

- The Japanese Society of Gastroenterology
- The Japan Society of Hepatology
- National Strength and Conditioning Association
- Japan Society of Physical Fitness and Sports Medicine
- Japan Society of Health Promotion

• Publications

- S. Oh*, K. Tanaka, E. Warabi, J. Shoda: Exercise reduces inflammation and oxidative stress in obesity-related liver diseases, "Med Sci Sports Exerc" 45, 2214-2222
- S. Oh*, T. Shida, K. Yamagishi, K. Tanaka, T. Tsujimoto, R. So, J. Shoda: Moderate to vigorous physical activity volume is an important factor for managing non-alcoholic fatty liver disease: A retrospective study, "Hepatology" 61(4), 1205-1215
- S. Oh*, R. So*, T. Shida, T. Matsuo, B. Kim, K. Akiyama, T. Isobe, Y. Okamoto, K. Tanaka, J. Shoda: High-intensity aerobic exercise improves both hepatic fat content and stiffness in obese men with nonalcoholic fatty liver disease, "Sci Rep." 7, 43029
- S. Oh*, T. Tsujimoto, B. Kim, F. Uchida, H. Suzuki, S. Iizumi, T. Isobe, T. Sakae, K. Tanaka, J. Shoda: Weight-Loss-Independent benefits of regular exercise on steatosis and stiffness in Japanese men with NAFLD: A retrospective study, "JHEP Rep", 3(3), 100253
- N. Oshida*, S. Oh*, B. Kim, I. Miura, N. Hasegawa, S. Komine, T. Isobe, J. Shoda: Muscle quality as a potential diagnostic marker of advanced liver fibrosis in patients with non-alcoholic fatty liver disease, "J Obes Metab Syndr". Accepted

Symposium 6

Lifestyle Strategies in the Management of MAFLD: The Role of Muscle Metabolism and Exercise

Sechang Oh (R Professional University of Rehabilitation, Japan)

Metabolic-associated fatty liver disease (MAFLD) is a global health problem characterized by excessive accumulation of liver fat independent of alcohol consumption. Recently, the term MAFLD has replaced non-alcoholic fatty liver disease (NAFLD) to better reflect its association with metabolic conditions such as metabolic syndrome, obesity and diabetes. This change allows for more accurate diagnosis and treatment approaches.

Muscle metabolism is important in the management of MAFLD. Often referred to as the “second liver,” muscle shares important metabolic functions with the liver, including energy production, protein synthesis, glycogen storage, and fatty acid oxidation. Regular exercise increases muscle metabolism, improves insulin sensitivity, reduces inflammation, and promotes liver health. Poor muscle quality, as indicated by intramuscular fat accumulation, is a risk factor for advanced liver fibrosis, increasing the risk 7.6-fold. (Oshida and Oh. J Obes Metab Syndr, 2024)

Both aerobic and resistance exercise are beneficial in the management of MAFLD. Aerobic exercise improves cardiovascular health and fatty acid oxidation, which reduces liver fat and fibrosis and improves enzyme levels. Resistance exercise increases muscle strength, mass, and insulin sensitivity and reduces liver fat. A combined exercise program of 150-300 minutes of moderate-intensity or 75-150 minutes of vigorous-intensity aerobic exercise per week, along with resistance training 2-3 times per week, is recommended for patients with MAFLD.

Exercise benefits MAFLD through several mechanisms. It improves insulin receptor signaling, increases glucose uptake, and reduces insulin resistance. Exercise decreases pro-inflammatory cytokines and increases anti-inflammatory markers. It also activates AMP-activated protein kinase, which promotes fatty acid oxidation and reduces liver fat. In addition, exercise boosts antioxidant defenses by increasing nuclear factor erythroid 2-related factor 2 activation, which reduces oxidative stress and inflammation. Myokines from muscle and hepatokines from liver further improve metabolic functions and energy homeostasis.

In conclusion, regular exercise is essential for the management of MAFLD and provides metabolic benefits beyond weight loss. By improving muscle metabolism and reducing liver fat, exercise may slow the progression of MAFLD and improve overall health. Future research should focus on identifying the most effective exercise modalities and intensities to optimize muscle metabolism and develop personalized lifestyle strategies for patients with MAFLD.



Young-Min Park

Incheon National University, Korea

• Education

Period	Affiliation	Position
– 2010-2015	University of Missouri, USA	Ph.D.
– 2008-2010	Florida State University	M.Sc.
– 2001-2005	Sung Kyun Kwan University	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Incheon National University	Associate Professor
– 2019-2023	Incheon National University	Assistant Professor
– 2019-2019	University of Colorado Anschutz Medical Campus	Assistant Professor
– 2015-2019	University of Colorado Anschutz Medical Campus	Post-Doctoral Fellow

• Committee Memberships

- Korean Society of Exercise Physiology
- Korean Society of Sport and Leisure Studies
- Korean Journal of Sport Science
- Korean Society of Physical Education
- The Institutional Review Board (IRB), Incheon National University

• Publications

- Lee H-A, Park Y-M, and Kang N-J. Unilateral hand force control impairments in older women. *EXCLI*, 21:1231-1244
- Kim N-A, Noh G-Y, Hada S, Na K-J, Yoon H-J, Park K-W, Park Y-M, and Jeong S-H. Enhanced protein aggregation suppressor activity of N-acetyl-L-arginine for agitation-induced aggregation with silicone oil and its impact on innate immune responses. *Int J Biol Macromol*, 216:42-51
- Yoon H-J, Kim R-K, Kang N, and Park Y-M. Exercise training with hormone replacement therapy has no synergistic effect on the improvement of lean and fat mass in postmenopausal women: a meta-analysis of randomized controlled trials. *Inter J Human Move Sci*, 15(2):71-85
- Park Y-M, Jankowski CM, Swanson CM, Hildreth KL, Kohrt WM, and Moreau KL. Bone Mineral Density in Different Menopause Stages is Associated with Follicle Stimulating Hormone Levels in Healthy Women. *Int. J. Environ. Res. Public Health* 18(3):1200
- Park Y-M, Jankowski CM, Ozemek C, Hildreth KL, Kohrt WM, and Moreau KL. Appendicular lean mass is lower in late-compared to early- perimenopausal women: potential role of FSH. *J Appl Physiol*, 128(5):1373-1380

Symposium 6

Sarcopenia, Menopause, and Exercise Intervention in Women

Young-Min Park (Incheon National University, Korea)

Age-related declines in skeletal muscle mass (i.e. sarcopenia) contribute to physical disability in older women. Although a menopause-related increase in fat mass is well documented, whether menopause influences muscle mass and bone mineral density (BMD) is unclear. We determined the extent to which skeletal muscle mass and BMD differ across the stages of menopause in women, and whether these differences are associated with estradiol or follicle stimulating hormone (FSH) hormones. This was a cross-sectional study of 144 healthy women (aged 30-70 years), classified as premenopausal (Pre; n=30, 38±6yrs; mean ± SD), early perimenopausal (EPeri; n=31, 50±3yrs), late perimenopausal (LPeri; n=30, 50±4yrs), early postmenopausal (EPost; n=26, 55±3yrs), or late postmenopausal (LPost; n=27, 62±4yrs). Appendicular lean mass (ALM) adjusted by the square of height in meters (ALM index; ALMi) and BMD were assessed using dual-energy x-ray absorptiometry. ALMi was lower in LPeri and LPost compared to EPeri with no significant differences between other groups (Pre, 6.6±0.6; EPeri, 6.8±0.8; LPeri, 6.1±0.8; EPost, 6.5±1.1; and LPost, 6.2±0.9 kg/m²). The prevalence of sarcopenia (ALMi ≤5.67 kg/m²) was 7, 3, 30, 27, and 32% in Pre, EPeri, LPeri, EPost, and LPost, respectively. Compared to EPeri, spine BMD was lower in LPeri, EPost, and LPost and hip BMD was lower in EPost and LPost. Our correlation data showed that ALMi measured across menopause stages was inversely correlated to FSH (r=-0.28, p=0.003) but not to estradiol (r=0.088, p=0.34). BMD was inversely associated with FSH (spine: r = -0.341; hip: r = -0.271, p < 0.05) and directly associated with estradiol (spine: r = 0.274; hip: r = 0.256, p < 0.05). The menopause transition appears to be a vulnerable period for the loss of skeletal muscle mass and BMD that may begin during the late perimenopausal transition. Future studies are necessary to investigate the potential harmful effect of FSH on skeletal muscle and BMD.

Symposium 7

Lipid Remodeling and Adipocyte Biology
in Metabolic Health and Disease

Chairpersons

Yun-Hee Lee

Seoul National University, Korea

Dae Ho Lee

Gachon University, Korea

Speakers

Emilio Mottilo

Henry Ford Hospital, USA

Maria Ulvmar

Uppsala University, Sweden

Dong Wook Choi

Korea University, Korea

Panel Discussion

Ja Hyun Koo

Seoul National University, Korea

Ki Yong Hong

Seoul National University, Korea



Emilio Mottillo

Henry Ford Hospital, USA

• Education

Period	Affiliation	Position
– 2008-2013	Pathology, Wayne State University School of Medicine, Detroit, MI, USA	Ph.D.
– 2001-2003	Biological Sciences, University of Windsor, Windsor, ON, Canada	M.Sc.
– 1996-2001	Biological Sciences, University of Windsor, Windsor, ON, Canada	B.Sc.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Henry Ford Hospital, Detroit, MI, USA	Associate Scientist
– 2020-Present	Physiology, Wayne State University	Assistant Professor Full-time Affiliate
– 2019-2023	Henry Ford Hospital, Detroit, MI, USA	Assistant Scientist

• Committee Memberships

- Anamika Sharma, Doctoral
- Chisom Onu, Doctoral
- Diabetes Endocrinology and Metabolic Diseases, NIDDK, National Institutes of Health (NIH)

• Publications

- Guohua Chen, Zhou G., Zai L., Bao X., Li J., Tiwari N., Mottillo E.P. and Jian Wang. Serine catabolism reduces fatty liver but promotes liver inflammation and fibrosis in mice. *Commun.* 12;7(1):173. doi: 10.1038/s42003-024-05861-y
- Rahman A.A., Butcko J.A., Songyekutu E., Granneman J.G., and Mottillo E.P. Direct effects of adipocyte lipolysis on AMPK through intracellular long-chain acyl-CoA signaling. *Scientific Reports.* 2; 14(1):19. doi: 10.1038/s41598-023-50903-w
- Mottillo E.P., Ljiljana Mladenovic-Lucas, Huamei Zhang, Li Zhou Christopher V. Kelly, Pablo A. Ortiz and James G. Granneman. A FRET sensor for the real-time detection of long chain acyl-CoAs and synthetic ABHD5 ligands. *Cell Reports Methods*
- Kim H, Wei J, Song Z, Mottillo E.P., Samavati L, Zhang R, Li L, Chen X, Jena BP, Lin JD, Fang D, Zhang K. Regulation of hepatic circadian metabolism by the E3 ubiquitin ligase HRD1-controlled CREBH/PPARα transcriptional program. *Mol Metab.* 49:101192. PMID:33592335; PMCID: PMC7966871. Role: study conception, design, implementation. IF: 8.57 Citations: 11
- Mottillo E.P., Huamei Zhang, Alexander Yang, Li Zhou and James G. Granneman. Genetically -encoded Sensors to detect fatty acid production and trafficking. *Mol Metab.* 29:55-64. &Corresponding author. PMID: 31668392 IF: 8.57 Citations: 11

Symposium 7

Role of Lipid Droplets in Health and Cardiometabolic Disease

Emilio Mottillo (Henry Ford Hospital, USA)

The balance between the storage and mobilization of triacylglycerol (TAG) is critical for metabolic health. TAG hydrolysis is regulated by the dynamic assembly of protein complexes on the surface of lipid droplets (LDs) in key metabolic tissues such as fat tissue and the liver. As such, Patatin Like Phospholipase Domain Containing 2 (PNPLA2)/Adipose Triglyceride lipase (ATGL), the major TAG lipase, is regulated by the co-lipase α/β hydrolase domain-containing 5 (ABHD5, also known as CGI-58). Importantly, the dysregulation of lipid metabolism is at the heart of cardiometabolic disease which encompasses cardiovascular disease (CVD), non-alcoholic fatty liver disease (NAFLD) and chronic kidney disease (CKD). Recently we demonstrated that PNPLA3, a close paralogue of PNPLA2 interacts with ABHD5. Of significance, a common human variant of PNPLA3, I148M, is the greatest single genetic risk factor for the development of non-alcoholic fatty liver disease (NAFLD). Notably, PNPLA3 I148M is a gain of function for the interaction with ABHD5 and functions to sequester ABHD5 away from PNPLA2, likely initiating TAG accumulation and subsequent NAFLD. This interaction between ABHD5 and PNPLA3 I148M represents a novel therapeutic target for NAFLD. Surprisingly, patients that carry the I148M mutation are protected from coronary artery disease. Our lab is currently investigating the mechanism by which PNPLA3 I148M causes NAFLD but protects from cardiac disease. Overall, by understanding the fundamental mechanisms of lipid storage and hydrolysis this will lead to novel therapies for treating cardiometabolic disease.



Maria Ulvmar

Uppsala University, Sweden

• Education

Period	Affiliation	Position
– 2009	Karolinska Institute, Sweden	Ph.D.
– 2001	Stockholm University, Sweden	M.Sc.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-Present	Uppsala University, (IMBIM), Sweden	Senior Lecturer Associate Professor
– 2017-2022	Uppsala University, (IGP), Sweden	Group leader, Assistant Professor
– 2013-2017	Uppsala University, Department of Immunology, Genetics and Pathology (IGP), Sweden	Senior Postdoctoral Fellow
– 2010-2013	Birmingham University, Centre for Immune Regulation, United Kingdom	Marie Curie Postdoctoral Fellow (IEF FP7)

• Committee Memberships

- The Swedish Cancer Foundation, microbiology and immunology division
- Medical Research Council in the United Kingdom, Grant committee
- Auckland Medical Research Foundation, New Zealand, Grant committee
- U-CAN (Uppsala-Umeå Comprehensive Cancer Consortium) diagnosis-specific group breast cancer U-CAN (Uppsala-Umeå Comprehensive Cancer Consortium) diagnosis-specific group pancreatic and liver cancer
- European Vascular Biology Organisation (EVBO)

• Publications

- Bekkhus T, Olofsson A, Sun Y, Magnusson PU, Ulvmar M.H. Stromal transdifferentiation drives lipomatosis and induces extensive vascular remodeling in the aging human lymph node *The Journal of Pathology*. 259(3):236-253. doi: 10.1002/path.6030. Cover article
- Bekkhus T, Avenel C, Hanna S, Franzén Boger M, Klemm A, Bacovia DV, Wärnberg F, Wählby C, Ulvmar M.H.. Automated detection of vascular remodeling in tumor-draining lymph nodes by the deep-learning tool HEV-finder. *The Journal of Pathology*. 258(1):4-11. doi: 10.1002/path.5981. Cover article
- Bekkhus T., Martikainen T., Olofsson A., Franzen Boger M., Vasiliu Bacovia D., Warnberg F., Ulvmar M.H.: Remodeling of the Lymph Node High Endothelial Venules Reflects Tumor Invasiveness in Breast Cancer and is Associated with Dysregulation of Perivascular Stromal Cells. *Cancers (Basel)*, doi: 10.3390/cancers13020211. Senior corresponding author. Selected as editors choice
- Xiang M., Adrián Grosso R., Takeda A., Pan J., Bekkhus T., Brulois K., Dermadi D., Nordling S., Vanlandewijck M., Jalkanen S., Ulvmar M.H.* and Butcher E.C.* A single-cell transcriptional roadmap of the mouse and human lymph node lymphatic vasculature. *Frontiers in Cardiovascular medicine* 7(52) doi: 10.3389/fcvm.00052 *Co-senior and corresponding author
- Ulvmar M.H., Werth K., Braun A., Kelay P., Hub E., Eller K., Chan L., Lucas B., Novitzky-Basso I., Nakamura K., Rüllicke T., Nibbs R.J., Worbs T., Förster R., Rot A. The atypical chemokine receptor CCRL1 shapes functional CCL21 gradients in lymph nodes. *Nature Immunology*, (7); 623-630. doi: 10.1038/ni.2889. Cover article

Symposium 7

Stromal Transdifferentiation Drives Lipomatosis and Induces Extensive Vascular Remodeling in the Aging Human Lymph Node

Maria Ulvmar (Uppsala University, Sweden)

Lymph node (LN) lipomatosis is a common but rarely discussed phenomenon associated with aging that involves a gradual exchange of the LN parenchyma into adipose tissue. The mechanisms behind these changes and the effects on the LN are unknown. We show that LN lipomatosis starts in the medullary regions of the human LN and link the initiation of lipomatosis to transdifferentiation of LN fibroblasts into adipocytes. The latter is associated with a downregulation of lymphotoxin beta expression. We also show that isolated medullary and CD34+ fibroblasts, in contrast to the reticular cells of the T-cell zone, display an inherently higher sensitivity for adipogenesis. Progression of lipomatosis leads to a gradual loss of the medullary lymphatic network, but at later stages, collecting-like lymphatic vessels are found inside the adipose tissue. The stromal dysregulation includes a dramatic remodeling and dilation of the high endothelial venules associated with reduced density of naïve T-cells. Abnormal clustering of plasma cells is also observed. Thus, LN lipomatosis causes widespread stromal dysfunction with consequences for the immune contexture of the human LN. Our data warrant an increased awareness of LN lipomatosis as a factor contributing to decreased immune functions in the elderly and in disease.



Dong Wook Choi

Korea University, Korea

• Education

Period	Affiliation	Position
– 2014	Department of Biological Sciences, Sungkyunkwan University	Ph.D.
– 2010	Department of Biological Sciences, Sungkyunkwan University	M.S.
– 2004-2008	Department of Biological Sciences, Sungkyunkwan University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Department of Biotechnology, College of Life Sciences and Biotechnology, Korea University	Associate Professor
– 2021	Department of Biochemistry, College of Natural Sciences, Chungnam National University	Assistant Professor
– 2016	Division of Metabolic Diseases, Department of Cancer Biology, Dana Farber Cancer Institute, Harvard Medical School	Research Fellow
– 2014	Department of Biological Sciences, Sungkyunkwan University	Postdoctoral Fellow

• Committee Memberships

- KSBMB, Energy Metabolism Subcommittee
- KSBMB YSP, Committee / FAOBMB exhibition committee
- The Korean Association for Laboratory Science (KALAS) Webzine
- Korean Society for The Study of Obesity
- Korean Diabetes Association

• Publications

- Hepatic stellate cells facilitate ammonia detoxification via GPT1-driven alanine synthesis in hepatocellular carcinoma. *Under Review at Nature Metabolism*. *Co-corresponding Author
- A microbiota-derived metabolite, 3-phenyllactic acid, prolongs healthspan by enhancing mitochondrial function and stress resilience via SKN-1/ATFS-1. *Minor revision at Nature Communications*. *Co-corresponding Author
- MsrB1-regulated GAPDH oxidation plays programmatic roles in shaping metabolic and inflammatory signatures during macrophage activation. *Cell Reports*. 2022 Nov 8;41(6):111598. *Co-corresponding author
- Mitochondrial morphology controls fatty acid utilization by changing CPT1 sensitivity to malonyl-CoA. *EMBO Journal*. 2023 Mar 14;e111901 Co-first author
- HCF-1 regulates de novo lipogenesis through a nutrient sensitive complex with ChREBP. *Molecular Cell*. 2019 Jul 25;75(2):357-371 *Co-first author

Symposium 7

The Functional Relevance of a Microbiome-Derived SCFA in Reprogramming Hepatic Lipid Metabolism

Dong Wook Choi (Korea University, Korea)

A hepatocyte is the primary cell responsible for the metabolism of de novo synthesized, dietary, and microbiome-derived fuels to maintain systemic metabolic homeostasis. In this presentation, I will introduce a robust platform, stable isotope-based metabolic flux analysis, which enables the mapping and tracing of nutrient utilization within cellular metabolic processes. Specifically, I will discuss the hepatic alterations following propionate (Prop) treatment, a three-carbon short-chain fatty acid predominantly produced by the gut microbiome in mammals. Propionate-treated hepatocytes exhibit a distinctive metabolic profile, including the significant reprogramming of TCA cycle carbon flux into amino acids, facilitating the synthesis of phosphatidylcholine (PC). This rerouted carbon flux into PC is potentially significant for driving hepatic lipoprotein clearance. Additionally, this metabolic reprogramming, coupled with the hepatic regulation of adipose tissues, may play a vital role in enhancing systemic lipid metabolism, as demonstrated in an in vivo mouse model of propionate administration. In summary, our study comprehensively mapped the hepatic remodeling induced by propionate, elucidating its intricate regulatory mechanisms underlying the beneficial effects of a microbiome-derived metabolite on host metabolism.

Symposium 8

Medical Condition Change After Bariatric Surgery

Chairpersons

In Ju Kim

Pusan National University, Korea

Sung Il Choi

Kyung Hee University, Korea

Speakers

Kanokkan Tepmalai

Chiang Mai University, Thailand

Jong-Han Kim

Korea University, Korea

Moon-Won Yoo

University of Ulsan, Korea

Panel Discussion

Sungbae Lee

Incheon Sejong Hospital, Korea

Kye-Yeung Park

Hanyang University, Korea



Kanokkan Tepmalai

Chiang Mai University, Thailand

• Education

Period	Affiliation	Position
- 2024	Bariatric surgery Cleveland Clinic, Ohio, USA	Observership
- 2014	Kobe university, Japan	Certificate in Diagnostic and therapeutic endoscopy including ESD,EUS and ERCP
- 2012	King Chulalongkorn Memorial Hospital, Thailand	Certificate in Advanced Laparoscopic and Endoscopic surgery
- 2011	Rajavithi hospital, Thailand	Certificate in Diagnostic and therapeutic gastrointestinal endoscopy
- 2011	Chulalongkorn University, Thailand	Diplomate of the Thai Board of Pediatric Surgery

• Committee Memberships

- (Woman ELSA) Endoscopic and laparoscopic surgeon of Asia (ELSA)
- Thai hernia society (THS)
- The association of general surgeons of Thailand
- Thai society of metabolic and bariatric Surgery (TSMBS)
- International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO)

• Publications

- Chantakhow S, Tepmalai K, Singhavejsakul J, Tantraworasin A, Khorana J. Prognostic factors of postoperative Hirschsprung-associated enterocolitis: a cohort study. *Pediatr Surg Int* 2023. Jan 9;39(1):77
- Tanprasert, P.; Khorana, J.; Tepmalai, K. Factors Predicting Postoperative Esophageal Stricture after Repaired Tracheoesophageal Malformation in Children with Esophageal Atresia. *Journal of The Medical Association of Thailand* 106 : 402 - 410 2023
- Tanprasert P, Tepmalai K, Chakrabandhu B, Yodkeeree S, Piyamongkol W, Yamada SL. Collagen Deposition and Inflammatory Response Associated with Macroporous Mesh Shrinkage in Incisional Hernia Repair: A Rat Model. *Journal of Investigative Surgery* 35 : 1635 - 1645. 2022
- Techagumpuch A. , Pantanakul S. , Chansaenroj P. , Boonyagard N. , Wittayapiroch J. , Poonthananiwatkul T. , Chanswangphuvana P. , Tepmalai K. , Taweerutchana V. , PUNCHAI S. , Yolsuriyanwong K. , Ingkukul T. , Prathanvanich P. , Sumritpradit P. , Khaimook A. , Yimcharoen P. , Cheewattanakorukul S. , Udomsawaengsup S. , Nimmanwudipong T. , Linananda S. Thai society for metabolic and bariatric surgery consensus guideline on bariatric surgery for the treatment of obese patient in Thailand *Journal of the Medical Association of Thailand*. 103:300-307. 2020
- Ohara Y., Toyonaga T., Toyonaga T., Tanaka S., Ishida T., Hoshi N., Yoshizaki T., Kawara F., Lui K., Tepmalai K., Damrongmanee A., Nagata M., Morita Y., Umegaki E., Azuma T., Risk of stricture after endoscopic submucosal dissection for large rectal neoplasms. *Endoscopy*, 2016

Symposium 8

Cardiovascular Disease and Hypertension Change After Bariatric Surgery

Kanokkan Tepmalai (Chiang Mai University, Thailand)

Obesity is now recognized as a chronic, relapsing, multifactorial disease by the International Classification of Diseases (ICD). This shift in perspective is crucial, as it acknowledges obesity's complex etiology. Excessive adipose accumulation leads to hyperleptinemia and leptin resistance. Leptin is a hormone produced by adipose tissue that normally regulates appetite and metabolism. Leptin resistance contributes to insulin resistance and Type II diabetes. This metabolic dysfunction is a major risk factor for cardiovascular disease. Hyperleptinemia has effects include contribution to hypertension and vascular/myocardial injury and also contribute to hypertension. The combination of hypertension, vascular injury, and myocardial injury creates a vicious cycle, further exacerbating cardiovascular risk. There are multiple pathways through which excessive adipose accumulation leads to cardiac dysfunction. Sleep Apnea/Obesity Hypoventilation Syndrome: This leads to hypoxia and acidosis, contributing to pulmonary arterial hypertension. This, in turn, causes right ventricular (RV) hypertrophy and enlargement, potentially leading to RV failure.

The weight loss can yield significant cardiovascular benefits: Hypertension: 5-15% weight loss can lead to improvements in blood pressure, with benefits continuing even beyond 15% weight loss.

Dyslipidemia: 3-10% weight loss can improve lipid profiles.

Type 2 Diabetes: 5-15% weight loss can aid in diabetes prevention and potentially lead to remission in some cases.

Non-alcoholic fatty liver disease (NAFLD): 10% weight loss can improve this condition, which is closely associated with cardiovascular risk.

These findings underscore the importance of weight management in cardiovascular disease prevention and treatment. We should consider weight loss interventions as a fundamental component of cardiovascular risk reduction strategies.

Challenges in Weight Management Despite the clear benefits, achieving and maintaining weight loss is challenging. The physiological adaptations that occur with weight loss, including increased hunger and a slowing metabolism. This helps explain why many individuals struggle to maintain weight loss long-term.

or Obesity and Metabolic Disorders Bariatric surgery, which involves modifying the gastrointestinal tract to aid weight loss, has emerged as a powerful tool in managing obesity and its related complications, particularly type 2 diabetes and cardiovascular risk factors. The procedures can be categorized into restrictive, malabsorptive, or combined approaches, each with unique impacts on weight loss and metabolic improvements.

Mechanisms of Metabolic Improvement Several theories explain the metabolic benefits of bariatric surgery:

Rapid hindgut delivery hypothesis: Procedures like Roux-en-Y gastric bypass (RYGB) and biliopancreatic diversion (BPD) create shortcuts for food to reach the distal bowel, stimulating L cells to increase incretin hormone secretion, improving glucose homeostasis.

Upper intestinal hypothesis: Exclusion of the proximal small intestine from nutrient contact may decrease anti-insulin factors, enhancing insulin sensitivity and secretion.

Hormonal changes: Post-surgery, patients show markedly increased postprandial plasma GLP-1 and PYY levels, which play crucial roles in appetite regulation and glucose metabolism.

Cardiovascular Benefits From a cardiovascular perspective, the metabolic improvements following bariatric surgery are particularly noteworthy:

Diabetes Remission: In a study comparing laparoscopic Roux-en-Y gastric bypass (LRYGB) and laparoscopic sleeve gastrectomy (LSG), both procedures led to significant improvements in glucose homeostasis.

Hypertension Improvement: The study showed that 68% of adolescents and 41% of adults experienced remission of hypertension 5 years after surgery.

Improved Cardiac Function, reduced heart failure risk Sustainable Weight Loss: Both adolescents and adults achieved substantial and similar weight loss 5 years post-surgery (26% and 29% respectively).

Implications for Cardiovascular Care Earlier intervention in the course of obesity and metabolic disease may lead to better long-term cardiovascular outcomes.

Comprehensive Approach: While bariatric surgery is effective, it should be part of a comprehensive approach to cardiovascular risk reduction, including lifestyle modifications and appropriate medical management.

Patient Selection: Careful patient selection is crucial.

Safety and Complications: The complication rate is relatively low, comparable to Laparoscopic cholecystectomy or Hysterectomy. This supports the overall safety profile of bariatric surgery in experienced centers.

Long-term follow-up of bariatric surgery patients is essential to monitor and maintain cardiovascular health improvements. The risk of nutritional deficiencies post-surgery is an important consideration, should be monitored closely.

Conclusion

Bariatric surgery represents a powerful tool in our armamentarium against obesity-related cardiovascular disease. Its ability to induce significant and sustained weight loss, improve glycemic control, and reduce cardiovascular risk factors makes it an important consideration in the management of high-risk obese patients. We should be aware of these benefits and consider bariatric surgery referral for appropriate patients as part of a comprehensive cardiovascular risk reduction strategy.



Jong-Han Kim

Korea University, Korea

• Education

Period	Affiliation	Position
– 2001-2007	Graduate School, College of Medicine, Korea University	Ph.D.
– 1999-2001	Graduate School, College of Medicine, Korea University	M.M.
– 1990-1996	College of Medicine, Korea University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2018-Present	Department of Surgery, Korea University Guro Hospital	Professor
– 2016-2018	Department of Surgery, Korea University Ansan Hospital	Professor
– 2011-2012	Department of Bariatric Surgery, Oregon Health & Science University, USA	Visiting Professor
– 2011-2016	Department of Surgery, Korea University Ansan Hospital	Associate Professor
– 2007-2011	Department of Surgery, Korea University Ansan Hospital	Assistant Professor

• Committee Memberships

- Korean Society for Metabolic and Bariatric Surgery
- Perioperative Intra-Peritoneal & Systemic Chemotherapy Study group
- Korean Anti-Reflux Surgery Study Group
- Korean Laparoscopic GI Surgery Study Group
- Korean Gastric Cancer Association

• Publications

- Survival impact of compliance in extra-perigastric lymphadenectomy for gastric cancer: 20 years of real-world data from a single institution. *Surgery* 2022
- Perioperative Intra-Peritoneal & Systemic Chemotherapy for Gastric Cancer (PIPS-GC) study group. Intraperitoneal Paclitaxel Combined with S-1 Plus Oxaliplatin for Advanced Gastric Cancer with Peritoneal Metastasis: a Phase I Study. *J Gastric Cancer*. 2021
- Multicenter results of long-limb bypass reconstruction after gastrectomy in patients with gastric cancer and type II diabetes. *Asian J Surg*. 2020
- Sentinel Node Mapping Using a Fluorescent Dye and Visible Light During Laparoscopic Gastrectomy for Early Gastric Cancer: Result of a Prospective Study from a Single Institute. *Ann Surg*. 2017
- Should lymph node micrometastasis be considered in node staging for gastric cancer? The significance of lymph node micrometastasis in gastric cancer. *Ann Surg Oncol*. 2015

Symposium 8

Gastrointestinal Motility and Function Change After Bariatric Surgery

Jong-Han Kim (Korea University, Korea)

Alterations in digestive motility after bariatric surgery are not rare complications and they are frequently part of the mechanism of action and a result of surgery. They are usually associated with an increase in weight loss but can lead to the negative consequences on quality of life, which are reversible as a real surgical complication.

Esophageal dysmotility is more frequent in patients with obesity than in the rest of population. Laparoscopic sleeve Gastrectomy (LSG) is the most common bariatric surgery in the world. While clinically effective, recent studies have shown increasingly higher rates of gastroesophageal reflux disease (GERD) and esophageal motility disorders. Anatomical changes after LSG including disruption of the anti-reflux barrier mechanism, hyper pressurization of the proximal and distal chamber of stomach can induce GERD.

Several diagnostic tools such as high-resolution manometry, gastric scintigraphy and impedance pH testing are useful to investigate the relationship between LSG and GERD.

RYGB is considered the gold standard in patients with obesity and GERD and This operation permits a decrease in the DeMeester score after impedance pH-metry and preserves esophageal motility.

Treatment of esophageal dysmotility, especially GERD, is first medical. In the case of medical treatment failure, surgical treatment is recommended: LAGB removal, conversion of LSG to RYGB.

Acceleration of gastric emptying after LSG is due to the increase in intra-gastric pressure, the decrease in gastric wall compliance and the fundus removal, with a loss of reservoir function of the stomach. Also, accelerated gastric emptying makes RYGB the first-line treatment of gastroparesis in patients with obesity and for patients who received other types of gastric surgery.

Dumping syndrome is due to accelerated passage of aliments into the intestine. Symptoms of early dumping syndrome (1 hour after food intake) are abdominal pain, nausea, diarrhea, hypotension, tachycardia and post-prandial fatigue. Late dumping syndrome is characterized by hypoglycemia and hyperinsulinemia 1-3 hours after food intake. First-line treatment of dumping syndrome is based on alimentary behavioral changes. In the case of failure, pharmacological treatment is based on somatostatin analogues with a short duration of action.



Moon-Won Yoo

University of Ulsan, Korea

• Education

Period	Affiliation	Position
– 2010-Present	The Catholic University of Korea Department of Business Administration	Ph.D.
– 2006-2008	Seoul National University college of Medicine	M.S.
– 1992-1998	Seoul National University college of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2012-Present	Asan Medical Center	Clinical Professor
– 2008-2012	Konkuk University College of Medicine	Assistant professor, Clinical Assistant Professor
– 2006-2008	Seoul National University Hospital	Clinical Instructor
– 2003-2006	Republic of Korea Army	Medical Officer (Captain)
– 1998-2003	Seoul National University Hospital	Intern & Resident

• Committee Memberships

- Korean Society of Metabolic and Bariatric Surgery
- Korean Society of Gastrointestinal Surgery
- Korean Gastric Cancer Association
- Korean Society for the Study of Obesity
- Korean Society of Endo-Laparoscopic & Robotic Surgery

• Publications

- Survey of information acquisition and satisfaction after bariatric surgery at a tertiary hospital in Korea. *J Obes Metab Syndr.* 2024 Mar 30;33(1):45-53. (corresponding author)
- Factors Associated With Loss to Follow-up After Laparoscopic Sleeve Gastrectomy: A Single-Center Retrospective Study. *J Metab Bariatr Surg.* 2023 Jun;12(1):1-10. (corresponding author)
- Safety evaluation of curative gastrectomy for gastric cancer patients who underwent liver transplantation: a comparative study with conventional gastrectomy for gastric cancer patients. *World J Surg Oncol.* 2023 May 11;21(1):145. (corresponding author)
- Early Clinical Outcomes of the Morbidly Obese Patients Who Underwent Laparoscopic Sleeve Gastrectomy by Gastric Cancer Surgeons: the Analysis of Fifty Consecutive Cases. *J Metab Bariatr Surg.* 2021 Dec;10(2):66-73. (corresponding author)
- Risk Factors for Gallbladder Stone Formation after Gastric Cancer Surgery. *J Gastric Cancer.* 2019 Dec;19(4):417-426. (corresponding author)

Symposium 8

Bariatric Surgery and its Impact on Cancer Risk Reduction

Moon-Won Yoo (University of Ulsan, Korea)

Introduction

Bariatric surgery, an effective treatment for morbid obesity, has shown not only significant weight loss and improvements in obesity-related comorbidities but also a potential reduction in cancer risk. This review examines the current evidence regarding the relationship between bariatric surgery and cancer incidence.

Mechanisms of Cancer Risk Reduction

Obesity is a well-established risk factor for various cancers, including breast, colon, endometrial, and pancreatic cancers. The mechanisms linking obesity to cancer include chronic inflammation, insulin resistance, altered adipokine levels, and hormonal changes. Bariatric surgery reduces body weight significantly, which in turn reduces these cancer-promoting factors. Additionally, bariatric surgery improves metabolic profiles, reduces systemic inflammation, and normalizes insulin levels, thereby potentially lowering cancer risk.

Evidence from Clinical Studies

Several observational studies and meta-analyses have investigated the association between bariatric surgery and cancer risk. Key findings will be shown in this presentation.

Conclusion

Bariatric surgery appears to significantly reduce the risk of several obesity-related cancers, particularly in women. The mechanisms likely involve substantial weight loss, hormonal changes, and improved metabolic health. As obesity rates continue to rise globally, bariatric surgery may play a crucial role in cancer prevention strategies for high-risk populations.

Sponsored Session 2

Obesity Management with Combination Phentermine
Plus Topiramate from Strategy to Practice

Chairpersons

Ji A Seo

Korea University, Korea

Bumjo Oh

Seoul National University, Korea

Speakers

Jee-Hyun Kang

Konyang University, Korea

Yoon Jeong Cho

Daegu Catholic University, Korea

Jong Han Choi

Konkuk University, Korea



Jee-Hyun Kang

Konyang University, Korea

• Education

Period	Affiliation	Position
	Korea University, Department of Medicine	Ph.D.
	Ewha Womans University, Department of Medicine	M.A.
	Ewha Womans University, Department of Medicine	B.A.

• Affiliations / Experience

Period	Affiliation	Position
	Konyang University Hospital, Department of Family Medicine	Professor
	Ewha Womans University Mokdong Hospital, Department of Family Medicine	Resident & Fellowship

• Committee Memberships

- Korean Society for the Study of Obesity

• Publications

- Relationship between Serum Total Testosterone Concentration and Metabolic Syndrome in Premenopausal Obese Women. *Korean J Fam Med.* 2024;45:215-22
- Guidelines for obesity clinic consultations in primary healthcare clinics. *Journal of the Korean Medical Association/Taehan Uisa Hyophoe Chi,* 2024 67(4)
- Evaluation and Treatment of Obesity and Its Comorbidities: 2022 Update of Clinical Practice Guidelines for Obesity by the Korean Society for the Study of Obesity. *J Obes Metab Syndr.* 2023 Mar 30;32(1):1-24
- Impact of biologic agents on body weight and obesity-related disorders in patients with psoriasis: A nationwide population-based cohort study. *Obes Res Clin Pract.* 2023 May-Jun;17(3):210-217
- Updated Meta-Analysis of Studies from 2011 to 2021 Comparing the Effectiveness of Intermittent Energy Restriction and Continuous Energy Restriction. *J Obes Metab Syndr.* 2022 Sep 30;31(3):230-244

Sponsored Session 2

A FAQ-Based Approach to Prescription of Combination Phentermine Plus Topiramate

Jee-Hyun Kang (Konyang University, Korea)

This lecture will cover a FAQ-based approach to the prescription of combination Phentermine plus Topiramate. The questions addressed in the lecture include the following:

1. Can patients with weight-related chronic comorbidities take Qsymia® ?
2. Is Qsymia® better than phentermine alone or topiramate alone?
3. Is Qsymia® approved for use in adolescents in Korea?
4. What was the duration of pivotal trials for Qsymia®?
5. How should Qsymia® be discontinued?
6. Can pregnant or breastfeeding women take Qsymia®?
7. Can patients have vision problems with Qsymia® ?
8. Is Qsymia® considered a narcotic drug?
9. Can patients with psychiatric disorders also use Qsymia® ?
10. Interactions with other drugs



Yoon Jeong Cho

Daegu Catholic University, Korea

• Education

Period	Affiliation	Position
– 2017	Kyungpook National University Graduate School, School of Medicine	Ph.D.
– 2011	Kyungpook National University Graduate School, School of Medicine	M.S.
– 2006	Kyungpook National University Graduate School, School of Medicine	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	Department of Family Medicine, Daegu Catholic University School of Medicine	Associate professor
– 2020	University of California, Irvine, School of Medicine	Visiting scholarship

• Committee Memberships

- Information Committee, Korean Society for the Study of Obesity

• Publications

- Smoking cessation and risk of metabolic syndrome A meta-analysis. *Medicine* 2024;103:22(e38328)
- Age-specific association of physical activity on visceral obesity: Cross-sectional study. *Obesity Medicine* 48 (2024) 100542
- Association between Smoking and Symptoms of Late-Onset Hypogonadism in Korean Men. *Korean J Fam Pract.* 2024;14(1):11-18
- Effect of Carbohydrate-Restricted Diets and Intermittent Fasting on Obesity, Type 2 Diabetes Mellitus, and Hypertension Management: Consensus Statement of the Korean Society for the Study of Obesity, Korean Diabetes Association, and Korean Society of Hypertension. *Diabetes Metab J* 2022;46:355-376
- Pharmacotherapy in obesity: the current state and the near future. *J Korean Med Assoc* 2022 August; 65(8):514-531

Sponsored Session 2

Weight Maintenance Strategy for Obesity Drug Therapy; Combination Phentermine Plus Topiramate

Yoon Jeong Cho (Daegu Catholic University, Korea)

Obesity is increasing significant social burden worldwide. Therefore, effective long term management and treatment for obesity are crucial.

For the treatment of obesity, foundational approaches typically involve dietary, exercise and behavior interventions. Additionally, pharmacotherapy can be employed as adjunctive treatment, and in cases of severe obesity with comorbidities, bariatric surgery might be considered. Even after successful weight loss through obesity treatment, maintaining the reduced weight requires consideration of various factors. Key among these is the management of lifestyle habits including diet and exercise, along with the maintenance of appropriate behavioral therapies. Depending on the patient, continued pharmacotherapy may also be necessary. In this lecture, I aim to discuss the maintenance of weight loss achieved through the use of phentermine-topiramate combination therapy.



Jong Han Choi

Konkuk University, Korea

• Education

Period	Affiliation	Position
– 2024	Konkuk University School of Medicine	Ph.D.
– 2019	University of Ulsan College of Medicine	M.A.
– 2010	Chonnam National University Medical School	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	Konkuk University Medical Center	Assistant Professor
– 2018-2020	Asan Medical Center, Division of Endocrinology and Metabolism	Clinical Instructor
– 2011-2014	Asan Medical Center, Department of Internal Medicine	Residency
– 2010-2011	Asan Medical Center	Intern

• Committee Memberships

- Committee of Training and the Committee of Training in the Korean Society for the Study of Obesity
- Committee of Clinical Practice Guideline, the Committee of Health Insurance, and the Committee of Food and Nutrition in the Korean Diabetes Association
- Committee of Clinical Practice Guideline, the Committee of Legislation in the Korean Endocrine Society

• Publications

- JH Choi, MK Moon *et al.*, 2023 Clinical Practice Guidelines for Diabetes Mellitus of the Korean Diabetes Association. *Diabetes Metab J.* 2023; 47(5): 575-594
- JH Choi, KM Kim, KH Song, GH Seo, Risk for Newly Diagnosed Type 2 Diabetes Mellitus after COVID-19 among Korean Adults: A Nationwide Matched Cohort Study, *Endocrinol Metab.* 2023
- JH Choi, M-S Kim, Homeostatic Regulation of Glucose Metabolism by the Central Nervous System, *Endocrinol Metab.* 2022;37(1):9-25
- JH Choi, YJ Cho, H-J Kim, *et al.*, Effect of Carbohydrate-Restricted Diets and Intermittent Fasting on Obesity, Type 2 Diabetes Mellitus, and Hypertension Management: Consensus Statement of the Korean Society for the Study of Obesity, Korean Diabetes Association, and Korean Society of Hypertension, *Diabetes Metab J.* 2022;46(3):355-376
- JH Choi, HR Kim, KH Song, Musculoskeletal Complication in Patients with Diabetes Mellitus, *Korean J Int Med.* 2022; 37(6): 1099-1110

Sponsored Session 2

The Role of Combination Phentermine Plus Topiramate in Obese Patients with T2DM

Jong Han Choi (Konkuk University, Korea)

The prevalence of type 2 diabetes mellitus (T2DM) has been rapidly increasing globally, and the prevalence among adults aged 30 and above reached 16.7% in Korea in 2021. This surge is closely linked to the rising incidence of obesity, particularly among young males. Weight reduction is crucial for the management of T2DM. However, while dietary and exercise interventions are essential, their effects are often insufficient and difficult to maintain. Thus, the appropriate use of effective anti-obesity medications can significantly aid in weight loss, improve glycemic control, and potentially lead to diabetes remission.

In Korea, there are only four long-term anti-obesity medications available, with phentermine/topiramate and liraglutide being the most commonly used. Liraglutide, originally developed as an anti-diabetic medication, is highly effective in glycemic control and has proven cardiovascular benefits. However, its use is limited by its administration route (injection), higher cost, and common gastrointestinal side effects such as nausea, vomiting, and diarrhea. Conversely, phentermine/topiramate, despite its contraindications in patients with cardiovascular diseases, hyperthyroidism, glaucoma, and neuropsychiatric disorders due to its sympathomimetic and central nervous system effects, is an oral medication that is relatively affordable and has a slightly higher weight loss efficacy. Therefore, it can be safely attempted in patients without these underlying conditions.

This presentation aims to explore the mechanisms of action, efficacy, and safety of phentermine/topiramate, and to review case studies where this combination has been utilized in the treatment of patients with T2DM.

Plenary Lecture 2

Chairperson

Kee-Hyoung Lee
Korea University, Korea

Speaker

Silva Arslanian
University of Pittsburgh, USA



Silva Arslanian

University of Pittsburgh, USA

• Education

Period	Affiliation	Position
– 1980-1984	Children’s Hospital of Pittsburgh Pittsburgh, Pennsylvania	Fellowship
– 1978-1980	American University Hospital of Beirut, Beirut, Lebanon	Residency
– 1973-1978	American University of Beirut School of Medicine, Beirut, Lebanon	M.D.
– 1971-1973	American University of Beirut, Beirut, Lebanon	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2008-Present	University of Pittsburgh	Professor
– 2005-Present	University of Pittsburgh, School of Medicine	Richard L. Day Professor of Pediatrics Director, Pediatric Clinical & Translational Research Center
	UPMC Children’s Hospital of Pittsburgh	Scientific Director, Center for Pediatric Research in Obesity and Metabolism (CPROM)
– 1999-Present	University of Pittsburgh School of Medicine UPMC Children’s Hospital of Pittsburgh	Tenured Professor of Pediatrics

• Committee Memberships

- Pediatric Endocrine Society (PES)
- Endocrine Society
- American Diabetes Association (ADA)
- International Society Pediatric and Adolescent Diabetes (ISPAD)

• Publications

- Arslanian SA, Hannon T, Zeitler P, Chao LC, Boucher-Berry C, Barrientos-Pérez M, Bismuth E, Dib S, Cho JI, Cox D for the AWARD-PEDS Investigators: Once-Weekly Dulaglutide for the Treatment of Youths with Type 2 Diabetes. *N Engl J Med.* 387(5):433-443
- Weghuber D, Barrett T, Barrientos-Pérez M, Gies I, Hesse D, Jeppesen OK, Kelly AS, Mastrandrea LD, Sørrig R, Arslanian S the STEP Teens Investigators: Once-Weekly Semaglutide in Adolescents with Obesity. *N Engl J Med.* 15;387(24):2245-2257
- Vajravelu ME, Mani I, Malik S, Hewitt B, Peyyety V, Arslanian S: Race and Neighborhood-Related Disparities Spanning the COVID-19 Pandemic: Trajectories of Combined Glycemic Control and Body Mass Index in Youth with Diabetes. *Diabetes Care* 1;46(3):511-518
- Kelly A, Arslanian S, Hesse D, Iversen AT, Körner A, Schmidt S, Sørrig R, Weghuber D, Jastreboff A: Reducing BMI Below the Obesity Threshold in Adolescents Treated with Once-weekly Subcutaneous Semaglutide 2.4 mg. *Obesity* 31(8):2139-2149
- Hannon TS, Arslanian SA. Obesity in Adolescents. *N Engl J Med.* 389(3):251-261

Plenary Lecture 2

Management of Youth Type 2 Diabetes: New Pharmacotherapeutic Modalities

Silva Arslanian (University of Pittsburgh, USA)

Parallel to the increase in obesity worldwide, there has been a rise in the prevalence of type 2 diabetes mellitus (T2DM) in youth. The etiology of T2DM in youth, like adults, is multifactorial including genetic and environmental factors, among which obesity, sedentary lifestyle, family history of T2DM, and high-risk ethnicity play important roles. The pathophysiology of youth T2DM involves peripheral, hepatic, and adipose tissue insulin resistance combined with relative insulin deficiency, and impaired incretin effect. Treatment of T2DM should not have a glucocentric approach, rather it should target pathophysiological impairments in improving not only glycemia, but also dyslipidemia, hypertension, weight management and the prevention of short- and long-term complications. Presently limited pharmacotherapeutic options need to be expanded both for childhood T2DM and obesity.

During this lecture the following points will be discussed:

1. What are the clinical characteristics of T2DM in youth?
2. What is the pathophysiology of T2DM in youth?
3. What is the treatment of T2DM in youth?
4. What are the long-term complications?

Symposium 9

Obesity and Cardiovascular Health

Chairpersons

Yoon-Sok Chung

Ajou University, Korea

Do Thi Ngoc Diep

Vietnam Nutrition Association, Vietnam

Speakers

Richard Kibbey

Yale University, USA

Kyung-Hee Kim

Incheon Sejong Hospital, Korea

Jonathan Bennett

University of Hawaii Cancer Center, USA

Panel Discussion

Bumjo Oh

Seoul National University, Korea

Jun Hwa Hong

Eulji university, Korea



Richard Kibbey

Yale University, USA

• Education

Period	Affiliation	Position
– 2007	Yale School of Medicine	Endocrinology Fellowship
– 2002	Yale School of Medicine	Intern/ Resident Internal Medicine
– 2000	University of Texas Southwestern Medical School	M.D.
– 2000	University of Texas Southwestern Medical School	Ph.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Yale School of Medicine	Professor with tenure

• Publications

- Matthew J. Merrins, Richard G. Kibbey, Glucose Regulation of β -Cell KATP Channels: It Is Time for a New Model! *Diabetes* 2024;73(6):856–863, <https://doi.org/10.2337/dbi23-0032> PubMed: 38768366
- Matthew J Merrins 1, Barbara E Corkey 2, Richard G Kibbey 3, Marc Prentki 4 Metabolic cycles and signals for insulin secretion. *Pubmed* PMID: 35728586 PMCID: PMC9262871, DOI: 10.1016/j.cmet.2022.06.003
- Abulizi A, Cardone RL, Stark R, Lewandowski SL, Zhao X, Hillion J, Ma L, Sehgal R, Alves TC, Thomas C, Kung C, Wang B, Siebel S, Andrews ZB, Mason GF, Rinehart J, Merrins MJ, Kibbey RG. Multi-Tissue Acceleration of the Mitochondrial Phosphoenolpyruvate Cycle Improves Whole-Body Metabolic Health. *Cell Metab.* 2020;32(5):751-66 e11. Epub 2020/11/05. doi: 10.1016/j.cmet.2020.10.006. PubMed PMID: 33147485; PMCID: PMC7679013
- Lewandowski SL, Cardone RL, Foster HR, Ho T, Potapenko E, Poudel C, VanDeusen HR, Sdao SM, Alves TC, Zhao X, Capozzi ME, de Souza AH, Jahan I, Thomas CJ, Nunemaker CS, Davis DB, Campbell JE, *Kibbey RG, *Merrins MJ. Pyruvate 224 Kinase Controls Signal Strength in the Insulin Secretory Pathway. *Cell Metab.* 2020;32(5):736-50 e5. Epub 2020/11/05. doi: 10.1016/j.cmet.2020.10.007. PubMed PMID: 33147484; PMCID: PMC7685238
- Alves TC, Pongratz RL, Zhao X, Yarborough O, Sereda S, Shirihai O, Cline GW, Mason G, Kibbey RG*. Integrated, step-wise, mass-isotopomeric flux analysis of the TCA cycle. *Cell Metabolism* 2015;22(5):936-47. PMC4635072

Symposium 9

Reconsidering the Role of Mitochondria in Nutrient Sensing

Richard Kibbey (Yale University, USA)

The nutrient environment has to first be “sensed” if cellular, tissue, and organismal metabolic homeostasis are to be maintained. Some signals, such as insulin, glucagon, and GLP-1, work through cell surface receptors. But, for such hormones to be secreted, nutrient sensing cells must first utilize metabolism-based “sensing” of nutrients like glucose, amino acids and fats. Oxidative synthesis of ATP by the mitochondria (OxPhos) has largely been ascribed the role of transmitting nutrient levels to the secretory apparatus. If such a system were even bioenergetically possible, it would make them perilously susceptible to death when energy levels are low. However, the first human inborn error in mitochondrial metabolism that impacted insulin secretion, GDHH545Y, indicated there must be another explanation that did not involve OxPhos. Instead of making ATP, the cell’s metabolism has been rewired to make the much higher energy containing metabolite phosphoenolpyruvate in the PEP cycle that is then triggers the depolarization that releases insulin. This revised role of how mitochondria are involved in energy sensing throughout the body has important implications for balancing energy storage and utilization.



Kyung-Hee Kim

Incheon Sejong Hospital, Korea

• Education

Period	Affiliation	Position
- 2016	Seoul National University	Ph.D.
- 2013	Seoul National University	M.S.
- 2004	University of medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2019-Present	Mayo Clinic, Rochester, USA	Visiting and Research doctor
- 2013-Present	Sejong Hospital	Director of Heart Transplantation
- 2020	Penn state hospital, USA	Visiting and Research doctor
- 2015	Incheon Sejong Hospital	Director of Heart Transplantation
- 2014	Drexel University Hospital, USA	Visiting and Research doctor

• Committee Memberships

- ISHLT guideline update Task Force 3 co-chair
- ISHLT 2020 Program Committee
- ISHLT Committee
- Korean Society of Echocardiography
- Korean Society of Heart Failure, Outreach Committee, Education Committee

• Publications

- Artificial intelligence-enhanced smartwatch ECG for heart failure-reduced ejection fraction detection by generating 12-lead ECG
- Sex Differenced in Diastolic Function and Long-term Clinical Outcomes in Patient With Peripheral Artery Disease Who Underwent Percutaneous Transluminal Angioplasty: Single
- Applicable Machine Learning Model for Predicting Contrast-induced Nephropathy Based on Pre-catheterization Variables
- The International Society for Heart and Lung Transplantation (ISHLT) guidelines for the care of heart transplant recipients
- Optimizing Outcomes for Post-ECMO Heart Transplant Patients in South Korea: Addressing Multi-Organ Failure and Allocation Challenges

Symposium 9

Bariatric Surgery in Patients with Advanced Heart Failure

Kyung-Hee Kim (Incheon Sejong Hospital, Korea)

Background:

Obesity is increasingly recognized as a critical factor complicating the management of advanced heart failure (HF). The intersection of obesity and HF presents unique challenges, especially in patients requiring advanced therapies such as left ventricular assist devices (LVADs) and heart transplantation. Obesity not only exacerbates the hemodynamic and metabolic demands on the failing heart but also increases the risk of post-transplant complications, such as graft failure and infections. As bariatric surgery has emerged as a viable treatment option for severe obesity, its role in the management of advanced heart failure patients is gaining attention. This review lecture will discuss the clinical benefits, challenges, and current evidence surrounding the use of bariatric surgery in this high-risk population.

Objectives:

This lecture aims to provide a comprehensive overview of the following topics:

1. The impact of obesity on the progression of advanced heart failure and its implications for treatment strategies.
2. The role of bariatric surgery in improving candidacy for heart transplantation by addressing obesity-related contraindications.
3. The effects of bariatric surgery on the management and outcomes of patients with LVADs, including potential reductions in device-related complications.
4. The considerations for perioperative and postoperative management of advanced heart failure patients undergoing bariatric surgery, with an emphasis on cardiac optimization, mechanical circulatory support, and multidisciplinary care.

Key Findings:

The existing evidence suggests that bariatric surgery can lead to significant weight loss and improvements in comorbid conditions, such as diabetes and hypertension, which are pivotal in managing advanced heart failure. Studies indicate that post-bariatric surgery weight reduction can enhance cardiac function, decrease pulmonary artery pressures, and improve right ventricular performance. These benefits are particularly relevant for heart transplantation candidates, as achieving a lower BMI can enhance transplant candidacy and reduce perioperative risks. In patients with LVADs, bariatric surgery may reduce the incidence of device-related complications, such as driveline infections and systemic inflammation, by decreasing overall body mass and improving metabolic health.

Challenges and Considerations:

While bariatric surgery offers promising benefits, the procedure in heart failure patients carries substantial risks, particularly related to perioperative management and postoperative recovery. Advanced heart failure patients, especially those requiring LVAD support or listed for transplantation, need tailored preoperative optimization and close monitoring for complications such as hemodynamic instability, wound healing issues, and respiratory failure. A multidisciplinary approach involving cardiologists, cardiothoracic surgeons, bariatric surgeons, anesthesiologists, and nutritionists is critical to ensuring successful outcomes in this complex patient population.

Conclusion:

Bariatric surgery represents a potential pathway to improving outcomes in patients with advanced heart failure, particularly those who are candidates for heart transplantation or LVAD therapy. The procedure can alleviate the adverse effects of obesity on heart failure and improve the overall health status of these patients. However, the risks associated with bariatric surgery in this fragile population require meticulous perioperative planning and interdisciplinary collaboration. Future studies should focus on long-term outcomes, including transplant-free survival, quality of life, and the durability of cardiac improvements following weight loss.



Jonathan Bennett

University of Hawaii Cancer Center, USA

• Education

Period	Affiliation	Position
– 2023	University of Hawaii, Manoa	Ph.D.
– 2012	California State University, Long Beach	M.S.
– 2009	Northern Illinois University	B.S.
– 2009	Northern Illinois University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	University of Hawaii Cancer Center	Researcher

• Committee Memberships

- International Society of Clinical Densitometry
- International Atomic Energy Agency
- International Body Composition Symposium

• Publications

- Bennett JP, Liu YE, Quon BK, Kelly NN, Wong MC, Leong L, ... & Shepherd JA (2022). Three-dimensional optical body shape and features improve prediction of metabolic disease risk in a diverse cross-sectional sample of adults. *Obesity*, 30(8), 1589-1598
- Bennett JP, Cataldi D, Liu YE, Kelly NN, Quon BK, ... & Shepherd JA (2024). Development and validation of a rapid multicompartiment body composition model using 3-dimensional optical imaging and bioelectrical impedance analysis. *Clinical Nutrition*, 43(2), 346-356
- Bennett JP, Prado CM, Heymsfield SB, & Shepherd JA (2024). Evaluation of visceral adipose tissue thresholds for elevated Metabolic Syndrome risk across diverse populations: A systematic review. *Obesity Reviews*, e13767
- Bennett JP, Ford KL, Siervo M, Gonzalez MC, Lukaski HC, Sawyer MB, Deutz NEP, Shepherd JA, & Prado CM (2024). Advancing body composition assessment in patients with cancer: First comparisons of traditional versus multicompartiment models. *Nutrition*, 125: 112494
- Garber AK, Bennett JP, Wong MC, Ng BK, Maskarinec G, ... & Shepherd JA (2023). Cross-sectional assessment of body composition and detection of malnutrition risk in participants with low Body Mass Index and eating disorders using 3D optical surface scans. *American Journal of Clinical Nutrition*, 118(4), 812-821

Symposium 9

Body Composition and Its Associations with Disease Risk: Measures, Assessment Techniques, and Future Directions

Jonathan Bennett (University of Hawaii Cancer Center, USA)

The proportions of fat, muscle, and bone that make up overall body weight serve as a reflection of lifelong diet and physical activity. Measurement of these body composition components is essential to nutrition assessment as the quantification of these components can identify over/undernutrition, monitor growth and development, and track changes related to disease progression or treatment. The assessment of body composition therefore plays an integral role in the assessment of disease risk (e.g.; cardiovascular disease, type II diabetes, cancer) across the lifespan.

Body composition assessment methods continue to develop in terms of their feasibility and practicality, as well as the number and types of features available. Tools such as dual energy X-ray absorptiometry, bioelectrical impedance analysis, and 3-dimensional optical imaging are now providing measurements of body composition and disease risk that were previously only available in specialized settings. By measuring and monitoring these body composition components, clinicians can detect changes that are more strongly associated with disease risk compared to traditional assessments like Body Mass Index (BMI). The range of assessment methods can identify whole-body and regional muscle and fat as well as other components such as visceral fat that are more closely linked to cardiovascular disease risk.

Understanding body composition and its related measures can significantly enhance disease risk assessment and patient monitoring across clinical settings. The measurements obtained from these tools can support the creation of tailored treatment plans that consider an individual's unique body composition and goals. Additionally, they can provide valuable insights for public health strategies aimed at encouraging a health, weight management, and disease risk prevention. Areas for future development and improvement of these techniques include: improving the accuracy and features provided by body composition assessment methods, large-scale data collection of population health and features associated with disease risk, and the development of more comprehensive and accurate risk prediction models for various diseases.

This lecture will identify the current state of knowledge regarding key components of body composition useful for clinical monitoring of health and disease risk, highlight features and capabilities of various body composition assessment techniques, and identify areas for future research to improve the utility of body composition assessment across clinical and research settings.

Symposium 10

Obesity and Cancer

Chairpersons

Hyuk-Sang Kwon

The Catholic University of Korea, Korea

Elaine Rush

Auckland University of Technology, New Zealand

Speakers

Emma Fontvieille

International Agency for Research on Cancer, IARC/WHO, France

Thi Xuan Mai Tran

Hanyang University, Korea

Wonsock Kim

Eulji University, Korea

Panel Discussion

Young-Sang Kim

CHA University, Korea

Dong Wook Shin

Sungkyunkwan University, Korea



Emma Fontvieille

International Agency for Research on Cancer, IARC/WHO, France

• Education

Period	Affiliation	Position
– 2021-2024	Nutrition and Metabolism Branch, International Agency for Research On Cancer	Ph.D.
– 2018-2020	University Lyon 1	M.A

• Committee Memberships

- International Society of Clinical Densitometry
- International Atomic Energy Agency
- International Body Composition Symposium

• Publications

- Impact of pre-existing cardiometabolic diseases on metastatic cancer stage at diagnosis: a prospective multinational cohort study
- Tissue-specific genetic variation suggests distinct molecular pathways between body shape phenotypes and colorectal cancer
- Consumption of ultra-processed foods and risk of multimorbidity of cancer and cardiometabolic diseases: a multinational cohort study
- Body mass index and cancer risk among adults with and without cardiometabolic diseases: evidence from the EPIC and UK Biobank prospective cohort studies
- Body mass index and incident cardiometabolic conditions in relation to obesity-related cancer risk: A population-based cohort study in Catalonia, Spain

Symposium 10

Body Mass Index and Cancer Risk Among Adults With and Without Cardiometabolic Diseases

Emma Fontvieille (International Agency for Research on Cancer, IARC/WHO, France)

The prevalence of overweight and obesity (body mass index, BMI ≥ 25 kg/m²) has increased globally in recent decades. Overweight and obesity has been associated with an increased risk of 13 cancer types. Cancer and other cardiometabolic diseases (CMD) (e.g., type 2 diabetes mellitus [T2D], and cardiovascular disease [CVD]), often share common risk factors including adiposity and tend to co-occur within the same individuals. However, whether cancer risk associated with a higher BMI differs among adults with and without CVD and/or T2D is unclear. We aimed to evaluate separate and joint associations of BMI and CVD and/or T2D with the risk of cancer.

In an individual participant data meta-analysis of UK Biobank (UKB) and the European Prospective Investigation into Cancer and nutrition (EPIC), with a total of 577,343 adults, free of cancer, T2D, and CVD at recruitment, BMI (per ~5 kg/m²) was positively associated with the risk of obesity-related cancer among participants without CVD or T2D (HR: 1.11, 95%CI: 1.07,1.16), among participants with T2D (HR: 1.11, 95% CI: 1.05,1.18), and among participants with CVD (HR: 1.17, 95% CI: 1.11,1.24). The joint association of obesity (BMI ≥ 30 kg/m²) and CVD with the risk of overall cancer translated into a meta-analytical relative excess risk due to interaction (RERI) of 0.28 (95% CI: 0.09–0.47). No joint association was observed for T2D (RERI: -0.03; -0.33, 0.28).

These findings are important for cancer risk stratification and to guide public health interventions for overweight/obesity prevention. Our study showed that population sub-groups affected by a CVD are at higher risk of cancer for a given level overweight or obesity as compared to sub-groups without CVD.



Thi Xuan Mai Tran

Hanyang University, Korea

• Education

Period	Affiliation	Position
– 2017-2021	National Cancer Center Graduate School of Cancer Science and Policy	Ph.D.
– 2014-2017	National Cancer Center Graduate School of Cancer Science and Policy	M.A.
– 2009-2013	Ho Chi Minh City Medicine and Pharmacy University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Department of Preventive Medicine, Hanyang University, College of Medicine	Assistant Research Professor
– 2021-2023	Department of Preventive Medicine, Hanyang University, College of Medicine	Post-doctoral Researcher
– 2021	National Cancer Center, Korea	Post-doctoral Researcher

• Committee Memberships

- Korean Society for Preventive Medicine
- Korean Breast Cancer Society
- Korean Society of Epidemiology

• Publications

- Tran TXM, Chang Y, Choi HR, Kwon R, Lim GY, Kim EY, Ryu S, Park B. Adiposity, Body Composition Measures, and Breast Cancer Risk in Korean Premenopausal Women. *JAMA Netw Open*. 2024 Apr 1;7(4):e245423. doi: 10.1001/jamanetworkopen.2024.5423. PMID: 38578637; PMCID: PMC10998159
- Tran TXM, Kim S, Park B. Changes in metabolic syndrome and the risk of breast and endometrial cancer according to menopause in Korean women. *Epidemiol Health*. 2023;45:e2023049. doi: 10.4178/epih.e2023049. Epub 2023 May 1. PMID: 37139668; PMCID: PMC10593591
- Tran TXM, Kim S, Song H, Lee E, Park B. Association of Longitudinal Mammographic Breast Density Changes with Subsequent Breast Cancer Risk. *Radiology*. 2023 Feb;306(2):e220291. doi: 10.1148/radiol.220291. Epub 2022 Sep 20. PMID: 36125380
- Tran TXM, Kim S, Song H, Ryu S, Chang Y, Park B. Consecutive gain and loss in body weight and waist circumference with risk of subsequent breast cancer in Korean women. *Int J Obes (Lond)*. 2022 Oct;46(10):1742-1748. doi: 10.1038/s41366-022-01173-5. Epub 2022 Jul 6. PMID: 35794193
- Tran TXM, Moon SG, Kim S, Park B. Association of the Interaction Between Mammographic Breast Density, Body Mass Index, and Menopausal Status With Breast Cancer Risk Among Korean Women. *JAMA Netw Open*. 2021 Dec 1;4(12):e2139161. doi: 10.1001/jamanetworkopen.2021.39161. PMID: 34940866; PMCID: PMC8703253

Symposium 10

Metabolic Health and Risk of Breast Cancer: A Focus on Impact of Body Composition and Waist Circumference

Thi Xuan Mai Tran (Hanyang University, Korea)

In 2020, over 2.3 million women worldwide were diagnosed with breast cancer, and by the end of the year, there were 7.8 million breast cancer survivors, making it the most prevalent cancer globally. While a high body mass index (BMI) has long been recognized as a risk factor for postmenopausal breast cancer, recent evidence highlights the importance of other metabolic health indicators, including excess body weight and composition, as modifiable risk factors. Waist circumference, also serves as an indicator of abdominal obesity or central adiposity, providing additional risk-related information beyond BMI or weight alone. Thus, the assessment of the waist circumference and other body composition measures can provide risk-related information in addition to BMI.

While body composition and waist circumference play a crucial role in breast cancer risk, findings from previous studies indicate that the associations between body composition, waist circumference, and breast cancer risk differ according to menopausal status. In postmenopausal, studies have shown that metabolic syndrome is independently associated with an increased risk of breast, with waist circumference being significant risk factors even after adjusting for BMI. Postmenopausal women exhibited more fat in different body segments, which are associated with increased risk for breast cancer, compared to premenopausal women. Fat mass control throughout the body may be beneficial in mitigating the risk for breast cancer and was not limited to abdominal fat alone among postmenopausal women.

Conversely, an inverse association or null association is observed in premenopausal women. Previous studies found that higher value of waist circumference or body composition is associated with reduced breast cancer risk while some study suggest that there is no association between obesity and premenopausal breast cancer risk. Fat distribution differed between pre- and postmenopausal women. Fat mass and waist circumference were significantly associated with the risk for breast cancer among postmenopausal but not premenopausal women. These findings underscore the different role of metabolic health and body composition in pre- and postmenopausal breast cancer risk.



Wonsock Kim

Eulji University, Korea

• Education

Period	Affiliation	Position
– 2024	School of medicine, Korea University	Ph.D.
– 2021	School of medicine, Korea University	M.S.
– 2015	School of medicine Korea University	M.D.
– 2005	College of Law, Seoul National University	L.L.B.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Department of Family Medicine, Uijeongbu Eulji Medical Center, Eulji University School of Medicine	Assistant Professor
– 2021-2023	Department of Family Medicine, Uijeongbu Eulji Medical Center	Clinical Professor
– 2019-2021	Department of Family Medicine, University Anam Hospital	Clinical Instructor
– 2016-2019	Korea University Anam Hospital	Residency in Family Medicine

• Committee Memberships

- Korean Society for the Study of Obesity
- Korean Academy of Family Medicine
- Korean Geriatrics Society

• Publications

- Park CM, *et al.* Functional status recovery trajectories in hospitalised older adults with pneumonia. *BMJ Open Respir Res.* 2022 May;9(1):e001233
- Park CM, *et al.* Comparison of Frailty Index to Pneumonia Severity Measures in Older Patients With Pneumonia. *J Am Med Dir Assoc.* 2022 Jan;23(1):165-169
- Nam GE, *et al.* Association between living alone and incident type 2 diabetes among middle-aged individuals in Korea: a nationwide cohort study. *Sci Rep.* 2021 Feb 11;11(1):3659
- Kim W, *et al.* Impact of waist circumference on the risk of vertebral fracture: A nationwide cohort study in South Korea. *Bone.* 2021 Apr;145:115870
- Nam GE, *et al.* Body Weight Variability and the Risk of Cardiovascular Outcomes and Mortality in Patients With Type 2 Diabetes: A Nationwide Cohort Study. *Diabetes Care.* 2020 Sep;43(9):2234-2241

Symposium 10

Lifestyle, Obesity, and Cancer

Wonsock Kim (Eulji University, Korea)

Cancer, which is a main cause of mortality, has become a major public health burden worldwide, and its incidence has increased over past decades. In 2020, it is reported that cancer is a worldwide leading cause of mortality with 10 million deaths as well as 19.3 million new cases. Although, cancer is developed due to various causes, recent studies have reported that unhealthy lifestyle is an important risk factor in malignancy. It is reported that unhealthy lifestyle has become a great social burden including development of cancer and premature mortality.

In addition, obesity which is a multifactorial, chronic and complex disease that has increased dramatically in recent decades, is a pandemic disease that increases the risk of type 2 diabetes, cardiovascular diseases, dyslipidemia, osteoarthritis, dementia, depression and various types of cancer. The significant positive association between cancer and obesity which is usually defined by a body mass index (BMI) value $\geq 30\text{kg/m}^2$ and 25kg/m^2 in Asian population, is reported in many recent studies. In a meta-analysis reported in 2018, 18 types out of 23 cancer types had a causal association with BMI. The moderate association between BMI and overall cancer is repeatably reported in many studies. Moreover, it has been suggested that central adiposity measured by waist circumference may be an independent and possibly more accurate risk factor in cancer and mortality.

Lifestyle is believed to have an important role in the development of obesity and cancer. It seems that healthy lifestyle is an important modifiable factor that could reduce risk of malignancy and obesity. Healthy lifestyle that includes behaviors such as healthy food, reasonable and constant physical activities, stress control and elimination of tobacco and excessive alcohol intake, may influence the development of cancer. The onset of most types of cancer may be preventable through the adoption of a healthy lifestyle such as avoiding smoking, physical activity, eliminating excessive alcohol use, and eating a healthy diet. In addition, preventing obesity which acts as an outcome as well as a factor, is important in reducing the risk of malignancy.

Therefore, in this session, we will discuss how lifestyle, obesity and cancer are linked, and what effort and change should be made for better health outcomes.

Symposium 11

Perspectives in Digital Nutrition Care for Obesity

Chairpersons

Jeong Hyun Lim

Seoul National University, Korea

Yoonju Song

The Catholic University of Korea, Korea

Speakers

Wen Peng

Qinghai University, China

Melissa Ventura-Marra

West Virginia University, USA

Shinok Park

Noom Korea, Korea

Panel Discussion

Hyunjung Lim

Kyung Hee University, Korea

Oh Yoen Kim

Dong-A University, Korea



Wen Peng

Qinghai University, China

• Education

Period	Affiliation	Position
– 2015-2016	Hebrew University of Jerusalem, Israel	M.P.H.
– 2011-2014	Charite Medical College, Humboldt University, Germany	Ph.D.
– 2002-2009	Nanjing Medical University	M.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2017-Present	Medical College, Qinghai University	Assistant Professor, Associate Professor, Professor
– 2013-2017	Medical College, Jiangsu University	Assistant Professor
– 2009-2017	Affiliated People's Hospital of Jiangsu University	Physician

• Committee Memberships

- Asia Pacific Journal of Clinic Nutrition
- The Obesity-Prevention and Control Section of the Chinese Nutrition Society
- Nutritional Food Safety Branch of the Chinese Geriatrics Society
- Dietary Nutrition and Health Branch of China Health Management Association
- Chronic Disease Prevention and Management Specialized Committee of China Health Information and Healthcare Big Data Society

• Publications

- Wang LM#, Peng W#, Zhao ZP#, Zhang M, Shi ZM, Song ZW, Zhang X, Li C, Huang ZJ, Sun XM, Wang LH, Zhou MG, Wu J*, Wang YF*. *Prevalence and treatment of diabetes in China*, 326(24):2498-2506
- Peng W. Waste on the roof of the world. *Science*. 365(6458),1090
- Peng W#, Chen SQ#, Chen XG, Ma Y, Wang TT, Sun XM, Wang YG, Ding GQ, Wang YF*. Trends in major non-communicable diseases and related risk factors in China: an analysis of nationally representative survey data. *Lancet Regional Health Western Pacific*. 100809
- Peng W#, Zhang L#, Wen FY, Tang X, Zeng LX, Chen JP, Galea G, Wen DL, Wang YF*. Trends and disparities in non-communicable diseases in the Western Pacific region. *Lancet Regional Health Western Pacific*. 100938
- Peng W. Nutritional implications of Tibetan Plateau resettling and urbanization programmes. In: Oenema S, Campeau C, Delmuè DCC, ed. *United Nations System Standing Committee on Nutrition (UNSCN)-Nutrition 44. Rome: UNSCN pp. 83-90*

Symposium 11

Applications of Digital Health and Nutrition Approaches for Obesity Prevention and Management in the Western Pacific Region

Wen Peng (Qinghai University, China)

The prevalence of obesity increased rapidly in recent years, contributing to the huge increasing disease burdens in the Western Pacific region (WPR). The use of digital health (dHealth) technologies, such as wearable gadgets, mobile apps, and artificial intelligence (AI), facilitates interventions for obesity prevention and treatment via nutrition and other approaches. Currently, most studies on dHealth and obesity in WPR were conducted in a few high- and middle-income countries like Australia, China, Japan, the Republic of Korea, and New Zealand. Evidence indicated that dHealth services promoted early prevention by behavior interventions, and AI-based innovation brought automated diagnosis and clinical decision-support. dHealth brought facilitators for the doctor-patient interplay in the effectiveness, experience, and communication skills during healthcare services, with rapidly development during the pandemic of coronavirus disease 2019. In the future, the improvement of dHealth services in WPR needs to gain more policy support, enhance technology innovation and privacy protection, and perform cost-effectiveness research.



Melissa Ventura-Marra

West Virginia University, USA

• Education

Period	Affiliation	Position
– 2006	Florida International University	Ph.D.
– 1999	West Virginia University	M.S.
– 1996	West Virginia University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	West Virginia University	Associate Professor
– 2013-2020	West Virginia University	Assistant Professor
– 2010-2012	Digestive CARE, Florida	Director of Nutrition Services
– 2008-2010	Private Practice	Nutrition Consultant

• Committee Memberships

- USDA Multistate Research Fund Project NE1939
- Academy of Nutrition and Dietetics Telehealth Taskforce

• Publications

- Marra MV, Lilly C, Nelson K, Woofers D, Malone J. A Pilot Randomized Controlled Trial of a Telenutrition Weight Loss Intervention in Middle-aged and Older Men with Multiple Risk Factors for Cardiovascular Disease. *Nutrients*. 11(2):229
- Dabeek W* and Marra M. Dietary Quercetin and Kaempferol: Bioavailability and Potential Cardiovascular-related Bioactivity. *Nutrients*. 11(10). 2288
- Dabeek W*, Kovicich N, Walsh C, and Marra MV. Characterization and Quantification of Major Flavonol Glycosides in Ramps. (*Allium tricoccum*). *Molecules*, 24(18). 3281
- Drazba M*, Holásková I, Sahyoun N and Marra MV. Association of Adiposity and Diet Quality with Serum Ceramides in Middle-aged Adults with Risk Factors for Cardiovascular Disease. *J. Clin. Med.* 8(4), 527
- Marra MV, Drazba M*, Holásková I, and Belden WJ. Nutrition Risk is Associated with Leukocyte Telomere in a Middle-aged Appalachian Population. *Nutrients*. 11(3):508

Symposium 11

Exploring the Landscape of Telenutrition in Obesity Management

Melissa Ventura-Marra (West Virginia University, USA)

Nearly 42% of adults in the United States are living with obesity. Although obesity rates continue to rise, and many individuals affected struggle to lose weight and maintain weight loss, comprehensive nutrition and behavioral counseling for managing obesity and its comorbidities remains underused. Obstacles to implementing effective obesity care include insufficient insurance coverage, limited access to specialty providers, and difficulty sustaining behavior change. The COVID-19 pandemic accelerated the adoption of tele-delivery for nutrition care, presenting a promising solution to many of these obstacles. Emerging research suggests that nutrition counseling via audio and/or video technology is as effective as in-person sessions, leading to notable improvements in weight, BMI, A1c, and serum lipids. However, there are potential barriers to address, such as technological limitations, accessibility issues, state licensure requirements, patient privacy concerns, and the need for personalized care. Adopting new payment models like value-based care, adding virtual nutrition coaching and teaching kitchen options, and providing Food is Medicine programs could improve service use, patient satisfaction, and engagement, promoting sustained behavior change and health outcomes. More research is needed to establish best practices such as dosage, address implementation challenges, and evaluate long-term cost-effectiveness. Furthermore, it is essential to train the dietetics workforce in this approach to care delivery to ensure they can provide safe, high-quality virtual nutrition care to patients managing obesity and diet-related comorbidities.



Shinok Park

Noom Korea, Korea

• Education

Period	Affiliation	Position
– 2017-Present	Noom Korea	B2B/ Research Lead
– 2011-2013	Ewha Mokdong Hospital	Clinical dietitian
– 2007-2009	University of Essex, Department of Health and Human Sciences	M.P.H.
– 2001-2003	Ewha womans University, The Graduate School of Clinical Health Sciences	M.S.
– 1993-1998	Ewha womans University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2017-Present	Noom Korea	B2B/ Research Pod Lead
– 2022-2023	Soonguei Women's college	Adjunct Professor
– 2011-2013	Ewha Mokdong Hospital	Clinical dietitian
– 2003-2005	Korea Cancer Centre Hospital	Clinical dietitian
– 2001-2002	Kangbuk Samsung Hospital	Internship

• Committee Memberships

- Korean Society for the Study of Obesity
- The Korean Society of Lipid and Atherosclerosis

• Publications

- Dietary and socioeconomic factors that influence on the intake of B vitamins in pregnant women (Master's thesis)
- Socioeconomic Inequalities and Obesity among Korean women: Secondary analysis of data from the third Korea National Health and Nutrition Examination Survey (Master's thesis)

Symposium 11

Telenutrition for Weight Management: Benefits, Limits, and Future Perspectives

Shinok Park (Noom Korea, Korea)

The COVID-19 pandemic has significantly accelerated the adoption of telehealth services, including telenutrition. Leveraging advancements in technology such as medical devices, information technology systems, and artificial intelligence, telenutrition provides remote nutritional counseling. This review explores the current state of telenutrition—its benefits, constraints, and future outlook.

The pandemic has catalyzed dramatic changes in remote healthcare solutions, establishing telehealth as a vital component of modern healthcare. With the integration of advanced technologies, telenutrition has become more accessible and effective in providing dietary guidance and support. It breaks the barriers of distance and time, offering flexible and timely dietary advice. Cost-effectiveness is a significant advantage, as it reduces travel time and clinic visit costs. Furthermore, telenutrition has proven effective for weight management and chronic disease management, ensuring sustained health benefits. The valuable data collected through telenutrition facilitates more informed decision-making in dietary management.

However, challenges remain. Digital literacy among the elderly and chronic disease patients presents a significant barrier, although technological advancements are rapidly addressing this issue. Ensuring the safe and ethical use of personal data is paramount, and reliable access to necessary digital infrastructure continues to be a concern. Additionally, assisting users in prioritizing information can help avoid data fatigue.

New challenges are inevitable as telenutrition evolves. Accurately assessing patients' nutritional status requires a deeper understanding of various diet monitoring methods' strengths and limitations. Sustaining behavioral change and motivation necessitates effective strategies such as incentives and modeling to encourage continuous and active self-monitoring.

As telenutrition continues to advance, integrating cutting-edge technologies and refining methodologies will be essential. The role of dietitians will become increasingly crucial in leveraging these advancements to provide personalized, effective dietary guidance and support.

Symposium 12

Childhood Obesity is a Chronic Disease
Demanding Specific Health Care

Chairpersons

Il Tae Hwang

Hallym University, Korea

Kye Sik Shim

Kyung Hee University, Korea

Speakers

Sochung Chung

Konkuk University, Korea

Mary Easaw

Cardiac Vascular Sentral Kuala Lumpur, Malaysia

Silva Arslanian

University of Pittsburgh, USA

Panel Discussion

Yeo-Jin Hong

Korea University, Korea

Hwal Rim Jeong

Soonchunhyang University, Korea



Sochung Chung

Konkuk University, Korea

• Education

Period	Affiliation	Position
- 2001	Yonsei University	
- 1996	Yonsei University	
- 1985-1991	Yonsei University	

• Affiliations / Experience

Period	Affiliation	Position
- 2010-Present	Konkuk University School of Medicine	Professor
- 1999-2009	Konkuk University School of Medicine	Assistant Professor Associate Professor
- 2004	Obesity Research Center, Columbia University, New York, NY, USA	Visiting
- 1999	Yonsei University Medical center	Clinical & Research Fellowship
- 1991-1996	Yonsei University Medical center	Internship, Residency

• Committee Memberships

- Korean Society for the Study of Obesity
- The Adolescent Medicine Board, The Korean Pediatric Society

• Publications

- Chung S. Body composition analysis and references in children: clinical usefulness and limitations. *Eur J Clin Nutr.* F73(2):236-242
- Hong YH, Chung S. Small for gestational age and obesity related comorbidities. *Ann Pediatr Endocrinol Metab.* 23(1):4-8
- Park HW, Chung S. Reference Values of Body Composition Indices: The Korean National Health and Nutrition Examination Surveys. *Yonsei Med J.* 56(1):95-102
- Hong YH, Chung IH, Han K, Chung S; Taskforce Team of the Obesity Fact Sheet of the Korean Society for the Study of Obesity. Prevalence of Type 2 Diabetes Mellitus among Korean Children, Adolescents, and Adults Younger than 30 Years: *Diabetes Metab J.* 46(2):297-306
- Han JA, Chung YE, Chung IH, Hong YH, Chung S. Impact of the COVID-19 Pandemic on Seasonal Variations in Childhood and Adolescent Growth: Experience of Pediatric Endocrine Clinics. *Children.* 8(5):404

Symposium 12

Pediatric Obesity Prevention and Management in Korea: How to Do in the Real World?

Sochung Chung (Konkuk University, Korea)

Obesity is a major public problem worldwide and receiving social attention in Korea. However, it is not actually treated as a disease nor covered as a medical illness in National Health Insurance Service in Korea, except surgery. The increase in obesity prevalence expects the increase of the social burden, including medical expenses, especially in the counties with rapid rising of the aging index in regional demographic characteristics of population. As society develops, it has been differentiated into each field and specialization is emphasized and many specialists should be involved in discussion to solve this issue, obesity. Although the concern in pediatric obesity has increased in Korea, the realistic measures or social structure of preventive approach and care system for this problem is still very limited. In Korea, there is a very nice National General Health Screening Program across life course, however, more targeted measures are needed to increase the efficiency of prevention in children and adolescents. Pediatricians dealing obesity needs fundamental social support system to integrate the interest of each field specialists. Cooperation of experts of each field would be a key factor of success in running an obesity intervention program at school or in town level. Personalized and culture specific intervention program and health care system in town specific cooperative approach would be helpful.

In this lecture, the status of pediatric obesity in Korea and its associated factors will be presented and possible suggestions to do will be discussed.



Mary Easaw

Cardiac Vascular Sentral Kuala Lumpur, Malaysia

• Education

Period	Affiliation	Position
– 2012-2014	Liverpool John Moores University – United Kingdom in collaboration with MAHSA College	M.Sc.
– 2007-2009	Liverpool John Moores University – United Kingdom in collaboration with IJN College	Professional Diploma Cardiovascular Thoracic Sciences (International)
– 1978-1982	JBAS (formerly known as SIET College) University of Madras, Chennai, India	B.Sc.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Monash University, Kuala Lumpur	Adjunct Senior Lecturer
– 2023-2024	PICASO Hospital Kuala Lumpur	Senior Manager & Consultant Dietitian
– 2019-2024	CVSKL Hospital	Consultant Dietitian
– 2019-2023	International Medical University, Kuala Lumpur	Senior Lecturer
– 1993-2019	National Heart Institute, Kuala Lumpur	Chief Dietitian & Senior Manager

• Committee Memberships

- Malaysian Dietitian Association
- Nutrition Society of Malaysia
- International Affiliate of the Academy of Nutrition & Dietetics
- National Heart Association Malaysia

• Publications

- Vatana V Sundar, Shu Hwa Ong, Mary Easaw P M Easaw, Winnie Siew Swee Chee. Sarcopenia with co-existent type 2 diabetes mellitus is associated with worse clinical outcomes among hospitalized cardiac patients Clinical Nutrition ESPEN (Journal)
- Vatana V Sundar, Siti Farhath Sehu Allavudin, Mary Easaw P M Easaw. Factors influencing adequate protein and energy delivery among critically ill children with heart disease in pediatric intensive care unit Clinical Nutrition ESPEN (Journal)
- Easaw M, Ramli J, Mustafa MN, Wan Norzahrin WM, Salmah K, Pang WL and Ho SF. Patient Food Safety Goals: From the farm to the patient's Table. Malaysian Journal Of Public Health Medicine Vol 9 (Supplementary 2)
- Easaw M. The challenges of Optimizing Diet Among People with Diabetes-The Malaysian Experience, Journal of the Medical Association of Thailand Volume 88 Suppl. 6

Symposium 12

Nutritional Intervention Strategies for Childhood Obesity: The Role of the Dietitian

Mary Easaw (Cardiac Vascular Sentral Kuala Lumpur, Malaysia)

The prevalence of childhood obesity has risen more than 10-fold over the 40 years (WHO 2018) Childhood obesity is one of the most serious global public health challenges of the 21st century, affecting every country in the world. The need to change is a multi-effort by the government and healthcare staff and the community.

What needs to change?

1. Early nutrition that includes maternal nutrition, breastfeeding and complementary feeding.
2. Food environments that are supported by healthy choices which is easy and affordable and protected from exposure to powerful marketing of food and beverages. Taxes on sugar sweetened beverages and proper front of pack labelling
3. Monitoring childhood obesity at schools and colleges to help evaluate the countries childhood obesity strategy both for prevention and treatment.
4. School environments to provide healthy choices of meal and beverages, banning vending machines, promoting physical activity and health education
5. Physical activities such as cycling to school, swimming facilities and a gymnasium.

There are **five steps** on guidelines to discuss weight with children and their families. According to the reference rethinkobesity. global by Novo Nordisk as healthcare practitioners we can flow these steps to initiate the counselling process:

1. Initiate
 - a. Ask permission. b. Start the conversation
2. Diagnose
 - a. Weigh the patient. b. Calculate the Body Mass Index (BMI)
3. Discuss
 - a. Start the conversation. b. Take weight history. c. Set realistic and attainable goals
4. Treat
 - a. Lifestyle modification (Diet, mindful eating, physical activity & sleep)
 - b. Pharmacotherapy (appropriate for pediatrics) and Bariatric surgery
5. Follow up
 - a. Assess progress. b. Modify treatment. c. Make new appointment

As a dietitian we would look into

Nutrition Assessment The dietitian collects & documents information such as food or nutrition-related history; biochemical data, medical tests & procedures; anthropometric measurements, nutrition-focused physical findings & client history

Nutrition Diagnosis Data collected during the nutrition assessment guides the dietitian in selection of the appropriate nutrition diagnosis (i.e., naming the specific problem)

Nutrition Intervention The dietitian then selects the nutrition intervention that will be directed to the root cause (or etiology) of the nutrition problem & aimed at alleviating the signs & symptoms of the diagnosis.

Nutrition Monitoring & Evaluation. The final step of the process is monitoring & evaluation, which the dietitian uses to determine if the client has achieved, or is making progress toward, the planned goals.

The presentation will highlight the role of the dietitian in managing children with obesity based on lifestyle modifications using the motivating interview techniques and appropriate nutrition assessment, diagnosis, intervention and monitoring.

1. World Health Organisation. Taking action on childhood obesity report 2018. <https://iris.who.int/bitstream/handle/10665/274792/WHO-NMH-PND-ECHO-18.1-eng.pdf> Accessed on 1/7/2024
2. Caterson I, Alfadda A, Auerbach P, et al. Gaps to bridge: Misalignment between perception, reality and actions in obesity. *Diabetes Obes Metab.* 2019;21:1914–1924.
3. Kaplan L, Golden A, Jinnett K, et al. Perceptions of Barriers to Effective Obesity Care: Results from the National ACTION Study. *Obesity.* 2018; 26:61–69.
4. Academy of Nutrition and Dietetics. <https://www.ncpro.org/nutrition-care-process>. Accessed on 3/7/2024
5. Rethink Obesity 2022. <https://iris.who.int/bitstream/handle/10665/274792/WHO-NMH-PND-ECHO-18.1-eng.pdf>



Silva Arslanian

University of Pittsburgh, USA

• Education

Period	Affiliation	Position
– 1980-1984	Children’s Hospital of Pittsburgh Pittsburgh, Pennsylvania	Fellowship
– 1978-1980	American University Hospital of Beirut, Beirut, Lebanon	Residency
– 1973-1978	American University of Beirut School of Medicine, Beirut, Lebanon	M.D.
– 1971-1973	American University of Beirut, Beirut, Lebanon	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2008-Present	University of Pittsburgh	Professor
– 2005-Present	University of Pittsburgh, School of Medicine	Richard L. Day Professor of Pediatrics Director, Pediatric Clinical & Translational Research Center
	UPMC Children’s Hospital of Pittsburgh	Scientific Director, Center for Pediatric Research in Obesity and Metabolism (CPROM)
– 1999-Present	University of Pittsburgh School of Medicine UPMC Children’s Hospital of Pittsburgh	Tenured Professor of Pediatrics

• Committee Memberships

- Pediatric Endocrine Society (PES)
- Endocrine Society
- American Diabetes Association (ADA)
- International Society Pediatric and Adolescent Diabetes (ISPAD)

• Publications

- Arslanian SA, Hannon T, Zeitler P, Chao LC, Boucher-Berry C, Barrientos-Pérez M, Bismuth E, Dib S, Cho JI, Cox D for the AWARD-PEDS Investigators: Once-Weekly Dulaglutide for the Treatment of Youths with Type 2 Diabetes. *N Engl J Med.* 387(5):433-443
- Weghuber D, Barrett T, Barrientos-Pérez M, Gies I, Hesse D, Jeppesen OK, Kelly AS, Mastrandrea LD, Sørrig R, Arslanian S the STEP Teens Investigators: Once-Weekly Semaglutide in Adolescents with Obesity. *N Engl J Med.* 15;387(24):2245-2257
- Vajravelu ME, Mani I, Malik S, Hewitt B, Peyyety V, Arslanian S: Race and Neighborhood-Related Disparities Spanning the COVID-19 Pandemic: Trajectories of Combined Glycemic Control and Body Mass Index in Youth with Diabetes. *Diabetes Care* 1;46(3):511-518
- Kelly A, Arslanian S, Hesse D, Iversen AT, Körner A, Schmidt S, Sørrig R, Weghuber D, Jastreboff A: Reducing BMI Below the Obesity Threshold in Adolescents Treated with Once-weekly Subcutaneous Semaglutide 2.4 mg. *Obesity* 31(8):2139-2149
- Hannon TS, Arslanian SA. Obesity in Adolescents. *N Engl J Med.* 389(3):251-261

Symposium 12

Adolescent Obesity: Complexities of Chronic Disease

Silva Arslanian (University of Pittsburgh, USA)

Obesity is a global epidemic that is associated with increased morbidity and mortality. Pediatric obesity is a multifactorial disease requiring consideration of developmental stage, risk of comorbidities, psychological state, and social implications. Prevalence of pediatric obesity increases with age and is highest among adolescents 12 to 19 years old. Pediatric obesity is associated with present and future complications including prediabetes and type 2 diabetes, hypertension, dyslipidemia, obstructive sleep apnea (OSA), metabolic dysfunction-associated steatotic liver disease (MASLD), and polycystic ovary syndrome (PCOS) among others.

The current treatment for pediatric obesity includes lifestyle modification which typically does not result in substantial weight reduction, pharmacotherapy, and bariatric surgery. Presently, there are limited globally approved medications available for long-term weight management in youth with obesity over 12 years of age including orlistat, liraglutide, phentermine/topiramate, and semaglutide.

Per the American Academy of Pediatrics clinical practice guidelines, pediatricians and other pediatric health care providers should offer weight loss pharmacotherapy, according to indications, risks, and benefits as an adjunct to healthy behavior and lifestyle treatment to adolescents 12 years of age and older who have obesity. This lecture will discuss youth obesity as a chronic disease, the complex causes of obesity, its health consequences and complications and finally obesity pharmacotherapy in adolescents.

Joint Symposium KSSO-EASO

Comprehensive Approaches to Understanding and
Managing Obesity and Related Metabolic Health Issues

Chairpersons

Volkan Yumuk

Istanbul University-Cerrahpaşa, Turkey

Cheol-Young Park

Sungkyunkwan University, Korea

Speakers

Jason Halford

University of Leeds, UK

Chang Hee Jung

University of Ulsan, Korea

Barbara McGowan

Guy's and St Thomas' NHS Foundation Trust, UK



Jason Halford

University of Leeds, UK

• Education

Period	Affiliation	Position
– 1994	University of Leeds	Ph.D.
– 1991	University of Leeds	B.Sc.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	University of Leeds, Psychology	Head of School
– 2010	University of Liverpool, Psychology	Head of School
– 1999	University of Liverpool, Psychology	Lecturer/Senior Lecturer
– 1997	University of Central Lancashire, Psychology	Lecturer
– 1996	Penn State University, Nutrition	Research Fellow

• Committee Memberships

- World Obesity Federation (WOF)
- European Association for the Study of Obesity (EASO)
- European Coalition for People Living with Obesity (ECPO)
- Association for the Study of Obesity (ASO-UK)
- ACTION-Teens Steering Committee

• Publications

- Bowman-Busato J, Schreurs L, Halford JCG, Yumuk V, O'Malley G, Woodward E, De Cock D, Baker JL. 2024. Providing a common language for obesity: the European Association for the Study of Obesity obesity taxonomy. *International Journal of Obesity*. <https://doi.org/10.1038/s41366-024-01565-9>
- Busetto, L., Dicker, D., Frühbeck, G. et al. A new framework for the diagnosis, staging and management of obesity in adults. *Nat Med* (2024). <https://doi.org/10.1038/s41591-024-03095-3>
- Jones, R.A., Christiansen, P., Maloney, N.G. et al. Perceived weight-related stigma, loneliness, and mental wellbeing during COVID-19 in people with obesity: A cross-sectional study from ten European countries. *Int J Obes* 46, 2120–2127 (2022). <https://doi.org/10.1038/s41366-022-01220-1>
- Randle M, Ahern AL, Boyland E, Christiansen P, Halford JCG, Stevenson-Smith J, Roberts C. 2023. A systematic review of ecological momentary assessment studies of appetite and affect in the experience of temptations and lapses during weight loss dieting. *Obesity Reviews*. 24.9 <https://doi.org/10.1111/obr.13596>
- Halford JCG, Bereket A, Bin-Abbas B, Chen W, Fernández-Aranda F, Garibay Nieto N, López Siguero JP, Maffei C, Mooney V, Osorto CK, Reynoso R, Rhie Y, Toro-Ramos M, Baur LA. 2022. Misalignment among adolescents living with obesity, caregivers, and healthcare professionals: ACTION Teens global survey study. *Pediatric Obesity*. 17.11 <https://doi.org/10.1111/ijpo.12957>

Joint Symposium KSSO-EASO

ACTION Teens: Barriers for Adolescents Living with Obesity to Weight Management in the UK

Jason Halford (University of Leeds, UK)

Children/adolescents living with obesity (ALwO) are more likely to be living with obesity in adulthood than those without obesity and have an increased risk of health complications (including cardiovascular and metabolic disease) in adulthood. Obesity is also associated with mental health issues among ALwO. The ACTION Teens study was designed to explore the attitudes, behaviours, perceptions and barriers to effective obesity care among ALwO, caregivers and healthcare professionals (HCPs). It was a cross-sectional online survey study. ACTION-Teens was conducted across 10 countries. Here, we report data from UK respondents. Overall, 416 ALwO (aged 12 to <18 years; body mass index \geq 95th percentile for age and sex [WHO charts]), 498 caregivers and 250 HCPs in the UK completed the survey (August–December 2021). The survey questions addressed key aspects of obesity management for ALwO.

Results: 1) Overall, 46% of ALwO perceived their weight as normal or below normal and 86% believed their health was at least good; 56% and 93% of caregivers responded similarly to their ALwO. Despite this, most ALwO (57%) had attempted to lose weight in the past year and 34% felt highly motivated to lose weight. 2) YouTube and social media were most often used by ALwO for information about weight management (41% and 39%); few ALwO and caregivers sought information from a doctor (13% and 22%). 3) Among ALwO who had discussed weight with an HCP (n=122), 49% trusted their weight-management advice. Only 10% of ALwO and 8% of caregivers were told by a doctor that they/their child had obesity. 4) For HCPs, obesity-related comorbidities were the most common reason for initiating weight conversations with ALwO (73%), while short appointment times were the most common barrier (46%). Overall, 30% of ALwO and 11% of caregivers did not feel comfortable bringing up weight with an HCP.

The lack of awareness of body weight status in UK ALwO is a major concern as the low numbers receiving a diagnosis of obesity. The rising prevalence of adolescent obesity and data from this study highlight a need to improve education and communication among ALwO, caregivers and HCPs in the UK. It is also important to improve trust in HCPs among ALwO to encourage uptake of health services. Additional training for HCPs could help reduce weight stigma and increase understanding of the complexity of obesity, thus empowering HCPs to initiate potentially challenging weight-related conversations with ALwO and caregivers. Recognition of obesity may also improve perceptions of weight among ALwO and caregivers. Weight-related communication strategies in the future should consider using social media and digital technology to improve ALwO's access to high-quality and trusted information about weight (Trial registration: ClinicalTrials.gov (NCT05013359). Action Teens (novonordisk.com) <https://pro.novonordisk.com/disease-area/obesity/action-teens.html>)

Halford JCG, Bereket A, Bin-Abbas B, Chen W, Fernández-Aranda F, Garibay Nieto N, López Sigüero JP, Maffei C, Mooney V, Osorto CK, Reynoso R, Rhie Y, Toro-Ramos M, Baur LA. 2022. Misalignment among adolescents living with obesity, caregivers, and healthcare professionals: ACTION Teens global survey study. *Pediatric Obesity*. 17.11 <https://doi.org/10.1111/ijpo.12957>

Halford JCG, Brown A, Clare K, Ells LJ, Ghosh A, Giri D, Hughes C, Senniappan S. 2024 Insights from the ACTION Teens study: a survey of adolescents living with obesity, their caregivers and healthcare professionals in the UK. *BMJ Open* – in press



Chang Hee Jung

University of Ulsan, Korea

• Education

Period	Affiliation	Position
– 2012-2014	University of Ulsan College of Medicine	Ph.D.
– 2010-2012	University of Ulsan College of Medicine	M.S
– 1996-2002	Korea University	M.D

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	University of Ulsan College of Medicine, Asan Medical Center	Professor
– 2017-2021	University of Ulsan College of Medicine, Asan Medical Center	Associate Professor
– 2018-2020	University of Virginia, VA, USA	Visiting Scholar

• Committee Memberships

- Official Member of KSSO, KDA, KSoLA

• Publications

- 1. Kim MJ, Cho YK, Kim EH, Lee MJ, Lee WJ, Kim HK, Jung CH. Association between metabolic dysfunction-associated steatotic liver disease and myosteatosi s measured by computed tomography. *J Cachexia Sarcopenia Muscle*. 2024 Epub ahead of print
- 2. Kim MJ, Cho YK, Kim EH, Lee MJ, Lee WJ, Kim HK, Jung CH. Association between estimated glucose disposal rate and subclinical atherosclerosis. *Nutr Metab Cardiovasc Dis*. 2024 Epub ahead of print
- 3. Cho YK, Jung HN, Kim EH, Lee MJ, Park JY, Lee WJ, Kim HK, Jung CH: Association between sarcopenic obesity and poor muscle quality based on muscle quality map and abdominal computed tomography. *Obesity (Silver Spring)* 2023.;31:1547-1557
- 4. Kim HS, Lee J, Kim EH, Lee MJ, Bae IY, Lee WJ, Park JY, Kim HK, Jung CH: Association of Myosteatosi s with Nonalcoholic Fatty Liver Disease, Severity, and Liver Fibrosis Using Visual Muscular Quality Map in Computed Tomography. *Diabetes Metab J* 2023;47:104-117
- 5. Jung HN, Cho YK, Kim HS, Kim EH, Lee MJ, Lee WJ, Kim HK, Jung CH: Association between hypertension and myosteatosi s evaluated by abdominal computed tomography. *Hypertens Res* 2023;46:845-855

Joint Symposium KSSO-EASO

Ectopic Fat Dynamics: Unraveling the Interplay Between Myosteatorsis and Cardio-Metabolic Health

Chang Hee Jung (University of Ulsan, Korea)

Sarcopenia is a muscular disease characterized by the gradual loss of muscle mass and strength, but it is a more complex condition that cannot be fully explained by this loss alone. As muscle mass and function decline with age, various changes occur within individual muscles, affecting muscle quality and the physiological functional capacity of muscle tissue. Accordingly, the updated guidelines from the European Working Group on Sarcopenia in Older People emphasize low muscle strength and poor muscle quality as the primary characteristics of sarcopenia.

One of the factors affecting muscle quality is the redistribution of adipose tissue, where subcutaneous adipose tissue moves to more harmful locations such as intramuscular and intermuscular adipose tissue (IMAT). This phenomenon, known as myosteatorsis, negatively impacts muscle strength by causing muscle fiber disorientation. Myosteatorsis has emerged as an important concept in the field of sarcopenia, both in clinical practice and research. In this lecture, I will introduce our recent work on the relationship between myosteatorsis, as measured by abdominal CT scan, and various cardio-metabolic disorders.



Barbara McGowan

Guy's and St Thomas' NHS Foundation Trust, UK

• Education

Period	Affiliation	Position
– 2003-2007	Imperial London	Ph.D.
– 1993-1998	Royal Free Hospital London	M.B.B.S.
– 1984-1988	Oxford University	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2009-Present	Guys & St Thomas's Hospital	Professor of Endocrinology and Diabetes

• Committee Memberships

- International Society for Endocrinology
- EASO Obesity Management Task Force
- ESE Policy and Advocacy Task Force

• Publications

- Once-weekly Semaglutide in Adults with Overweight or Obesity, Wilding, McGowan *et al*, 384:989-1002 DOI: 10.1056/nejmoa2032183
- Liraglutide 3.0 mg in the treatment of adults with obesity and prediabetes using real-world UK data: A clinical evaluation of a multi-ethnic population. Dobbie *et al*, McGowan, *Clinical Obesity*
- Effectiveness of integrating a pragmatic pathway for prescribing liraglutide 3.0 mg in weight management services (STRIVE study): a multicentre, open-label, parallel-group, randomized controlled trial Papamargaritis, McGowan *et al*, *Lancet Regional Health* <https://doi.org/10.1016/j.lanepe.100853>
- Laparoscopic adjustable gastric banding with liraglutide in adults with obesity and type 2 diabetes (GLIDE): a pilot randomised placebo controlled trial C. Coelho, L. Dobbie *et al*, B McGowan. *Int J Obesity*, doi: 10.1038/s41366-023-01368-4
- Real world data of a digitally enabled, time restricted eating weight management program in public sector workers living with overweight and obesity in the UK, A. Brown, *et al*, McGowan. *Obesity Science and practice* 10 (1), e730 DOI: 10.1002/osp4.730

Joint Symposium KSSO-EASO

An EASO Framework for the Diagnosis, Staging, and Management of Obesity as a Chronic Disease

Barbara McGowan (Guy's and St Thomas' NHS Foundation Trust, UK)

Obesity is a multifactorial, chronic, relapsing, non-communicable disease marked by an abnormal and/or excessive accumulation of body fat that presents a risk to health. The clinical recommendations that guide the diagnosis of obesity and its management have not been sufficiently aligned with the clinical processes normally adopted for other chronic diseases. The diagnosis of obesity is still based on body mass index and does not reflect the role of adipose tissue distribution and function in the severity of the disease.

EASO performed a modified Delphi study to identify a set of statements that can aid the diagnosis, staging and management of obesity. This lecture will discuss the consensus process and its outcomes, outlining a new framework for the diagnosis, staging and management of obesity in adults.

EASO

Presidential Lecture

Chairperson

Sung Rae Kim

The Catholic University of Korea, Korea

Speaker

Volkan Yumuk

Istanbul University-Cerrahpaşa, Turkey



Volkan Yumuk

Istanbul University-Cerrahpaşa, Turkey

Education

Period	Affiliation	Position
– 1995-1997	University of Alabama at Birmingham School of Medicine, Division of Endocrinology, Birmingham, USA	Clinical Fellow
– 1992-1993	University of Michigan School of Medicine, Division of Endocrinology, Ann Arbor, USA	Research Fellow
– 1987-1992	Okmeydanı Teaching and Training Hospital, Istanbul, Turkey	Internal Medicine Resident
– 1979-1985	Hacettepe University Medical Faculty, Ankara, Turkey	Medical Doctor

Affiliations / Experience

Period	Affiliation	Position
– 1992-Present	Istanbul University-Cerrahpaşa, Cerrahpaşa Medical Faculty	Faculty Member
– 1985-1987	Ministry of Health Primary Care Health Unit	General Practitioner

Committee Memberships

- EASO Policy Working group
- TOS Steering Committee for the Standards of Care for Obesity Clinical Practice in Adults
- ESE Research Roadmap Steering Group of European Society of Endocrinology
- EASL Lancet commission Fatty Liver Disease Research and Action Priorities
- Obesity Canada CALIBRE Scientific Planning Committee

Publications

- A new framework for the diagnosis, staging and management of obesity in adults. Luca Busetto, Dror Dicker, Gema Frühbeck, Jason CG Halford, Paolo Sbraccia, Volkan Yumuk, Gijs Goossens. *Nature Medicine* 2024. <https://doi.org/10.1038/s41591-024-03095-3>
- Providing a common language for obesity: the European Association for the Study of Obesity obesity taxonomy. Halford JCG, Yumuk V, O'Malley G, Woodward E, De Cock D, Baker JL. *Int J Obes (Lond)*. 2024 Jun 20. doi: 10.1038/s41366-024-01565-9
- Pharmacotherapy for older people with obesity. Boyle LD, Akbas F, Yazıcı D, McGowan BM, Yumuk V. *Eur J Intern Med*. 2024 Jun 18:50953-6205(24)00192-4. doi: 10.1016/j.ejim.2024.05.006.
- Expert Opinion on the Utility of Telemedicine in Obesity Care: Recommendations on a Hybrid Multidisciplinary Integrated Care Follow-Up Algorithm. Bayram F, Sonmez A, Kiyici S, Akbas F, Yetgin MK, Yazici D, Cingi A, Sargin M, Unal S, Iseri C, Mahmutoglu FS, Yumuk VD. *Curr Obes Rep*. 2024 Mar;13(1):167-182. doi: 10.1007/s13679-023-00541-0

EASO Presidential Lecture

Management of Obesity in Older Adults

Volkan Yumuk (Istanbul University-Cerrahpaşa, Turkey)

Obesity is a multifactorial, relapsing, progressive, chronic disease, that is a gateway to other diseases. Population of the world is ageing and the prevalence of obesity in older people is increasing. The prevalence of overweight (BMI > 25 kg/m²) in older people (age > 65 yrs) in the European Union has reached 60% in 2019. The all-cause mortality in this population shows an exponential increase beyond a body mass index of 30.9 kg/m². In the 20-70 age range, a rise in fat mass (FM), a progressive decrease in fat free mass (FFM) by 40%, a decline in basal metabolic rate by 30% are expected. After the age of 70 years, a decrease in FM and FFM, increase in abdominal fat, and a decrease in physical activity are observed. Current data suggests that excess visceral or muscle fat is associated with higher prevalence of cardiometabolic complications in older adults, who are of normal body weight. Practitioners should not discount the risk of this condition in older people entirely on the basis of body weight or BMI. In a study in older adults, more lean mass was lost with weight loss than was gained with weight gain, showing that weight loss could accelerate sarcopenia in older people. The diagnosis of sarcopenic obesity can be made by referring to the ESPEN/EASO consensus statement. The goals of obesity therapy are comprised of reaching a weight loss target, maintaining the lost weight and most importantly providing significant health benefits. Diabetes risk reduction, improvement of cardiovascular risk markers, reduction in functional impairment, improvement of quality of life, remission of complications of obesity and de-escalation of therapy are among those benefits. Currently the obesity guidelines for younger adults are being implemented for older people. Lifestyle interventions (LSI), pharmacotherapy and bariatric surgery are choices of treatment. The severity of the disease could be assessed by the Edmonton obesity staging system and the treatment plan could be devised by pertinent algorithms. A moderately hypocaloric diet may be prescribed with adjustments to protein intake, accompanied by resistance exercise in order to maintain muscle strength and performance. In non-frail younger adults with concomitant diseases, who are not responding to LSI, adult guidelines for pharmacotherapy may be used. Orlistat and liraglutide may be first line choices. Second generation obesity management medications may be an effective treatment option older people unless evidence states otherwise. Phentermine-topiramate, bupropion-naltrexone combinations may be avoided due to their cardiovascular and central nervous system side effects and scarce data in older people. Polypharmacy and drugs causing weight gain must be avoided. Bariatric surgery is an effective treatment in patients over 60 years of age. Although the risk of post-operative complications and re-operations are higher, the length of hospital stay is similar to younger adults. The improvement in obesity-related complications is also similar between patients over 60 years old and those aged 60 and under.

ICOMES 2024

International Congress on Obesity and Metabolic Syndrome hosted by KSSO

Integrating Cutting-Edge Insights in Obesity Management

DAY 3

September 7, Saturday

Breakfast Symposium 4

Chairperson

Sung Ho Han

Dong-A University, Korea

Speaker

Chang Hee Jung

University of Ulsan, Korea



Chang Hee Jung

University of Ulsan, Korea

• Education

Period	Affiliation	Position
– 2012-2014	University of Ulsan College of Medicine	Ph.D.
– 2010-2012	University of Ulsan College of Medicine	M.S
– 1996-2002	Korea University	M.D

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	University of Ulsan College of Medicine, Asan Medical Center	Professor
– 2017-2021	University of Ulsan College of Medicine, Asan Medical Center	Associate Professor
– 2018-2020	University of Virginia, VA, USA	Visiting Scholar

• Committee Memberships

- Official Member of KSSO, KDA, KSoLA

• Publications

- Kim MJ, Cho YK, Kim EH, Lee MJ, Lee WJ, Kim HK, **Jung CH**. Association between metabolic dysfunction-associated steatotic liver disease and myosteatorsis measured by computed tomography. **J Cachexia Sarcopenia Muscle**. 2024 Epub ahead of print
- Kim MJ, Cho YK, Kim EH, Lee MJ, Lee WJ, Kim HK, **Jung CH**. Association between estimated glucose disposal rate and subclinical atherosclerosis. **Nutr Metab Cardiovasc Dis**. 2024 Epub ahead of print
- Cho YK, Jung HN, Kim EH, Lee MJ, Park JY, Lee WJ, Kim HK, **Jung CH**: Association between sarcopenic obesity and poor muscle quality based on muscle quality map and abdominal computed tomography. **Obesity (Silver Spring)** 2023;31:1547-1557
- Kim HS, Lee J, Kim EH, Lee MJ, Bae IY, Lee WJ, Park JY, Kim HK, **Jung CH**: Association of Myosteatorsis with Nonalcoholic Fatty Liver Disease, Severity, and Liver Fibrosis Using Visual Muscular Quality Map in Computed Tomography. **Diabetes Metab J** 2023;47:104-117
- Jung HN, Cho YK, Kim HS, Kim EH, Lee MJ, Lee WJ, Kim HK, **Jung CH**: Association between hypertension and myosteatorsis evaluated by abdominal computed tomography. **Hypertens Res** 2023;46:845-855

Breakfast Symposium 4

Latest Treatment Trend for Diabetic Kidney Disease

Chang Hee Jung (University of Ulsan, Korea)

A significant percentage of people with diabetes develop diabetic kidney disease (DKD), and diabetes is also a leading cause of end-stage kidney disease (ESKD) worldwide. In addition, DKD is associated with significant morbidity and mortality, which are predominantly related to cardiovascular complications and the progression to kidney disease that requires renal replacement therapy. Indeed, the development of kidney complications (increasing albuminuria or decline in GFR) is an indicator of significant cardiovascular morbidity.

The factors that have proven to be central to optimization and treatment of DKD include better glucose control, blood pressure control, and the use of inhibitors of the renin aldosterone angiotensin system (RAASi). These treatments have been augmented by the recent publications that have demonstrated the significant benefit that sodium glucose co-transporter 2 inhibitors (SGLT2i) have on progression of DKD and additionally their benefits in relation to prevention of heart failure progression. However, even taking the two primary kidney studies involving SGLT2i which include CREDENCE and DAPA CKD where SGLT2i was added onto standard of care which included the use of RAASi, blood pressure control and reasonable glycemic control, there remained significant residual risk of progression of DKD.

Finerenone, is a selective nonsteroidal MRA which is metabolized predominantly in the liver with minimal excretion via the kidneys. In phase 3 clinical trials called as FIDELIO and FIGARO, finerenone was able to reduce renal and cardiac endpoints compared to placebo with less hyperkalemia than non-selective MRA in people with DKD and proteinuria. In this session, let me deal with the benefits of finerenone against the progression of DKD and its potential clinical use.

Breakfast Symposium 5

Chairperson

Sung-Hoon Kim
Mizmedi Hospital, Korea

Speaker

Jang Won Son
The Catholic University of Korea, Korea



Jang Won Son

The Catholic University of Korea, Korea

• Education

Period	Affiliation	Position
– 2011	Graduate school, The Chung-Ang University of Korea, Seoul, Korea	Ph.D.
– 2006	Graduate School, The Chung-Ang University of Korea, Seoul, Korea	
– 1995-2001	College of Medicine, The Chung-Ang University of Korea, Seoul, Korea	M.D

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	Bucheon Saint Mary Hospital. College of Medicine, The Catholic University of Korea	Professor
– 2017-2018	Karolinska institute, Sweden	Visiting researcher
– 2016-2021	Bucheon Saint Mary Hospital. College of Medicine, The Catholic University of Korea	Associate professor
– 2012-2016	Bucheon Saint Mary Hospital. College of Medicine, The Catholic University of Korea	Assistant professor

• Publications

- Genetic Determinants of Obesity in Korean Populations: Exploring Genome-wide Associations and Polygenic Risk Scores. Briefings in Bioinformatics 2024 [Epub ahead of print]
- GLP-1 Based Therapies: A New Horizon in Obesity Management. Endocrinol Metab. 2024 Apr;39(2):206-221
- An international multidisciplinary consensus statement on MAFLD and the risk of CVD. Hepatol Int 17, 773–791 (2023).
- Human Tissue-Engineered Skeletal Muscle: A Tool for Metabolic Research Endocrinol Metab. 2022;37(3):408-414.
- Obesity Fact Sheet in Korea, 2021: Trends in Obesity Prevalence and Obesity-Related Comorbidity Incidence Stratified by Age from 2009 to 2019. JOMES 2022;31:169-177

Breakfast Symposium 5

Revolutionizing Obesity Care

Jang Won Son (The Catholic University of Korea, Korea)

The global obesity epidemic affects approximately 1 billion people, with this number expected to rise continuously. Obesity is not only a health concern but also contributes to a widespread internalized weight bias, affecting at least 44% of the general population. In addition, effective obesity treatment is crucial as reversing obesity can improve numerous obesity-related complications.

Tirzepatide, a novel pharmacological treatment, is designed to activate both the glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 (GLP-1) receptors. This dual action mechanism enhances its potential in managing obesity more effectively than existing treatments.

The SURMOUNT-1 clinical trial demonstrated the significant efficacy of Tirzepatide in reducing body weight. Participants administered with 15 mg of Tirzepatide experienced an average body weight reduction of 22.5%. These findings highlight Tirzepatide as a promising therapeutic option in the battle against obesity.

Further research and development of such treatments are imperative to address the escalating global health crisis posed by obesity.

Keywords: obesity epidemic, weight bias, obesity treatment, Tirzepatide, SURMOUNT-1, weight reduction

Breakfast Symposium 6

Chairperson

Keun-Mi Lee

Yeungnam University, Korea

Speaker

Seung-Hwan Lee

The Catholic University of Korea, Korea



Seung-Hwan Lee

The Catholic University of Korea, Korea

• Education

Period	Affiliation	Position
– 2013	The Catholic University of Korea	Ph.D.
– 2001	The Catholic University of Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2013-Present	Seoul St. Mary's Hospital, The Catholic University of Korea	Professor
– 2016-2017	UCSF	Visiting Professor
– 2011-2013	BIDMC, Harvard Medical School	Research Fellow

• Committee Memberships

- Obese Diabetes TFT, Korean Diabetes Association
- Committee of publication, Korean Diabetes Association
- Clinical research committee, Korean Society of Lipidology and Atherosclerosis
- Committee of scientific affairs, Korean Society for the Study of Obesity

• Publications

- Seung-Hwan Lee, Kyu Na Lee, Jong-Chan Youn, Hun Sung Kim, Kyungdo Han, Mee Kyoung Kim. Different associations between lipid levels and risk for heart failure according to diabetes progression. *Diabetes Metab J* In press
- Marie Rhee, Joonyub Lee, Eun Young Lee, Kun-Ho Yoon, Seung-Hwan Lee*. Lipid variability induces endothelial dysfunction by increasing inflammation and oxidative stress. *Endocrinol Metab* 39:511-520, 2024
- Soo Lim*, Seung-Hwan Lee*, Kyung-Wan Min, Chang Beom Lee, Sang Yong Kim, Hye Jin Yoo, Nan Hee Kim, Jae Hyeon Kim, Seungjoon Oh, Jong Chul Won, Hyuk-Sang Kwon, Mi Kyung Kim, Jung Hwan Park, In-Kyung Jeong, Sungrae Kim. Multicenter, double-blind, placebo-controlled, randomized, parallel comparison, phase 3 trial to evaluate the efficacy and safety of pioglitazone add-on therapy in type 2 diabetic patients treated with metformin and dapagliflozin. *Diabetes Obes Metab* 26:2188-2198, 2024 (co-first author)
- Mee Kyoung Kim, Kyu Na Lee, Kyungdo Han, Seung-Hwan Lee*. Diabetes duration, cholesterol levels, and risk of cardiovascular diseases in individuals with type 2 diabetes. *J Clin Endocrinol Metab* In press 2024
- Jeongmin Lee, Jin-Hyung Jung, Dong Woo Kang, Min-Hee Kim, Dong-Jun Lim, Jung Min Lee, Hyuk-Sang Kwon, Sang-Ah Chang, Kyungdo Han*, Seung-Hwan Lee*. Body weight variability and risk of suicide mortality: a nationwide population-based study. *Depress Anxiety* 2024:7670729, 2024

Breakfast Symposium 6

What is the Best Combination Therapy for KOREAN T2DM Patients?

Seung-Hwan Lee (The Catholic University of Korea, Korea)

The combination therapy of Sodium-Glucose Co-Transporter 2 (SGLT2) inhibitors and Thiazolidinediones (TZDs) offers a multifaceted approach to managing type 2 diabetes mellitus (T2DM). SGLT2 inhibitors reduce blood glucose levels by preventing renal glucose reabsorption, promoting glycosuria. TZDs enhance insulin sensitivity by activating peroxisome proliferator-activated receptor gamma (PPAR- γ), which regulates gene expression involved in glucose and lipid metabolism. This complementary mechanism not only provides superior glycemic control compared to monotherapy but also offers several potential benefits in beta-cell function, insulin resistance, and the prevention of diabetic complications. Clinical evidence suggests that this combination might preserve and possibly improve beta-cell function by reducing glucotoxicity and lipotoxicity, thereby slowing the progression of T2DM. Enhanced insulin sensitivity through TZDs improves peripheral glucose uptake, reducing insulin resistance. Additionally, the dual therapy has shown potential in lowering the risk of diabetic complications, such as cardiovascular disease and nephropathy, due to improved glycemic control and favorable effects on lipid profiles and blood pressure. Overall, the combination therapy of SGLT2 inhibitors and TZDs holds promise for optimizing T2DM management.

Keynote Lecture 2

Chairperson

Hye Soon Park
University of Ulsan, Korea

Speaker

Jean-Pierre Després
VITAM – Research Centre on Sustainable Health, Canada



Jean-Pierre Després

VITAM – Research Centre on Sustainable Health, Canada

• Education

Period	Affiliation	Position
– 1984-1986	University of Toronto, Toronto, ON, Canada	Ph.D.
– 1982-1984	Université Laval, Québec, QC, Canada	M.Sc.
– 1980-1982	Université Laval, Québec, QC, Canada	Ph.D.
– 1978-1980	Université Laval, Québec, QC, Canada	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2012-Present	Department of Kinesiology Faculty of Medicine Université Laval, Québec, QC, Canada	Full Professor
– 2004-2012	Department of Social and Preventive Medicine – Kinesiology Faculty of Medicine Université Laval, Québec, QC, Canada	Full Professor
– 1996-2004	Department of Food Sciences and Nutrition Faculty of Agricultural Sciences and Nutrition Université Laval, Québec, QC, Canada	Full Professor
– 2000-2004	Human Nutrition, Lipidology and Prevention of Cardiovascular Diseases Université Laval, Québec, QC, Canada	Chair Professor
– 1994-1996	Department of Physical Education Faculty of Education Sciences Université Laval, Québec, QC, Canada	Professor

• Committee Memberships

- American College of Sports Medicine
- American Diabetes Association
- American Heart Association
- Association francophone pour le savoir (Acfas)

• Publications

- Adiposity, type 2 diabetes and atherosclerotic cardiovascular disease risk: Use and abuse of the body mass index. Arsenault BJ, Carpentier AC, Poirier P, Després JP. *Atherosclerosis*. 117546 PMID: 38692978
- Cardiovascular-Kidney-Metabolic Health: A Presidential Advisory From the American Heart Association. Ndumele CE, Rangaswami J, Chow SL, Neeland IJ, Tuttle KR, Khan SS, Coresh J, Mathew RO, Baker-Smith CM, Carnethon MR, Despres JP, Ho JE, Joseph JJ, Kernan WN, Khera A, Kosiborod MN, Lekavich CL, Lewis EF, Lo KB, Ozkan B, Palaniappan LP, Patel SS, Pencina MJ, Powell-Wiley TM, Sperling LS, Virani SS, Wright JT, Rajgopal Singh R, Elkind MSV; American Heart Association. *Circulation*. 148(20):1606-1635. PMID: 37807924
- BMI versus obesity subtypes in the era of precision medicine. Després JP. *Lancet Diabetes Endocrinol*. 11(6):382-384. PMID: 37068507
- Cardiometabolic Health Outcomes Associated With Discordant Visceral and Liver Fat Phenotypes: Insights From the Dallas Heart Study and UK Biobank. Tejani S, McCoy C, Ayers CR, Powell-Wiley TM, Després JP, Linge J, Leinhard OD, Petersson M, Borga M, Neeland IJ. *Mayo Clin Proc*. 97(2):225-237. PMID: 34598789
- Management of Obesity in Cardiovascular Practice: JACC Focus Seminar. Després JP, Carpentier AC, Tchernof A, Neeland IJ, Poirier P. *J Am Coll Cardiol*. 78(5):513-531. PMID: 34325840

Keynote Lecture 2

Cardiometabolic Health: Importance of Lifestyle Vital Signs

Jean-Pierre Després (VITAM – Research Centre on Sustainable Health, Canada)

In 2010, the American Heart Association (AHA) strategic decision to move the focus from managing cardiovascular disease (CVD) to promote cardiovascular health (CVH) was a visionary and remarkable conceptual advance. At that time, the AHA Expert Panel defined CVH on the basis of 3 traditional biological risk factors (cholesterol, blood pressure, and glucose) and 4 behaviors (smoking, healthy weight, overall nutritional quality, and physical activity). Using these simple metrics (referred to as the Simple 7) defining ideal CVH, cohort studies consistently reported that its prevalence was very low (less than 1%). However, when present, ideal CVH was associated with extremely low CVD event rates. One key finding from these early analyses performed on large cohorts was that in order to prevent cardiovascular events, behavioral risk factors were as important to target as biological risk factors. Unfortunately, studies conducted in the United States and in Canada have revealed that primary care physicians are ill-equipped to assess and target key behaviors such as level of physical activity and overall nutritional quality. More recently, AHA has added sleep as another important behavior to define cardiovascular health and the concept of Life's Essential 8 is now promoted.

Our laboratory has developed and tested simple tools to rapidly assess behaviors and their consequences in clinical practice. We have proposed the use of four lifestyle vital signs: waist circumference (as an index of abdominal adiposity), cardiorespiratory fitness (a key predictor of a healthy life trajectory), overall nutritional quality (assessed by a food-based questionnaire) and level of physical activity (assessed by a questionnaire). We found that a composite lifestyle risk score using these four variables was strongly associated with the cardiometabolic risk profile of our participants. Furthermore, in response to a 3-month lifestyle modification program, we found that changes in these four lifestyle vital signs contributed to explaining improvements in traditional biological risk factors.

It is therefore proposed that environments providing primary care or proximity health services could also become epicenters for the promotion of cardiovascular health. However, to achieve this goal, proximity health service environments will have to be properly designed so that lifestyle vital signs are measured and targeted. Promoting healthy lifestyle behaviors is the cornerstone of cardiometabolic health.

Symposium 13

Obesity Related Comorbidity-Fatty Liver

Chairpersons

Chang Beom Lee

Hanyang University, Korea

Geeta Appannah

University Putra Malaysia, Malaysia

Speakers

Seung-Jin Kim

Kangwon National University, Korea

Hua Wang

The First Affiliated Hospital of Anhui Medical University, China

Jun Hwa Hong

Eulji University, Korea

Panel Discussion

Bo Kyung Koo

Seoul National University, Korea

Youn Huh

Eulji University, Korea



Seung-Jin Kim

Kangwon National University, Korea

• Education

Period	Affiliation	Position
– 2008-2013	Chonnam National University	Ph.D.
– 2006-2008	Chonnam National University	M.S.
– 2000-2006	Chonnam National University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Kangwon National University	Associate Professor
– 2019-2024	Kangwon National University	Assistant Professor
– 2015-2019	NIAAA/NIH	Post-Doc Fellow
– 2014-2015	NIDDK/NIH	Post-Doc Fellow

• Committee Memberships

- American Association for the Study of Liver Diseases (AASLD, USA)
- American Association for Cancer Research (AACR, USA)
- Korean Society for Biochemistry and Molecular Biology (KSBMB, Korea)
- Korean Society for Molecular and Cellular Biology (KSMCB, Korea)
- Review Editor: Frontiers in Immunology

• Publications

- Alcohol, adipose tissue and liver disease: mechanistic links and clinical considerations. Nature Reviews Gastroenterol. & Hepatol
- Adipocyte death preferentially induces liver injury and inflammation through the activation of chemokine (C-C Motif) receptor 2-positive macrophages and lipolysis. Hepatology
- Obesity increases morbidity and mortality in alcoholic hepatitis. EBioMedicine
- Deletion of adipocyte prohibitin 1 exacerbates high-fat diet-induced steatosis but not liver inflammation and fibrosis. Hepatol. Commun
- BRCA1 function in the intra-S checkpoint is activated by acetylation via a pCAF/SIRT1 axis. Oncogene

Symposium 13

Impact of Adipocyte Death on Steatotic Liver Disease (SLD)

Seung-Jin Kim (Kangwon National University, Korea)

The current presentation discusses mouse models which focus on metabolic diseases. Adipocyte death occurs under various pathophysiological conditions, including obesity and alcohol drinking, and can trigger organ damage particularly in the liver, but the underlying mechanisms remain obscure. To explore these mechanisms, we developed a mouse model of inducible adipocyte death by overexpressing the human CD59 (hCD59) on adipocytes (adipocyte-specific hCD59 transgenic mice). Injection of these mice with intermedilysin (ILY), which rapidly lyses hCD59 expressing cells exclusively by binding to the hCD59 but not mouse CD59, resulted in the acute selective death of adipocytes, adipose macrophage infiltration, and elevation of serum free fatty acid (FFA) levels. ILY injection also resulted in the secondary damage to multiple organs with the strongest injury observed in the liver, with inflammation and hepatic macrophage activation. Mechanistically, acute adipocyte death elevated epinephrine and norepinephrine levels and activated lipolysis pathways in adipose tissue in a chemokine (C-C motif) receptor 2-positive (CCR2+) macrophage-dependent manner, which was followed by FFA release and lipotoxicity in the liver. Additionally, acute adipocyte death caused hepatic CCR2+ macrophage activation and infiltration, further exacerbating liver injury. Our findings suggest that adipocyte death predominantly induces liver injury and inflammation, which is probably due to the superior sensitivity of hepatocytes to lipotoxicity and the abundance of macrophages in the liver.



Hua Wang

The First Affiliated Hospital of Anhui Medical University, China

Education

Period	Affiliation	Position
– 2007-2014	Laboratory of Liver Diseases, NIAAA, NIH. (Liver Biology)	Postdoctoral
– 1994-1999	Department of Clinical Medicine, Anhui Medical University	M.D.
– 1999-2005	Institute of Clinical Pharmacology, Anhui Medical University	Ph..D.

Affiliations / Experience

Period	Affiliation	Position
– 2019-Present	Research Office of Anhui Medical University	Deputy Director
– 2014-2018	Laboratory of Liver Diseases, NIAAA, NIH	Guest Researcher
– 2014-Present	Department of Oncology, The First Affiliated Hospital of Anhui Medical University	Oncologist
– 2012-Present	Deputy Director, Institute for Liver Disease, Anhui Medical University	Professor
– 2012-Present	School of Pharmacy, Anhui Medical University, China	Professor

Committee Memberships

- Chinese Association for Pharmacology
- The American Association of Immunologists (AAI)
- American Association for the Studies of Liver Disease (AASLD)

Publications

- Dai H#, Zhu C#, Huai Q#, Xu W, Zhu J, Zhang X, Zhang X, Sun B, Xu H, Zheng M, Li X*, Wang H*. Chimeric antigen receptor-modified macrophages ameliorate liver fibrosis in preclinical models. *J Hepatol.* 2024 Jun;80(6):913-927
- Wang J#, Wang X#, Peng H, Dong Z, Liangpunsakul S, Zuo L*, Wang H*. Platelets in Alcohol-Associated Liver Disease: Interaction With Neutrophils. *Cell Mol Gastroenterol Hepatol.* 2024 Mar 8;18(1):41-52. doi: 10.1016/j.jcmgh.2024.03.001
- Fu S#, Liu M#, Zhu C, Zhang H, Zhao C, Xie Y, Chen G, Sheng D, Pan J, He Z, Dai Y, Gao Y, Li X, Chen L, Qian Y, Jin T, Sun C, Tian Z, Wang H*, Bai L*. Regulatory mucosa-associated invariant T cells controlled by β 1 adrenergic receptor signaling contribute to hepatocellular carcinoma progression. *Hepatology.* 2023 Jul 1;78(1):72-87. doi: 10.1097/HEP.0000000000000014
- Xu L#, Yang Y#, Wen X, Jeong J, Emontzpohl C, Atkins C, Sun Z, Poulsen K, Hall D, Bynon J, Gao B, Lee W, Rule J, Jacobsen E, Wang H*, Ju C*. Hepatic recruitment of eosinophils and their protective function during acute liver injury. *J of Hepatol.* 2022 Aug;77(2):344-352
- Wei X#, Yin F#, Wu M#, Xie Q, Zhao X, Zhu C, Xie R, Chen C, Liu M, Wang X, Ren R, Kang G, Zhu C, Cong J, Wang H*, Wang X*. G protein-coupled receptor 35 attenuates nonalcoholic steatohepatitis by reprogramming cholesterol homeostasis in hepatocytes. *Acta Pharm Sin B.* 2023 Mar;13(3):1128-1144. doi: 10.1016/j.apsb.2022.10.011

Symposium 13

GDF15 and Fatty Liver

Hua Wang (The First Affiliated Hospital of Anhui Medical University, China)

Background and aims: liver fibrosis/cirrhosis is significant health burden worldwide, resulting resulting in liver failure or cancer and accounting for many deaths each year. The pathogenesis of liver fibrosis is very complex, which makes treatment challenging. Growth differentiation factor 15 (GDF15), a cysteine knot protein belonging to the transforming growth factor b (TGF- β) superfamily, has been shown to play a protective role after tissue injury and to promote a negative energy balance during obesity and diabetes. However, paucity of literature is available about GDF15 function in liver fibrosis. This study aimed to investigate the immunomodulatory role and therapeutic potential of GDF15 in progression of hepatic fibrosis.

METHODS: GDF15 expression was studied in patients with fibrosis/cirrhosis and in 2 murine models of liver fibrosis, including mice treated with CCl₄ or DDC diet. GDF15 involvement in the pathogenesis of liver fibrosis was assessed in Gdf15 knockout mouse using both CCl₄ and DDC diet experimental models. We used the CCl₄ and/or DDC diet-induced liver fibrosis model to examine the antifibrotic and antiinflammatory effects of AAV8-mediated GDF15.

RESULTS: GDF15 expression is decreased in the liver of animal models and patients with liver fibrosis/cirrhosis compared with those without liver disease. In vivo studies showed that GDF15 deficiency aggravated CCl₄ and DDC diet-induced liver fibrosis, while GDF15 overexpression mediated by AAV8 or its recombinant protein alleviated CCl₄ and/or DDC diet-induced liver fibrosis. In Gdf15 knockout mice, the intrahepatic microenvironment that developed during fibrosis showed relatively more inflammation, as demonstrated by enhanced infiltration of monocytes and neutrophils and increased expression of proinflammatory factors, which could be diminished by AAV8-mediated GDF15 overexpression in hepatocytes. Intriguingly, GDF15 exerts its effects by reprogramming the metabolic pathways of macrophages to acquire an oxidative phosphorylation-dependent antiinflammatory functional fate. Furthermore, adoptive transfer of GDF15-preprogrammed macrophages to mouse models of liver fibrosis induced by CCl₄ attenuated inflammation and alleviated the progression of liver fibrosis.

CONCLUSION: GDF15 ameliorates liver fibrosis via modulation of liver macrophages. Our data implicate the importance of the liver microenvironment in macrophage programming during liver fibrosis and suggest that GDF15 is a potentially attractive therapeutic target for the treatment of patients with liver fibrosis.



Jun Hwa Hong

Eulji University, Korea

• Education

Period	Affiliation	Position
– 2015	Eulji University	Ph.D.
– 2008	Eulji University	M.Sc.
– 2004	Eulji University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– Present	Eulji University Hospital, Korea	Associate Professor
– 2023	Eulji University Hospital, Korea	Assistant Professor
– 2017	Kyungpook National University Hospital, Korea	Clinical Assistant Professor
– 2015	Chungnam National University Hospital	Fellowship

• Committee Memberships

- The Korean Society for the Study of Obesity
- The Korean Endocrine Society
- The Korean Diabetes Association
- The Daejeon Chungcheong Division of Korean Endocrine Society

• Publications

- Comparison of therapeutic efficacy and safety of sitagliptin, dapagliflozin, or lobeglitazone adjunct therapy in patients with type 2 diabetes mellitus inadequately controlled on sulfonylurea and metformin: third agent study. *Diabetes Res Clin Pract.* 2023 Aug 11;110872. doi: 10.1016/j.diabres.2023.110872
- Comparison of the effects of gemigliptin versus glimepiride on cardiac function in patients with type 2 diabetes uncontrolled with metformin: The gemi-heart study. *Diabetes Obes Metab.* 2023 Aug;25(8):2181-2190. doi: 10.1111/dom.15095. Epub 2023 May 3
- A randomized, active-controlled, parallel, open-label, multicenter, phase 4 study to compare the efficacy and safety of pregabalin sustained release tablet and pregabalin immediate release capsule in type II diabetic patients with peripheral neuropathic pain. *Medicine (Baltimore).* 2023 Apr 25;102(17):e33701
- Effects of Virtual Reality Exercise Program on Blood Glucose, Body Composition, and Exercise Immersion in Patients with Type 2 Diabetes. *Int. J. Environ. Res. Public Health* 2023, 20(5), 4178
- SGLT-2 inhibitors and GLP-1 receptor agonists in metabolic dysfunction-associated fatty liver disease: *Trends Endocrinol Metab.* 2022 Jun;33(6):424-442. doi: 10.1016/j.tem.2022.03.005. Epub 2022 Apr 28

Symposium 13

TZD and SGLT2i Combination for Fatty Liver Management

Jun Hwa Hong (Eulji University, Korea)

Fatty liver has become a leading cause of liver disease, affecting 30% of the global population. Fatty liver is particularly high in obese individuals and patients with type 2 diabetes mellitus (T2DM). Simple fat deposition in the liver to inflammation and fibrosis are variably expressed in patients. Thiazolidinedione (TZD) is representative improvement of insulin resistance and hepatic steatosis. However, there is some barriers to maintain the TZD by peripheral edema, weight gain and contraindicated to patients with heart failure. Sodium Glucose Co-Transporter 2 inhibitor (SGLT2i) also showed improvement of fatty liver with weight loss, alleviation of edema, and beneficial effect to wide spectrum of heart failure. Thus, we anticipated the synergistic improvement of fatty liver with combination treatment of TZD and SGLT2i. In this session, I will present the clinical data of TZD and SGLT2 combination therapy on fatty liver.

Symposium 14

Understanding Aging Skeletal Muscle and Dynamics

Chairpersons

Kijin Kim

Keimyung University, Korea

Jae Myoung Suh

KAIST, Korea

Speakers

William Evans

University of California, Berkeley, USA

Marc Hellerstein

University of California, Berkeley, USA

Il-Young Kim

Gachon University, Korea

Panel Discussion

Seung-Hwan Lee

The Catholic University of Korea, Korea

Justin Y. Jeon

Yonsei University, Korea



William Evans

University of California, Berkeley, USA

• Education

Period	Affiliation	Position
– 1980	Human BioEnergetics, Ball State University, Human Performance Laboratory	Ph.D.
– 1976	Biology, Ball State University, Human Performance Laboratory	M.S.
– 1972	Zoology, University of North Carolina at Chapel Hill	B.A

• Affiliations / Experience

Period	Affiliation	Position
– 2017-Present	Department of Nutritional Sciences & Toxicology, University of California, Berkeley	Adjunct Professor of Human Nutrition
–		Adjunct Professor of Medicine
– 2010-Present	Division of Geriatrics, Duke University Medical Center	President/ Director
– 2014-2016	Muscle & Health Division, KineMed, Inc	Vice President
– 2009-2014	Muscle Metabolism Discovery Unit, GlaxoSmithKline, Research Triangle Park, NC	Jane and Ed Warmack Chair/ Director
– 1997-2009	Donald W. Reynolds Institute on Aging at the University of Arkansas for Medical Sciences	

• Committee Memberships

- American Federation for Aging Research
- Skeletal muscle, and exercise physiology study section, Clinical and Integrative Diabetes and Obesity Study Section, and Multicenter AIDS Cohort Study (MACS)- NIH, Small Business Innovative Research grant, Pepper Center for Independent Living grants
- Society on Cachexia and Wasting Disorders” (SCWD)
- UAMS Institutional Review Board
- Neurological, Aging, and Musculoskeletal Epidemiology Study

• Publications

- WJ Evans, M Hellerstein, RJ Butterfield, E Smith, M Guglieri, N Katz, B Nave, L Branigan, S Thera BS3, KL Vordos, L Behar, M Schiava, M James, T Field, H Mohammed, and M Shankaran, Reductions in functional muscle mass measured using D3Creatine dilution and ability to ambulate in Duchenne muscular dystrophy from ages 4 – 24 years, (in review)
- M Hetherington-Rauth , CE McCulloch, SR Cummings, WJ Evans, M Hellerstein, JA Cauley, K Ensrud, L Langsetmo , ES Orwoll, and PM Cawthon Change in D3Cr muscle mass in oldest old men and its association with changes in grip strength and walking speed (in review)
- HR Banack, J Wactawski-Wende, HM Ochs-Balcom, EM Cespedes Feliciano, B Caan, C Lee, G Anderson, M Shankaran, WJ Evans A protocol for remote collection of skeletal muscle mass via D3-creatine dilution in community-dwelling postmenopausal women from the Women’s Health Initiative, PLOS One, 19: e0300140, DOI: 10.1371/journal.pone.0300140
- PM Cawthon, Blackwell TL, Kritchevsky SB, Newman AB, Hepple RT, Coen PM, Goodpaster BH, Duchowny K, Hetherington-Rauth M, Mau T, Shankaran M, Hellerstein M, Evans WJ, Cummings SR. Associations between D3Cr muscle mass and MR thigh muscle volume with strength, power, physical performance, fitness, and limitations in older adults in the SOMMA study. J Gerontol A Biol Sci Med Sci. Accepted
- E Cheng, BJ Caan, PM Cawthon, WJ Evans, MK Hellerstein, M Shankaran, KL Campbell, AM Binder, B Sternfeld, JA Meyerhardt, KH Schmitz, EM Cespedes Feliciano, D3-creatine dilution, computed tomography and dual-energy X-ray absorptiometry for assessing myopenia and physical function in colon cancer: A cross-sectional study, J Cachexia Sarcopenia Muscle, 10.1002/jcsm.13353

Symposium 14

Sarcopenia: New Insights for a Unified Definition

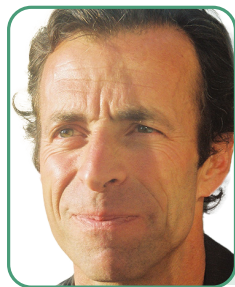
William Evans (University of California, Berkeley, USA)

The decline of muscle mass and muscle strength is one of the phenotypic characteristics of aging. Although this process can be attenuated by moderate-to-intense physical activity, even individuals that faithfully exercise every day see their muscles shrink and their strength decline. When this process is overt and crosses a critical threshold, it leads to a condition called sarcopenia. Over the last three decades, there has been a titanic effort to define standard criteria for the screening and clinical assessment of sarcopenia. Such efforts were driven by the notion that sarcopenia is a major cause of mobility disability in the elderly, and that screening for and “treating” sarcopenia shall result into mobility loss prevention. Yet, despite dozens of dedicated meetings, workshops, scientific articles, statements from professional societies and even the establishment of an ICD-10 code, no definition of sarcopenia that is widely acknowledged by the scientific community is currently available¹. Lean body mass (LBM) was assumed to be an appropriate surrogate assessment of muscle mass and has been so used in several large cohort studies. To date, cross-sectional and longitudinal aging cohort studies have reported little or no relationship between low LBM and increased risk of health-related outcomes, including functional capacity, disability, and mortality². A meta-analysis³ of longitudinal observational studies in older people (> 65 y) conducted between 1976 and 2012 examined reported data of body composition (BIA, DXA, CT) and physical functional capacity. Although LBM was measured, the authors incorrectly used the term “muscle mass” and concluded that “low muscle mass was not significantly associated with functional decline.” This lack of association of LBM with functional capacity or health related outcomes has led to a type 2 error in the existing literature and as a result there is no consensus on the role of muscle in defining sarcopenia. This lack of consensus has also resulted in several (> 15) ‘consensus’ definitions with no consensus at all¹. The use of surrogate measures of muscle mass in older people fail to distinguish between contractile proteins and other proteins that accumulate in skeletal muscle with aging, such as collagen and amyloid that thicken the matrix between myofibers⁴. Because this phenomenon is widely heterogeneous between individuals, the use of LBM is noisy, not very useful and the lack of relationship between LBM, strength and other health related outcomes more recent ‘consensus’ definitions of sarcopenia use no body composition assessment and rely on function and strength.

The D₃Creatine dilution method now allows a non-invasive measurement of total body skeletal muscle mass⁵. Because creatine is actively transported into the sarcomere against a large concentration gradient, almost 98% of the body creatine pool is found in muscle. In addition, creatine and phosphocreatine is co-located with contractile components, potentially providing a measure of the ‘functional’ components of skeletal muscle. Studies in the (MrOS) population in which 1425 older, community dwelling men were measured demonstrated that muscle mass assessed with D₃Cr muscle was strongly and independently associated with strength, functional capacity⁶, risk of disability (including IADL), hip fracture⁷, and mortality⁸. In addition, a threshold of approximately 25% muscle mass was described for a high risk of a mobility disability defined by chair stand time⁹. For the first time, we now have data demonstrating that longitudinal loss of muscle mass measured by D₃Cr dilution is significantly associated with decreased strength and walking speed¹⁰.

I propose a simplified definition of sarcopenia as the term implies (lack of flesh) as low muscle mass. The definitions so far attempted are based on three basic variables in various combinations: muscle mass (typically measured by DEXA or computerized tomography), muscle strength (either grip or knee extension strength) and lower extremity performance (typically walking speed). All three dimensions present complex assessment and interpretation problems. A simplified definition will have greater clinical utility. At the present time, most physicians have no idea how to diagnose or treat sarcopenia¹¹, perhaps because of the lack of consensus of what it is or that it is not recognized indication by the US Food and Drug Administration for development of sarcopenia drugs. Most health care professionals (HCP) do not routinely measure strength or functional capacity in their older patients. A definition of sarcopenia as low % muscle mass will also allow HCPs to determine who may be at risk for several age-associated syndromes that have been associated with low muscle mass and develop a therapy that targets maintenance or improvement skeletal muscle amount. Preservation of muscle mass to combat sarcopenia may prove to be the most effective strategy to preserve independence and face advancing age with dignity. A simplified definition available to all HCPs will go a long way to meet this goal.

1. Evans WJ, Guralnik J, Cawthon P, et al. Sarcopenia: no consensus, no diagnostic criteria, and no approved indication—How did we get here? *Geroscience*. 2023.
2. Studenski SA, Peters KW, Alley DE, et al. The FNIH sarcopenia project: rationale, study description, conference recommendations, and final estimates. *J Gerontol A Biol Sci Med Sci*. 2014;69(5):547-558.
3. Schaap LA, Koster A, Visser M. Adiposity, muscle mass, and muscle strength in relation to functional decline in older persons. *Epidemiol Rev*. 2013;35:51-65.
4. McGregor RA, Cameron-Smith D, Poppitt SD. It is not just muscle mass: a review of muscle quality, composition and metabolism during ageing as determinants of muscle function and mobility in later life. *Longev Healthspan*. 2014;3(1):9.
5. Evans WJ, Cawthon PM. D(3)Creatine Dilution as a Direct, Non-invasive and Accurate Measurement of Muscle Mass for Aging Research. *Calif Tissue Int*. 2023.
6. Cawthon PM, Orwoll ES, Peters KE, et al. Strong Relation Between Muscle Mass Determined by D3-creatine Dilution, Physical Performance, and Incidence of Falls and Mobility Limitations in a Prospective Cohort of Older Men. *J Gerontol A Biol Sci Med Sci*. 2019;74(6):844-852.
7. Cawthon PM, Peters KE, Cummings SR, et al. Association Between Muscle Mass Determined by D3 -Creatine Dilution and Incident Fractures in a Prospective Cohort Study of Older Men. *J Bone Miner Res*. 2022.
8. Cawthon PM, Blackwell T, Cummings SR, et al. Muscle Mass Assessed by the D3-Creatine Dilution Method and Incident Self-reported Disability and Mortality in a Prospective Observational Study of Community-Dwelling Older Men. *J Gerontol A Biol Sci Med Sci*. 2021;76(1):123-130.
9. Zanker J, Patel S, Blackwell T, et al. Walking Speed and Muscle Mass Estimated by the D3-Creatine Dilution Method Are Important Components of Sarcopenia Associated With Incident Mobility Disability in Older Men: A Classification and Regression Tree Analysis. *J Am Med Dir Assoc*. 2020.
10. Duchowny KA, Peters KE, Cummings SR, et al. Association of change in muscle mass assessed by D3 -creatine dilution with changes in grip strength and walking speed. *J Cachexia Sarcopenia Muscle*. 2020;11(1):55-61.
11. Guralnik JM, Cawthon PM, Bhasin S, et al. Limited physician knowledge of sarcopenia: A survey. *J Am Geriatr Soc*. 2023;71(5):1595-1602.



Marc Hellerstein

University of California, Berkeley, USA

• Education

Period	Affiliation	Position
– 1986	Mass Institute of Technology, Cambridge, MA	Ph.D.
– 1979	Yale Univ. School of Medicine, New Haven, CT	M.D.
– 1975	Brandeis University, Waltham, Massachusetts	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Myo Corps, Inc., Chapel Hill, NC	Co-founder, President, and Chairman of the Board
– 2017-Present	9 Muses-Hellerstein Foundation (a 501(c)3 public charity), Berkeley, CA	Founder and President
– 2002-2017	KineMed., Inc., Emeryville CA	Co-founder and Chief of SAB; President
– 1999-Present	University of California at Berkeley, CA and, University of California, San Francisco, CA	Professor of Nutritional Sciences and Professor of Medicine
– 1993-1999	University of California at Berkeley, CA and, University of California, San Francisco, CA	Associate Professor of Nutritional Sciences and Associate Professor of Medicine

• Committee Memberships

- EXCOM (Faculty Governance), UC Berkeley College of Natural Resources
- Graduate Admissions Committee, DNST, UC Berkeley
- NASA Scientific Advisory Bd, Nutritional and Metabolic Counter-Measures

• Publications

- Smith GI, Shankaran M, Hellerstein M, Klein S (Co-senior authors). Insulin resistance drives hepatic de novo lipogenesis in nonalcoholic fatty liver disease. *J Clin Invest.* 130(3):1453-1460
- Shankaran M, King CL, Angel TE, Hellerstein MK. Circulating protein synthesis rates reveal skeletal muscle proteome dynamics; *J Clin Invest.* 126(1):288-302. PMID: 26657858
- Holmes WE, Angel TE, Li KW, Hellerstein MK. Dynamic Proteomics: In Vivo Proteome-Wide Measurement of Protein Kinetics Using Metabolic Labeling. *Methods Enzymol.* 561:219-276
- Clark RV, Walker AC, O'Connor-Semmes RL, Leonard MS, Miller RR, Stimpson SA, Turner SM, Ravussin E, Cefalu WT, Hellerstein MK, Evans WJ. Total body skeletal muscle mass: estimation by creatine (methyl-d3) dilution in humans. *J Appl Physiol.* 116(12):1605-13. PMID: 24764133
- Busch R, Neese RA, Awada M, Hayes GM, Hellerstein MK. Measurement of cell proliferation by heavy water labeling. *Nat Protoc* 2:3045-57, PMID: 18079703

Symposium 14

Understanding Skeletal Muscle Protein Dynamics, Regulation and Function Using New Tracer Techniques

Marc Hellerstein (University of California, Berkeley, USA)

I will review data from the many applications of a new technology that we have developed to measure proteome-wide muscle protein synthesis rates *in vivo*. Metabolic labeling with heavy water is combined with tandem mass spectrometric (LC/MS-MS) analysis of isotope ratios by Mass Isotopomer Distribution Analysis (MIDA). Proteins across the proteome or targeted proteins can be measured. This methodology has allowed several important areas of muscle biology to be explored.

1. *Central role of muscle protein synthesis in both catabolic and anabolic conditions.* Somewhat surprisingly, almost every intervention that either increases or decreases muscle mass has been shown by this labeling method to act by altering muscle protein synthesis (fractional synthesis rate, FSR). On the anabolic side, this includes androgen therapy or resistance exercise in humans, and clenbuterol or weight-bearing exercise in rodents; on the catabolic side, energy restriction, bed rest, immobilization, weight loss, long-term calorie restriction, Duchenne's Muscular Dystrophy or glucocorticoid treatment (the latter widely believed to increase muscle protein breakdown). Of particular interest is the powerful effect of energy deficiency – which prevents concurrent testosterone therapy from increasing muscle FSR in humans, for example. These findings have important implications for prevention and treatment of muscle loss.

2. *Predictive value as an early marker.* In rodent models, increases in muscle protein FSR after several days of androgen therapy predict later gains in muscle mass. In human studies, muscle FSRs can increase within days of starting an intervention.

3. *Discovery.* We have shown that localized experimental muscle injury with cardiotoxin results not only in sequential changes in proteome turnover in the injured muscle but alters turnover in the contralateral muscle – suggesting circulating myokines or neurologic signals in response to local injury. The physiologic effect of an intervention can also be dissected by differential protein responses- e.g., using FSRs of mitochondrial vs. structural and glycolytic proteins to learn whether sprint exercise training increases aerobic, power or both types of muscle response in humans.

4. *Testing drug candidates in animal models and in Ph1 / 2 trials in humans.* We showed in a 15-day study that a candidate drug was effective at reversing the lower protein synthesis response to bed rest in muscle. We established the pharmacodynamics on muscle protein FSRs of a drug candidate in rodents and compared to a known muscle anabolic agent. The effect of a nutritional supplement on muscle FSR in humans was also documented through this highly sensitive method.

5. *Non-invasive measurements.* FSRs of plasma proteins derived from skeletal muscle can be used as a “liquid biopsy” or “virtual biopsy” of muscle protein dynamics and correlate well with muscle protein turnover. This can avoid the need for a muscle biopsy.

6. *Next generation applications: turning molecular-cell biology into physiology.* It is now possible to measure synthesis and breakdown rates of low abundance intracellular proteins that are important in metabolic control. We explored the interactive turnover of the LDL receptor and PCSK-9 in rodent liver in response to dietary cholesterol loading, for example, uncovering a surprising new dimension to the canonical cholesterol homeostasis model. Other intracellular proteins previously characterized mostly at the level of structure and content are now being studied for their kinetic response to interventions, revealing a rich physiologic life of these target molecules.

Many questions can be explored using these powerful tools. The effects of GLP-1-induced weight loss on muscle protein kinetics, mass and function is a topic of central public health importance today. Identifying effective treatments for sarcopenia and cachexia and for genetic disorders or muscle are long-unmet medical needs.

In summary, the ability to easily measure *in vivo* turnover rates of proteins globally across the proteome or for individual proteins in humans and animal models opens a new world of possibilities. Muscle physiology, pathophysiology, molecular control mechanisms and therapeutics



Il-Young Kim

Gachon University, Korea

• Education

Period	Affiliation	Position
– 2007-2011	University of Texas, Austin	Ph.D.
– 2004-2007	University of Texas, Austin	M.A.
– 2003-2004	University of California, Berkeley	Graduate Program in Dept. of Integrative Biology

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	Gachon University College of Medicine	Associate Professor
– 2018-2020	Gachon University College of Medicine	Assistant Professor
– 2015-2017	Univ. of Arkansas for Medical Sciences	Assistant Professor
– 2012-2015	Univ. of Arkansas for Medical Sciences	Post-Doc/ Faculty

• Committee Memberships

- The Korean Society for the Study of Obesity
- The Korean Society of Sports Medicine
- The Korean Society of Sarcopenia

• Publications

- Jang JW et al., Free Essential Amino Acid Feeding Improves Endurance During Resistance Training via DRP1-Dependent Mitochondrial Remodeling, *Journal of Cachexia, Sarcopenia, & Muscle* (co-corresponding author)
- Choi S et al., Hippo-YAP/TAZ signaling coordinates adipose plasticity and energy balance by uncoupling leptin expression from fat mass, *Nature Metabolism*
- Jang JW et al., Balanced Free Essential Amino Acids and Resistance Exercise Training Synergistically Improve Dexamethasone-Induced Impairments in Muscle Strength, Endurance, and Insulin Sensitivity in Mice, *Int. J. Mol. Sci.* (corresponding author)
- Kim I-Y et al., Tracing Metabolic Flux In Vivo: Basic Model Structures of Tracer Methodology, *Exp Mol Med* (corresponding author)
- Song BS et al., Mitochondrial defects aggravate liver cancer via aberrant glycolytic flux and T cell exhaustion, *Journal for ImmunoTherapy of Cancer* (co-corresponding author)

Symposium 14

Overcoming Anabolic Resistance to Exercise in Sarcopenia: Role of Free Essential Amino Acids

Il-Young Kim (Gachon University, Korea)

Sarcopenia is the age-associated progressive loss of muscle mass and function, accompanying with declines in independency and quality of life in older adults. The etiology of sarcopenia is multifactorial; however, a major characteristic phenomenon is the blunted muscle protein synthetic response to anabolic stimuli such as resistance exercise and nutrition (e.g., protein/amino acids), called anabolic resistance. Despite the existence of anabolic resistance of aging muscle in varying degrees, exercise, particularly, resistance exercise, is still the most powerful means to counteract the progression of sarcopenia. We hypothesized that consumption of balanced 9 free essential amino acids will enhance anabolic response to resistance exercise training as 9 essential amino acids as a team serve not only as building blocks for synthesis of new muscle proteins but as potent anabolic stimuli for protein synthesis. In my lab, we have recently demonstrated that consumption of balanced 9 essential amino acids enhances both endurance capacity and muscle mass and strength during resistance exercise training in young mice. To test if this hold in aging, we evaluated these beneficial effects in aging sarcopenic mice. First, we found that resistance exercise training over 8 weeks enhanced both muscle protein synthesis rate and muscle mass and strength in young. However, in old mice, the same resistance exercise training in old mice resulted in blunted muscle strength gains without changes in net muscle protein synthesis and muscle mass. This confirms anabolic resistance in gains in muscle mass and strength in response to resistance exercise training in older mice. Remarkably, consumption of balanced 9 essential amino acids over 8 weeks attenuated the magnitude of anabolic resistance in old mice. To explore these beneficial effects at physiological, metabolic, and molecular aspects in young and old mice, we employed (or will employ as the study is still in progress) both metabolic kinetics or “dynamics” approach using various stable isotope tracing techniques to access cumulative synthesis rates of myofibrillar and mitochondrial protein, turnover fluxes of various metabolites including glucose, amino acids, and fatty acids, TCA cycle fluxes as well as whole-body and muscle insulin sensitivity using hyperinsulinemic-euglycemic clamp in addition to traditional “statics” (static, snapshot) techniques including RNA-seq, molecular singling, and genetic modifications. In this talk, I will discuss the potential role of balanced essential amino acids in enhancing the efficacy of resistance exercise training in gaining of muscle mass and strength as well as endurance capacity, both of which are the best predictor of all-cause mortality and both healthspan and lifespan.

Symposium 15

Diet Quality and Weight Regulation

Chairpersons

Doo-Man Kim

Hallym University, Korea

Eun Mi Kim

Sungkyunkwan University, Korea

Speakers

Yuri Kim

Ewha Womans University, Korea

Yang Hu

Harvard T.H. Chan School of Public Health, USA

Hannah Oh

Korea University, Korea

Panel Discussion

SuJin Song

Hannam University, Korea

Hyun Ju You

Seoul National University, Korea



Yuri Kim

Ewha Womans University, Korea

• Education

Period	Affiliation	Position
– 2005	Tufts University Nutritional Biochemistry and Metabolism	Ph.D.
– 1999	The Ohio State University Human Nutrition	M.S.
– 1992	Ewha Womans University Nutritional Science and Food Management	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Ewha Womans University Global School of Continuing Education	Dean
– 2023-Present	Ewha Womans University Center for Arts & Culture Education	Dean
– 2023-Present	Ewha Womans University Institute for Leadership Development	Dean
– 2017-2018	Yale University Therapeutic Radiology Department School of Medicine	Visiting Professor
– 2010-Present	Ewha Womans University Nutritional Science and Food Management	Professor

• Committee Memberships

- Korean Nutrition Society
- The International Carotenoid Society
- Journal of Cancer Prevention
- Korean Nutritional Society
- Korean Society of Food and Culture

• Publications

- Y Choi, R Wong, YK Cha, TH Park, S-J Chung, Y Kim. (2024) Sweet-bitter taste interactions in binary mixtures of sweeteners: Relationship of taste receptor activities with sensory perception. Food Chemistry, accepted
- S Jang, H Han, Y Oh, Y Kim (2024) Sex differences in inflammation correlated with estrogen and estrogen receptor- β levels in azoxymethane/dextran sodium sulfate-induced colitis-associated colorectal cancer mice. Heliyon, 10(6):28121
- Y Kim, Y Oh, YS Kim, JH0 Shin, YS Lee, Y Kim. (2024). β -carotene attenuates muscle wasting in cancer cachexia by regulating myogenesis and muscle atrophy. Oncology Reports, 51(1); 1-12
- Y Kim, S Jung, G Park, H Shin, SC Heo, Y Kim (2023). β -Carotene suppresses cancer cachexia by regulating the adipose tissue metabolism and gut microbiota dysregulation. The Journal of Nutritional Biochemistry, 114; 109248
- M Kwon, Y Kim, J Lee, JA Manthey, Y Kim, Y Kim (2022) Neohesperidin dihydrochalcone and neohesperidin dihydrochalcone-O-glycoside attenuate subcutaneous fat and lipid accumulation by regulating PI3K/AKT/mTOR pathway in vivo and in vitro. Nutrients,14:1087

Symposium 15

Functional Supplements: Their Fat Controls and Molecular Mechanisms

Yuri Kim (Ewha Womans University, Korea)

Obesity is a complex disease that is highly associated with metabolic disorders, including hypertension, type 2 diabetes mellitus (T2DM), and nonalcoholic fatty liver disease (NAFLD). The prevalence of obesity is rapidly increasing worldwide. The WHO has declared obesity a global epidemic of the 21st century. Sugar reduction strategies often rely on using alternative sugars designed to substitute sugar and mimic its sensory profile, but also exert beneficial effects on obesity-related metabolic disorders. This lecture aims to discuss the anti-obesity and anti-metabolic disease effects and molecular mechanisms of various alternative sweeteners such as xylobiose, phylloolulcin, and neohesperidin. The level of hepatic triglyceride and serum cholesterol was regulated by these alternative sweeteners. Gene expressions related to lipogenesis, lipolysis, β -oxidation, and inflammation were significantly regulated in the perirenal adipose tissues and the liver. Additionally, fat regulation is crucial not only in obesity but also in cachexia, which is characterized by fat loss due to disease. Our laboratory has been investigating the role of β -carotene, a type of carotenoid, in regulating fat in early cancer cachexia. β -Carotene is well-known for its antioxidant properties, but it has also been reported to regulate fat mass in healthy conditions. Particularly, in cachexia, it has been shown to inhibit fat depletion. These diverse effects are attributed to mechanisms such as increasing adipogenesis and lipogenesis and regulating glycolysis. Results from these studies suggest that various functional supplements could have the potential to prevent obesity-related metabolic disorders and cachexia.



Yang Hu

Harvard T.H. Chan School of Public Health, USA

• Education

Period	Affiliation	Position
– 2014-2019	Harvard T.H. Chan School of Public Health	Ph.D.
– 2011-2013	Harvard T.H. Chan School of Public Health	M.A.
– 2007-2011	Peking University Health Science Center	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Harvard T.H. Chan School of Public Health	Research Scientist
– 2019-2023	Harvard T.H. Chan School of Public Health	Research Associate

• Publications

- Hu Y, Li J, Wang B, et al. Interplay between diet, circulating indolepropionate concentrations and cardiometabolic health in US populations. *Gut*. 72: 2260-2271
- Hu Y, Li G, Yu E, et al. Low-Carbohydrate Diet Scores and Mortality Among Adults With Incident Type 2 Diabetes. *Diabetes Care*. 46 (4): 874-884
- Hu Y, Li Y, Sampson L, et al. Lignan Intake and Risk of Coronary Heart Disease. *JACC*. 78(7):666-78
- Hu Y, Ding M, Sampson L, et al. Intake of whole grain foods and risk of type 2 diabetes: results from three prospective cohort studies. *BMJ*. 370:m2206
- Hu Y, Zong G, Liu G, et al. Smoking Cessation, Weight Change, Type 2 Diabetes, and Mortality. *NEJM*. 379 (7):623-32

Symposium 15

Optimal Diets for Body Weight Management

Yang Hu (Harvard T.H. Chan School of Public Health, USA)

This lecture summarizes the current epidemiological evidence regarding effects of a few well-established dietary patterns on body weight in adults. Focusing on both macronutrient- and food-based dietary patterns, this lecture covers key findings from recent landmark dietary weight-loss trials such as POUNDS Lost trial, DIETFITS trial, and PREDIMED-Plus trial. The current evidence shows that not all proposed dietary patterns are effective in weight control and the effectiveness primarily depends on the intervention intensity and reference diets. For instance, a low-fat diet leads to lower weight gain only compared with a usual diet whereas a low-carbohydrate diet and Mediterranean diet on average results in greater weight loss than a low-fat diet. In addition, simply targeting on the restriction of macronutrients per se may not necessarily lead to a healthy dietary pattern as our previous work has shown that only a low-carbohydrate diet that consists of high-quality protein, fat, and carbohydrates is associated with significantly less weight gain in the long-term. To complement the evidence from randomized controlled trials, the lecture presents data from the most recent meta-analysis of prospective cohort studies that are able to examine the long-term effects of healthy dietary patterns on weight change. Accumulating evidence has demonstrated that higher adherence to multiple food-based dietary patterns including alternative healthy eating index (AHEI), healthy plant-based diet (hPDI), Mediterranean diet, and DASH diet is associated with significantly lower weight gain. Finally, the lecture discusses the research frontiers in precision nutrition that aim to understand the biological mechanisms underlying the weight-loss effects of healthy dietary patterns. These novel findings will facilitate the development of individualized diets that most effectively aid in weight management.



Hannah Oh

Korea University, Korea

• Education

Period	Affiliation	Position
- 2010-2015	Harvard T. H. Chan School of Public Health, Boston, MA, USA	Sc.D.
- 2008-2010	Emory Rollins School of Public Health, Atlanta, GA, USA	M.P.H.
- 2004-2008	University of California, Berkeley, USA	B.A.

• Affiliations / Experience

Period	Affiliation	Position
- 2018-2021	Korea University, Korea	Assistant Professor
- 2017-2018	Rutgers Cancer Institute of New Jersey, USA/ Rutgers Robert Wood Johnson Medical School, New Brunswick, NJ, USA	Instructor
- 2015-2017	National Cancer Institute, Bethesda, MD, USA	Postdoctoral Fellowship

• Publications

- Kwon S, Kim R, Lee JT, Kim J, Song S, Kim S, Oh H. Association of smartphone use with body image distortion and weight loss behaviors in Korean adolescents. *JAMA Network Open* 5(5): e2213237
- Jo G, Park D, Lee J, Kim R, Subramania SV, Oh H*, Shin MJ*. Trends in diet quality and cardiometabolic risk factors among Korean adults, *JAMA Network Open* (6): e2218297
- Jang H, ...Giovannucci EL, Oh H. Overall and abdominal obesity and risks of all-cause and cause-specific mortality in Korean adults: a pooled analysis of three population-based prospective cohorts. *Int J Epidemiol*; dyac242
- Cho Y, Jang H, Kwon S, Oh H. Aerobic, muscle-strengthening, and flexibility physical activity and risks of all-cause and cause-specific mortality: a population-based prospective cohort of Korean adults. *BMC Public Health* 23(1): 1148
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Symposium 15

Trends in Diet Quality and Cardiometabolic Risk Factors Among Korean Adults

Hannah Oh (Korea University, Korea)

Poor diet, such as high intake of sodium and low intake of whole grains and fruits, increases the risks of obesity and various noncommunicable diseases, including cardiovascular disease, type 2 diabetes, and cancer. Few studies to date have investigated the trends in overall diet quality among Korean adults, beyond evaluating consumptions of individual food groups. Because overall diet quality, rather than consumption of individual food groups, better reflects overall health, understanding the nationwide trends in diet quality may provide important evidence for effective strategies and priorities to reduce related disease burdens. In this study, we used large, nationally representative survey data to examine the trends in diet quality and cardiometabolic risk factors (waist circumference and blood pressure, serum cholesterol, triglyceride, and fasting blood glucose levels) among Korean adults (n=65,416; aged 19 to 79 years) in 2007-2022. We used a validated diet quality index, the Korean Healthy Eating Index (KHEI), which indicates the overall adherence to recommended dietary guidelines. In our study population, higher KHEI was associated with lower waist circumference, systolic blood pressure, diastolic blood pressure, and triglyceride levels; and lower risks of all-cause and cardiovascular-specific mortality (all $P \leq .003$ for trend), confirming the validity of the KHEI. We first estimated the age-standardized mean KHEI scores in each survey year from 2007 to 2022, using the 2005 Korean Census population as the reference population. We also performed the age-period-cohort analyses of the KHEI to comprehensively investigate the independent associations of age, period, and birth cohort. The age-standardized mean (SE) KHEI score increased from 2007 to 2013, which was associated with reduced sodium intake and increased whole grain, dairy, and protein-rich food intakes. In 2013-2018, there was a slight decrease in KHEI, which was associated with reduced intakes of fresh fruits, vegetables, and whole grains and increased intake of sugar-sweetened beverages. The mean (SE) KHEI score was lowest at age 39 years (50.1 [0.3]) and increased at older ages (58.0 [0.3] at 79 years). Controlling for age and period effects, the highest KHEI score was observed among the birth cohorts of 1960-1964 (53.6 [0.9]) and decreased in subsequent cohorts (45.5 [1.2] in the 1990-1999 birth cohort). Similar cohort effects in cardiometabolic risk factors were observed, showing the lowest waist circumference, blood pressure, and total cholesterol levels among the birth cohorts of the 1960s and 1970s and higher levels among more recent birth cohorts (1990-1999 vs 1960-1964: waist circumference, 83.8 [0.5] vs 81.4 [0.4] cm; systolic blood pressure, 118.7 [0.7] vs 116.4 [0.4] mm Hg; total cholesterol, 200.2 [0.9] vs 198.9 [0.7] mg/dL). In most age groups, the mean KHEI score was consistently higher in adults living in urban areas and among high-income and educational level. The findings of this study suggest that the overall diet quality of Korean adults modestly improved from 2007 to 2013, followed by a slight decrease in 2013-2022. During the study period, inequalities in diet among socioeconomic subgroups persisted, suggesting that more intense interventions may be needed to target the susceptible groups.

Symposium 16

International Collaboration 2

Chairpersons

Eun-Jung Rhee

Sungkyunkwan University, Korea

Chang Hee Jung

University of Ulsan, Korea

Speakers

Jang Won Son

The Catholic University of Korea, Korea

Erika Bezerra Parente

Boehringer Ingelheim, Germany

W. Timothy Garvey

University of Alabama at Birmingham, USA

Panel Discussion

Sunyoung Kim

Kyung Hee University, Korea

Ye Seul Yang

Seoul National University, Korea



Jang Won Son

The Catholic University of Korea, Korea

• Education

Period	Affiliation	Position
- 2011	Graduate school, The Chung-Ang University of Korea, Seoul, Korea	Ph.D.
- 2006	Graduate School, The Chung-Ang University of Korea, Seoul, Korea	
- 1995-2001	College of Medicine, The Chung-Ang University of Korea, Seoul, Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
- 2021 -Present	Bucheon Saint Mary Hospital. College of Medicine, The Catholic University of Korea	Professor
- 2017-2018	Karolinska institute, Sweden	Visiting researcher
- 2016-2021	Bucheon Saint Mary Hospital. College of Medicine, The Catholic University of Korea	Associate professor
- 2012-2016	Bucheon Saint Mary Hospital. College of Medicine, The Catholic University of Korea	Assistant professor

• Publications

- Genetic Determinants of Obesity in Korean Populations: Exploring Genome-wide Associations and Polygenic Risk Scores. Briefings in Bioinformatics 2024 [Epub ahead of print]
- GLP-1 Based Therapies: A New Horizon in Obesity Management. *Endocrinol Metab.* 2024 Apr;39(2):206-221
- An international multidisciplinary consensus statement on MAFLD and the risk of CVD. *Hepatol Int* 17, 773–791 (2023).
- Human Tissue-Engineered Skeletal Muscle: A Tool for Metabolic Research. *Endocrinol Metab.* 2022;37(3):408-414.
- Obesity Fact Sheet in Korea, 2021: Trends in Obesity Prevalence and Obesity-Related Comorbidity Incidence Stratified by Age from 2009 to 2019. *JOMES* 2022;31:169-177

Symposium 16

The New Wave of Anti-Obesity Drugs: Advances and Challenges

Jang Won Son (The Catholic University of Korea, Korea)

Obesity is a significant risk factor for health issues like type 2 diabetes and cardiovascular disease. It often proves resistant to traditional lifestyle interventions, prompting a need for more precise therapeutic strategies. This has led to a focus on signaling pathways and neuroendocrine mechanisms to develop targeted obesity treatments.

Recent developments in obesity management have been revolutionized by introducing novel Glucagon-like peptide-1 (GLP-1) based drugs, such as semaglutide and tirzepatide. These drugs are part of an emerging class of nutrient-stimulated hormone-based therapeutics, acting as incretin mimetics to target G-protein-coupled receptors like GLP-1, glucose-dependent insulinotropic polypeptide (GIP), and Glucagon (GCG). These receptors are vital in regulating body fat and energy balance. The development of multi agonists, including GLP-1-GCG and GIP-GLP-1-GCG receptor agonists, especially with the potential for GCG receptor activation, marks a significant advancement in the field.

In a move to improve patient convenience, semaglutide has been formulated as an orally available tablet with an absorption enhancer, overcoming the need for injections. Despite its lower oral bioavailability and specific intake requirements, this development marks a step forward in drug administration. Additionally, the advent of small molecules such as orforglipron, which can interact with the GLP-1 receptor and offer greater resistance to gastrointestinal breakdown, is a groundbreaking advancement previously deemed unachievable.

In this lecture, I will cover the development and clinical efficacy of various GLP-1-based therapeutics, exploring the challenges and future directions in obesity management.



Erika Bezerra Parente

Boehringer Ingelheim, Germany

Education

Period	Affiliation	Position
– 2019-2020	University of Helsinki and Folkhälsan Research Center, Finland	Post Doctoral
– 2005-2009	Faculdade de Medicina da Universidade de São Paulo, Brazil	Ph.D.
– 1995-2000	Faculdade de Medicina da Universidade Federal do Ceará, Brazil	Medical Diploma

Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Boehringer-Ingelheim, Germany	Senior Global Medical Advisor
– 2019-Present	University of Helsinki, Finland	Visiting Researcher
– 2020-2023	Folkhälsan Research Center	Senior Researcher
– 2003-2005	Faculdade de Medicina da Universidade de São Paulo, Brazil	Medical Residency in Endocrinology & Metabolism
– 2001-2003	Faculdade de Medicina da Universidade de São Paulo, Brazil	Medical Residency in Internal Medicine

Committee Memberships

- Sociedade Brasileira de Endocrinologia e Metabologia: Rio de Janeiro, RJ, BR
- Sociedade Brasileira de Diabetes: São Paulo, BR
- European Association for the Study of Diabetes: Dusseldorf, Nordrhein-Westfalen, DE
- Finnish Diabetes Research Society: Helsinki, FI
- European Society of Endocrinology: Bristol, GB

Publications

- Mutter, S., Parente, E. B., Januszewski, A. S., Simonsen, J. R., Harjutsalo, V., Groop, P.-H., Jenkins, A. J., & Thorn, L. (2024). Insulin sensitivity estimates and their longitudinal association with coronary artery disease in type 1 diabetes. Does it matter? *Cardiovascular Diabetology*, 23, Article 152. <https://doi.org/10.1186/s12933-024-02234-x>
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- Kumar A, Mutter S, Parente EB, Harjutsalo V, Lithovius R, Mathavan S, Lehto M, Hiltunen TP, Kontula KK, Groop PH. L-type calcium channel blocker increases VEGF concentrations in retinal cells and human serum. *PLoS One*. 2023 Apr 13;18(4):e0284364. doi: 10.1371/journal.pone.0284364. PMID: 37053203; PMCID: PMC10101440.

Symposium 16

Beyond the Weight Metrics, a Deeper Look on Obesity Management with Survodutide: A Dual GCGR/GLP-1R Agonist

Erika Bezerra Parente (Boehringer Ingelheim, Germany)

Obesity is a disease that goes beyond the weight metrics. The fat deposits in and around key organs contribute to cardio-renal-metabolic (CRM) diseases such as metabolic dysfunction-associated steatohepatitis (MASH), type 2 diabetes, chronic kidney disease and heart failure. CRM diseases are interconnected, and having one of them increases the risk of developing another. Therefore, new treatments are essential for supporting long-term weight management and holistic health improvements for people living with obesity.

Survodutide, is a dual glucagon receptor and GLP-1 receptor agonist that potentially combines the beneficial effects of GLP-1 receptor agonism with a separate mechanism of action on glucagon receptor.

In a Phase 2 trial, including people living with overweight/obesity without type 2 diabetes, the treatment with Survodutide over 46 weeks reduced body weight up to 18.7% and showed reduction on waist circumference and blood pressure. In another Phase 2 trial, including people with type 2 diabetes, Survodutide decreased body weight by up to 8.7% and reduced mean HbA1c of up to 18.38 mmol/mol (1.68%).

In a Phase 2 trial, including people living with MASH (F1–F3), Survodutide met its primary and key secondary endpoint following 48 weeks of treatment vs placebo. Up to 83.0% of participants experienced MASH improvement with no worsening of fibrosis (vs 18.2% placebo).

Across all these Phase 2 trials there have been no unexpected safety concerns. Tolerability is in line with the GLP-1 class and the majority of adverse events were gastrointestinal in nature.

Survodutide chronic weight management Phase 3 trials are ongoing and based on the results from Phase 2 trials it has the potential to offer new treatment option for patients with overweight or obesity and patients with MASH and moderate to advanced fibrosis, targeting two distinct medical conditions that often coexist.

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3. Sanyal AJ, et al. N Engl J Med 2024.



W. Timothy Garvey

University of Alabama at Birmingham, USA

Education

Period	Affiliation	Position
– 1983-1984	University of California, San Diego, School of Medicine	Clinical and Research Fellow
– 1982-1983	University of Colorado Health Sciences Center	Clinical and Research Fellow
– 1974-1978	St. Louis University School of Medicine, St. Louis, Missouri	M.D.
– 1970-1974	Washington University, St. Louis	B.A.

Affiliations / Experience

Period	Affiliation	Position
– 2018-Present	UAB Diabetes Research Center	Director/ PI
– 2018-Present	University of Alabama at Birmingham	Professor
– 2003-Present	Birmingham Veterans Affairs Medical Center Birmingham	Staff Physician and GRECC Investigator
– 2003-2018	Medical University of South Carolina	Adjunct Professor of Medicine
– 1994-2003	Ralph H. Johnson Veterans Affairs Medical Center, Charleston	Staff Physician

Committee Memberships

- National Board of Medical Examiners
- American Board of Internal Medicine
- Specialty Board in Endocrinology and Metabolism
- American Board of Obesity Medicine
- American Association of Clinical Endocrinology

Publications

- Everett AB, Garvey WT, Fernandez JR, Habegger K, Harper LM, Battarbee AN, Martin SL, Moore BA, Fouts AE, Bahorski J, Chandler-Laney PC. Leptin resistance in children with in utero exposure to maternal obesity and gestational diabetes. *Pediatr Obes* (12):e13081. doi: 10.1111/ijpo.13081. Epub. PMID: 37859518; PMCID: PMC10841866
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Symposium 16

Adiposity-Based Chronic Disease and an International Consensus on a Complications-Centric Approach to Care

W. Timothy Garvey (University of Alabama at Birmingham, USA)

Beginning with the American Association of Clinical Endocrinology (AACE) Obesity Treatment Guidelines in 2016, all subsequent obesity guidelines published internationally have advocated a complications-centric approach to care. The goal of treatment is not the loss of a given amount of weight per se but the loss of sufficient weight to prevent or treat obesity complications and related diseases that are responsible for morbidity, mortality, and impaired quality of life. This is consistent with the diagnostic term Adiposity-Based Chronic Disease (ABCD) recommended by AACE and the European Association for the Study of Obesity (EASO). ABCD is a medically actionable diagnosis that indicates what we are treating (adiposity-based: abnormalities in the mass, distribution, and function of adipose tissue) and why we are treating it (chronic disease: prevention and treatment of complications). Treatment principles of complications-centric care and the pathophysiological and clinical rationale for the term, ABCD will be discussed. In addition, evaluation, disease staging, and treatment recommendations for obesity will be reviewed based on guidelines of multiple professional societies.

Sponsored Session 3

Exploring the CGM Use for Wellness Beyond Glycemic Control- Potential and Worries

Chairpersons

Young Sung Suh

Keimyung University, Korea

Kyoung-Kon Kim

Gachon University, Korea

Speakers

Jae Hyun Bae

Seoul National University, Korea

Jun Sung Moon

Yeungnam University, Korea

Sun-Joon Moon

Sungkyunkwan University, Korea



Jae Hyun Bae

Seoul National University, Korea

• Education

Period	Affiliation	Position
– 2017-2020	Seoul National University College of Medicine	Ph.D.
– 2011-2013	Seoul National University College of Medicine	M.S.
– 2002-2008	Seoul National University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Seoul National University Hospital	Clinical Associate Professor
– 2018–2024	Korea University Anam Hospital	Clinical Assistant Professor, Clinical Associate Professor
– 2017–2018	Seoul National University Hospital	Fellow
– 2008–2013	Seoul National University Hospital	Intern, Resident

• Committee Memberships

- Committee of General Affairs, Korean Society for the Study of Obesity
- Committee of Academic Affairs, Korean Society for the Study of Obesity
- Committee of Research, Korean Society for the Study of Obesity
- Committee of Clinical Guidelines, Korean Society for the Study of Obesity
- Committee of Exercise, Korean Society for the Study of Obesity

• Publications

- Bae JH, Park EH, Lee HK, Yoon KH, Won KC, Kim HM, Kim SG. Enhancing Diabetes Care through a Mobile Application: A Randomized Clinical Trial on Integrating Physical and Mental Health among Disadvantaged Individuals. *Diabetes Metab J.* 2024;48(4):790-801
- Kim JY, Jin SM, Kang ES, Kwak SH, Yang Y, Yoo JH, Bae JH, Moon JS, Jung CH, Bae JC, Suh S, Moon SJ, Song SO, Chon S, Kim JH. Comparison between a tubeless, on-body automated insulin delivery system and a tubeless, on-body sensor-augmented pump in type 1 diabetes: a multicentre randomised controlled trial. *Diabetologia.* 2024;67(7):1235-1244
- Bea S, Son H, Bae JH, Cho SW, Shin JY, Cho YM. Risk of thyroid cancer associated with glucagon-like peptide-1 receptor agonists and dipeptidyl peptidase-4 inhibitors in patients with type 2 diabetes: A population-based cohort study. *Diabetes Obes Metab.* 2024;26(1):108-117
- Bae JH, Lim H, Lim S. The Potential Cardiometabolic Effects of Long-Chain ω -3 Polyunsaturated Fatty Acids: Recent Updates and Controversies. *Adv Nutr.* 2023;14(4):612-628

Sponsored Session 3

The Expanding Role of CGM in Wellness: From Glycemic Control to Holistic Health

Jae Hyun Bae (Seoul National University, Korea)

Continuous glucose monitoring (CGM) was initially developed to manage diabetes by providing real-time insights into glucose levels, enabling more precise glycemic control. Over time, CGM technology has advanced significantly and now offers a wealth of data that can optimize overall health and well-being. Modern CGM systems track and analyze glucose fluctuations in response to various dietary choices, physical activities, and lifestyle factors. By understanding these patterns, individuals can make informed decisions about their nutrition and exercise routines, leading to improved energy levels, better weight management, and enhanced overall health. Furthermore, the integration of CGM with wearable fitness trackers provides a comprehensive view of health metrics, fostering a more personalized and proactive approach to health management. This lecture explores the evolution of CGM technology and its expanding role beyond diabetes management into broader aspects of wellness and holistic health.



Jun Sung Moon

Yeungnam University, Korea

• Education

Period	Affiliation	Position
- 2019	Yeungnam University Graduate School	Ph.D.
- 2012	S.A.A Society for American Archaeology	M.Sc.

• Affiliations / Experience

Period	Affiliation	Position
- 2024-Present	Yeungnam Universtiy Hospital	Professor
- 2020-2024	Society for American Archaeology	Associate professor
- 2014-2020	Society for American Archaeology	Assistant professor

• Committee Memberships

- Korean Society for the Study of Obesity (KSSO)

• Publications

- Karunakaran U, Elumalai S, Chung SM, Maedler K, Won KC, Moon JS. Mitochondrial aldehyde dehydrogenase-2 coordinates the hydrogen sulfide - AMPK axis to attenuate high glucose-induced pancreatic β -cell dysfunction by glutathione antioxidant system. *Redox Biol.* 2024 Feb;69:102994
- Elumalai S, Karunakaran U, Won KC, Chung SM, Moon JS. Perfluorooctane sulfonate-induced oxidative stress contributes to pancreatic β -cell apoptosis by inhibiting cyclic adenosine monophosphate pathway: Prevention by pentoxifylline. *Environ Pollut.* 2023 Mar 1;320:120959
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Sponsored Session 3

Current Evidence of CGM Use in Weight Management

Jun Sung Moon (Yeungnam University, Korea)

Continuous Glucose Monitoring (CGM) has emerged as a valuable tool in diabetes management, providing real-time glucose data to patients and healthcare providers. Recently, its potential for weight management has received considerable attention. I will review the current evidence on the use of CGM for weight management in diverse populations, including individuals with diabetes, prediabetes, and those without diabetes, both with and without obesity. I will also critically evaluate the strengths and limitations of the current evidence, highlighting both promising results and areas that require further investigation. We will examine the various mechanisms by which CGM might influence weight management, such as increased awareness of glucose fluctuations, improved dietary choices, and increased motivation for lifestyle changes. This will be placed in the broader context of personalized nutrition and precision medicine, and how CGM might fit into comprehensive weight management strategies will be discussed.



Sun-Joon Moon

Sungkyunkwan University, Korea

• Education

Period	Affiliation	Position
– 2018-2020	Seoul National University, Medicine	Ph.D.
– 2016-2018	Seoul National University, Medicine	M.S.
– 2005-2009	Seoul National University, Medicine	B.S, M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Kangbuk Samsung Hospital, Internal Medicine, Endocrinology and Metabolism	Assistant Professor
– 2020-2023	Kangbuk Samsung Hospital, Internal Medicine, Endocrinology and Metabolism	Clinical Assistant Professor
– 2019-2020	Seoul National University Hospital, Internal Medicine, Endocrinology and Metabolism	Clinical Assistant Professor
– 2013-2019	Seoul National University Hospital, Internal Medicine, Endocrinology and Metabolism	Resident/ Fellow

• Committee Memberships

- Korean Diabetes Association
- Korean Diabetes Association
- Pancreas Failure TFT, Korean Diabetes Association

• Publications

- Importance of FDA-Integrated Continuous Glucose Monitors to Ensure Accuracy of Continuous Glucose Monitoring. *JDST* 2024
- Effectiveness of Real-Time Continuous Glucose Monitoring (Dexcom G6) Among Cardiac Surgery Patients: A Randomised Controlled Trial. *EASD Abstract* 2024
- Efficacy of Patch SAP (EOPatch) compared to Other Intensive Insulin Therapies with CGM in T2D: a Three-arm, Multicenter, Randomized controlled trial. *ATTD* 2024 Oral presentation
- Efficacy of intermittent short-term use of a real-time continuous glucose monitoring system in non-insulin-treated patients with type 2 diabetes: A randomized controlled trial. *Diabetes Obes Metab.* 2023
- Current Advances of Artificial Pancreas Systems: A Comprehensive Review of the Clinical Evidence. *Diabetes Metab J.* 2021

Sponsored Session 3

Life Style Modification with CGM, How to Do?

Sun-Joon Moon (Sungkyunkwan University, Korea)

In this last lecture, we will overview the evidence studies that used CGM for life style modification. CGM studies on how to do diet and exercise are effective for glycemic control or wellness will be introduced, and the methodology of how to use CGM will also be examined.

Presidential Lecture

Chairperson

Kwang-Won Kim
Gachon University, Korea

Speaker

Cheol-Young Park
Sungkyunkwan University, Korea



Cheol-Young Park

Sungkyunkwan University, Korea

• Education

Period	Affiliation	Position
– 2002	Kyunghee University Graduate School, Seoul, Korea	Ph.D.
– 1999	Kyunghee University Graduate School, Seoul, Korea	M.S
– 1995	Kyunghee University College of Medicine, Seoul, Korea	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2006-Present	Kangbuk Samsung Hospital, Sungkyunkwan University School of Medicine, Seoul, Korea	Professor
– 2003-2006	Hallym Sacred Heart Hospital, Hallym University College of Medicine, Anyang, Korea	Assistant Professor
– 2000-2003	Kyunghee University Medical Center, Seoul, Korea	Instructor

• Committee Memberships

- Korean Society for the Study of Obesity / President of the Board of Directors
- the Korean Lipid and Atherosclerosis Society / Non-Standing Director

• Publications

- Association of non-alcoholic fatty liver disease with cardiovascular disease and all cause death in patients with type 2 diabetes mellitus: nationwide population based study. Kim KS, Hong S, Han K, Park CY. *BMJ*. 2024;384:e076388
- Fatty Liver & Diabetes Statistics in Korea: Nationwide Data 2009 to 2017. Han E, Han KD, Lee YH, Kim KS, Hong S, Park JH, Park CY. *Diabetes Metab J*. 2023;47(3):347-355
- Metabolic Dysfunction-Associated Fatty Liver Disease and Mortality: A Population-Based Cohort Study. Kim KS, Hong S, Ahn HY, Park CY. *Diabetes Metab J*. 2023;47(2):220-231
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Presidential Lecture

Obesity and Fatty Liver: Common but Ignored

Cheol-Young Park (Sungkyunkwan University, Korea)

The global prevalence of fatty liver disease has significantly increased from 25.3% (1990–2006) to 38.2% (2016–2019), reflecting a nearly 50% rise over the past three decades. According to the 2021 data from the Korean Diabetes Association, 36.1% of individuals aged 40 and above, 53.1% of type 2 diabetes patients, and 48% of males have fatty liver disease, indicating that nearly one in two men are affected. The prevalence of moderate fatty liver disease, defined by a Fatty Liver Index (FLI) of 60, has risen by 6.7% over ten years. Notably, prevalence is highest among individuals in their 40s, with 81.5% of type 2 diabetes patients and around 60% having moderate fatty liver disease. Moderate fatty liver disease is associated with a 3.8-fold increased risk of type 2 diabetes, and significantly elevated risks of myocardial infarction (16.3%), stroke (15.9%), heart failure (22.4%), and more than twice the risk of liver cancer. Ultimately, the presence of fatty liver disease indicates a close association with various chronic diseases, cardiovascular and cerebrovascular diseases, as well as an increased risk of cancer.

Obesity, defined as abnormal or excessive fat accumulation posing a health risk, often coexists with fatty liver disease, characterized by excess liver fat that can impair liver function. Obesity reflects fat overload throughout the body, while fatty liver disease represents the liver's specific fat overload, making their definitions almost synonymous. As a result, the prevalence of fatty liver is high among obese patients and vice versa.

The first-line treatment for fatty liver disease is weight loss through calorie reduction, exercise, and healthy eating. Although pharmacological treatments are limited, they are recommended to reduce the risks associated with fatty liver disease. Despite significant efforts in drug development, only an oral thyroid hormone receptor- β (THR- β) agonist has recently been approved, although its high-cost limits accessibility. Ultimately, treating fatty liver disease is about managing ectopic fat, making obesity treatment the primary focus. Clinically, fatty liver disease remains common yet often overlooked.

Luncheon Symposium 5

Chairperson

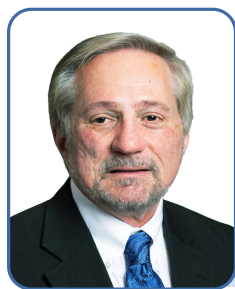
Seung Joon Oh

Kyung Hee University, Korea

Speaker

W. Timothy Garvey

University of Alabama at Birmingham, USA



W. Timothy Garvey

University of Alabama at Birmingham, USA

• Education

Period	Affiliation	Position
– 1983-1984	University of California, San Diego, School of Medicine	Clinical and Research Fellow
– 1982-1983	University of Colorado Health Sciences Center	Clinical and Research Fellow
– 1974-1978	St. Louis University School of Medicine, St. Louis, Missouri	M.D.
– 1970-1974	Washington University, St. Louis	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2018-Present	UAB Diabetes Research Center	Director/ PI
– 2018-Present	University of Alabama at Birmingham	Professor
– 2003-Present	Birmingham Veterans Affairs Medical Center Birmingham	Staff Physician and GRECC Investigator
– 2003-2018	Medical University of South Carolina	Adjunct Professor of Medicine
– 1994-2003	Ralph H. Johnson Veterans Affairs Medical Center, Charleston	Staff Physician

• Committee Memberships

- National Board of Medical Examiners
- American Board of Internal Medicine
- Specialty Board in Endocrinology and Metabolism
- American Board of Obesity Medicine
- American Association of Clinical Endocrinology

• Publications

- Everett AB, Garvey WT, Fernandez JR, Habegger K, Harper LM, Battarbee AN, Martin SL, Moore BA, Fouts AE, Bahorski J, Chandler-Laney PC. Leptin resistance in children with in utero exposure to maternal obesity and gestational diabetes. *Pediatr Obes* (12):e13081. doi: 10.1111/ijpo.13081. Epub. PMID: 37859518; PMCID: PMC10841866
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Luncheon Symposium 5

Semaglutide, a Second-Generation Obesity Medication for the Treatment and Prevention of Cardiovascular Disease

W. Timothy Garvey (University of Alabama at Birmingham, USA)

In 2021, semaglutide 2.4 mg/week became available for the treatment of obesity and since that time has been gaining regulatory approval in an increasing number of countries. Semaglutide 2.4 is the first second-generation medication for obesity defined as producing 15% weight loss on average or categorical weight loss where over half of patients lose 15% in clinical trials, in contrast to earlier first-generation medications where weight loss was 10%. Further, the unprecedented weight loss achieved by semaglutide 2.4 mg as a second-generation medication is now sufficient to treat or prevent a broad array of obesity complications and related diseases. In addition, semaglutide 2.4 mg also ameliorates CHF with preserved ejection fraction and provides secondary prevention for CVD events. In this light, semaglutide 2.4 mg can be seen as a medication for treating beyond weight loss. This emphasis on both weight loss and cardiovascular disease in phase 3 trials is consistent with a complications-centric approach to obesity care, and the treatment of obesity under the conceptual framework of the diagnostic term Adiposity-Based Chronic Disease (ABCD).

Luncheon Symposium 6

Chairperson

Sung-Soo Kim

Chungnam National University, Korea

Speaker

Kyung Soo Kim

CHA University, Korea



Kyung-Soo Kim

CHA University, Korea

• Education

Period	Affiliation	Position
– 2014-2020	CHA University	Ph.D.
– 2006-2008	CHA University	MMSc
– 1998-2004	CHA University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	CHA Bundang Medical Center, CHA University School of Medicine	Associate professor
– 2014-2020	CHA Bundang Medical Center, CHA University School of Medicine	Assistant professor
– 2012-2014	CHA Bundang Medical Center, CHA University School of Medicine	Fellow

• Committee Memberships

- Korean Society for the Study of Obesity
- Committee of Planning, Korean Diabetes Association
- Committee of Scientific Affairs, Korean Diabetes Association
- Committee of Publication, Korean Diabetes Association
- Diabetes & Metabolism Journal (SCIE, IF 6.8)

• Publications

- Park J, Jung JH, Park H, Song YS, Kim SK, Cho YW, Han K, Kim KS. Association between exercise habits and incident type 2 diabetes mellitus in patients with thyroid cancer: nationwide population-based study. *BMC Med* 2024;22:251. (Corresponding author)
- Kim KS, Hong S, Han K, Park CY. Association of non-alcoholic fatty liver disease with cardiovascular disease and all cause death in patients with type 2 diabetes mellitus: nationwide population based study. *BMJ* 2024;384:e076388.
- Kim KS, Han KA, Kim TN, Park CY, Park JH, Kim SY, Kim YH, Song KH, Kang ES, Kim CS, Koh G, Kang JG, Kim MK, Han JM, Kim NH, Mok JO, Lee JH, Lim S, Kim SS, Kim TH, Won KC, Lee KY, Cho JH, Han JY, Kim SH, Nah JJ, Song HR, Lee SE, Kim S; ENHANCE-D Investigators. Efficacy and safety of enavogliflozin versus dapagliflozin added to metformin plus gemigliptin treatment in patients with type 2 diabetes: A double-blind, randomized, comparator-active study: ENHANCE-D study. *Diabetes Metab* 2023;49:101440.
- Kim KS, Hong S, Ahn HY, Park CY. Metabolic dysfunction-associated fatty liver disease and mortality: a population-based cohort study. *Diabetes Metab J* 2023;47:220-231.
- Kim KS, Hong S, Han K, Park CY. Fenofibrate add-on to statin treatment is associated with low all-cause death and cardiovascular disease in the general population with high triglyceride levels. *Metabolism*. 2022;137:155327.

Luncheon Symposium 6

The Review of Combination Phentermine Plus Topiramate for Chronic Weight Management

Kyung-Soo Kim (CHA University, Korea)

Obesity is associated with a reduction in life expectancy and an increase in mortality from cardiovascular diseases, cancer, and other causes. The combination of phentermine and topiramate demonstrated dose-dependent effects on weight and metabolic variables in the direction expected to be beneficial with no evidence of serious adverse events induced by treatment. In this talk, I will review the combination phentermine plus topiramate for chronic weight management.

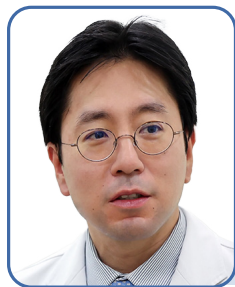
Luncheon Symposium 7

Chairperson

Hong-Kyu Kim
University of Ulsan, Korea

Speaker

Yong-Ho Lee
Yonsei University, Korea



Yong-Ho Lee

Yonsei University, Korea

• Education

Period	Affiliation	Position
– 2006–2014	Yonsei University College of Medicine	M.S, Ph.D.
– 1999–2005	Yonsei University College of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2015-Present	Yonsei University College of Medicine	Associate professor
– 2020-2022	Buck Institute for Research on Aging, CA, USA	Visiting scientist

• Committee Memberships

- Korean Diabetes Association (KDA)
- Korean Academy of Science and Technology, Young Korean Academy of Science and Technology (Y-KAST)

• Publications

- Wonjung Park, et al, Lee YH (Co-corres), Jayoung Kim, Hong Kyun Kim, Jang-Ung Park. In-depth correlation analysis between tear glucose and blood glucose using a wireless smart contact lens. *Nat Commun.* 2024;15(1):2828
- Chun HJ, Kim ER, Lee M, & Han DH, Cha BS, Lee YH (Co-corres) Increased expression of sodium-glucose cotransporter 2 and O-GlcNAcylation in hepatocytes drives non-alcoholic steatohepatitis. *Metabolism.* 2023;145:155612
- Kim ER, Park JS, et al, & Bae SH, Lee YH (Co-corres). A GLP-1/GLP-2 receptor dual agonist to treat non-alcoholic steatohepatitis: targeting the gut-liver axis and microbiome. *Hepatology*, 2022;75(6):1523-1538
- Lee JY, Kim Y, Han KD, Han E, Lee BW, Kang ES, Cha BS, Ko SH, Lee YH (Corres). Analysis of Severe Hypoglycemia among adults with Type 2 Diabetes and Non-alcoholic Fatty Liver Disease. *JAMA Network Open*, 2022;5(2):e220262
- Y Cho, H Rhee, & Lee YH (Corres). Ezetimibe combination therapy with statin for non-alcoholic fatty liver disease: an open label randomized controlled trial (ESSENTIAL study). *BMC Medicine* 2022;20:93

Luncheon Symposium 7

SGLT2i: Beyond Glucose Lowering Effects

Yong-Ho Lee (Yonsei University, Korea)

Obesity significantly exacerbates the risk of diabetes and myocardial infarction, with the 2021 Korean Society for the Study of Obesity Factsheet reporting a 2.6-fold increased risk of diabetes and a 1.3-fold higher risk of myocardial infarction in obese individuals. This presentation explores effective strategies for managing diabetes in obese patients, focusing on recent guidelines, combination therapies, and clinical evidence supporting an integrated care approach.

The 2023 Korean Diabetes Association guidelines recommend sodium glucose co-transporter 2 (SGLT2) inhibitors as the preferred treatment for glycemic control in diabetic patients with heart failure, chronic kidney disease, and atherosclerotic cardiovascular disease. These guidelines emphasize the importance of clear glycemic targets in managing these high-risk patients.

Evidence shows that SGLT2 inhibitors lower blood glucose through insulin-independent renal mechanisms. Furthermore, combining DPP-4 inhibitors (e.g., sitagliptin) with SGLT2 inhibitors (e.g., dapagliflozin) and metformin provides superior glycemic control compared to monotherapy. This combination offers enhanced blood sugar reduction through synergistic and complementary mechanisms of action, without increasing insulin or glucagon levels. The use of fixed-dose combination drugs has been shown to improve medication adherence and reduce costs. Tailoring treatment to each patient's specific needs further enhances adherence and effectiveness, leading to more individualized therapeutic approaches.

Patients with type 2 diabetes, especially those with obesity, hypertension, and dyslipidemia, face a higher risk of cardiovascular diseases. Therefore, a comprehensive management approach is essential for these high-risk groups. Due to their effectiveness and broad benefits, SGLT2 inhibitors should be a key component of treatment plans. Adapting treatment strategies to fit individual patient needs will enhance therapeutic options and improve clinical outcomes.

This lecture will present these topics, providing a comprehensive overview of the latest strategies for managing diabetes in obese patients, with a focus on improving outcomes through targeted therapies and personalized care.

Luncheon Symposium 8

Chairperson

Doo-Man Kim
Hallym University, Korea

Speaker

Sunghee Park
Soonchunhyang University, Korea



Sunghee Park

Soonchunhyang University, Korea

• Education

Period	Affiliation	Position
– 2022-2024	University of Ulsan, Graduate School	Doctoral candidate, ABD
– 2018-2021	Soonchunhyang University, Graduate School	M.A.
– 2010-2016	Soonchunhyang University, College of Medicine	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Division of Infectious Diseases, Department of Internal Medicine, Soonchunhyang University Bucheon Hospital	Assistant Professor
– 2022-2024	Division of Infectious Diseases, Department of Internal Medicine, Soonchunhyang University Bucheon Hospital	Clinical Assistant Professor
– 2020-2022	Division of Infectious Diseases, Department of Internal Medicine, Asan Medical Center	Fellow
– 2017-2020	Department of Internal Medicine, Soonchunhyang University Seoul/Gumi Hospital	Resident
– 2016-2017	Soonchunhyang University Seoul Hospital	Intern

• Committee Memberships

- Korean Society of Infectious Diseases
- Korean Society for Antimicrobial Therapy
- The Korean Society for AIDS

• Publications

- Initial and five-day positive rate of SARS-CoV-2 polymerase chain reaction in exposed inpatients within shared rooms in the Omicron variant dominant period (Infect Control Hosp Epidemiol. 2024;45(3):377-379.)
- Green vegetable juice as a potential source of human fascioliasis in Korea (One Health. 2022;15:100441.)
- The Role of Age in Subclinical Atherosclerosis in Asian People Living with Human Immunodeficiency Virus (Infect Chemother. 2022;54(2):308-315.)
- Clinical and virological characteristics of SARS-CoV-2 B.1.617.2 (Delta) variant: a prospective cohort study (Clin Infect Dis. 2022;75(1):e27-34.)
- Infectious Causes of Eosinophilic Meningitis in Korean Patients: A Single-Institution Retrospective Chart Review from 2004 to 2018 (Korean J Parasitol. 2021;59(3):227-233.)

Luncheon Symposium 8

Why is Shingles Vaccination Recommended for Patients with Metabolic Disease?

Sunghee Park (Soonchunhyang University, Korea)

Herpes zoster, commonly known as shingles, is caused by reactivation of the varicella-zoster virus (VZV), which lies dormant in sensory ganglia nerves after primary infection. Approximately 99.5% of adults over 40 years of age show serologic evidence of VZV infection, and in the U.S., 1 in 3 people develop shingles during their lifetime. Shingles is characterized by neuropathic pain accompanied by rash, which starts as erythematous papules in a dermatomal distribution, turns into grouped vesicles or bullae, then becomes pustular and ultimately crusts over after 7-10 days. Several complications such as postherpetic neuralgia, herpes zoster ophthalmicus, acute retinal necrosis, and Ramsay-Hunt syndrome may occur, and recent studies have shown herpes zoster to be associated with stroke, transient ischemic attack, myocardial infarction, and cardiovascular disease. Risk factors for herpes zoster include old age, immunosuppression due to medical conditions or immunosuppressive medications, psychological stress, physical trauma, and comorbidities such as diabetes mellitus, cardiovascular disease, chronic kidney disease, COPD, and obesity.

Herpes zoster can cause severe pain and may lead to serious complications that can significantly affect the patient's quality of life. While antivirals may help to decrease the duration and severity of symptoms, they are not a perfect cure, and cannot prevent recurrence. Thus, prevention through vaccination may be the best tactic. While the zoster live vaccine was initially used, it had certain limitations; 1) vaccine efficacy was found to wane rapidly over time, with efficacy no longer being valid after approximately 7 years, 2) vaccine efficacy was especially low in the older adult population (vaccine efficacy for patients over 60 years was 51.3%), and 3) it was contraindicated in patients with immunosuppression or immunodeficiency. The recombinant zoster vaccine (RZV), which was later developed, overcame these limitations, with a higher vaccine efficacy of 97.2% in patients over 50 years, and 91.3% in those over 70 years of age. In patients with diabetes, dyslipidemia, and hypertension, vaccine efficacy was over 91%. In a recent study that evaluated the overall vaccine efficacy in people ≥ 50 years at year 11 after RZV administration, the results showed vaccine efficacy to be maintained at around 88%. Additionally, since RZV does not contain the live virus, it can be safely used in immunocompromised patients. In recent years, several countries including the U.S., Canada, Germany, Austria, and the U.K. have modified their vaccine recommendations to include RZV for the prevention of shingles. In South Korea, the Korean Society of Infectious Diseases released their 2023 update to recommend RZV vaccination for adults aged 50 and older, and severely immunocompromised individuals aged 18 and older. Healthcare professionals should take care to recommend vaccination in patients with a high risk of shingles and its complications.

Special Scientific Lecture 2

Chairperson

Hong Kyu Lee

Seoul National University, Korea

Speaker

Soo Lim

Seoul National University, Korea



Soo Lim

Seoul National University, Korea

Education

Period	Affiliation	Position
– 2006-2009	Seoul National University School of Public Health	Doctor of Public Health
– 2004-2006	Seoul National University College of Medicine	Ph.D.
– 2002-2004	Seoul National University School of Public Health	M.Sc.
– 1990-1996	Seoul National University College of Medicine	M.D.

Affiliations / Experience

Period	Affiliation	Position
– 2017-Present	Endocrinology Seoul National University Bundang Hospital	Professor
– 2011-2012	Massachusetts General Hospital/Harvard Medical School, Boston, MA, USA	Research fellow
– 2005-2017	Endocrinology Seoul National University Bundang Hospital	Associate Professor
– 2001-2004	Department of Quarantine National Institute of Health, Korea	Epidemiology Intelligence Service Officer
– 1997-2001	Internal Medicine Seoul National University Bundang Hospital	Resident

Committee Memberships

- American Diabetes Association
- Korean Diabetes Association
- Korean Society of Endocrinology
- Korean Society of Lipidology and Atherosclerosis

Publications

- Sohn M, Nam S, Nauck MA, Lim S. Long-term comparison of renal and metabolic outcomes after sodium-glucose co-transporter 2 inhibitor or glucagon-like peptide-1 receptor agonist therapy in type 2 diabetes. *BMC Med.* 2024 Jul 2;22(1):273. doi: 10.1186/s12916-024-03483-z. PMID: 38956548; PMCID: PMC11218058
- Cho YK, Kim KS, Lee BW, Hong JH, Yu JM, Lim S, Kim YA, Lee CB, Kim SS, Kwak SH, Lee WJ. Efficacy and Safety of Pioglitazone Add-on in Patients with Type 2 Diabetes Mellitus Inadequately Controlled with Metformin and Dapagliflozin: A Multicenter, Randomized, Double-blind, and Placebo-Controlled Study. *Clin Ther.* 2024 Jul 26:S0149-2918(24)00198-X. doi: 10.1016/j.clinthera.2024.06.023. Epub ahead of print. PMID: 39068060
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- Kim NH, Moon JS, Lee YH, Cho HC, Kwak SH, Lim S, Moon MK, Kim DL, Kim TH, Ko E, Lee J, Kim SG. Efficacy and tolerability of initial triple combination therapy with metformin, dapagliflozin and saxagliptin compared with stepwise add-on therapy in drug-naïve patients with type 2 diabetes (TRIPLE-AXEL study): A multicentre, randomized, 104-week, open-label, active-controlled trial. *Diabetes Obes Metab.* 2024 Sep;26(9):3642-3652. doi: 10.1111/dom.15705. Epub 2024 Jun 10. PMID: 38853720
- Lim S, Sohn M, Nauck MA. Cardiovascular outcome with SGLT2i and GLP1RA. *Eur J Intern Med.* 2024 Jun 6:S0953-6205(24)00235-8. doi: 10.1016/j.ejim.2024.05.030. Epub ahead of print. PMID: 38849275

Special Scientific Lecture 2

Clinical Implication of GLP-1 Receptor Agonists and SGLT2 Inhibitors from a Cardiometabolic Perspective

Soo Lim (Seoul National University, Korea)

Certain sodium–glucose cotransporter-2 inhibitors (SGLT-2is) and glucagon-like peptide-1 receptor agonists (GLP-1RAs) compounds have shown not only safety, but superiority in their effects on preventing major adverse cardiovascular endpoints. Despite these advances, a comprehensive understanding of the distinct cardiovascular benefits of GLP-1RA and SGLT-2i has yet to be established. In contrast to most previous reports, we analysed and report the absolute risk reduction (ARR), which allows us to draw conclusions with more clinical consequences (e.g., numbers needed to treat). Our study aims to bridge this knowledge gap by indirectly comparing the ARR for 3P-MACE, the primary endpoint in large cardiovascular outcome trials, and for its components, between these two classes of therapeutic agents.

In the meta-analysis, which included all 12 available RCTs, both GLP-1RA and SGLT-2i therapies demonstrated a significant ARR for the risk of 3P-MACE compared with placebo. Of note, GLP-1RAs tended to exhibit a greater reduction in MACE risk than SGLT-2is. In the analysis of individual components of MACE, there were some differences between effects of GLP-1RA and SGLT-2i therapies. For CV death and nonfatal MI, significant ARR was observed with GLP-1RA therapy, but not with SGLT-2i therapy, though the between-group differences were not significant. Intriguingly, GLP-1RA treatment significantly reduced the stroke risk but SGLT-2i did not. Taken together, the trial's findings encourage further exploration into the complex mechanisms through which these agents confer cardiovascular protection, potentially leading to more targeted and effective treatments in the future.

[References]

1. Ahmad E*, Lim S* (co-first author), Lamptey R, Webb DR, Davies MJ. Type 2 diabetes. *Lancet* 2022 Nov 19;400(10365):1803-1820.
2. Neeland IJ, Lim S* (co-corresponding author), Tchernof A, Gastaldelli A, Rangaswami J, Ndumele CE, Powell-Wiley TM, Després JP* (co-corresponding author). The Metabolic Syndrome. *Nature Reviews Disease Primers*. 2024 [accepted]
3. Kadowaki T, Isendahl J, Khalid U, Lee SY, Nishida T, Ogawa W, Tobe K, Yamauchi T, Lim S (corresponding author). Effect of once-weekly subcutaneous semaglutide in adults with overweight or obesity, with or without type 2 diabetes, in an East Asian population. *Lancet Diabetes Endocrinol* 2022 Mar;10(3):193-206.
4. Lim S, Bae JH, Kwon HS, Nauck MA. COVID-19 and diabetes mellitus: from pathophysiology to clinical management. *Nature Rev Endocrinol*. 2021 Jan;17(1):11-30.
5. Jang HJ, Kim YJ, Lee DH, Joo SK, Koo BK, Lim S, Lee WJ, Kim W. Differential Class Effects of Oral Anti-diabetic Drugs on Nonalcoholic Fatty Liver Disease. *JAMA Intern Med*. 2024 Feb 12:e238029..

Plenary Lecture 3

Chairperson

Kwan Woo Lee
Ajou University, Korea

Speaker

William Evans
University of California, Berkeley, USA



William Evans

University of California, Berkeley, USA

• Education

Period	Affiliation	Position
– 1980	Human BioEnergetics, Ball State University, Human Performance Laboratory	Ph.D.
– 1976	Biology, Ball State University, Human Performance Laboratory	M.S.
– 1972	Zoology, University of North Carolina at Chapel Hill	B.A

• Affiliations / Experience

Period	Affiliation	Position
– 2017-Present	Department of Nutritional Sciences & Toxicology, University of California, Berkeley	Adjunct Professor of Human Nutrition
– 2010-Present	Division of Geriatrics, Duke University Medical Center	Adjunct Professor of Medicine
– 2014-2016	Muscle & Health Division, KineMed, Inc	President/ Director
– 2009-2014	Muscle Metabolism Discovery Unit, GlaxoSmithKline, Research Triangle Park, NC	Vice President
– 1997-2009	Donald W. Reynolds Institute on Aging at the University of Arkansas for Medical Sciences Park, NC	Jane and Ed Warmack Chair/ Director

• Committee Memberships

- American Federation for Aging Research
- Skeletal muscle, and exercise physiology study section, Clinical and Integrative Diabetes and Obesity Study Section, and Multicenter AIDS Cohort Study (MACS)- NIH, Small Business Innovative Research grant, Pepper Center for Independent Living grants
- Society on Cachexia and Wasting Disorders” (SCWD)
- UAMS Institutional Review Board
- Neurological, Aging, and Musculoskeletal Epidemiology Study

• Publications

- WJ Evans, M Hellerstein, RJ Butterfield, E Smith, M Guglieri, N Katz, B Nave, L Branigan, S Thera BS3, KL Vordos, L Behar, M Schiava, M James, T Field, H Mohammed, and M Shankaran, Reductions in functional muscle mass measured using D3Creatine dilution and ability to ambulate in Duchenne muscular dystrophy from ages 4 – 24 years, (in review)
- M Hetherington-Rauth , CE McCulloch, SR Cummings, WJ Evans, M Hellerstein, JA Cauley, K Ensrud, L Langsetmo , ES Orwoll, and PM Cawthon Change in D3Cr muscle mass in oldest old men and its association with changes in grip strength and walking speed (in review)
- HR Banack, J Wactawski-Wende, HM Ochs-Balcom, EM Cespedes Feliciano, B Caan, C Lee, G Anderson, M Shankaran, WJ Evans A protocol for remote collection of skeletal muscle mass via D3-creatine dilution in community-dwelling postmenopausal women from the Women’s Health Initiative, PLOS One, 19: e0300140, DOI: 10.1371/journal.pone.0300140
- PM Cawthon, Blackwell TL, Kritchevsky SB, Newman AB, Hepple RT, Coen PM, Goodpaster BH, Duchowny K, Hetherington-Rauth M, Mau T, Shankaran M, Hellerstein M, Evans WJ, Cummings SR. Associations between D3Cr muscle mass and MR thigh muscle volume with strength, power, physical performance, fitness, and limitations in older adults in the SOMMA study. J Gerontol A Biol Sci Med Sci. Accepted
- E Cheng, BJ Caan, PM Cawthon, WJ Evans, MK Hellerstein, M Shankaran, KL Campbell, AM Binder, B Sternfeld, JA Meyerhardt, KH Schmitz, EM Cespedes Feliciano, D3-creatine dilution, computed tomography and dual-energy X-ray absorptiometry for assessing myopenia and physical function in colon cancer: A cross-sectional study, J Cachexia Sarcopenia Muscle, 10.1002/jcsm.13353

Plenary Lecture 3

How Muscle Mass and Metabolism Affects Energy Metabolism and Functional Capacity

William Evans (University of California, Berkeley, USA)

Muscle plays a central role in physiological metabolism beyond its role in physical function¹. The maintenance of normal glucose homeostasis is dependent on appropriate regulation of glucose uptake by muscle. The torque resulting from muscular contraction is necessary for bone health. In periods of inadequate nutritional intake, skeletal muscle plays a key role as a “reservoir” of amino acids to maintain the rate of protein synthesis in other tissues and organs more essential for acute survival. It is for these reasons that there is an inverse relationship between LBM and morbidity and mortality from serious diseases in the elderly, including chronic obstructive pulmonary disease, congestive heart failure, and cancer². Perhaps even more important in the context of weight management, muscle plays a key role in energy metabolism. Loss of muscle mass with advancing age results in a substantial decrease in basal metabolic rate and reduced energy needs in older vs younger men and women^{3,4}. Low muscle mass in older people (sarcopenia⁵) is strongly associated with poor functional status, risk of disability, hip fracture, and mortality. Aging results in a decreased total daily energy need and an increase the dietary protein requirement⁶. Healthy older men and women consuming a eucaloric diet providing the current RDA for protein (0.8 g·kg⁻¹·d⁻¹) lose a significant amount of muscle. Reduced energy intake results in a substantial decrease in the rate of muscle protein synthesis in rats⁷ and humans⁸, resulting in a loss of muscle mass. A decrease in total energy intake in older obese individuals during weight loss results in a dietary protein intake that is well below the protein RDA that, along with the substantial decrease in synthesis rate, and, potentially, an exaggerated loss of muscle mass compared to younger people. Decreased muscle protein synthesis is a significant component of the decrease in total energy expenditure with weight loss. Reduced muscle protein synthesis can potentially affect both the resting energy expenditure (REE) and the diet induced thermogenesis. The energy expenditure related to muscle protein synthesis is the only component of REE that can vary considerably. The resting metabolic requirements of splanchnic tissues, brain and skin vary little under normal conditions because of relatively constant tissue mass and protein turnover rates. In contrast, large variations in muscle mass are possible, and the rate of muscle protein turnover may vary as well. Obese older men and women may lose an exaggerated amount of muscle during GLP-1 induced weight loss that may not be recovered, even during weight regains. Low muscle mass in obese older people is associated with poor functional status and increased risk of a mobility disability⁹. Strategies for retaining muscle mass during weight loss, particularly in older people should be a high clinical priority.

Keynote Lecture 3

Chairperson

Moon-Kyu Lee
Eulji University, Korea

Speaker

Michael D. Jensen
Mayo College of Medicine, USA



Michael D. Jensen

Mayo College of Medicine, USA

• Education

Period	Affiliation	Position
– 1982-1985	Mayo Graduate School of Medicine	Fellow
– 1980-1982	Mayo Graduate School of Medicine	Resident
– 1980	St. Luke’s Hospital of Kansas City	Resident
– 1979	U.M.K.C. School of Medicine	Medical Student

• Affiliations / Experience

Period	Affiliation	Position
– 1985-Present	Mayo Clinic	Consultant

• Committee Memberships

- North American Association for the Study of Obesity/The Obesity Society
- American Society for Nutrition
- NIH Integrative Physiology of Obesity and Diabetes Study Section NIH Clinical and Integrative Diabetes and Obesity
- NHLBI Expert Panel to Update the Report on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults
- NIDDK DDK-E, beginning October

• Publications

- Jensen MD, Haymond MW, Rizza RA, Cryer PE, Miles JM: Influence of body fat distribution on free fatty acid metabolism in obesity. *J. Clin. Invest.* 83:1168-1173
- Jensen MD: Gender differences in regional fatty acid metabolism before and after meal ingestion. *J. Clin. Invest.* 96:2297-2303
- Levine JA, Eberhardt NL, Jensen MD. Role of Non-exercise Activity Thermogenesis (NEAT) in Resistance to Fat Gain in Humans. *Science* 283: 212-214
- Nielsen S, Guo ZK, Johnson CM, Hensrud DD, Jensen MD. Splanchnic Lipolysis in Human Obesity. *J. Clin. Invest.* 113: 1582-1588
- Tchoukalova, Y, Votruba, SB, Tchkonina, T, Giorgadze, N, Kirkland, JL, Jensen, MD. Regional differences in cellular mechanisms of adipose tissue gain with overfeeding. *PNAS* 107(42):18226-31

Keynote Lecture 3

Human Adipose Tissue Metabolism: What Happens with Obesity

Michael D. Jensen (Mayo College of Medicine, USA)

Upper body/visceral obesity (UBO) is more strongly associated with metabolic abnormalities than is lower body obesity (LBO). The sine qua non of UBO is excess adipose tissue free fatty acid (FFA) release, especially under postprandial/hyperinsulinemic conditions, and these excess FFA undoubtedly contribute to the lipotoxicity of ectopic (liver, muscle, etc.) fat accumulation. In addition, UBO/T2DM is frequently accompanied by low grade adipose tissue inflammation and accumulation of senescent preadipocytes, but whether adipose inflammation related directly to the metabolic complications of UBO in humans by fueling adipose insulin resistance has not been examined in vivo. Because of the importance of FFA to whole body fuel metabolism, we have conducted studies that identified which adipose depot is primarily responsible for excess FFA in UBO. Although visceral fat is a predictor of excess FFA, it is not the source of excess FFA. Upper body subcutaneous fat accounts for ~75% of systemic FFA under basal and hyperinsulinemic conditions, with visceral and leg fat contributing lesser amounts. Excess FFA can cause insulin resistance by interfering with insulin signaling. It was unclear why upper body subcutaneous adipose fuel export is abnormal in UBO, but the preponderance of evidence from studies using rodent and cell culture models indicated that local inflammation was important. The data suggested that paracrine effects of cytokines, secreted by pro-inflammatory adipose tissue macrophages (ATM) interfere with adipocyte insulin signaling. If that is true in vivo, in humans, interventions to reduce inflammation would be a logical treatment strategy. We performed comprehensive measures of adipose inflammation and insulin regulation of lipolysis (the insulin concentration required to suppress lipolysis by 50% - IC50) in a large group of volunteers with a wide range of insulin resistance. We measured adipose insulin signaling at the level of Akt phosphorylation in relation to IC50 and studied the effects of lifestyle-mediated weight loss and 6 months of high dose omega-3 fatty acid supplements in a double-blind randomized trial.

From these studies we found that abdominal adipocyte size, but not total or pro-inflammatory macrophage burden, TNF, IL-6, IL-10 or IL-1 β expression in abdominal fat is related to insulin resistance with regards to lipolysis (IC50). We found that the ability of insulin at postprandial concentrations to signal from the receptor through the Akt phosphorylation step is unrelated to IC50. We also reported that lifestyle-induced weight loss reduced (improved) IC50, but did not reduce adipose tissue macrophage content. In another study, we administered maximum dose omega-3 fatty acid supplements for six months, which reduced plasma triglyceride concentrations, but did not reduce adipose macrophage or senescent cell burden and did not improve IC50. In summary, in humans with Class I-II obesity (BMI 30-39.9 kg/m²), adipose tissue inflammation and proximal insulin signaling are not linked to insulin resistant adipose lipolysis in UBO. We have ongoing studies designed to probe the causes of adipose insulin resistance in humans

Symposium 17

Incretin Therapy from MARS,
Bariatric Surgery from VENUS

Chairpersons

Sung Rae Kim

The Catholic University of Korea, Korea

Jae Hyun Kim

Seoul National University, Korea

Speakers

Mi-Kyung Kim

Keimyung University, Korea

Po-Chih Chang

National Sun Yat-Sen University, Taiwan

Barbara McGowan

Guy's and St Thomas' NHS Foundation Trust, UK

Panel Discussion

Kyung-Soo Kim

CHA University, Korea

Jun Sung Moon

Yeungnam University, Korea



Mi-Kyung Kim

Keimyung University, Korea

• Education

Period	Affiliation	Position
– 2006-2008	Keimyung University Graduate School	Ph.D.
– 2004-2006	Keimyung University Graduate School	M.S.
– 1996-2002	Keimyung University School of Medicine	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	Keimyung University School of Medicine	Professor
– 2018-2023	Keimyung University School of Medicine	Associate Professor
– 2016-2017	Sanford Burnham Prebys Medical Discovery Institute	Visiting Researcher
– 2011-2018	Keimyung University School of Medicine	Assistant Professor

• Committee Memberships

- Korean diabetes Association
- Korean Endocrine Society
- Korean Society for the Society of Obesity
- The Korean Association of Internal Medicine

• Publications

- Diabetic Kidney Disease Fact Sheet in Korea. Kim NH, Seo MH, Jung JH, Han KD, Kim MK, Kim NH; Diabetic Kidney Disease Research Group of the Korean Diabetes Association. *Diabetes Metab J*
- Strategies to Maintain the Remission of Diabetes Following Metabolic Surgery. Kim MK, Kim HS. *J Metab Bariatr Surg. Dec:12(2): 26-34*
- Lobeglitazone inhibits LPS-induced NLRP3 inflammasome activation and inflammation in the liver. Seo HY, Lee SH, Park JY, Han E, Han S, Hwang JS, Kim MK*, Jang BK*. *PLoS One. 24;18(8):e0290532*
- Muscle fat contents rather than muscle mass determines nonalcoholic steatohepatitis and liver fibrosis in patients with severe obesity. Han E, Kim MK*, Lee HW, Ryu S, Kim HS, Jang BK, Suh Y. *Obesity (Silver Spring). 30(12):2440-2449*
- Evogliptin Directly Inhibits Inflammatory and Fibrotic Signaling in Isolated Liver Cells. Seo HY, Lee SH, Han E, Hwang JS, Han S, Kim MK*, Jang BK*. *Int J Mol Sci. 23(19):11636*

Symposium 17

Incretin-Based Therapy Before Bariatric Surgery: Will It Be Helpful?

Mi-Kyung Kim (Keimyung University, Korea)

Obesity is increasing globally, resulting in obesity-related diseases. Guidelines recommend losing 5%–10% of body weight within 6 months after starting treatment as the primary weight loss goal through lifestyle modification, pharmacotherapy, or bariatric surgery to reduce obesity-related disease. Current anti-obesity medications expect about 5–15% weight loss, especially recently released incretin-based drugs with effective weight loss. However, the most effective treatment for obesity is bariatric surgery, which is durable, with the majority of patients maintaining a large percentage of their initial weight loss over the first postoperative decade. Successful outcomes, preoperative evaluation, and management of modifiable risk factors are recommended to reduce the risk of perioperative complications and improve outcomes. The impact of preoperative medical weight management is inconsistent. Some reported potential advantages such as shorter operative time, length of stay, and more significant postoperative weight loss; others reported discouraging for patients and possibly unnecessary delay of necessary treatment. A recent position statement recommends that the inability to lose weight with a preoperative diet should be precluded from bariatric surgery. However, while people wait for surgery, they need preoperative management about weight or glucose. If people have diabetes, we should choose anti-glycemic management, which has high efficacy in weight loss. Therefore, I will talk about whether incretin-based therapy before surgery will be helpful.



Po-Chih Chang

National Sun Yat-Sen University, Taiwan

• Education

Period	Affiliation	Position
– 2017-Present	Biomedical Engineering, Kaohsiung Medical University	Ph.D.
– 2015-2017	Department of Sports Medicine, Kaohsiung Medical University	M.Sc.
– 1994-2001	School of Medicine, Kaohsiung Medical University	M.D.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	School of Medicine, College of Medic, National Sun Yat-sen University	Associate Professor
– 2016-Present	Div. of Thoracic Surgery, Kaohsiung Medical University Hospital	Visiting Staff
– 2016-Present	Weight Management Center, Kaohsiung Medical University Hospital	Visiting Staff
– 2018-2024	Div. of Thoracic Surgery, Kaohsiung Medical University Hospital	Chief
– 2018-2024	College of Medicine, Kaohsiung Medical University	Clinical Assistant Professor

• Committee Memberships

- Taiwan Society for Metabolic And Bariatric Surgery (TSMBS)
- Taiwan Society of Thoracic Surgeons (TSTS)

• Publications

- Perioperative Dexmedetomidine Infusion Improves Perioperative Care of Bariatric-Metabolic Surgery: A Single Center Experience with Meta-Analysis. Chang PC, Huang IY, Liu SD, Huang CK, Lin TE, Jhou HJ, Chen PH, Chang TW. *Obes Surg.* 2024 Feb;34(2):416-428
- Dexamethasone and Dexmedetomidine: A Synergistic Approach to Reduce Postoperative Nausea and Vomiting in Bariatric Surgery Patients. Chang PC, Huang YW, Huang CK, Chang TW. *Obes Surg.* 2024 Jun;34(6):2253-2254
- Innovative Endoscopic Approach for Staple Line Leaks Following Sleeve Gastrectomy: Promising Outcomes with Considerable Concerns. Chang TW, Huang YW, Huang CK, Chang PC. *Obes Surg.* 2024 Mar;34(3):1029-1030
- Exploring the Need for Sustained GLP-1 Agonist Therapy: a Perspective on Weight Regain After Bariatric Surgery. Chang PC, Huang YW, Huang CK, Chang TW. *Obes Surg.* 2024 Jun;34(6):2259-2260
- Wernicke Encephalopathy After Roux-en-Y Gastric Bypass Presenting with Altered Mental Status-A Video Case Report. Chen CC, Chang PC, Chang TW, Chuang HY. *Obes Surg.* 2024 Jun;34(6):2271-2273

Symposium 17

Incretin-Based Therapy after Bariatric-Metabolic Surgery: When and How Long?

Po-Chih Chang (National Sun Yat-Sen University, Taiwan)

Incretin-based therapies, including GLP-1 receptor agonists and DPP-4 inhibitors, have gained prominence in the management of type 2 diabetes mellitus (T2DM) due to their efficacy in enhancing insulin secretion and suppressing glucagon release. Post-bariatric-metabolic surgery, these therapies hold potential for optimizing glycemic control and improving metabolic outcomes, including augmenting weight loss for those with insufficient weight loss or weight recidivism. This review discusses the indications, timing, and duration of incretin-based therapy following bariatric-metabolic procedures. It highlights the heterogeneity of patient responses to surgery and the necessity for personalized treatment plans. We also emphasize the importance of initiating incretin-based therapy in patients with suboptimal glycemic control post-surgery and suggests a tailored approach to therapy duration, balancing benefits against potential risks. Moreover, we will share the results of online survey of perspectives regarding using incretin-based therapy after bariatric-metabolic surgery among current bariatric-metabolic surgeons in Taiwan.



Barbara McGowan

Guy's and St Thomas' NHS Foundation Trust, UK

• Education

Period	Affiliation	Position
– 2003-2007	Imperial London	Ph.D.
– 1993-1998	Royal Free Hospital London	M.B.B.S.
– 1984-1988	Oxford University	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2009-2024	Guys & St Thomas's Hospital	Professor of Endocrinology and Diabetes

• Committee Memberships

- International Society for Endocrinology
- EASO Obesity Management Task Force
- ESE Policy and Advocacy Task Force

• Publications

- Once-weekly Semaglutide in Adults with Overweight or Obesity, Wilding, McGowan *et al*, 384:989-1002 DOI: 10.1056/nejmoa2032183
- Liraglutide 3.0 mg in the treatment of adults with obesity and prediabetes using real-world UK data: A clinical evaluation of a multi-ethnic population. Dobbie *et al*, McGowan, *Clinical Obesity*
- Effectiveness of integrating a pragmatic pathway for prescribing liraglutide 3.0 mg in weight management services (STRIVE study): a multicentre, open-label, parallel-group, randomized controlled trial Papamargaritis, McGowan *et al*, *Lancet Regional Health* <https://doi.org/10.1016/j.lanpe.100853>
- (Laparoscopic adjustable gastric banding with liraglutide in adults with obesity and type 2 diabetes (GLIDE): a pilot randomised placebo controlled trial C. Coelho, L. Dobbie *et al*, B McGowan. *Int J Obesity*, doi: 10.1038/s41366-023-01368-4
- Real world data of a digitally enabled, time restricted eating weight management program in public sector workers living with overweight and obesity in the UK, A. Brown, *et al*, McGowan. *Obesity Science and practice* 10 (1), e730 DOI: 10.1002/osp4.730

Symposium 17

Incretin-Based Therapy - Will It Be Better Than Bariatric Surgery Alone

Barbara McGowan (Guy's and St Thomas' NHS Foundation Trust, UK)

Bariatric Surgery generally results in more substantial and rapid weight loss compared to pharmacotherapy for weight loss. Studies indicate an average weight loss of 25-30% of total body weight, which is often maintained long-term.

Incretin Therapy can achieve significant weight loss, typically around 10-15% of total body weight. However, new incretin therapies including GLP-1/GIP agonists and triple GLP-1/GIP/glucagon agonists can achieve around 20-25% weight loss, matching outcomes achievable following bariatric surgery.

Pharmacotherapy for weight loss needs to be taken long-term for weight maintenance. Weight loss after bariatric surgery is usually maintained over a period of 20 years and beyond. However, over 25% of patients will regain weight post-bariatric surgery. There is evidence indicating that additional incretin therapy post-bariatric surgery can achieve further weight loss in those with sub-optimal responses and achieve further improvements in glycemic control in patients with Type 2 diabetes.

This lecture will discuss the evidence for bariatric surgery vs incretin therapy and results of combination therapies post-bariatric surgery. Ultimately, the decision between incretin therapy and bariatric surgery should be individualized, considering the patient's specific medical conditions, preferences, and risk tolerance. For some patients, incretin therapy might offer a safer, less invasive option with significant benefits, though perhaps not as dramatic as bariatric surgery. For others, especially those with severe obesity and comorbidities, bariatric surgery may provide more rapid and extensive improvements in weight and metabolic health.

Combining therapies or using incretin therapy as a bridge to surgery could also be potential strategies to maximize benefits. Ongoing research and longer-term studies will further clarify the comparative advantages and optimal uses of these treatments.

Symposium 18

Cracking the Neural Code: Understanding Obesity through the Hypothalamus, Brain Stem, and Vagus Pathways

Chairpersons

Ki Woo Kim

Yonsei University, Korea

Hyung Jin Choi

Seoul National University, Korea

Speakers

Joe Eun Son

Kyungpook National University, Korea

Chen Ran

The Scripps Research Institute, USA

Cheng Zhan

University of Science and Technology of China, China

Panel Discussion

Yong Taek Jeong

Korea University, Korea

Chan Hee Lee

Hallym University, Korea



Joe Eun Son

Kyungpook National University, Korea

• Education

Period	Affiliation	Position
– 2008-2013	Seoul National University, Korea	Ph.D.
– 2004-2008	Seoul National University, Korea	B.Sc.

• Affiliations / Experience

Period	Affiliation	Position
– 2014-2023	The Hospital for Sick Children, University of Toronto, Canada	Postdoctoral Research Associate
– 2013-2014	Seoul National University, Korea	Postdoctoral Researcher
– 2011-2013	Lunenfeld-Tanenbaum Research Institute, Mount Sinai Hospital, Toronto, Canada	Visiting Scholar

• Committee Memberships

- Korean Diabetes Association
- Korea Society for Molecular and Cellular Biology
- Korean Society of Food Science and Technology
- Korean Society of Toxicogenomics and Toxicoproteomics
- Korea Society of Food Science and Nutrition

• Publications

- Son JE *, Dou Z, Kim KH, Wanggou S, Cha VSB, Mo R, Zhang X, Ketela T, Chen X, Li X, Huang X, Hui CC. *Irx3 and Irx5 in Ins2-Cre+ cells regulate hypothalamic postnatal neurogenesis and leptin response. Nature Metabolism, 3(5):701-713*
- Son JE*, Dou Z, Wanggou S, Chan J, Mo R, Li X, Huang X, Kim KH, Michaud J, Hui CC*. Ectopic expression of *Irx3* and *Irx5* in the paraventricular nucleus of the hypothalamus contributes to defects in *Sim1* haploinsufficiency. *Science Advances, 7(44):eabh4503 (*, co-correspondence)*
- Son JE, Dou Z, Kim KH, Hui CC. Deficiency of *Irx5* protects mice from diet-induced obesity and associated metabolic abnormalities. *International Journal of Obesity, 46(11):2029-2039*
- Dou Z, Son JE*, Hui CC*. *Irx3* and *Irx5* - novel regulatory factors of postnatal hypothalamic neurogenesis. *Frontiers in Neuroscience, 15:763856. (*, co-correspondence)*
- Son JE, Jo J.-Y, Kim S, Park MJ, Lee Y, Park SS, Park SY, Jung SM, Jung SK, Kim JY and Byun S. Rice Bran Extract Suppresses High-Fat Diet-Induced Hyperlipidemia and Hepatosteatosis through Targeting AMPK and STAT3 Signaling. *Nutrients, 15(16), 3630*

Symposium 18

Hypothalamic Function of IRX3 and IRX5, Genetic Determinants of Human Obesity

Joe Eun Son (Kyungpook National University, Korea)

Obesity has become a serious health concern worldwide, increasing the prevalence of other chronic diseases. It is critical to gain a deeper understanding of the machinery underlying the development of obesity to improve current prediction, diagnosis, and treatment options for obesity and associated metabolic disorders. While obesity is a complex condition resulting from a combination of hereditary and environmental factors, it is largely attributed to genetic defects involved in the control of appetite by the brain, particularly the hypothalamus, a major command center in energy homeostasis regulation. To this end, by using mouse genetics and multi-omics technologies, my research identified Iroquois (IRX) homeobox genes, IRX3 and IRX5, as novel genetic determinant factors of obesity and further unveiled their obesity regulatory mechanism in the control of hypothalamic neurodevelopment at the single-cell level. Specifically, IRX3 and IRX5 are genetic effectors of FTO (fat mass and obesity-associated gene) variants, the strongest genetic risk factors for human obesity, and SIM1 haploinsufficiency, a monogenic form of human obesity. Furthermore, I identified a novel neural stem cell (NSC) population in the postnatal mouse hypothalamus, and established that predominant expression of *Irx3* and *Irx5* in this NSC population is critical for postnatal neurogenesis and hypothalamic feeding control; and I established the molecular profiles of *Sim1*⁺ neurons in the paraventricular nucleus of the mouse hypothalamus and uncovered that ectopic expression of *Irx3* and *Irx5* in these neurons represents a central mechanism contributing to the neurodevelopmental defects leading to overeating in *Sim1* haploinsufficiency. Given that both FTO obesity-risk alleles and SIM1 haploinsufficiency are associated with increased energy intake in human obesity, my research provides unprecedented mechanistic evidence for genetic control of human obesity. These findings could potentially lead to novel predictions and treatment options for this condition.



Chen Ran

The Scripps Research Institute, USA

• Education

Period	Affiliation	Position
– 2011-2017	Stanford University	Ph.D.
– 2007-2011	Peking University	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2017-2024	Harvard Medical School	Postdoctoral Fellow
– 2010	Washington University in St. Louis	Research Assistant

• Publications

- Ran C, Boettcher JC, Kaye JA, Gallori CE, Liberles SD. A brainstem map for visceral sensations. *Nature*. 2022 Sep;609(7926):320-326. doi: 10.1038/s41586-022-05139-5. Epub 2022 Aug 31. Erratum in: *Nature*. 2022 Nov;611(7934):E6. doi: 10.1038/s41586-022-05414-5. PMID: 36045291; PMCID: PMC9452305
- Ran C, Hoon MA, Chen X. The coding of cutaneous temperature in the spinal cord. *Nat Neurosci*. 2016 Sep;19(9):1201-9. doi: 10.1038/nn.4350. Epub 2016 Jul 25. PMID: 27455110; PMCID: PMC5599125
- Ran C, Kamalani GNA, Chen X. Modality-Specific Modulation of Temperature Representations in the Spinal Cord after Injury. *J Neurosci*. 2021 Sep 29;41(39):8210-8219. doi: 10.1523/JNEUROSCI.1104-21.2021. Epub 2021 Aug 18. PMID: 34408066; PMCID: PMC8482863
- Ran C, Chen X. Probing the coding logic of thermosensation using spinal cord calcium imaging. *Exp Neurol*. 2019 Aug;318:42-49. doi: 10.1016/j.expneurol.2019.04.009. Epub 2019 Apr 20. PMID: 31014574; PMCID: PMC6993943
- Lammel S, Lim BK, Ran C, Huang KW, Betley MJ, Tye KM, Deisseroth K, Malenka RC. Input-specific control of reward and aversion in the ventral tegmental area. *Nature*. 2012 Nov 8;491(7423):212-7. doi: 10.1038/nature11527. Epub 2012 Oct 14. PMID: 23064228; PMCID: PMC3493743

Symposium 18

The Coding of Internal Senses in the Brainstem

Chen Ran (The Scripps Research Institute, USA)

Our external senses of sight, smell, sound, touch, and taste enable us to perceive the external world. In addition, our interoceptive system monitors the physiological state of peripheral organs. This bodily sensory system orchestrates multi-organ physiological responses, regulating feeding, drinking, sickness behaviors, and generating the internal senses such as satiety, hunger, nausea, malaise, and visceral pain. However, despite the scientific and clinical importance, the principles that define visceral sensory processing remain poorly defined. Previously, we developed an in vivo two-photon mouse brainstem calcium imaging preparation to understand internal organ representations in the nucleus of the solitary tract (NTS), the interoceptive gateway in the brain. Combining the imaging platform with stimulation of multiple visceral organs, we uncover diverse neuronal responses to internal stimuli, while functionally defined cell types are highly organized within the NTS. Using patterned in vivo brainstem optogenetics, we precisely stimulate different neuronal ensembles and show that spatial domains of the NTS differentially modulate autonomic functions. Using mouse genetics and functional manipulations of specific brainstem circuits, we reveal viscerosensory information streams that have distinct functions. Our study defines the functional architecture of brainstem viscerosensory pathways, laying the foundation for future research to understand interoceptive processing throughout the brain.



Cheng Zhan

University of Science and Technology of China, China

• Education

Period	Affiliation	Position
– 2011	Hua Zhong University of Science and Technology	Ph.D.
– 2006	Hua Zhong University of Science and Technology	M.S.
– 2003	Hua Zhong University of Science and Technology	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	University of Science and Technology of China	Professor
– 2011-2021	National Institute of Biological Sciences (NIBS), Beijing	Engineer
– 2006-2008	National Institute of Biological Sciences (NIBS), Beijing	Director of the Imaging Facility

• Committee Memberships

- Stress Neurobiology Branch of the Chinese Society of Neuroscience
- Autonomic Neurobiology Branch of Chinese Association for Physiological Sciences

• Publications

- Liang Wang, Mingxiu Cheng, Yucheng Wang, Jing Chen, Faming Xie, Li-Hao Huang, Cheng Zhan#. Fasting-activated neurons regulate immune cell homing and suppress autoimmune diseases in mice. *Nature Neuroscience*
- Jing Cai, Jing Chen, Joshua Ortiz-Guzman, Jessica Huang, Benjamin R Arenkiel, Yuchen Wang, Yan Zhang, Yuyan Shi, Qingchun Tong#, Cheng Zhan#. AgRP neurons are not indispensable for body weight maintenance in adult mice. *Cell Reports*
- Jing Chen, Chunli Li, Zhonghua Lu, Cheng Zhan#. Optimal Timing of a Commonly-Used Rabies Virus for Neural Recording and Manipulation. *Neuroscience Bulletin*
- Jing Chen, Minxiu Cheng, Liang Wang, Lei Zhang, Dan Xu, Peng Cao, Fengchao Wang, Herbert Herzog, Sen Song, Cheng Zhan#. A vagal-NTS neural pathway that stimulates feeding. *Current Biology*
- Z. Zhao, L. Wang, W. Gao, F. Hu, J. Zhang, Y. Ren, R. Lin, Q. Feng, M. Cheng, D. Ju, Q. Chi, D. Wang, S. Song, M. Luo and C. Zhan#. A Central Catecholaminergic Circuit Controls Blood Glucose Levels during Stress. *Neuron*

Symposium 18

Roles of Brainstem Catecholaminergic Neurons in Control of Energy Homeostasis

Cheng Zhan (University of Science and Technology of China, China)

The brain plays a crucial role in regulating energy intake and expenditure in response to various internal and external factors and energy requirements. While extensive research has highlighted the significance of the hypothalamus in maintaining energy balance, there is limited understanding of the functional roles of other brain regions. Our comprehensive investigation focused on brainstem catecholaminergic neurons (solitary nucleus and ventrolateral medulla), exploring their brain-wide connections and functional contributions to the regulation of energy homeostasis, including food intake, blood glucose levels, and energy expenditure during fasting. This presentation will address the importance of brainstem catecholaminergic neurons in energy metabolism control, elucidating their roles and mechanisms of action.

Symposium 19

Expanding Horizons in Pediatric Obesity

Chairpersons

Sochung Chung

Konkuk University, Korea

Junga Lee

Kyung Hee University, Korea

Speakers

Jihyun Ahn

Kyeongin High School, Korea

Eunji Nam

Incheon National University, Korea

Seung Eun Jung

The University of Alabama, USA

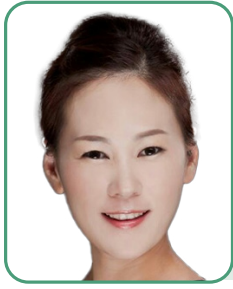
Panel Discussion

Jisun Park

Inha University, Korea

Kyoung Huh

Kium Growth Clinic, Korea



Jihyun Ahn

Kyeongin High School, Korea

• Education

Period	Affiliation	Position
- 2006	Seoul National University Seoul, Korea	M.A.
- 2004	Korea Heritage Service	M.A.
- 2000	Seoul National University Seoul, Korea	B.A.

• Affiliations / Experience

Period	Affiliation	Position
- 2021-Present	Kyeong-in High School	Teacher
- 2018	Dosun-High School	Teacher
- 2008	Seoul Global High School	Teacher
- 2005	Gae-bong Middle School	Teacher
- 2000	Gocheok Middle School	Teacher

• Publications

- Revised Curriculum Writing Physical Education, Sports Life, Exercise and Health Textbooks
- Writing of the Sports Guidance Data Book (New possibilities of sports education) of the Seoul Metropolitan Office of Education
- Seoul Metropolitan Office of Education, Seoul Student 7560+Teacher Manual Writing
- Korea Gender Equality Education Promotion Agency writes Gender Recognition (Sports) Writing
- Development of textbooks for Seoul International Professional Curriculum and Arts Practice Curriculum "Korean Traditional Culture"

Symposium 19

The Effects of Physical Activity on Obesity and Health in Adolescents

Jihyun Ahn (Kyeongin High School, Korea)

The topic of this presentation is about the effects of physical activity in adolescence on obesity.

This study was to investigate the experiences of obese adolescents participating in physical activities and to reveal what factors they feel while participating in regular physical activities (P. E time).

Five adolescents who think they are obese and regularly participate in exercise participated in this study, and in-depth and group interviews were conducted for 5 months, and participant observation was also conducted at the place of physical activity in which obese adolescents participated. During observation, the behavior and interview contents of the study participant were recorded in field notes, which were used for the content analysis of the subject. As a result of data analysis, what obese adolescents experienced while exercising were motivation, protective function, lifestyle improvement, pressure, and fun factors. Participants in the study mentioned various motivational or motivational factors such as health benefits of physical activity, uncomfortable days to exercise, and difficulties with specific exercise. A healthy lifestyle was specifically the recognition of the increased relationship between changes in perceptions and attitudes toward exercise and activities. The protective functions they referred to meant maintaining social and functional ability, establishing an identity that is good in physical strength, and losing weight. Participants in the study said that there was a lot of pressure to achieve weight-related goals. Most of the study participants saw that the enjoyment of physical activity was a by-product of the activity and could be a goal pursued during the activity. They also said that encouraging all participants to be safe, accommodated by others, and active is an important factor in continuing their participation in physical activity.

In this presentation, we would like to analyze the common lifestyle, exercise habits, and ways to improve them by dividing them into individuals, teachers, and curriculum levels that many obese adolescents met while serving as physical education teachers for 24 years.



Eunji Nam

Incheon National University, Korea

• Education

Period	Affiliation	Position
- 2018	University of Kansas	Ph.D.
- 2010	Seoul National University	MS.W.
- 2008	Seoul National University	BS.W.

• Affiliations / Experience

Period	Affiliation	Position
- 2020-Present	Incheon National University	Assistant Professor
- 2018-2020	University of Central Florida	Assistant Professor

• Committee Memberships

- Korean Academy of Health and Social Welfare (KAHSW)
- Korean Association for Social Welfare Studies (KASWS)

• Publications

- Ha, S. C., & Nam, E. Perceived risk of solitary death and depressive symptoms among older adults living in Seoul: Can structural and functional support buffer the impact? *Journal of Applied Gerontology*, 43(3), 251-260
- Lee, E., Hines, R. B., Zhu, J., Nam, E., & Rovito, M. J. Racial and ethnic variations in pre-diagnosis comorbidity burden and health-related quality of life among older women with breast cancer. *Journal of Racial and Ethnic Health Disparities*, 1-13
- Gryglewicz, K., Peterson, A., Vance, M., Nam, E., Borntreger, L. & Karver, M. Caring Transitions: A care coordination intervention to reduce suicide risk among youth discharged from inpatient psychiatric hospitalization. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 44(1), 1-13
- Nam, E., Palmer, A. N., & Patel, M. Characteristics of emergency department visits by homeless young adults in the US. *Journal of Adolescent Health*, 69(2), 302-307
- Nam, E., Lee, E., & Kim, H. 10-year trends of emergency department visits, wait time, and length of stay among adults with mental health and substance use disorders in the United States. *Psychiatric Quarterly*, 92, 1159-1174

Symposium 19

Understanding Pediatric Obesity from a Social Work Perspective

Eunji Nam (Incheon National University, Korea)

There is a growing body of evidence on socioeconomic disparities in childhood obesity. As childhood obesity is associated with negative immediate and long-term health outcomes, many efforts have been made to reduce obesity among children and adolescents from disadvantaged families. However, behavioral and lifestyle change has been prioritized in these efforts, with little attention given to the broader context of childhood obesity. Traditionally, social workers have worked with vulnerable populations to promote their health. The Social Determinants of Health (SDOH) framework, which emphasizes the social gradient of health and health inequalities, aligns with the core principles of social work in healthcare settings.

This lecture uses data from the Korean Welfare Panel Study to understand the phenomenon of childhood obesity in Korea from an SDOH perspective. Specifically, this lecture presents the prevalence of childhood obesity within and across different vulnerable populations. Also, this lecture highlights several risk factors for childhood obesity at the individual, family, and community levels to guide interventions aimed at reducing socioeconomic disparities in childhood obesity.

Many principles of social work practice can be useful when addressing childhood obesity, including person-in-environment theory, advocacy, and a strengths-based perspective. This lecture concludes with strategies to address childhood obesity from the micro to the macro level.



Seung Eun Jung

The University of Alabama, USA

• Education

Period	Affiliation	Position
– 2014	Oklahoma State University	Ph.D.
– 2014	Oklahoma State University	R.D.
– 2008	Oklahoma State University	M.Sc.
– 2002	Kyung Hee University	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2021-Present	The University of Alabama	Associate Professor
– 2015-2021	The University of Alabama	Assistant Professor
– 2014-2015	Oklahoma State University	Visiting Assistant Professor
– 2002-2005	Samsun Everland Food and Distribution Division	Dietitian

• Committee Memberships

- Healthy Aging Division Society of Nutrition Education and Behavior (SNEB)
- Academy of Nutrition and Dietetics (AND)
- Alabama Dietetic Association (ALDA)

• Publications

- Jung SE, Shin YH, Hermann J, Abercrombie M, Wilson S. Examining College Students' Willingness to Consume Local Foods Utilizing the Health Belief Model with the Addition of Social Influence and Self-identity. *Journal of Hunger and Environmental Nutrition*
- Jung SE, Shin YH, Cave L, Rockett J, Hermann J. Understanding Whole Grain Consumption among Low-Income Older Adults using The Theory of Planned Behavior. *Journal of Nutrition in Gerontology and Geriatrics*. 41(1):46-64
- Jung SE, Shin YH, Niu A, Hermann J, Dougherty R. Grocery Store Tour Education Program Promotes Fruit and Vegetable Consumption. *Public Health Nutrition*. 22(14):2662-2669
- Jung SE, Kim S, Bishop A, Hermann J. Poor Nutritional Status among Low-Income Older Adults: Examining the Interconnection Between Self-Care Capacity, Food Insecurity, and Depression. *Journal of the Academy of Nutrition and Dietetics*. 119(10):1687-1694
- Jung SE, Shin YH, Kim S, Hermann J, Bice C. Identifying Underlying Beliefs about Fruit and Vegetable Consumption among Low-Income Older Adults: An Elicitation Study Based on the Theory of Planned Behavior. *Journal of Nutrition Education and Behavior*. 49(9):717-723

Symposium 19

The Effectiveness of Social Media Nutrition Education for Promoting Locally Grown Fruit and Vegetable Consumption Among College Students

Seung Eun Jung (The University of Alabama, USA)

By 2050, the global population is anticipated to exceed 9 billion. As the population increases, resources are becoming scarcer. Experts warn that the current food system is unsustainable, and, without changes, future generations' food security is at risk. Consequently, policymakers are advocating for sustainable dietary patterns to safeguard both human health and the environment. A recent position paper from the Society of Nutrition Education and Behavior (SNEB) emphasized that health and nutrition professionals should incorporate environmental conservation and sustainability into nutrition education. This approach aims to enable consumers to make food choices that protect natural resources and ensure future food security. Consuming local food can decrease the energy needed for transportation and storage, reduce pollution from fossil fuels, support local agricultural markets, and help localize food systems.

College students, who are often transitioning to independence, form lasting habits during this critical period. Unfortunately, college students often exhibit poor dietary habits, consuming insufficient amounts of fruits and vegetables while indulging in high levels of fat, sugar, salt, and alcohol. Promoting locally grown fruits and vegetables could possibly address both the instability of the current food system and the unhealthy eating habits of college students.

Research has found that utilizing social media platforms for health promotion offers an opportunity to encourage lifestyle changes and disseminate health information easily, potentially overcoming time constraints associated with traditional face-to-face interventions. Therefore, this project utilized social media as a platform to provide nutrition education for college students to increase their intentions to purchase and consume locally grown fruits and vegetables.

Symposium 20

Exercise and Cardiometabolic Dysfunction

Chairpersons

Jong-Hee Kim

Hanyang University, Korea

Sewon Lee

Incheon National University, Korea

Speakers

Oh Sung Kwon

University of Connecticut, USA

Jaehoon Seol

University of Tsukuba, Japan

Min-Hwa Suk

Hanyang University, Korea

Panel Discussion

Kyeongho Byun

Incheon National University, Korea

Seungyong Lee

Incheon National University, Korea



Oh Sung Kwon

University of Connecticut, USA

• Education

Period	Affiliation	Position
- 2013	University of Florida	Ph.D.
- 2009	East Carolina University	M.A.
- 2002	Seoul National University	M.A.
- 2000	Seoul National University	B.A.

• Affiliations / Experience

Period	Affiliation	Position
- 2019-Present	University of Connecticut	Assistant Professor
- 2016-2018	University of Utah	Research Associate
- 2014-2016	University of Utah	Post Doctoral Fellow

• Committee Memberships

- American College of Sports Medicine (ACSM)
- American Physiological Society (APS)

• Publications

- The Receptor for Advanced Glycation End Products (RAGE) is involved in Mitochondrial Function and Cigarette Smoke-Induced Oxidative Stress. *Free Radical Biology and Medicine*, 195:261-269
- Aging and Endothelium-mediated Vascular Dysfunction: The Role of the NADPH Oxidases. *Journal of Physiology*, 601(3):451-467
- Regulation of Endothelial Function in Human Skeletal Muscle Arteries: Role of Adropin. *Journal of Physiology*, 597(7):1791-1804
- Quadriceps Muscle Atrophy After Non-invasive Anterior Cruciate Ligament Injury: Evidence Linking to Autophagy and Mitophagy. *Frontiers in Physiology*, 15:1341723
- Intramyocellular ceramides and skeletal muscle mitochondrial respiration are partially regulated by toll-like receptor 4 during hindlimb unloading. *Am J Physiol Regul. Integr. and Comp*, 311(5):R879-R887

Symposium 20

Impact of Progressive Dynamic Resistance Training on Skeletal Muscle and Vascular Function in Older Adults

Oh Sung Kwon (University of Connecticut, USA)

Resistance training results in significant improvements in skeletal muscle strength and mass in older adults. However, there is no consensus on the effect of resistance training on vascular endothelial function. Accordingly, the purpose of this study was to determine the effect of progressive dynamic resistance training on both vascular endothelial function as well as skeletal muscle function in older adults.

Twelve older adults (6 males and 6 females) aged 71 ± 4.2 years (mean \pm SD) participated in this study, undertaking 12 weeks of dynamic resistance training. Prior to and following the training, subjects underwent testing of vascular function using flow mediated dilation (FMD) on brachial artery, passive leg movement (PLM) on femoral artery, and pulse wave velocity (PWV) and muscular function using handgrip, knee extension, and leg press.

As anticipated, handgrip maximal strength showed significant improvement in both hands before and after training (right hand: 24.6 ± 6.0 vs. 28.0 ± 5.4 kg, $p < 0.001$, RT PRE vs. RT POST; left hand: 23.0 ± 5.4 vs. 26.9 ± 5.8 kg, $p < 0.001$, RT PRE vs. RT POST). Additionally, 12 weeks dynamic resistance training enhanced leg press 1RM (43.5 ± 10.8 vs. 55.7 ± 14.6 kg, $p < 0.01$, RT PRE vs. RT POST) and knee extension 1 RM (32.1 ± 59.8 vs. 44.4 ± 10.6 kg, $p < 0.01$, RT PRE vs. RT POST). Interestingly, flow mediated dilation (FMD) was significantly improved with resistance training (4.5 ± 0.5 vs. 6.0 ± 0.6 %, $p < 0.05$, RT PRE vs. RT POST). Furthermore, the passive leg movement (PLM)-induced peak leg blood flow was significantly enhanced with the training (222 ± 40 vs. 358 ± 51 ml/min, $p < 0.05$, RT PRE vs. RT POST) Pulse wave velocity (PWV) significantly decreased after resistance training (12.6 ± 0.7 vs. 10.7 ± 0.9 m/s, $p < 0.001$, RT PRE vs. RT POST).

Together, our data support that dynamic resistance training may enhance vascular function concomitantly with skeletal muscle function.



Jaehoon Seol

University of Tsukuba, Japan

• Education

Period	Affiliation	Position
– 2017-2020	University of Tsukuba, Japan	Ph.D.
– 2015-2017	University of Tsukuba, Japan	M.S.
– 2013-2015	University of Tsukuba, Japan	Research Student in Physical Education
– 2006-2013	Myeongji University, Korea	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2024-Present	University of Tsukuba, Japan	Assistant Professor
– 2024-Present	National Center for Geriatrics and Gerontology, Japan	Visiting Researcher
– 2021-Present	International Institute for Integrative Sleep Medicine, Japan	Visiting Researcher
– 2023-2023	National Institute of Occupational Safety and Health, Japan	Researcher
– 2021-2023	Japan Society for the Promotion of Science, Japan	JSPS Postdoctoral Fellowship

• Committee Memberships

- Korean Society Exercise Nutrition
- BMC Geriatrics, Part of Springer Nature
- Korean Academy of Kinesiology

• Publications

- Validation of sleep-staging accuracy for an in-home sleep electroencephalography device compared with simultaneous polysomnography in patients with obstructive sleep apnea. *Scientific Reports*, 14(1):3533
- Relationship between rest-activity rhythms and cardiorespiratory fitness in middle-aged workers: A cross-sectional study with non-parametric analysis using accelerometers worn on the thigh. *BMC Public health*, 24(1):62
- Association between electroencephalogram-based sleep characteristics and physical health in the general population of middle age. *Scientific Reports*, 13(1):21545
- Bidirectional associations between physical activity and sleep in older adults: a multilevel analysis using polysomnography. *Scientific Reports*, 12(1): 15399
- Distinct effects of orexin receptor antagonist and GABAA agonist on sleep and physical/cognitive functions after forced awakening. *PNAS*, 116: 24353-24358

Symposium 20

Sleep, Metabolic Diseases, and the Role of Physical Activity in Middle and Older Individuals

Jaehoon Seol (University of Tsukuba, Japan)

Sleep is a critical physiological activity that everyone engages in, comprising one-third of our daily lives. Numerous studies have demonstrated that sleep deprivation can lead to various health problems, with a well-established link to metabolic diseases, including cardiometabolic risk.

Modern life patterns vary widely, and many people are unable to secure sufficient sleep due to night shifts, overtime work, and irregular sleep schedules, leading to chronic sleep deprivation and social jetlag. Older adults often experience a decrease in deep sleep, an increase in light sleep, and frequent nighttime awakenings. These changes in sleep patterns can lead to various health-threatening conditions, including insomnia-related disorders.

Conversely, abundant physical activity in daily life positively impacts both cardiometabolic risk and sleep. The presenter has explored the relationship between physical activity and sleep among middle-aged and older adults through large-scale epidemiological surveys using questionnaires, quantitative assessments with accelerometers, and both quantitative and qualitative sleep evaluations using polysomnography and portable electroencephalography devices.

In this symposium, the presenter will introduce recent research findings on the relationship between sleep and cardiometabolic risk. Furthermore, the effects of physical activity on sleep and cardiometabolic risk among middle-aged and older adults will be discussed. Additionally, the presenter will address the relationship between rest-activity rhythms, cardiometabolic risk, and cognitive function in middle-aged and older adults, a topic that has garnered significant attention in sleep medicine in recent years.



Min-Hwa Suk

Hanyang University, Korea

• Education

Period	Affiliation	Position
– 2008	Seoul National University	Ph.D.
– 2002	Seoul National University	M.A
– 2000	Seoul National University	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2020-Present	Seoul National University of Education	Part-Time Lecturer
– 2019-Present	Hanyang University	Adjunct Professor
– 2017-2020	Sungkyunkwan University (Samsung Medical Center)	Researcher

• Committee Memberships

- Korean Society for the Study of Obesity
- Seoul Yoga Association
- Korean Society Exercise Nutrition

• Publications

- Lee, J., Suk, M. H., Yoo, S., & Kwon, J. Y. (2023). The Decline of Physical Activity with Age in School-Aged Children with Cerebral Palsy: A Single-Center Cross-Sectional Observational Study. *Journal of Clinical Medicine*, 12(13), 4548
- Suk, M. H., & Kwon, J. Y. (2022). Effect of equine-assisted activities and therapies on cardiorespiratory fitness in children with cerebral palsy: a randomized controlled trial. *Journal of Integrative and Complementary Medicine*, 28(1), 51-59
- Lee, J., Suk, M. H., Yoo, S., & Kwon, J. Y. (2022). Physical activity energy expenditure predicts quality of life in ambulatory school-age children with cerebral palsy. *Journal of Clinical Medicine*, 11(12), 3362
- Suk, M. H., Park, I. K., Yoo, S., & Kwon, J. Y. (2021). The association between motor capacity and motor performance in school-aged children with cerebral palsy: An observational study. *Journal of Exercise Science & Fitness*, 19(4), 223-228
- Suk, M. H., Jang, H. S., Lee, J. W.(2020). Comparison of the Daily Fitness Test in Nursing Home Residents and Community-Dwelling Residents Elderly Women. *Exercise Science*, 29(4), 409-415

Symposium 20

Exercise Recommendation Algorithm for Improving Functional Movement: Focusing on Individuals with Obesity

Min-Hwa Suk (Hanyang University, Korea)

Obesity is highly associated with chronic diseases such as type 2 diabetes, ischemic heart disease, hypertension, and atherosclerosis, as well as musculoskeletal disorders (Flegal, Kit, Orpana, & Graubard, 2013). While physical activity interventions can lead to overall improvements in physical condition, individuals with a high body mass index (BMI) may exhibit reduced range of motion in various joints (Park, Ramachandran, Weisman, & Jung, 2010).

Reduced range of motion can result in the weakening of the kinetic chain system or dysfunction of connective tissues related to the human movement system. Damage to body tissues can trigger inflammatory responses, which in turn activate the body's pain receptors, initiating protective mechanisms. This leads to increased muscle tension and muscle spasms. Consequently, adhesions (knots or trigger points) begin to form in the soft tissues. These adhesions weaken the tissue, transforming it into inelastic tissue (unable to stretch), thereby reducing the normal elasticity of the soft tissues. This alters the length-tension relationship of the muscles, leading to muscle imbalances and potential injuries (Clark & Lucett, 2010).

When obese individuals with decreased normal elasticity of soft tissues or muscle imbalances and injuries experience pain during exercise, they tend to stop exercising. Repeated movements with poor posture cause pain, so proper movement is essential to exercise without pain. It is necessary to first improve the function of movement or range of motion to enable pain-free exercise before proceeding with an exercise program. It will present a comprehensive exercise algorithm that has been designed for this purpose. This algorithm carefully considers the individual's physical capabilities, presence of pain, and gradual progression.

Reference

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- Park, W., Ramachandran, J., Weisman, P., & Jung, E. S. (2010). Obesity effect on male active joint range of motion. *Ergonomics*, 53(1), 102-108.
- Clark, M., & Lucett, S. (Eds.). (2010). *NASM essentials of corrective exercise training*. Lippincott Williams & Wilkins.

Joint Symposium KSSO-TOS

Real Word Experience of Anti-Obesity Medications

Chairpersons

Marc-Andre Cornier

Medical University of South Carolina, USA

Soo Lim

Seoul National University, Korea

Speakers

Marc-Andre Cornier

Medical University of South Carolina, USA

Yu Mi Kang

Harvard Medical School, USA

Robyn Pashby

Health Psychology Partners, USA



Marc-Andre Cornier

Medical University of South Carolina, USA

• Education

Period	Affiliation	Position
– 1999-2001	University of Colorado Health Sciences Center - Denver, CO	Certificate in Clinical Science
– 1988-1992	Medical College of Georgia, School of Medicine - Augusta, GA	M.D.
– 1983-1987	Vanderbilt University, School of Engineering - Nashville, TN	B.S.

• Affiliations / Experience

Period	Affiliation	Position
– 2023-Present	Endocrinology Fellowship Program Division of Endocrinology, Diabetes & Metabolic Diseases, MUSC, Charleston, SC	Program Director
– 2021-Present	Medical University of South Carolina	Professor
– 2021-Present	James A. Keating Endowed Chair in Diabetes	Chair
– 2021-Present	Department of Medicine, MUSC – Charleston, SC	Director
– 2021-2023	Diabetes Management Service MUSC – Charleston, SC	Medical Director

• Committee Memberships

- The Obesity Society
- Advocacy & Public Outreach Core Committee, Endocrine Society
- Steering Committee, Obesity Curriculum-in-a-Box
- Scientific Advisory Board, LetsGetChecked
- Clinical Endocrinology Update (CEU) Steering Committee, Endocrine Society

• Publications

- Peters JC, Breen JA, Pan Z, Niklaus J, Cornier MA. A Randomized, crossover trial assessing appetite, energy metabolism, blood biomarkers, and ad libitum food intake responses to a mid-morning pecan snack vs an equicaloric high-carbohydrate snack in healthy volunteers with overweight/obesity. *Nutrients*, 16:2082, 2024
- Iwamoto SJ, Rice JD, Moreau KL, Cornier MA, Wierman ME, Mancuso MP, Gebregzabheir A, Hammond DB, Rothman MS. The Association of Gender-Affirming Hormone Therapy Duration and Body Mass Index on Bone Mineral Density in Gender Diverse Adults. *J Clin Transl Endocrinol*, ePub 30 April 2024
- Dodd KC, Legget KT, Cornier MA, Novick AM, McHugo M, Berman BD, Lawful BP, Tregellas JR. Relationship Between Functional Connectivity and Weight-Gain Risk of Antipsychotics in Schizophrenia. *Schizophr Res*, 28:173-181, 2024
- Arif E, Medunjanin D, Solanki A, Zuo X, Su Y, Dang Y, Winkler B, Lerner K, Kamal AI, Palygin O, Cornier MA, Wolf BJ, Hunt KJ, Lipschutz JH. Beta 2 adrenergic receptor agonists as a treatment for diabetic kidney disease. *Am J Physiol Renal Physiol*, 326:F20-F2, 2024
- Palmer V, Cornier MA, Waring A, Valdebran M. Evaluation and Treatment of Metabolic Syndrome and Cardiovascular Disease in Adult Patients with Psoriasis. *Int J Dermatol*, 62:1437-1446, 2023

Joint Symposium KSSO-TOS

Real-World Experience with Novel Anti-Obesity Medications

Marc-Andre Cornier (Medical University of South Carolina, USA)

Pharmacotherapy or “anti-obesity medications” (AOMs) are indicated for patients with obesity or overweight with weight related comorbidities. AOMs are important therapies that primarily work by treating the central dysregulation of food intake associated with the disease of obesity. These therapies have been shown to also be associated with successful long-term weight loss and. Newer, novel AOMs, such as semaglutide and tirzepatide, are associated with significantly greater weight loss than previously approved agents. With average weight loss of 15-20% seen with these novel agents, we are seeing significantly greater benefits in weight-related comorbidities. Furthermore, semaglutide has been shown to reduce cardiovascular outcomes and is now approved in the U.S. for the treatment cardiovascular disease. Issues with medication shortages, costs and reductions in lean body mass have created some barriers to using these agents. There are many new therapies being developed that are associated with similar, if not more, weight loss. Other therapies are being developed in efforts to minimize lean mass loss and/or functional declines. This is an exciting time for the medical treatment of obesity but many unanswered questions remain.



Yu Mi Kang

Harvard Medical School, USA

• Education

Period	Affiliation	Position
– 2024-Present	Harvard School of Public Health, Boston, MA, USA	Masters of Public Health in Clinical Effectiveness
– 2023-2015	University of Ulsan College of Medicine, Asan Medical Center, Seoul, Korea	Ph.D.
– 2006-2010	Chonbuk National University College of Medicine, Jeonju, Korea	M.D.
– 2002-2005	University of Toronto	B.Sc.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-2025	Harvard Medical School	Senior Interdisciplinary Fellow (US)
– 2019-2022	Yale University School of Medicine	Internal Medicine Residency (US)
– 2017-2019	Asan Medical Center	Instructor
– 2015-2017	Asan Medical Center	Fellow (Endocrine & Metabolism)
– 2011-2015	Asan Medical Center	Internal Medicine Residency

• Committee Memberships

- International Advisory Board Member, Korean Society of Lipid and Atherosclerosis
- Korean Society for the Study of Obesity
- American Diabetes Association
- American Heart Association
- European Society of Cardiology

• Publications

- Patel SM, Kang, YM et al. Sodium Glucose Co-transporter 2 Inhibitors and Major Adverse Cardiovascular Outcomes: A SMART-C Collaborative Meta-Analysis. *Circulation*. 2024 Apr 7 Online ahead of print. doi: 10.1161/CIRCULATIONAHA.124.069568
- Kang YM, Cho YK, Lee J, Lee SE, Lee WJ, Park JY, Kim YJ, Jung CH, Nauck MA. Asian Subpopulations May Exhibit Greater Cardiovascular Benefit From Long-Acting Glucagon-Like Peptide 1 Receptor Agonists: A Meta-Analysis of Cardiovascular Outcome Trials. *Diabetes Metab J* 2019 Aug;43(4):410-421. doi: 10.4093/dmj.2018.0070. PMID 3060459
- Kang YM, Cho YK, Lee SE, Park JY, Lee WJ, Kim YJ, Jung CH. Cardiovascular Diseases and Life Expectancy in Adults with Type 2 Diabetes; A Korean National Sample Cohort Study. *J Clin Endocrinol Metab* jc.2017-00643. DOI: <https://doi.org/10.1210/jc.2017-00643>. PMID 28911137

Joint Symposium KSSO-TOS

Advancing Obesity Treatment in Individuals of Asian Descent: Clinical Implications of GLP-1 Receptor Agonists in Asia

Yu Mi Kang (Harvard Medical School, USA)

Epidemiologic studies have shown that individuals in Asia or of Asian descent are at a higher risk of cardiometabolic deterioration at lower BMI levels compared to Western populations, particularly those of White race. This increased risk is thought to be mediated by a greater tendency towards visceral adiposity for a given degree of subcutaneous adiposity. Consequently, healthcare practices in East Asia employ more stringent BMI cut-offs to define obesity, aiming to initiate preventative strategies at an earlier stage. Over the past decade, numerous randomized clinical trials have consistently demonstrated significant benefits of GLP-1 receptor agonists in weight and visceral adiposity reduction among people of Asian descent, along with potentially greater improvements in glycemic control and cardiovascular risk reduction. In this session, we will review the current literature and clinical experience to discuss the effectiveness of GLP-1 receptor agonists in individuals of Asian descent, which may have considerable public health implications in Asia and globally.



Robyn Pashby

Health Psychology Partners, USA

• Education

Period	Affiliation	Position
– 2009	USUHS, F. Edward Hebert School of Medicine	Ph.D.
– 2001	American University	M.A.
– 1999	Colby College	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2022-Present	The Obesity Action Coalition	Board Member
– 2016-Present	Health Psychology Partners	Owner/ Director
– 2012-2017	National Center for Weight and Wellness	Assistant Director
– 2009-2012	George Washington University Weight Management Program	Consulting Psychologist

• Committee Memberships

- Obesity Action Coalition
- The Obesity Society
- Obesity Medical Association
- Women Business Leaders of the U.S. Health Care Industry Foundation

• Publications

- Pashby, R. (2024). Using Trauma Informed Care When Discussing Weight in Clinical Practice. Presented for the Academy of Nutrition and Dietetics. *Virtual Meeting*
- Pashby, R. (2024). Mental and Behavioral Health Considerations for Adults with Obesity Taking Anti-Obesity Medications. Presented as part of the “Medications and Obesity: Exploring the Landscape and Advancing Comprehensive Care.” sponsored by the National Academies of Science, Engineering and Medicine. Virtual meeting.
- Pashby, R. (2023). A Psychologist’s Perspective on Obesity Stigma and Internalized Weight Bias. Presented at The Obesity Society Annual Meeting, Dallas Texas
- Pashby, R. (2023). Talking about Weight in Clinical Practice. Presented for The MacDonald Center for Obesity Prevention and Education (COPE) at Villanova University’s Fitzpatrick College of Nursing. *Virtual Meeting*
- Pashby, R. (2023). Communicating about Body Weight in the Clinic and Beyond: Navigating discussions gracefully in a body positivity vs obesity treatment world. Presented as part of the “Going Beyond BMI: Communicating About Body Weight: A Second Workshop in the Series” sponsored by the National Academies of Science, Engineering and Medicine. *Virtual meeting*

Joint Symposium KSSO-TOS

Real World Mental Health Implications of Anti-Obesity Medication Use

Robyn Pashby (Health Psychology Partners, USA)

The use of anti-obesity medications (AOM) presents a complex landscape where medical treatment intersects with mental health and societal perceptions. This talk explores nuanced mental and behavioral health implications in the era of increased AOM use. The discussion will include a review of the state of behavioral science, recent advancements in lifestyle and behavior modification strategies, and an exploration of the practical psychological responses and challenges experienced by individuals prescribed AOMS.

Central to this discussion is how internalized weight bias is embedded within the patient experience, not only influencing treatment decisions but also profoundly affecting the physical and mental well-being of individuals seeking to manage their weight through medication.

Through continued dialogue and research, this talk aims to broaden awareness of how medical advancements in obesity treatment affect psychological processes. By empowering healthcare providers and advocating for patient-centered strategies, we can work towards mitigating stigma, promoting mental resilience, and ultimately improving the quality of care for individuals navigating the complexities of obesity treatment with AOMs.

Plenary Lecture 4

Chairperson

Kyu Rae Lee
Gachon University, Korea

Speaker

W. Timothy Garvey
University of Alabama at Birmingham, USA



W. Timothy Garvey

University of Alabama at Birmingham, USA

• Education

Period	Affiliation	Position
– 1983-1984	University of California, San Diego, School of Medicine	Clinical and Research Fellow
– 1982-1983	University of Colorado Health Sciences Center	Clinical and Research Fellow
– 1974-1978	St. Louis University School of Medicine, St. Louis, Missouri	M.D.
– 1970-1974	Washington University, St. Louis	B.A.

• Affiliations / Experience

Period	Affiliation	Position
– 2018-Present	UAB Diabetes Research Center	Director/ PI
– 2018-Present	University of Alabama at Birmingham	Professor
– 2003-Present	Birmingham Veterans Affairs Medical Center Birmingham	Staff Physician and GRECC Investigator
– 2003-2018	Medical University of South Carolina	Adjunct Professor of Medicine
– 1994-2003	Ralph H. Johnson Veterans Affairs Medical Center, Charleston	Staff Physician

• Committee Memberships

- National Board of Medical Examiners
- American Board of Internal Medicine
- Specialty Board in Endocrinology and Metabolism
- American Board of Obesity Medicine
- American Association of Clinical Endocrinology

• Publications

- Everett AB, Garvey WT, Fernandez JR, Habegger K, Harper LM, Battarbee AN, Martin SL, Moore BA, Fouts AE, Bahorski J, Chandler-Laney PC. Leptin resistance in children with in utero exposure to maternal obesity and gestational diabetes. *Pediatr Obes* (12):e13081. doi: 10.1111/ijpo.13081. Epub. PMID: 37859518; PMCID: PMC10841866
- Hankosky ER, Wang H, Neff LM, Kan H, Wang F, Ahmad NN, Griffin R, Stefanski A, Garvey WT. Tirzepatide reduces the predicted risk of atherosclerotic cardiovascular disease and improves cardiometabolic risk factors in adults with obesity or overweight: SURMOUNT-1 post hoc analysis. *Diabetes Obes Metab*. 26(1):319-328. doi: 10.1111/dom.15318. Epub. PMID: 37932236
- Kirkman MS, Tripputi M, Krause-Steinrauf H, Bebu I, AbouAssi H, Burch H, Duran-Valdez E, Florez H, Garvey WT, Hsia DS, Salam M, Pop-Busui R; GRADE Research Group. Comparative Effects of Randomized Second-line Therapy for Type 2 Diabetes on a Composite Outcome Incorporating Glycemic Control, Body Weight, and Hypoglycemia: An Analysis of Glycemia Reduction Approaches in Diabetes: A Comparative Effectiveness Study (GRADE). *Diabetes Care*. dc231332. doi: 10.2337/dc23-1332. Epub ahead of print. PMID: 38194519
- Garvey WT, Cohen RM, Butera NM, Kazemi EJ, Younes N, Rosin SP, Suratt CE, Ahmann A, Hollander PA, Krakoff J, Martin CL, Seaquist E, Steffes MW, Lachin JM; GRADE Research Group. Association of Baseline Factors With Glycemic Outcomes in GRADE: A Comparative Effectiveness Randomized Clinical Trial. *Diabetes Care*. dc231782. doi: 10.2337/dc23-1782. Epub ahead of print. PMID: 38285957
- Howell CR, Zhang L, Mehta T, Wilkinson L, Carson AP, Levitan EB, Cherrington AL, Yi N, Garvey WT. Cardiometabolic Disease Staging and Major Adverse Cardiovascular Event Prediction in Two Prospective Cohorts. *JACC Advances, In press*

Plenary Lecture 4**Current and Future Second-Generation Medications for Adiposity-Based Chronic Disease: an Era of Drug Discovery that Constitutes a Landmark in the History of Medicine**

W. Timothy Garvey (University of Alabama at Birmingham, USA)

Since 2021, two medications have been available for treatment of obesity that provide 15% weight loss in clinical trials, semaglutide and tirzepatide. These are described as second-generation medications based on an unprecedented efficacy for weight loss that is sufficient to prevent or treat a broad array of obesity complications and related diseases. This level of efficacy enables a complications-centric approach to the care of Adiposity-Based Chronic Disease where the goal is to ameliorate complications that confer morbidity and mortality rather than the loss of weight per se. Semaglutide and tirzepatide are peptide agonists of the nutrient-regulated hormones (NRHs) glucagon-like peptide 1 (GLP1) and dual agonism for GLP1 and gastric inhibitory polypeptide (GIP), respectively. Importantly, multiple other medications are actively being developed by pharma based on NRHs, including GLP1, GIP, amylin, glucagon, and peptide YY either as mono-, dual-, or triple-agonist/antagonists. Other NRHs also represent active drug targets including leptin agonism and ghrelin antagonism, and pharmaceutical strategies for muscle preservation during weight loss are under development. It is exciting that medications in phase 1-3 trials have already been shown to have second-generation level efficacy closing the gap with bariatric surgery. Furthermore, these medications are proving to be effective in treating multiple weight-related complications including osteoarthritis, sleep apnea, and the cardiometabolic disease outcomes of type 2 diabetes, MASH, hypertension, CHF with preserved ejection fraction, CKD, and prevention of cardiovascular disease. The potential benefits regarding patients suffering from obesity and the burden of this disease in societies are immense, and the current era of drug development for obesity merits recognition as a landmark in the history of medicine. To realize these benefits, societies will need to ensure access to these life-saving medications for those patients who need them.

Oral Presentation 1

Chairpersons

Yeong Sook Yoon

Inje University, Korea

Yang-Im Hur

CHA University, Korea

Judge

Jin Wook Kim

Hippocrata Clinic, Korea

Speakers

Wan Ying Gan

Universiti Putra Malaysia, Malaysia

Wonsock Kim

Eulji University, Korea

Mahla Chambari

UCSI University, Malaysia

Darae Kim

Sungkyunkwan University, Korea

Soo Lim

Seoul National University, Korea

Sinyoung Cho

Seoul National University, Korea

OP 1-1 1. Behavior and Public Health for Obesity

Relationship Between Weight-Related Self-Stigma and Eating Disorders in University Students: The Mediating Role of Psychological Distress and BMI

Wan Ying Gan¹, Wai Chuen Poon², Serene En Hui Tung³

¹Department of Nutrition, Universiti Putra Malaysia, Malaysia

²Sunway Business School, Sunway University, Malaysia

³Division of Nutrition and Dietetics, IMU University, Malaysia

Background: University students who experience weight-related stigma may face increased psychological distress, which can elevate the risk of developing obesity and/or eating disorders. This cross-sectional study aimed to determine the mediating effect of psychological distress and BMI in the relationship between weight-related self-stigma and eating disorders among Malaysian university students.

Methods: A total of 1044 university students completed an online survey including Weight Self-Stigma Questionnaire, Depression, Anxiety, Stress Scale-21, and Eating Disorder Examination Questionnaire. Body weight and height of the students were self-reported. The Partial Least Square Structural Equation Modelling (PLS-SEM) using the SmartPLS 3.0 software was used to test the mediation analysis in this study.

Results: The prevalence of overweight and obesity was 19.4%. Weight-related self-stigma was found to be significantly related to psychological distress ($\beta=0.455$, $p<0.001$), BMI ($\beta=0.478$, $p<0.001$) and eating disorders ($\beta=0.505$, $p<0.001$). BMI was also found to be significantly related to psychological distress ($\beta=-0.136$, $p<0.001$) and eating disorders ($\beta=0.174$, $p<0.001$), as well as psychological distress and eating disorders ($\beta=0.091$, $p<0.001$). Psychological distress and BMI mediated the relationship between weight-related self-stigma and eating disorders

Conclusion: University students with weight-related self-stigma tend to have high BMI and psychological distress, which in turn has the potential to lead to eating disorders. Addressing and reducing weight stigma is critical for promoting the overall well-being and healthy behaviors in this population.

OP 1-2 1. Behavior and Public Health for Obesity

Association of Lifestyle Factors with all-cause and cause-specific Mortality among Individuals with Obesity: A nationwide retrospective study in Korea

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Background: Obesity is a prevalent, chronic disease worldwide and unhealthy lifestyle is an important risk factor in mortality. We investigated the association between mortality (all-cause and cause-specific) and combined unhealthy lifestyle factors including smoking, excessive use of alcohol, and lack of physical activity among obese individuals.

Methods: In this study, 179,714 individuals were included from a representative sample cohort of the Korean National Health Insurance System. The information of unhealthy lifestyle factors was identified through questionnaire at baseline.

Results: During the 7.6 years of follow-up, individuals with current smoking, excessive use of alcohol, or with lack of physical activity had higher hazard ratios (HRs) compared to those who did not; 1.37 (95% confidence intervals, CI: 1.29–1.46) with current smoking, 1.12 (95% CI:

1.02–1.22) with heavy alcohol consumption, 1.22 (95% CI: 1.16–1.28) with lack of physical activity (p value <0.001). The HRs compared with individuals in unhealthy lifestyle score that was calculated by summing the participants' scores of baseline lifestyles, those scored 1, 2, and 3 were associated with higher risks of all-cause mortality; HRs 1.27 (95% CI: 1.20–1.36), 1.59 (95% CI: 1.47–1.72), and 1.82 (95% CI: 1.58–2.10), respectively to those with score 0 (P for trend <0.001). Similar trends were also identified in cause-specific mortality such as cardiovascular disease and cancer.

Conclusion: The unhealthy lifestyle factors increase mortality and the number of unhealthy lifestyles is strongly associated with all-cause and cause specific death. Our findings suggest that appropriate policies and interventions are required for better health outcomes with obese individuals.

OP 1-3 1. Behavior and Public Health for Obesity

Transitioning to Sustainable Dietary Practices in Malaysia Current Insights and Future Strategies

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Background: The urgency for adopting sustainable dietary patterns has intensified in Malaysia due to rapid climate change and the country's heightened vulnerability. This study aims to identify and summarize available data on the changes required in the current Malaysian diet to enhance sustainability, and to evaluate the extent to which current policies address this shift.

Methods: A systematic search was conducted using PubMed, Scopus, Web of Science, and Malaysian scientific databases from January 1990 to March 2024. A total of 61 studies and policy analyses were included in this review, and this review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement.

Results: Findings suggest that moving towards a sustainable Malaysian

diet necessitates increased consumption of fruits, vegetables, legumes, cereals, and poultry, and reduced intake of red meat, refined grains, sugars, and high-fat foods. Sustainable dietary patterns, such as the Mediterranean Diet and plant-based diets like the EAT-Lancet diet, offer significant environmental and health benefits, including reduced carbon and water footprints and lower risks of chronic diseases such as diabetes and cardiovascular diseases. Despite efforts to address non-communicable diseases (NCDs) by limiting access to unhealthy foods, current Malaysian policies insufficiently cover the environmental dimensions of sustainable diets.

Conclusion: To create an enabling environment for sustainable diets, it is essential to enhance public awareness, support research to provide robust evidence, and implement targeted interventions. Promoting sustainable and healthy dietary practices is crucial for addressing public health challenges and achieving environmental sustainability in Malaysia.

OP 1-4 10. Metabolic and Bariatric Surgery

Role of Bariatric Surgery in Patients with Advanced Heart Failure: Safety, Efficacy and Clinical Implications

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Background: Bariatric surgery (BS) is an important treatment option for obesity, however, the safety, efficacy and clinical implications of BS in advanced heart failure (HF) are not well known. We aimed to describe the use of BS in a diverse group of high-risk obese HF patients.

Methods: Among consecutively enrolled obese (body mass index [BMI] > 35kg/m²) advanced HF patients between 2010 and 2022, 15 patients underwent BS. We evaluated the safety and efficacy of BS in these patients and compared the clinical course of obese advanced HF patients who underwent HTx or durable mechanical circulatory support (MCS) without BS (non-BS group, n=62) during the same period.

Results: Among 15 BS patients, 12 underwent sleeve gastrectomy and 3 underwent gastric bypass surgery. The mean hospital stay for BS was

5.7 ± 2.4 days. Post-BS complications occurred in only 2 (13.3%) patients with no BS related death. After BS, the mean value of BMI was significantly reduced (pre-BMI: 39.8 [39.0-42.2] kg/m², post-BMI: 31.6 [27.7-35.3] kg/m², p < 0.001). Baseline characteristics were comparable between two groups. Comparable proportion of patients were listed for HTx (6/11 [54.5%] vs. 45/62 [72.6%], p=0.277) and underwent HTx (6/11 [54.5%] vs. 40/62 [64.5%], p=0.522). Post-HTx survival was compared between subgroup of BS patients who underwent HTx after BS (n=6) and non-BS group who underwent HTx (n=40). During median follow up duration of 26 [IQR: 8.3-79] months, post-HTx survival was comparable between two groups.

Conclusion: BS in advanced HF patients is a relatively safe and effective treatment to reduce BMI.

OP 1-5 9. Therapeutics of Obesity and Metabolic Syndrome

Once-Weekly Semaglutide 2.4 mg for Weight Management in an Asian Population with Obesity Diagnosed as BMI ≥25 kg/m², According to Local Guidelines: Results From the STEP 11 Trial

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Background: We investigated the efficacy and safety of semaglutide 2.4 mg in an Asian population with obesity (BMI ≥25 kg/m²), defined according to local guidelines.

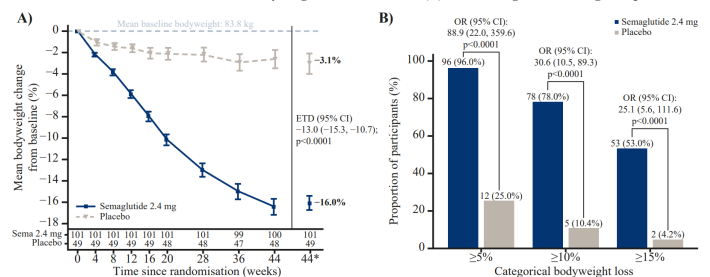
Methods: This double-blind, 44-week trial (STEP 11; NCT04998136) included adults from South Korea and Thailand with BMI ≥25 kg/m² and ≥1 unsuccessful weight loss attempt, without diabetes. Participants were randomised 2:1 to once-weekly subcutaneous semaglutide 2.4 mg or placebo, alongside lifestyle interventions. Endpoints from baseline to week 44 included percentage bodyweight change (co-primary); proportion of participants with bodyweight loss ≥5% (co-primary), ≥10% and ≥15% (confirmatory); change in waist circumference (confirmatory) and blood pressure (supportive); and safety. The treatment policy estimand was used.

Results: All participants completed the trial; 101 received semaglutide 2.4 mg and 49 received placebo. At baseline, most participants were female (74%), mean age was 39 years, bodyweight 83.8 kg, BMI 31.3 kg/m² and waist circumference 98.1 cm. Mean bodyweight reductions were greater with semaglutide 2.4 mg versus placebo (Figure-A). Greater proportions of participants receiving semaglutide 2.4 mg versus placebo achieved categorical bodyweight loss (Figure-B). Greater reductions were also observed in mean waist circumference (estimated treatment difference

[95% confidence interval] -9.0 [-11.4, -6.6] cm, systolic (-10.1 [-14.1, -6.0] mmHg) and diastolic blood pressure (-5.4 [-8.7, -2.0] mmHg). Serious adverse events were reported by 12.9% of participants receiving semaglutide 2.4 mg and 8.2% receiving placebo; no clustering was observed.

Conclusion: Semaglutide 2.4 mg was superior to placebo in reducing bodyweight in an Asian population with obesity (BMI ≥25 kg/m²), with no new safety concerns.

Figure: Percentage bodyweight change from baseline to week 44 (A) and proportion of participants with ≥5%, ≥10% and ≥15% bodyweight loss at week 44 (B) with semaglutide 2.4 mg and placebo



Data are for the full analysis set and the in-trial observation period, using the treatment policy estimand.
*Estimated mean percentage change in bodyweight from baseline to week 44.
CI, confidence interval; ETD, estimated treatment difference; OR, odds ratio; Sema, semaglutide.

OP 1-6 10. Metabolic and Bariatric Surgery

Income Status and Incident Cardiovascular Disease after Bariatric Surgery in Korea: A Population-based Cohort Study

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Background: Limited evidence examined the association of longitudinal change in income with incident cardiovascular disorders risk among individuals who underwent bariatric surgery

Methods: This longitudinal study utilized a nationally representative sample from the Korean National Health Insurance Service database. Cox proportional hazard regression analyses were performed to identify the association of income dynamics with incident CVD, including myocardial infarction and heart failure in patients who underwent bariatric surgery. Hazard ratios (HRs) and 95% confidence intervals (CIs) were estimated after adjusting for potential confounders.

Results: A total of 39 and 145 individuals were classified as outcome groups of myocardial infarction and heart failure among 7,203 adults. Individuals with sustained low income over 4 years had the highest HF risk compared with those who had never experienced low income (Model 3: HR 1.562, 95% CI 1.006-2.426; P for trend <0.05). Individuals with

sustained high income over 4 years had a lower HF risk compared with those who had never experienced high income (Model 3: HR 0.363, 95% CI 0.189-0.697; P for trend <0.05). The highest income at baseline exhibited the lowest HF risk compared to those with lower income (Model 3: HR 0.327, 95% CI 0.169-0.631; P for trend <0.05). Higher income variability over 5 years, especially income drop was associated with higher MI and CVD risk without statistical significance.

Conclusion: Sustained low-income status was associated with increased HF risk, whereas baseline high-income and sustained high-income status was associated with decreased HF risk among individuals who underwent BS. Our findings underscore the need for increased public policy awareness of the impact of income status on CVD risk among individuals who underwent BS.

Keywords: Obesity, Income, Socioeconomic factor, Risk factors, Heart failure, Bariatric surgery

Oral Presentation 2

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OP 2-1 1. Behavior and Public Health for Obesity

Unravelling the impact of obesity and oxidative stress on reproductive health of infertile women

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Background: Obesity is associated with various reproductive disorders in women including reproductive impairment such as menstrual disorders, anovulation, unable to conceive, miscarriages /recurrent miscarriages, and pregnancy defects outcomes. Thus, obesity poses some severe challenges in women. The purpose of the study is to investigate the association of infertility with obesity and oxidative stress in women.

Methods: The clinical investigation was performed among infertile and healthy married female patients aged 18-45. Patients (50 fertile and 50 infertile women) were randomly selected from the Department of Obstetrics & Gynaecology, King George's Medical University, Lucknow, India. Written consent and lifestyle information of patients were collected during blood sample collection. Oxidative stress and antioxidants biomarkers were determined by Elisa sandwich method and data were statistically analyzed by t-test at $p < 0.05$.

Results: Demographically, it was observed that most of the subjects who

belonged to the rural areas, were not literate, and most of the infertile patients were facing irregular menstrual cycles (48%) and imbalances in their reproductive hormone levels. Significantly the higher level of prolactin hormone was observed in our result, which indicated that ovulation may be suppressed due to oxidative stress. Body Mass Index (BMI) of 27.72 ± 4.23 of infertile women was higher as compared to control subjects. The study observed glutathione peroxidase (GPx) and catalase (CAT) ($p < 0.0001$) enzyme activities were significantly higher in infertile patients when compared with the control subjects. The Lipid peroxide levels were found to increase in cases compared to controls. The enzyme activity of superoxide dismutase (SOD) and glutathione reductase (GR) activity was declined in the case of subjects as compared to control subjects.

Conclusion: The results of this study suggested that obesity and oxidative stress affect fertility in infertile women. Infertile women who were overweight and obese were at high risk for reproductive disorders.

OP 2-2 2. Nutrition, Education and Exercise for Obesity

Beyond the Scale: The Effect of Trim and Triumph (TNT) Challenge on Metabolic Parameters in Overweight and Obese Office Workers.

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Background: Obesity is not only a global health challenge but also correlates with a sedentary lifestyle. Weight loss programs, that include structured training and a controlled diet, have been shown to lower the risk of developing obesity-related complications. Our study investigates the effectiveness of the TNT challenge on body fat, blood cholesterol, fasting blood glucose, high-sensitivity C-reactive protein (hs-CRP), and leptin levels, among overweight and obese office workers.

Methods: A total of 40 overweight and obese participants, with an average age of 35 ± 5.49 years old, and a body mass index (BMI) of 32.80 ± 5.75 kg/m², were enrolled in the TNT challenge. This challenge comprises of 36 sessions featuring intense workouts, dietary guidance, and fitness assessments with the supervision of fitness trainers and a nutritionist. Anthropometry tests and blood tests were assessed before and after the challenge. Data were analysed by using the IBM SPSS Statistics version 29.0.1.1.

Results: After a 12-week weight loss program, significant differences were observed in weight (-5.62 ± 2.45 kg), BMI (-2.21 ± 0.99 kg/m²), body fat mass (-3.91 ± 2.19 kg), body fat percentage (-2.11 ± 2.12 %), total blood cholesterol (-0.41 ± 0.79 mmol/L), and LDL level (-0.28 ± 0.75 mmol/L) ($p < 0.05$), indicating decreases in these parameters. However, there were no significant differences in fasting blood glucose, hs-CRP, triglyceride, and leptin levels ($p > 0.05$).

Conclusion: Our findings show that the TNT challenge involving diet and lifestyle modification led to significant decreases in the weight, BMI, body fat mass, and blood cholesterol of the office workers. The implementation of this challenge would allow overweight and obese office workers to achieve improvement in weight-related outcomes, which could have long-term positive effects on their health and well-being.

OP 2-3 8. Pathophysiology of Obesity and Metabolic Syndrome

The Formation of Reward Memory through a Neuropeptide Y Spotlight in Nucleus Accumbens

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Background: The nucleus accumbens (NAc) has been recognized as a prime center for the reward. However, the mechanism by which neurons in NAc controls food-specific memory, especially for palatable food, remains unknown. Here, we demonstrated that NPY neurons in NAc control the formation of reward memory.

Methods: Experiments were conducted in mice utilizing photometry to observe real-time neural activity and optogenetics for neuromodulation. Furthermore, single-cell monitoring was performed using a miniscope, and electrophysiology was employed to examine the correlation with dopamine.

Results: Using calcium imaging, we demonstrated that NAc^{NPY} neurons encode the expected value and current value of food. Using miniscope,

we also discovered that NAc^{NPY} neurons track the changes in value representations, with the role of updating value extinction. Optogenetic experiments showed that NAc^{NPY} neurons bidirectionally regulate feeding behavior by controlling food-liking. Furthermore, NAc^{NPY} neurons are sufficient and necessary for the formation of contextual and flavor reward memories. Interestingly, these effects are specific to the high-value condition (palatable food), not in the low-value condition (chow). The NAc^{NPY} neurons indirectly receive input signaling from dopamine.

Conclusion: In conclusion, these experiments provide strong evidence that NAc^{NPY} neurons encode positive memory for palatable food. Our findings could lead to the development of novel therapeutic strategies to prevent and treat obesity and food addiction.

OP 2-4 1. Behavior and Public Health for Obesity

Poor sleep quality and gestational weight gain across trimesters

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Background: Sleep quality has been reported as an emerging factor to prevent excessive gestational weight gain. However, the critical timing of which trimester where poor sleep quality influences GWG remains unclear. Hence, this study aims to determine the association between sleep quality across trimesters with GWG during pregnancy.

Methods: This was a prospective cohort study where 316 pregnant women at second trimester were recruited from maternal and child health clinics in Kuala Lumpur, Malaysia via convenience sampling. A total of 276 pregnant women completed assessment of sleep quality at both trimesters using the Pittsburgh Sleep Quality Index (PSQI), while total GWG was taken from antenatal health records.

Results: Prevalence of inappropriate GWG was 68%, with 29% inadequate GWG and 39% excessive GWG. Sleep latency, subjective sleep quality,

sleep duration, and sleep quality was significantly deteriorated across trimesters ($p < 0.001$). Second trimester sleep latency score was significantly higher for inadequate GWG ($F = 4.396$, $p = 0.013$). Third trimester subjective sleep quality score was significantly higher for inadequate GWG ($F = 5.498$, $p = 0.005$). Poor sleep quality was increased from second (62%) to third trimester (64%). During the second trimester, only increased sleep latency was observed to increase GWG ($\beta = -0.231$, $p < 0.001$). However, during the third trimester, poor subjective sleep quality ($\beta = -0.207$, $p < 0.001$), increased sleep latency ($\beta = -0.192$, $p = 0.001$), and poor sleep quality ($\beta = -0.116$, $p = 0.045$) was associated with increased GWG.

Conclusion: Poor sleep quality poses an increased risk of excessive GWG, especially during the third trimester. Future interventions should focus on addressing disturbed sleep during the late pregnancy period for optimum gestational weight management.

OP 2-5 2. Nutrition, Education and Exercise for Obesity

Different Individual Glycemic Response to Meal Composition and Type in Korean adults

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Background: The regulation of postprandial glycemic is complex, but meal composition and meal types are major determinants. Despite high variability between individuals, specific nutrition strategies can be developed based on individual glycemic responses. The aim of this study is to explore factors affecting postprandial glycemic response to typically consumed meals in apparently healthy Korean adults, in order to develop individualized nutritional strategies.

Methods: To monitor postprandial glucose levels, participants wore continuous glucose monitoring (CGM) for two weeks. During the intervention periods, three standardized mixed meals and a 75g glucose were administered on separate days following an 8-hour fast. The rice-based meal (typical Korean-style) contains 96.4g carbs, 15.3g protein, 15.6g fat, totaling 582 kcal. The bread-based meal (sandwich and mixed grain beverage) contains 77.1g carbs, 19.9g protein, 18.0g fat, totaling 550 kcal. The salad meal (fresh salad with chicken and drinking yogurt) contains 67.5g carbs, 28.8g protein, 24.7g fat, totaling 551 kcal.

Results: The average glycemic responses of the three meals corresponded to their carbohydrate contents. However, the postprandial responses of

the rice-based meal and the bread-based meal were similar, despite their differing carbohydrate contents (96.4g vs 77.1g) and proportion (65.7% vs 56.1%). When the area under the curve (AUC) of postprandial glucose up to 180 minutes was calculated, the average AUC was 1166.4±181.9 mmol/L for the rice meal and 1171.0±162.2 mmol/L for the bread meal. Participants were categorized into two groups based on their higher response to either the rice meal (n=22) or the bread meal (n=25) according to the AUC of each meal. There were no differences in sex or age between the groups. However, individuals with a higher response to the bread meal showed a greater postprandial glycemic response to a 75g glucose load, with a higher coefficient of variation than those with a higher response to the rice meal (18.0% vs 13.8%). The bread meal has lower carbs contents than the rice meal. However, the mixed grain beverage as liquid form comprises half of the carbohydrate contents, which may lead to higher postprandial response in some individuals.

Conclusion: The postprandial response to mixed meals depends on meal contents and meal type, including the physical form (solid or liquid), and its effect varies by individual. Specific nutritional recommendations should be individualized based on each person's postprandial response to

Oral Presentation 3

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Bumjo Oh

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OP 3-1 5. Diabetes and Obesity

Control of Feeding Behavior and Body Weight by Hypothalamic Cereblon (CRBN)

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Background: Cereblon (CRBN) is a substrate receptor for the CUL4A E3 ubiquitin ligase. It was discovered that CRBN KO mice show diet-induced obesity (DIO)-resistant phenotypes, including less weight gain and lower fat storage in tissues. As CRBN is known to inhibit AMPK activity, it was suggested that the resistance to DIO in CRBN KO resulted from hyperactive hepatic AMPK, which reduces lipogenic gene expressions. However, it is insufficient to explain the remarkable lean phenotypes of CRBN KO mice, and multilateral research is still required regarding CRBN's physiological actions on energy intake and expenditure.

Methods: We verified DIO-resistant phenotypes in the CRBN KO mice model and the body weight-lowering effect of CRBN inhibition by thalidomide in vivo administration. To meticulously examine the role of CRBN in body weight regulation, we established several conditional CRBN knockout mice models utilizing Cre-loxP system – e.g. KO in adipose tissue (Adiponectin-Cre;Crbn flox), nervous system (Nestin-Cre;Crbn flox), and the paraventricular nucleus of the hypothalamus (PVN) (Sim1-Cre;Crbn flox). Through AAV-mediated gene delivery, we conducted a gain-of-function study in the condition of CRBN ectopic expression in the PVN.

Results: Unlike the previous study, we consistently observed reduced food intake in high-fat diet (HFD) -fed CRBN KO mice. The administration

of thalidomide, which targets the E3 ligase function of CRBN, phenocopied the bodyweight and food intake reductions in CRBN KO mice, and this bodyweight-lowering effect of thalidomide was CRBN-dependent. Moreover, as with phenotypes in CRBN whole-body KO mice, CRBN neuronal KO (NKO) mice showed decreased body weight and food intake, but neither CRBN KO nor NKO mice induced measurable alterations in energy expenditure and thermogenic gene expression in fat tissues. Thus, we hypothesized that the central regulation of food intake rather than energy expenditure is the major contributor to CRBN-mediated body weight regulation. Strikingly, while CRBN KO in the Sim1+ neurons (Sim1-Cre; Crbn flox) of the paraventricular nucleus (PVN) led to body weight and food intake reduction, AAV-mediated ectopic expression of CRBN in the PVN elicits vigorous hyperphagic obesity in mice under HFD-feeding condition.

Conclusion: We conclude that CRBN contributes to body weight control through the central regulation of feeding behavior rather than energy expenditure. Since thalidomide administration phenocopied CRBN KO, we speculate that DIO-resistance phenotypes in CRBN KO/NKO/PKO mice were led by alterations in substrate protein stability, which might act in the PVN for feeding regulation.

OP 3-2 5. Diabetes and Obesity

Adenosylhomocysteinase-like 1 regulates nutrient-induced insulin sensitivity by interacting with IP3Rs in brown adipose tissue.

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Background: Brown adipose tissue (BAT) is essential for maintaining body temperature by burning up mitochondria in human infants and rodents during growth. Also, according to a previous paper, BAT reactivation has a therapeutic potential to combat metabolic disease. There are some reasons that calcium intake to mitochondria is related to Uncoupling protein 1 (UCP1) level. Adenosylhomocysteinase-like 1 (Ahcyl1) binds to IP3Rs and regulates calcium release. However, the role of Ahcyl1 in BAT, which is believed to regulate metabolism by calcium signaling, is not well-known.

Methods: This study presents data from BAT-specific Ahcyl1 KO mice (cKO; Ucp1^{Cre/+}; Ahcyl1^{fl/fl}) and the Ahcyl1 KO immortalized brown preadipocyte (iBPA) cell line to evaluate highly sensitive IP3Rs-mediated thermogenesis in KO brown adipocytes and improved metabolic homeostasis.

Results: We identified that AHCYL1 acted and bound more to IP3Rs in response to calcium and adrenergic signaling while treated with the acetylcholine receptor agonist (carbachol) or norepinephrine (NE) in the iBPA cell line or wild-type mice. Also, we checked increased heat

generation after acute and chronic cold stimulation with upregulated UCP1 levels in BAT of cKO mice. Consistently, KO cells revealed upregulated oxygen consumption rates. However, cKO iBAT had larger sizes of brown adipocytes than controls after chronic cold stimulation. This was because of increased lipid utilization with lipolysis and activation of nutrient-sensing kinase mTOR to supply an energy source for mitochondrial uncoupled respiration. Next, to investigate if the enhanced brown fat activation could promote insulin sensitivity, we induced insulin signaling by refeeding the standard chow diet after fasting or feeding the high-fat diet (HFD). cKO mice showed improved insulin sensitivity with upregulated p-AKT levels in epididymal white adipose tissue compared to control mice.

Conclusion: Collectively, targeting Ahcyl1 would be a potential therapeutic target for obese-induced metabolic diseases, including diabetes, by increasing energy consumption and improving insulin tolerance.

OP 3-3 1. Behavior and Public Health for Obesity

Chrononutrition behaviours and its implications to maternal gestational weight gain

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Background: Regular meal timings play an important role in maintaining healthy gestational weight gain (GWG), which is beneficial for optimum maternal and infant health. This study aims to investigate the changes of chrononutrition behaviours across trimesters and its association with GWG.

Methods: This was a prospective cohort study where 197 pregnant women were recruited at second trimester, while 138 completed follow-up data at third trimester. Chrononutrition behaviours were extracted from a self-administered 3-days food record, while GWG data was collected through antenatal health records.

Results: The mean age of the participants was 28.08 ± 3.76 years old, with the majority being Malay (72%). The average total GWG was 13.7 ± 5.7 kg, with 33% having adequate GWG, while inadequate and excessive GWG were 27% and 41% respectively. Meal timing and calorie intake

remained significantly unchanged across trimesters. Prevalence of skipping breakfast for at least one day increases from second (20%) to third trimester (25%). Lunch was the largest meal throughout pregnancy with 609 (179) kcal and 607 (186) kcal in second and third trimester respectively. The average meal frequency was 4 meals, and the eating window was less than 12 hours for most pregnant women (59% vs 64%). Indulgence in night eating behaviour reduces as the pregnancy progressed (63% vs 37%). Adjusted logistic regression shows that pregnant women were more likely to have excessive GWG (AOR= 3.759, 95% CI: 1.254, 11.270; p=0.018) and inadequate GWG (Adjusted OR= 4.217, 95% CI: 1.113, 15.983; p=0.034) when frequency of breakfast skipping increases from second to third trimester.

Conclusion: Breakfast skipping habits could have a negative influence on healthy GWG of pregnant women. Future studies should determine the underlying factors of breakfast skipping habits among pregnant women to propose effective approaches to consume breakfast regularly.

OP 3-4 11. Obesity and Metabolic Syndrome in Children and Adolescents

Leptin, adiponectin, and insulin resistance in relation to hepatic steatosis in pediatric obesity

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Background: The prevalence of hepatic steatosis is increasing, and one of its risk factors is obesity. The purpose of this study is to investigate the serum biomarkers associated with hepatic steatosis in children and adolescents with obesity.

Methods: A total of 221 children and adolescents with a body mass index (BMI) above the 85th percentile (mean age: 11.01 years) were included in this study. Magnetic resonance imaging (MRI)-estimated proton density fat fraction (PDFF) was used for quantification of hepatic fat. And obesity-related hormones such as human leptin, adiponectin, and fibroblast growth factor 21 (FGF21) were measured using the participants' serum. Participants were divided into two groups based on hepatic fat fraction of 5%, group without and group with hepatic steatosis.

Results: Baseline human leptin was significantly higher and adiponectin was lower, in group with hepatic steatosis than in those without hepatic steatosis. Hepatic fat fraction was correlated negatively with adiponectin ($r = -0.25$, $p < 0.001$), and positively with human leptin ($r = 0.04$, $p < 0.001$) and homeostasis model assessment for insulin resistance (HOMA-IR; $r = 0.38$, $p < 0.001$). FGF21 showed no significant correlation with hepatic fat deposition. After adjustment for potential confounders, including BMI z-score, hepatic fat fraction was found to be independently associated with higher human leptin ($\beta = 0.20$, $p = 0.001$), and lower adiponectin ($\beta = -1.04$, $p = 0.011$).

Conclusion: The results suggest a potential role for leptin and adiponectin as non-invasive biomarkers of hepatic steatosis in children and adolescents with obesity, in which insulin resistance is likely to be involved.

OP 3-5 5. Diabetes and Obesity

Effect of semaglutide on kidney outcomes in people with overweight or obesity and established cardiovascular disease in the SELECT trial

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Background: Obesity is an important risk factor for declining kidney function and albuminuria. Secondary analyses of cardiovascular outcome trials in people with type 2 diabetes suggest that the glucagon-like peptide-1 receptor agonist semaglutide has the potential to reduce kidney function deterioration. Semaglutide reduced the primary endpoint of major adverse cardiovascular events by 20% in the randomised controlled SELECT trial in people with overweight or obesity without diabetes. The present report is the prespecified analysis on secondary and exploratory kidney outcomes in SELECT.

Methods: The main kidney endpoint was the time from randomisation to first occurrence of a 5-component nephropathy composite comprising: death from kidney causes; initiation of chronic kidney replacement therapy (dialysis or transplantation); onset of persistent estimated glomerular filtration rate (eGFR) <15 mL/min/1.73 m²; persistent ≥50% reduction in eGFR compared with baseline; or onset of persistent macroalbuminuria. Persistence was defined as at least two measures at least 4 weeks apart. Patients were randomised to once-weekly subcutaneous semaglutide 2.4 mg or placebo. Blood and urine samples for eGFR and urinary albumin-to-creatinine ratio (UACR) were collected at screening, at 20, 52, 104, 156, 208 weeks of follow-up and at the end of treatment. Analyses were of in-trial data and used Cox regression and mixed models for repeated measures.

Results: A total of 8803 patients were assigned to semaglutide and 8801 to placebo. The median follow-up was 182 weeks. The main composite nephropathy endpoint occurred in fewer of those assigned semaglutide (1.8% [155/8803]) than placebo (2.2% [198/8801]): hazard ratio 0.78 [95% confidence interval (CI)

0.63, 0.96]; p=0.02 (Figure 1). This effect on the main endpoint was driven by the treatment effect on onset of macroalbuminuria and, to a lesser extent, persistent ≥50% reduction in eGFR. At the prespecified 104-week time point, eGFR had declined less in the semaglutide than placebo arm, giving a treatment effect of 0.75 mL/min/1.73 m² [95% CI 0.43, 1.06]; p<0.001 (Figure 2A). The treatment effect on eGFR at 104 weeks was 0.57 mL/min/1.73 m² [95% CI 0.26, 0.89] among those with eGFR ≥60 mL/min/1.73 m² (N=15 638) at baseline and was 2.19 mL/min/1.73 m² [95% CI 1.00, 3.38] in those with eGFR <60 mL/min/1.73 m² (N=1908) at baseline. At 104 weeks the proportionate increase in UACR was less in the semaglutide than the placebo arm, with a treatment effect of -10.7% [95% CI -13.2, -8.2]; p<0.001 (Figure 2B). The treatment effect on UACR at 104 weeks was -8.1% [95% CI -10.6, -5.6], -27.2% [95% CI -35.3, -18.1] and -31.4% [95% CI -54.9, 4.3] in those with normo- (N=14 848), micro- (N=1968) and macroalbuminuria (N=325) at baseline, respectively. Semaglutide was not associated with any excess of acute kidney injury, regardless of baseline eGFR.

Conclusion: These prespecified secondary analyses suggest a beneficial effect of once-weekly subcutaneous semaglutide 2.4 mg on a composite kidney endpoint in people with overweight or obesity and established cardiovascular disease. Significant benefits for both eGFR and UACR were found, including clinically relevant lesser eGFR decline in those with baseline eGFR <60 mL/min/1.73 m².

Keywords: semaglutide, SELECT trial, weight loss, kidney outcome, pharmacotherapy, obesity, cardiovascular disease

OP 3-6 5. Diabetes and Obesity

Impacts of a novel peptide, LEAP-2, administered centrally on different models of food intake in conscious rats: the gut-liver-brain interactions with acyl ghrelin

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Background: Liver-expressed antimicrobial peptide-2 (LEAP-2), an endogenous antagonist of ghrelin, inhibits ghrelin-induced food intake under freely fed state, whereas how LEAP-2 impacts on action of ghrelin under time-restricted feeding (TRF) is still unknown. This study aimed to explore central administration of LEAP-2 influencing the eating behavior evaluated by cumulative food intake under TRF state in rats.

Methods: Before intracerebroventricular (ICV) administration of O-n-octanoylated ghrelin (0.1 nmol), a food-stimulatory model, the rats were received various doses of LEAP-2 (0.3, 1, 3 nmol/rat, ICV), respectively. The cumulative food intake was recorded at 1, 2, 4, 8, 12, and 24 h immediately after ICV injection under 12-h freely fed and TRF state in light phase.

Results: Under a 12-hour freely fed state, ICV administration of ghrelin significantly stimulated food intake in rats, while pre-treatment with ICV LEAP-2 at the doses of 1 and 3 nmol inhibited the O-n-octanoylated ghrelin-induced hyperphagic effect. Under TRF state, centrally administered LEAP-2 did not reverse O-n-octanoylated ghrelin-induced food intake, which might be related to the endogenous ghrelin.

Conclusion: The centrally-administered LEAP-2 inhibits O-n-octanoylated ghrelin-induced eating behaviors under freely fed rather than TRF state. As TRF is widely applied to weight loss and improving metabolic disease, such as metabolic dysfunction-associated steatotic liver disease, the network of TRF and gut-liver hormones (ghrelin and LEAP-2) should be established in the future.

Oral Presentation 4

Chairpersons

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OP 4-1 2. Nutrition, Education and Exercise for Obesity

Diet Quality and Obesity Indicators of Malaysian Young Female Adults

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Background: Poor diet quality has been viewed as a modifiable risk factor for obesity. Existing studies investigating the diet-obesity relationship have seldom been described using country-specific diet indices. This study aimed to determine the association between diet quality using the Standardized Malaysian Healthy Eating Index (S-MHEI) and multiple obesity indicators of Malaysian young female adults.

Methods: A cross-sectional study was conducted among 710 Malaysian young female adults from three private and public universities in Klang Valley. Dietary intake was assessed using a 2-day 24-hour diet recall and translated into S-MHEI to determine the diet quality. Obesity indicators, including body mass index (BMI), body fat percentage (BF%), waist circumference (WC), visceral fat (VF), and waist-to-height ratio (WHtR), were determined using stadiometer and TANITA bioelectrical impedance analyzer. Association between variables to test the hypothesis was performed using the Generalized Estimating Equation (GEE) analysis with alpha of 5%.

Results: About 26% and 19% were overweight/obese and overfat/

obese, respectively. Meanwhile, 19%, 8%, and 20 % were reported to have abdominal obesity, high risk of cardiovascular diseases, and high cardiometabolic risk related to central adiposity, respectively. Over half (69.7%) reported poor diet quality. Most failed to meet the recommended serving sizes in the Malaysian Dietary Guidelines 2020 for all food and nutrient groups except total grains and meat/poultry/eggs. GEE analysis revealed that the lower S-MHEI scores significantly contribute to higher BF% ($B=-0.002$, $p=0.037$), WC ($B=-0.001$, $p=0.044$), and WHtR ($B=-0.001$, $p=0.018$) after adjusting for covariates. No significant association was determined for BMI and VF ($p<0.05$).

Conclusion: As measured by S-MHEI, country-specific diet indices were associated with excess adiposity such as BF%, WC, and WHtR, not measures of BMI and VF. Utilizing obesity indicators specific to excess adiposity would accurately ascertain the diet-obesity relationship among this population. Nutrition initiatives to address poor diet quality should consider increasing awareness of the importance of healthy eating to prevent excessive adiposity.

OP 4-2 9. Therapeutics of Obesity and Metabolic Syndrome

Effects of 8 Weeks of Kinect-based Mixed Reality Exercise and Deep-sea Water Consumption on Metabolic Syndrome: A Randomized Controlled Trial

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Background: The prevalence of metabolic syndrome (MetS) is increasing globally, significantly contributing to the risk of type 2 diabetes and cardiovascular diseases. Deep-sea water (DSW) and Kinect-based mixed reality (KMR) exercise have each shown potential benefits for MetS, but studies examining their combined effects are lacking. DSW, rich in essential minerals, improves lipid metabolism and insulin sensitivity, while KMR, an unsupervised feedback-based exercise program, enhances cardiovascular fitness and metabolic health markers. Therefore, this study aims to investigate the effects of DSW and KMR, both individually and in combination, on improving MetS factor scores.

Methods: A total of 83 participants were recruited and randomly assigned to four groups for an 8-week intervention: 1) Control; 2) DSW consumption; 3) KMR exercise; and 4) DSW + KMR exercise. The intervention was conducted three times per week, and participants in the DSW groups consumed deep-sea water daily. At baseline and post-intervention, measurements included blood pressure, body composition,

blood profiles (lipids, glucose, hemoglobin A1c), handgrip strength, depression levels, quality of life, and physical activity.

Results: Forty-eight of the 83 participants (mean age 48.54 ± 9.46 years) completed the study. After the intervention, the exercise groups (KMR, DSW+KMR) showed 98.4% compliance, and the consumption groups (DSW, DSW+KMR) showed 99.2% compliance. Among MetS factors, waist circumference significantly decreased in the DSW ($p = 0.002$), KMR ($p < 0.0001$), and DSW+KMR ($p < 0.0001$) groups, with a significant difference between the Control and KMR groups ($p = 0.02$). Additionally, MetS component scores significantly declined in the KMR ($p = 0.0042$) and DSW+KMR ($p = 0.0016$) groups, with mean values of 2.60 and 2.83 falling below the diagnostic threshold of 3 points.

Conclusion: These results suggest that while both DSW and KMR interventions are individually effective in improving metabolic syndrome, their combination appears to offer more substantial benefits.

OP 4-3 7. Other Comorbidities of Obesity and Metabolic Syndrome

Diabetes Mellitus as a Predictor of Severe Hospitalization and Death in Patients with Cardiovascular Diseases: Evidence from the Indonesian National Health Insurance Claim Database

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Background: As the world's largest single-payer national health insurance program, and the country with the fifth-highest number of diabetes mellitus (DM) globally, Indonesia experiences immense health and financial burdens from DM. However, the indirect medical and cost consequences of DM remain underexplored, including in patients with cardiovascular diseases (CVD), in which DM is known to be a strong risk factor. Therefore, we aimed to investigate the additional burden of DM comorbidity in patients admitted to hospitals with CVD.

Methods: In this cross-sectional analysis of 872,201 hospital admissions from the National Health Insurance Database, CVD (primary) and DM (secondary) diagnoses were identified using ICD-10 codes. We performed logistic regressions to examine whether the presence of DM comorbidity in CVD patients was associated with worse hospitalization outcomes, including extended hospital stays, need for more-than-standard procedures/medications, and mortality. Associations were adjusted for sociodemographic confounders, and stratified by sex, age, class of

inpatient ward, and geographical setting to identify potential effect modification.

Results: CVD accounted for 2.1% of all hospital admissions. DM comorbidity was associated with poorer outcomes in CVD patients, particularly those aged >65 years [AOR(95%CI): 5.34(1.05-27.07)], staying in third-class inpatient wards [3.16(1.06-9.39)], and residents of Java Island [2.39(1.05-5.44)]

Conclusion: As measured by S-MHEI, country-specific diet indices This nationally representative study indicates that DM comorbidity exacerbates complications and expenses in CVD patients. Further research on the indirect medical and cost consequences of DM in other diseases is essential to comprehend the full burden of DM in Indonesia. Urgent public health interventions are crucial to mitigate the severity of DM in the country.

OP 4-4 11. Obesity and Metabolic Syndrome in Children and Adolescents

Nutritional quality of canteen menus and knowledge, attitude, and practice of school canteen managers towards DepEd Order No. 13, s. 2017 in public elementary schools in Los Banos, Laguna, Philippines

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Background: The DepEd Order (DO) No. 13, s. 2017 was issued to promote healthy eating habits to pupils. However, the high rate of malnutrition among school-age children in the province of Laguna in the Philippines led us to question the strict implementation of this policy in educational institutions. This study aimed to determine the nutritional quality of foods and beverages in public elementary school canteens in Los Baños, Laguna; to assess the knowledge, attitude, and practice (KAP) of canteen managers towards the DO; and to evaluate school compliance with the DO.

Methods: A pretested questionnaire was used to determine the KAP of 10 canteen managers along with a canteen monitoring checklist to evaluate their compliance to the DO. Lastly, a semi-structured interview was conducted to obtain the list of foods and beverages offered in school canteens.

Results: Findings show that the knowledge of participants in the DO is good (97.27%) while their knowledge in categorizing food items according to the traffic light system is moderate (72.08%). An overall positive attitude (83.00%) towards the DO was also observed.

Meanwhile, 80.00% of participants lacked training regarding food and nutrition which is reflected through their moderate operational compliance (71.25%) and good administrative compliance (82.78%) to the DO.

Remarkably, the menus showed low nutritional quality as snacks high in refined sugar are more prominent, whereas sources of protein, vitamins, and minerals are lacking in school canteens. The increased availability of confectionery and sweets in school canteens can influence the overconsumption of sugar among children which has been associated with overweight and obesity, poor diet quality, and inadequate nutrient intake.

Conclusion: Given that school canteens can heavily influence the dietary behavior of pupils, poor diet quality may be established among children if school canteens continue to operate with these menus. Thus, recommendations to improve policy implementation include the redevelopment of canteen menus, knowledge enhancement of canteen managers through periodic training, and the strict monitoring of school canteen practices. Further studies may also be done to assess other enablers and barriers to the implementation of the DO.

OP 4-5 3. Epidemiology of Obesity and Metabolic Syndrome

Mediating Effect of Insulin Resistance and Physical Activity on the Association between Body Mass Index and Metabolic Syndrome in Korean Children

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Background: Obesity-related metabolic syndrome is etiologically linked to physical inactivity and insulin resistance. Little is known about how insulin resistance and physical activity interact to influence the relationship between body fat and metabolic syndrome in pediatric populations. This study aimed to investigate the mediation effect of fasting insulin and physical activity on the relationship between body mass index (BMI) and continuous metabolic syndrome (cMetS) score in 1,008 Korean children aged 7 to 12 years older (535 girls and 473 boys).

Methods: Body composition measurements included body mass index and percent body fat. Physical activity was objectively assessed by wearing an accelerometer for 7 days. The cMetS score was calculated by summing the standardized residuals for waist circumference, mean arterial pressure, triglyceride, fasting blood glucose (FBG), and high-density lipoprotein cholesterol (HDL-C). The standardized HDL-C was multiplied by -1 since it is inversely related to metabolic syndrome.

Results: Girls were more physically active, but they had higher BMI, FBG, and cMetS scores than boys. Stepwise linear regression analysis showed that gender, BMI, insulin, and vigorous physical activity (VPA) were significant determinants of cMetS. Mediation analysis found a significant indirect effect of the impact of BMI on cMetS score through insulin ($\beta=0.095$, 95% CI = 0.074-0.117) and VAP ($\beta=0.006$, 95% CI = 0.002-0.011). The direct effect of BMI on cMeT score in the presence of the two mediators was also significant ($\beta=0.328$, 95% CI=0.290-0.367).

Conclusion: The current findings suggest that both IR and physical activity partially mediate the relationship between BMI and cMetS in Korean children.

OP 4-6 3. Epidemiology of Obesity and Metabolic Syndrome

Trends and Implications of Metabolic Syndrome in Korea, 2007-2022: A Nationwide Study

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Background: This study aimed to analyze the prevalence trends of metabolic syndrome (MetS) among Korean adults over 15 years.

Methods: A cross-sectional study was conducted, using data from the Korea National Health and Nutrition Examination Survey (KNHANES) from 2007 and 2022. The study included 87,397 subjects. MetS was defined according to the National Cholesterol Education Program-Third Adult Treatment Panel (NCEP-ATP III) and the Korean Society for the Study of Obesity (KOSSO) criteria.

Results: MetS prevalence increased from 22.8% in 2007 to 28.6% in 2022, but showed sex difference with men increasing (from 24.5% to 36.8%), and women decreasing (from 20.6% to 19.5%). Among the components of MetS, hyperglycemia and abdominal obesity showed the largest increases (1.51-fold, and 1.29-fold, respectively). While hyperglycemia increased

in all age groups, abdominal obesity increased most in men aged 30-39 (1.98-fold) and 19-29 (1.81-fold). Low HDL-C was the only component that decreased (0.62-fold) and was more prevalent among women. In sub-analysis of those aged 65 and older, MetS increased in both men and women, but was more prevalent in women. Individuals with MetS had higher rates of current smoking, heavy drinking, physical inactivity and carbohydrates consumption.

Conclusion: The prevalence of MetS is gradually increasing in Korea, and hyperglycemia and abdominal obesity are rapidly increasing, especially in younger men. Although the prevalence of MetS in women is decreasing due to changes in social environment, continuous efforts are needed for postmenopausal women. Targeted health policies and interventions should be established.

Guided Poster Presentation 1

Chairperson

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Korea University, Korea

Judge

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Jimin Lee
Eulji University, Korea

HyoJin Lim
Eli Lilly and Company, Korea

PRIYOSMITA DAS
University of Delhi, India

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University of Delhi, India

GPP 1-1 1. Behavior and Public Health for Obesity

The potential role of exercise in osteocalcin-elicited memory improvement in HFHSD-induced obese mice

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Background: Obesity is a precipitating factor for developing memory dysfunction. Osteocalcin (OCN) is a dispensable molecule for osteoblast activity and bone formation. Recent studies suggest that bone-derived OCN is able to be across the blood brain barrier (BBB), and modulate cognitive function. There's been a growing interest in high-intensity interval training (HIIT) as a potential time-effective alternative modality to conventional aerobic exercise. This work showed the beneficial role of exercise-exerted OCN within dentate gyrus (DG) in obesity mouse model and its underlying mechanism.

Methods: Mice were fed with the high fat and high sucrose diet (HFHSD) for 12 weeks. Mice were subjected to the HIIT for 8 weeks. For measuring spatial memory capacity, the Modified Y-maze test was performed 1 day after the last exercise regimen. To explore the potential role of BBB-permeable OCN in obese-induced memory deficits and its related mechanism, molecular changes were assessed by the immunofluorescence approaches.

Results: HFHS-fed increase in body weight gain was attenuated by the exercise intervention. In Y-maze test, obese-induced decrease in the entry

and time spent in novel arm was reversed by exercise intervention. In neurogenic activity, obese-induced decline of Ki-67+ and doublecortin+ cells were reversely increased by exercise intervention, in which exercise itself enhanced neurogenic capacity. BDNF expression in DG area corresponded well to neurogenic activity. OCN immunoreactivities profoundly raised by exercise regardless of the HFHS diet in the hilus area. Co-localized GRP158+ with OCN+ particle area increased regardless of HFHS diet in the hilus area. In particular, GRP158+ particles were predominantly detected in GFAP+ cells, and exercise intervention enhanced GRP158 expression regardless of HFHS diet. Moreover, OCN activated AKT/GSK3 β signal cascade in the hilus area. Based on our data, exercise intervention improved obese-induced body weight gain and spatial memory impairment via the delivery of bone-derived OCN across the BBB, thereby enhancing the neurogenic capacity through the brain-derived neurotrophic factor expression in astrocyte and its enhanced release into the DG area.

Conclusion: In conclusion, HIIT may a promising strategy to be able to elevate the brain OCN for improving HFHSD-induced decline of memory function.

GPP 1-2 1. Behavior and Public Health for Obesity

Associated factors for Metabolically Unhealthy Obesity and its relation to Food Insecurity in Korean adults with obesity

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Background: Food insecurity has been associated with obesity in previous studies; however, the association between food insecurity and metabolically unhealthy obesity (MUO) in obese population is unclear. In this study, we evaluated associated factors for MUO in adults with obesity and investigated the relationship between food insecurity and MUO.

Methods: We analyzed 5,191 adults with obesity (BMI ≥ 25 kg/m²) in the 8th Korea National Health and Nutrition Examination Survey 2019–2021. MUO was defined when participants with obesity had any of the followings: 1) triglyceride ≥ 150 mg/dL, 2) HDL-cholesterol < 40 mg/dL (men), < 50 mg/dL (women), 3) SBP ≥ 135 mmHg or DBP ≥ 85 mmHg or on treatment for hypertension, 4) fasting glucose ≥ 100 mg/dL or on treatment for diabetes. The ORs and 95% CIs for MUO according to food security status, sociodemographic characteristics, and lifestyle factors were calculated by multivariate logistic regression analysis.

Results: Of the 5,191 participants with obesity, the prevalence of MUO and metabolically health obesity (MHO) was 85.4% and 14.6%, respectively. In the multivariate model, the OR (95% CIs) for MUO in food insecurity group was 1.87 (1.03–3.43) compared to food secure group. The odds for MUO were higher among participants with older age, higher BMI, < 12 years of education, and lower fat intake compared to their counterparts. The odds were also higher among non-manual workers, those with moderate and low physical activity compared to those without occupation and those with high physical activity.

Conclusion: Food insecurity, as well as, older age, higher BMI, lower educational level, lower fat intake, being non-manual workers, and lower physical activity were associated with MUO. Improving food insecurity and public health strategies targeting these populations are needed to prevent cardiometabolic disorders entailed to obesity.

GPP 1-3 5. Diabetes and Obesity

Modelling Outcomes of Tirzepatide Versus Lifestyle Modification for Overweight and Obesity

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Background: Tirzepatide showed up to 22.5% of weight reduction and improvement in cardiometabolic risk factors in SURMOUNT-1 study. This study estimated clinical outcomes over 10 and 15 years with tirzepatide compared to lifestyle modification (LSM) using a patient-level simulation (PLS).

Methods: A PLS was implemented in the discretely-integrated condition-event framework, which considers patient heterogeneity and event history. Baseline patient characteristics were derived from NHANES data filtered to match FDA criteria for anti-obesity medications, excluding people with type 2 diabetes (T2D). The model used data from the SURMOUNT-1 study to simulate the impact of tirzepatide and LSM on BMI. Simulated metabolic factor (i.e., BMI, HDL, SBP, and fasting plasma glucose) trajectories were inputs to published risk equations that estimate risk of key obesity-related complications, including cardiovascular events (Framingham 10-year risk estimate) and onset of T2D (Framingham Offspring study). Health-related quality of life was linked to BMI and complications over time.

Results: The model estimated tirzepatide 15 mg reduced the percentage of patients developing T2D by 24.8% and 17.5% versus LSM, and delayed time to onset of T2D by 0.89 and 1.95 years, over a 10-year and 15-year time horizon, respectively. Rates of renal disease at 10-years were 6.5% lower and at 15-years were 7.8% lower for tirzepatide 15 mg versus LSM. The percentage of patients developing any cardiovascular event was 2.5% and 1.5% lower for tirzepatide 15 mg versus LSM at 10years and 15years, respectively. The rate of cardiovascular death was 1.1% lower for tirzepatide 15 mg versus LSM at both time points.

Conclusion: Ten- and fifteen-year estimated projections using a validated model showed people with obesity or overweight treated with tirzepatide were projected to have decreased incidence of obesity-related complications.

GPP 1-4 2. Nutrition, Education and Exercise for Obesity

Maternal Biochemical indicators and their correlation with Foetal Birth weight, India.

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Background: Birth weight is a crucial parameter in assessing neonatal health and predicting lifelong health outcomes. Low birth weight (LBW) and high birth weight, or macrosomia, represent two ends of the birth weight spectrum, each carrying distinct health implications for individuals across the life course. 1 in 7 newborns are affected by Low birth weight. (UNICEF-WHO Low birth weight estimates, 2023). This study aims to investigate the relationship between various maternal biochemical markers and fetal birth weight, highlighting key factors that could predict and potentially modulate birth outcomes.

Methods: The present study is a pregnancy follow-up study conducted among 249 pregnant women in Delhi, India. Biochemical investigations (plasma homocysteine, folate, and vitamin B12 levels) were performed on all pregnant women in first & third trimester and infant birth weight were recorded. Statistical analysis was performed to understand the effect of selected maternal biomarkers on foetal birth weight.

Results: The study revealed that the prevalence of Low Birth Weight babies was significantly higher in the group with similar levels of folate during first trimester and during delivery assessment, compared to those with reduced or increased levels of folate at the time of delivery ($p=0.013$). During the 1st trimester homocysteine was found to be associated with number of foetal complications.

Conclusion: The study found a significantly higher prevalence of low birth weight (LBW) infants in mothers who maintained similar levels of folate throughout the first trimester and at delivery, compared to those whose folate levels either decreased or increased by delivery ($p=0.013$). Additionally, elevated homocysteine levels during the first trimester were associated with a higher number of fetal complications, indicating the importance of monitoring and managing these biochemical markers during pregnancy to improve neonatal outcomes.

GPP 1-5 11. Obesity and Metabolic Syndrome in Children and Adolescents

Association Between Muscular and Cardiorespiratory Fitness with Body Composition, Blood Pressure, and Leptin in Children and Adolescents with Obesity

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Background: The prevalence of pediatric obesity is increasing. Physical fitness has been known to be associated with the risk of cardiometabolic diseases. This study aims to examine the associations of muscular and cardiorespiratory fitness with body composition and cardiometabolic markers in children and adolescents with obesity.

Methods: Data from 198 participants (age: 11.03 ± 1.44 years, BMI: $27.56 \pm 3.25 \text{ kg/m}^2$) of ICAAN study, an intervention study for children and adolescents with obesity, were analyzed. Heart rate recovery (HRrec) was evaluated by measuring the heart rate change 1-minute post-exercise using the YMCA step test. Muscle strength index (MSI) was calculated by dividing the sum of the 1-RM for the chest press and leg extension by body weight. Body composition was evaluated using whole-body dual-energy X-ray absorptiometry. The proton density fat fraction estimated by magnetic resonance imaging was used to quantify hepatic fat. Venous blood samples were obtained after a 10-h overnight fast for metabolic variables. Participants were stratified into three groups based on tertiles of MSI (TM1, TM2, TM3) and HRrec (TH1, TH2, TH3). Data analysis was performed using one-way analysis of variance and analysis of covariance.

Results: The group with the highest tertile of HRrec (TH3) showed

significantly lower systolic blood pressure (SBP, 118.74 ± 9.29 vs 125.83 ± 13.23 , $p = .001$), diastolic blood pressure (DBP, 64.35 ± 10.15 vs 69.02 ± 9.31 , $p = .010$), insulin (13.28 ± 5.88 vs 17.70 ± 9.06 , $p = .018$), and HOMA-IR (3.00 ± 1.38 vs 4.25 ± 3.16 , $p = .015$) compared to the lowest tertile of HRrec (TH1). The TM3 group exhibited significantly lower fat mass index (FMI, 9.98 ± 2.20 vs 11.31 ± 2.35 , $p = .003$), percent body fat (%BF, 36.16 ± 5.16 vs 41.17 ± 4.29 , $p < .001$), hepatic fat (11.27 ± 8.90 vs 15.53 ± 11.18 , $p = .040$), and leptin (28.48 ± 11.76 vs 37.96 ± 15.63 , $p < .001$) compared to the TM1 group while showing significantly higher fat free mass index (FFMI, 17.56 ± 2.06 vs 15.95 ± 1.23 , $p < .001$). After adjusting for age, sex, and BMI Z score, The TH3 group showed significantly lower SBP (Mean (SE); 116.75 (1.59) vs 125.17 (1.28), $p = .000$), DBP (64.10 (1.39) vs 68.88 (1.11), $p = .025$) compared to the TH1 group. The TM3 demonstrated significantly lower FMI (10.28 (0.17) vs 11.22 (0.14), $p = .000$), %BF (37.08 (0.54) vs 40.74 (0.45), $p = .000$) and leptin (31.52 (1.91) vs 38.48 (1.59), $p = .018$), along with increased FFMI (17.25 (0.16) vs 16.11 (0.13), $p = .000$) compared to TM1.

Conclusion: The findings indicate that muscular and cardiorespiratory fitness could serve as significant parameters for assessing body composition and cardiometabolic health in pediatric obesity.

GPP 1-6 3. Epidemiology of Obesity and Metabolic Syndrome

Comparison of Time Restricted Feeding and Continuous Energy Restriction on Body Composition and Multiple Metabolic Parameters in Obese Indian Adults

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University of Delhi, India

Background: Time-restricted feeding (TRF) is a novel dietary tool that recommends individuals to shorten the duration of the daily eating window, without altering calorie intake or diet quality. It proposes a solution to restraining the feeding window from 4 to 12 hours per day, aligning it with circadian rhythms. TRF enhances metabolic health and promotes weight loss without altering calorie intake in obese adults. This study aims to assess the effect of TRF compared to Continuous Energy Restriction (CER) in addressing body composition, multiple metabolic measures, sleep quality and quality of life in obese adults.

Methods: This prospective randomized controlled trial was carried out at AIIMS, Delhi. 120 subjects aged between 18-60 years fulfilling the inclusion criteria were randomly assigned in one of the three groups, TRF (10:14) (n=40), TRF (12:12) (n=40) or CER (n=40) for a 12-weeks period. Subjects were advised to follow TRF (10:14), TRF (12:12) or CER diet and to practice 150 minutes of moderate intensity physical activity throughout the week. The assessment included anthropometric, biochemical, body composition, sleep quality (Pittsburgh Sleep Quality Index Questionnaire) and quality of life (Short Form-36 Questionnaire) analysis at baseline, 6 weeks and at 12 weeks.

Results: Significant improvements post-intervention was observed in TRF (12:12) group in anthropometrics, body fat %, blood glucose, lipid profile, sleep quality and quality of life. The mean age was comparable in all the groups [TRF (12:12) 44 ± 5.2 y, TRF (12:12) 43 ± 5.5 y and CER 44 ± 4.6) and 60% were females. At the end of intervention, weight loss of 8.36% was observed in the TRF (12:12) against of 6.82% in TRF (10:14) and 3.2% in the control group ($p < 0.05$). A significant reduction in waist hip ratio (-3.9%, $p < 0.05$), body fat % (-24.66%, $p < 0.05$), total cholesterol (-7.29%, $p < 0.05$) and triglycerides (-6.3%, $p < 0.05$) were observed in the TRF (12:12) as compared to TRF (10:14) and CER group. TRF (12:12) was found to be beneficial in significant improvement of sleep quality and quality of life among the obese subjects, demonstrating potential health benefits.

Conclusion: This study found that TRF (12:12) was more beneficial and a suitable alternative for managing obesity and promoting health with no side effects compared to TRF (10:14) and CER.

Guided Poster Presentation 2

Chairperson

Kyung-Soo Kim
CHA University, Korea

Judge

Kyung Ae Lee
Jeonbuk National University, Korea

Speakers

Dongwon IM
H+ Yangji Hospital, Korea

Jessy Hardjo
RSUD PLOSO, Indonesia

FUJUE JI
Hanyang University, Korea

Minsoo Shin
Korea University, Korea

Seo Young Kang
Eulji University, Korea

Hae-Jin Ko
Kyungpook National University, Korea

GPP 2-1 5. Diabetes and Obesity

T-cell receptor repertoire profiles in peripheral blood and adipose tissue of patients with severe obesity with and without type 2 diabetes mellitus

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Background: Severe obesity without metabolic alterations (Metabolically Healthy Obesity, MHO) is associated with a lower risk of death and cardiovascular disease compared to severe obesity with metabolic alterations (Metabolically Unhealthy Obesity, MUO). Inflammation is considered as the key risk factor in mediating the metabolic dysfunction in obesity. The dysregulation of T cell immune homeostasis in blood and adipose tissue in patients with severe obesity in relation to chronic inflammation is well acknowledged. However, the characteristics of T-cell receptors (TCR) repertoire in MHO and MUO remain largely unexplored.

Methods: High-throughput sequencing of TCR repertoires was conducted on peripheral blood and adipose CD4+ T cells from subjects with MHO (n = 3; age = 33.6 ± 11 years; BMI = 35.9 ± 4.7; HbA1c = 5.2 ± 0.2) and subjects with severe obesity with type 2 diabetes mellitus (T2DM) representing the MUO group (n = 4; age = 32.7 ± 9 years; BMI = 35.0 ± 1.6; HbA1c = 10.1 ± 1.5).

Results: Analysis of TCR repertoires in peripheral blood samples showed that the number and diversity of V-J combinations in the MUO group

tended to be more skewed compared to that of the MHO group. The usages of the V gene and V-J pair, along with the frequency distributions of some complementarity-determining region 3 (CDR3) amino acids (AAs) in TCR differed significantly between the two groups. Unique TCR CDR3 clonotypes were mildly decreased in the MUO subjects. A higher similarity of TCR V-J distribution and an increased frequency of differentially expressed V-J gene segments with shorter CDR3 length were identified in the MUO group. Profiling of TCR repertoire in adipose tissue CD4+ T cells also showed significantly shorter CDR3 lengths and a higher frequency of several variable genes including TRBV12-4, TRBV18, TRBV7-9 in the MUO group compared to that of the MHO group.

Conclusion: This study demonstrates potential variations and unique properties of TCR repertoires in peripheral blood and visceral adipose tissue in patients with severe obesity with and without T2DM. These findings could guide the development of potential biomarkers to distinguish MHO and MUO and inform future immunotherapeutic strategies for patients with severe obesity with T2DM.

GPP 2-2 7. Other Comorbidities of Obesity and Metabolic Syndrome

Effectiveness of GLP1-RA as a Therapy for NAFLD in Type 2 Diabetes: A Systematic Review

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Background: One of the most common complications of type 2 diabetes mellitus (T2DM) is non-alcoholic fatty liver disease (NAFLD), which occurs due to insulin resistance, obesity, and inflammation. These two diseases exacerbate each other, increasing mortality in T2DM patients. However, current NAFLD therapies are limited to lifestyle improvements, prompting extensive research into glucagon-like peptide 1 receptor agonists (GLP1-RA) as a potential anti-diabetic drug that can improve liver function. This study aims to demonstrate the effectiveness of GLP1-RA in improving liver enzymes (AST, ALT, and GGT) in T2DM patients with NAFLD.

Methods: A systematic literature search was conducted through PubMed, ProQuest, EBSCOhost, and ScienceDirect. Inclusion criteria encompassed studies from the last five years that investigated the effects of GLP1-RA on T2DM patients with NAFLD. The quality of the studies was assessed using the CEBM Oxford criteria for therapeutic studies.

Results: Out of 257 studies, nine high-quality studies (N=298) met the inclusion criteria. All studies indicated that GLP1-RA administration successfully reduced AST and ALT levels, with 5 studies showing significant reductions (p<0.05). AST levels decreased by 3-33.4 U/L, while ALT levels decreased by 5.9-40.1 U/L. Seven of the 9 studies reported GGT reductions of 1-32.9 U/L, with 4 studies showing significant decreases. The most frequently used GLP1-RA drug was liraglutide, with a significant impact observed at 24 weeks of administration.

Conclusion: GLP1-RA has been proven to reduce inflammation by lowering liver enzyme levels of AST, ALT, and GGT, making it an effective therapeutic option for T2DM patients with NAFLD. Future research on the impact of GLP1-RA on liver biopsy or elastography outcomes could further support these findings.

GPP 2-3 2. Nutrition, Education and Exercise for Obesity

Regulation of Ferroptosis in Obesity: Muscle Type-Specific Effects of Dietary Restriction and Exercise

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Background: Obesity is a significant global health issue and a risk factor for numerous diseases. Ferroptosis, an iron-dependent regulated cell death, is triggered by iron overload and the excessive accumulation of lipid peroxidation mediated by reactive oxygen species. Recent research has identified a strong association between ferroptosis and obesity. Additionally, dietary restriction (DR) and DR combined with exercise (DR+Ex) are effective strategies for managing obesity and ferroptosis. However, the regulation of ferroptosis and its signaling pathways in skeletal muscle under conditions of obesity, DR, and DR+Ex remains poorly understood.

Methods: Mice were divided into four groups: normal diet, high-fat diet, 20% high-fat DR, and 20% high-fat DR+Ex. All mice were fed ad libitum with either a normal or high-fat diet for the first 14 weeks, followed by normal diet, high-fat diet, 20% high-fat DR and 20% high-fat DR+Ex for the last 8 weeks, separately. The left gastrocnemius muscle was examined for ferroptosis using immunohistochemistry, H&E, Masson's trichrome,

and Prussian blue staining. Muscle type-specific expression of ferroptosis signaling proteins in the right gastrocnemius muscle was analyzed by Western-Immunoblot.

Results: The high-fat diet resulted in significantly increased inflammatory cell infiltration, fibrosis, and iron accumulation in skeletal muscle ($P < .05$). Additionally, red and white muscles showed increased expression of 4-HNE, regulated by GPX4 and NCAO4, respectively ($P < .05$). Although high-fat DR and DR+Ex did not significantly impact fibrosis and iron accumulation in skeletal muscle ($P > .05$), they reduced downstream 4-HNE expression by regulating GPX4 in red muscle ($P < .05$).

Conclusion: Red and white muscles respond to obesity-induced ferroptosis through different signaling pathways. The regulation of ferroptosis by DR and DR+Ex is muscle type-specific. Specifically, red muscle is more sensitive to the regulation of ferroptosis signaling by DR and DR+Ex compared to white muscle.

GPP 2-4 11. Obesity and Metabolic Syndrome in Children and Adolescents

Exploring Pediatric Health: Unraveling Obesity Prevalence and Activity Patterns in East Asia

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Background: Pediatric obesity is a global health concern, also in the East Asia. Physical inactivity is a risk factor for pediatric obesity. Physical activity is important to maintain and improve health, yet disparities persist across different regions. This study endeavors to explore the variations in physical activity levels and the prevalence of pediatric obesity across Korea, China, and Japan.

Methods: Analyzing data sourced from the NCD Risk Factor Collaboration, our study scrutinized the trends in overweight including obesity prevalence among children and adolescents across Korea, Japan, and China, from 2013 to 2022. Obesity and overweight were defined as a BMI of more than 2 SD and 1 SD above the median of the WHO growth reference. Additionally, as part of global initiatives led by the Active Healthy Kids Global Alliance, we compared and analyzed key data and international indicators of physical activity released in the Global Matrix to assess changes in physical activity.

Results: Korea showed higher prevalence than China and Japan, especially in boys. The regression equations for predicting BMI based on gender are calculated by country. The trends in physical activity and related factors from 2018 to 2022 show varying levels of change. Korea experienced a no change in overall physical activity, while sedentary behavior improved slightly, and governmental policies showed notable enhancement. China showed improving levels of physical activity, with no notable changes in governmental policies. Japan exhibited improvements in physical fitness, active transportation, community and environment, with stable levels of sedentary behavior and moderate governmental policies throughout the period.

Conclusion: Understanding the patterns of physical activity is essential for crafting precise interventions and policy frameworks for fostering active lifestyles. We emphasize the importance of reassessing strategies for managing increasing pediatric obesity in Korea, despite the presence of improving governmental policies, indicating a need for targeted interventions.

GPP 2-5 7. Other Comorbidities of Obesity and Metabolic Syndrome

Relationship between obstructive sleep apnea and cardiovascular health in middle-aged Korean men and women: a nationwide study

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Background: Cardiovascular health (CVH) can be conceptualized as encompassing 7 health behaviors and metabolic factors that contribute to cardiovascular disease. We explored the relationship between the risk of obstructive sleep apnea (OSA) and CVH among middle-aged Korean adults.

Methods: Data from 5909 participants in the Korea National Health and Nutrition Examination Survey (2019–2021) were analyzed. The risk of OSA was assessed using the STOP-Bang questionnaire, with score of 0–2, 3–4, and 5–8 indicating low, moderate, and high risk, respectively. CVH metrics, including smoking status, diet, physical activity, body mass index (BMI), blood pressure, total cholesterol level, and fasting glucose concentration, were evaluated using American Heart Association criteria. Each metric was assigned a score of 2 (ideal), 1 (intermediate), or 0 (poor). The sum of these scores was used to assess overall CVH. A total score of ≥ 12 was classified as ideal, 8–11 as intermediate, and ≤ 7 as poor CVH. Multivariate logistic regression analysis was employed to investigate the association between OSA risk and CVH.

Results: Among study participants, 78.6% of men and 16.3% of women displayed moderate-to-high risk of OSA, while 45.4% of men and 17.2% of women exhibited poor CVH. In the multivariate model, the odds ratios (95% confidence intervals) for poor CVH were 2.69 (2.08–3.49) for men at moderate risk of OSA and 6.54 (4.81–8.90) for those at high risk, compared to men at low risk. For women, the odds ratios were 3.21 (2.47–4.19) for those with moderate risk and 12.88 (6.29–26.38) for those with high risk of OSA, compared to women at low risk. CVH metrics associated with moderate-to-high OSA risk included high BMI, high blood pressure, elevated fasting glucose, and smoking.

Conclusion: The risk of OSA was associated with poor CVH, while various CVH components were linked to moderate-to-high OSA risk. Therefore, managing both OSA and components of CVH is essential to minimize poor CVH.

GPP 2-6 5. Diabetes and Obesity

Long-term weight loss in the SELECT trial: semaglutide 2.4 mg vs placebo over 208 weeks in a global population of 17,604 participants

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Background: The SELECT cardiovascular (CV) outcome trial provided the opportunity to study weight and anthropometric effects of semaglutide vs placebo over 4 years of intervention in a large, geographically and racially diverse population of individuals with body mass index (BMI) ≥ 27 kg/m² and pre-existing CV disease, without type 2 diabetes.

Methods: SELECT, a multicentre, randomised, double-blind, placebo-controlled, event-driven superiority trial, enrolled 17,604 patients aged ≥ 45 years. Patients were randomly assigned to receive once-weekly subcutaneous semaglutide 2.4 mg or placebo in addition to standard of care recommendations for secondary prevention of CV disease, including healthy lifestyle counselling without specific weight-loss instruction. This prespecified, as-treated analysis examined the effect of semaglutide and placebo on weight change, anthropometric measures and subgroups based on baseline demographics, weight-related and glycaemic measures. We assessed the following measures: change in body weight (%); change in waist circumference (WC, cm); change in WC/height ratio (WHtR) and change in BMI category.

Results: With semaglutide, weight loss continued to week 65 and then weight was

sustained for the rest of the study. Mean percent weight losses with semaglutide 2.4 mg vs placebo at years 2, 3 and 4 are shown (Figure 1A). At 208 weeks, semaglutide was associated with robust and sustained weight loss (average -10.18%), reduced WC (average -7.73 cm) and improvement in average WHtR (-6.85%) as compared with placebo at the same time points (-1.53% , -1.34 cm and -0.99% , respectively; $p < 0.0001$ for all comparisons vs placebo). These improvements were seen across both sexes and all categories of race, age, baseline glycaemic status and degree of adiposity. We analysed change in BMI category at week 104 (Figure 1B). More patients in the semaglutide-treated group (52.4%) experienced improvement in BMI category compared with those receiving placebo (15.7%). In the semaglutide group, 12% reached a BMI < 25 kg/m² compared with 1.2% for placebo.

Conclusion: In SELECT, use of once-weekly subcutaneous semaglutide 2.4 mg produced clinically significant and durable weight loss and improvements in anthropometric measurements over 4 years in individuals with BMI > 27 kg/m² and pre-existing CV disease from diverse racial and geographic backgrounds and with varied body anthropometrics.

Poster Exhibition

1. Behavior and Public Health for Obesity

PE 01-01 1. Behavior and Public Health for Obesity

Relationship Between Pre-Pregnancy Body Mass Index And Antenatal Depression in Mongolian Women: A National Study

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Background: Depression and obesity are common medical problems and both have been associated with adverse pregnancy outcomes. The study aimed to determine the relationship between pre-pregnancy body mass index (BMI) and antenatal depression.

Methods: Population-based cross-sectional study involved 6-40 weeks 1482 participants from 80 clusters were randomly selected according to the Mongolian regions of Western (Khovd, Govi-Altai, Zavkhan), Khangai (Uvurkhangai, Arkhangai, Bayankhongor), Central (Tuv, Dundgovi, Umnugovi) and Eastern (Dornod, Khentii) in 12 soums of 11 provinces, 4 districts of Ulaanbaatar from February 21 to April 08, 2022. 79 questionnaires with 4 groups, physical measurements were performed. Depression was assessed by the Edinburgh Perinatal/Postnatal Depression Scale (EPDS) with 10 questions, and the result was considered antenatal depression if the total score was higher than 13. BMI classified as normal

(18.5-24.9 kg/m²), overweight (25-29.9 kg/m²) and obese (≥30 kg/m²). Statistical analysis was done by SPSS 21. The study of ethics was approved at a meeting of the Ethics Committee of the Mongolian National University of Medical Sciences (№ 2022/3-02)

Results: The average age of participants was 30.11±5.88 (18-46 years). The mean pre-pregnancy BMI was 23.9±4.3 kg/m²; more than a third (34.4%) were overweight or obese. First trimester, second trimester, and third trimester were respectively 6.7% (n=100), 60.3% (n=893) and 33.0% (n=489). The prevalence of prenatal depression was 15.9% (n=235). Pre-pregnancy BMI was not significantly related to antenatal depression (p=0.305).

Conclusion: Pre-pregnancy BMI was not significantly associated with antenatal depression in our study.

PE 01-02 1. Behavior and Public Health for Obesity

Influencing factors of the combined rate of chronic diseases and obesity

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Background: Obesity is a disease with a high risk of causing various chronic diseases rather than the problem of obesity itself, and it is a disease that requires various healthy beviors in the prevention and management of obesity. This study aims to compare the characteristics of 'people with hypertension and diabetes at the same time as obesity' with the characteristics of 'obese people without chronic diseases' and 'people with only chronic diseases' in terms of demographic and sociological characteristics, health behaviors and health status.

Methods: A total of 5,826 people were adults aged 19 and older. This study is a secondary data study and a cross-sectional survey study that analyzed the data from the 7th Korean National Health and Nutrition Examination Survey in 2020. Hypertension and diabetes were examined for chronic diseases, and subjects were divided into a total of 6 groups (no chronic disease and obesity, only obesity, only one chronic disease, one chronic disease with obesity, two chronic diseases without obesity, two chronic diseases with obesity) and demographic and sociological characteristics, health behaviors, and health status were compared. The analysis used descriptive statistics and χ² analysis to identify differences in characteristics among groups.

Results: Women, the higher the level of education and income, married people, and professional administrators and office workers showed higher the proportion of 'no chronic disease and obesity'. Also, single-person households, as age increased, the proportion of 'two chronic diseases with obesity' increased. In terms of health behavior and health status, those who did not walk regularly, ate breakfast 5 to 7 times a week, slept less than 6 hours, did not engage in aerobic physical activity, had poor subjective health levels, and had activity limitations showed higher the proportion of 'two chronic diseases with obesity' than other groups.

Meanwhile, the proportion of 'no chronic disease and obesity' was high in those who did not smoke, were not high-risky alcohol drinkers, slept 7 to 8 hours, and responded that their subjective health level was good.

Conclusion: From a health equity perspective, the combined rate of chronic diseases and obesity increased when people had low income and low education. In addition, it was confirmed that 'healthy lifestyle habits that do not smoke and drink high-risk alcohol' are more important for 'people with both obesity and chronic diseases'.

PE 01-03 1. Behavior and Public Health for Obesity

Effectiveness of an Occupational Therapist-Led Lifestyle Modification Program for Obesity Management in Putrajaya, Malaysia

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Background: Obesity remains a major health concern among the Malaysian population, with Putrajaya reporting the highest prevalence. Contributing factors include sedentary lifestyles, demanding work schedules, and widespread availability of fast-food options, leading to unhealthy dietary habits. This study aims to evaluate the effectiveness of a lifestyle modification program, implemented by occupational therapists, in reducing obesity rates in Putrajaya.

Methods: This single-arm study involved 45 obese individuals from the Putrajaya community, participating in a six-month program designed by an occupational therapist. The intervention focused on behavioral modification, engagement in meaningful routines, and modification of daily activities. Participants were prescribed personalized activities addressing physical, cognitive, and social aspects to promote sustainable lifestyle changes. Key components included leisure activities participation, physical activities regimens, and strategies for incorporating healthy habits into daily life.

Results: Statistical analysis revealed a significant reduction in body weight

and HbA1c levels among participants, alongside improved occupational performance. The findings indicate a substantial enhancement in health-related quality of life, highlighting the program's efficacy in fostering well-being among the obese population in Putrajaya.

Table 1: Summary of Findings from the Lifestyle Modification Program

Measure	Baseline (Mean ± SD)	Post-Intervention (Mean ± SD)	Percent Change	p-value
Body Weight (kg)	95.2 ± 15.3	85.6 ± 14.1	-10.1%	< 0.001
HbA1c (%)	8.5 ± 1.2	6.9 ± 1.0	-18.8%	< 0.001
Occupational Performance	62.5 ± 8.7	78.4 ± 9.3	+25.4%	< 0.001
Health-Related QoL	65.3 ± 7.5	82.7 ± 6.8	+26.6%	< 0.001

Conclusion: The occupational therapist-led lifestyle modification program demonstrates significant potential in addressing obesity in Putrajaya. By integrating behavioral changes and personalized activity routines, the program not only aids in weight reduction but also improves overall quality of life. These results underscore the importance of multidisciplinary approaches in managing obesity and offer a promising framework for public health interventions in Malaysia.

PE 01-04 1. Behavior and Public Health for Obesity

Evaluating Consumer Noticeability of Calorie Labels and KAP Towards Menu Calorie Labels at Selected Fast-Food Restaurants

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Background: Malaysia aims to introduce menu calorie labelling in foodservice outlets by 2025 to address the issue of obesity. Clear calorie information on restaurant menus empowers consumers to make informed choices, a crucial step in a country with high obesity rates and frequent eating out. This study was conducted to assess consumers' noticeability and level of knowledge, attitudes, and practices regarding menu calorie labelling in selected fast-food restaurants.

Methods: This cross-sectional study recruited participants through convenience sampling in four purposely selected fast-food restaurants. Online questionnaires were used to collect data on sociodemographic factors, knowledge (K) of calorie requirements, attitudes (A), practices (P) and noticeability towards menu calorie labelling. Statistical analysis was performed using IBM SPSS Statistics 26 with a significance level set at $p < 0.05$.

Results: A total of 1324 consumers participated in the study. Approximately two-thirds of the participants noticed the presence of calorie labelling on the menu. While more than half of the participants demonstrated a high level of knowledge on calorie requirements, 95.3% expressed positive attitudes towards menu calorie labelling. However, 3 out of 5 consumers scored poorly in practising menu calorie labelling. Age, gender, education level, noticeability, knowledge, and attitudes were significantly associated with consumers' practices of menu calorie labelling.

Conclusion: The results show that while consumers notice menu calorie labels and possess good knowledge and positive attitudes towards them, their practices remain poor. Urgent action is needed to address this concerning issue, which is crucial in combating the obesity epidemic. Implementing comprehensive interventions, such as nutritional education programs and policy measures, is vital to promote healthier eating habits and reduce the burden of obesity in our society.

PE 01-05 1. Behavior and Public Health for Obesity

Influencing factors of the Obesity compared urban and rural

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Background: Obesity is on the rise worldwide and is a major health risk factor for modern humans. Due to differences in economic activities between rural and urban areas and the average age of population group members, factors related to obesity in urban and rural and fishing areas are expected to differ. This study aims to compared of factors influencing obesity compared urban and rural.

Methods: Secondary data was analyzed using the 2022 9th National Health and Nutrition Examination National Cross-sectional Survey. The subjects were 19 years of age or older (n=6,146). The effects of urban and rural sociodemographic characteristics, sleep time, subjective health, and stress on obesity were confirmed.

Results: In the case of men, obesity was 7.6 times higher in urban areas and 4.6 times higher in rural areas than for women. In addition, obesity in rural areas was found to be influenced by education and occupation, and in urban areas, marriage and stress.

Conclusion: Obesity is caused by a combination of various causes, such as sleep time, stress, age, and education level. Through this study, factors related to obesity in urban and rural areas were identified. Intervention strategies that take into account different approaches and priorities are needed by identifying the socioeconomic factors of the growing obesity population in urban and rural areas.

Keywords: obesity, urban, rural, sleep time, stress

PE 01-06 1. Behavior and Public Health for Obesity

Evaluating the WeCare Program: A Study on the Acceptability, Appropriateness, and Feasibility for Obesity Prevention Among Older People in Malaysia

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Background: The WeCare Program is an occupation-based activities aimed at preventing obesity by enhancing meaningful activity among older people in Malaysia. This program addresses sedentary lifestyles in the elderly, which adversely impacts health and contributes to obesity, by offering a structured, culturally relevant intervention to improve well-being and quality of life. Customized for Malaysia's unique cultural context, WeCare effectively engages the country's aging population in obesity prevention. The study's objective was to evaluate the acceptability, appropriateness, and feasibility of the WeCare Program, focusing on its implementation by OTs for older people to prevent obesity.

Methods: Conducted across six districts of Kelantan, 30 older people from six locations participated in a six-week intervention led by trained OTs. Evaluation tools included the Acceptability of Intervention Measure (AIM), Intervention Appropriateness Measure (IAM), and Feasibility of Intervention Measure (FIM).

Results: The study revealed high levels of acceptability, appropriateness, and feasibility for the WeCare Program among OTs and participants, indicating its effectiveness and suitability in obesity prevention.

Table 4: The results of the evaluation of WeCare Program

EVALUATION MEASURE	QUESTION	M	SD	M	SD	95% CI
ACCEPTABILITY	Q1	4.93	0.25	4.94	0.22	[4.86:5.03]
	Q2	4.93	0.25			
	Q3	4.97	0.18			
	Q4	4.93	0.25			
APPROPRIATENESS	Q5	4.97	0.18	4.85	0.20	[4.87:5.03]
	Q6	4.97	0.18			
	Q7	4.93	0.25			
	Q8	4.93	0.25			
FEASIBILITY	Q9	4.90	0.31	4.88	0.33	[4.75:4.99]
	Q10	4.87	0.35			
	Q11	4.87	0.35			
	Q12	4.87	0.35			

Conclusion: These findings have significant implications for OTs, providing a framework for engaging the elderly in meaningful activities to prevent obesity. This study is significant for the elderly community in Malaysia, offering culturally appropriate health interventions aimed at obesity prevention. At the policy level, it underscores the potential of occupation-based programs in elder care, advocating for further investment and support. For the elderly, WeCare offers a valuable opportunity for enhanced health and quality of life in Malaysia.

PE 01-07 1. Behavior and Public Health for Obesity

Factors affecting Wearable Device Adherence among Middle to Older adults: Qualitative study

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Background: As one of the rapid aging countries, South Korea is challenged to find ways to reduce medical and care costs in future. Mobile healthcare industry has recently garnered attention, particularly the use of wearable devices. Since wearable devices allow users to monitor their health status in real-time, collect data, and analyze it to manage their health, these devices are recognized as effective tools for managing health.

In practice, continuous use of wearable devices is crucial for them to be effective in elderly health management. However, research on the factors that enable people to continue using wearable devices is limited. This study aims to identify the factors that enable middle to older adults to continuously use wearable devices by investigating the factors influencing sustained usage through in-depth interviews.

Methods: Qualitative data from five participants: (Mean age: 55(8.05)) were collected through in-depth interview and pre-surveys to explore topics and insights of adherence use of wearable device. Through

synthesizing findings from interview and pre-surveys, insights and concerning issues were summarized into three dimensions: attitudes toward the use of wearable device, digital literacy, and Self-efficacy.

Results: Results reveal that all participants reported perceived usefulness, perceived ease of use, and perceived self-efficacy for digital device have a significant impact on attitudes toward the use of wearable device at the initial stage of activity. However, research has found that their willingness to continuously use wearable devices decreases once they become accustomed to tracking their activities using wearable devices, specifically when they could predict the number of calories burned and the number of steps walked compared to the distance walked.

Conclusion: This study concludes that social and psychological factors that can encourage users to continue wearing the devices should be more considered in future device development for middle to older aged population.

PE 01-08 1. Behavior and Public Health for Obesity

Body weight status of university students and its association with their dietary preferences: A comparative study between university residents and non-residents group

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Background: Obesity is a risk factor that affects the body health and growth. Understanding and promoting healthier dietary habits and active lifestyle are essential strategies for maintaining health weight among university students. The aim of this study is to examine the association between body weight status with dietary preferences among university students in Selangor and to compare the dietary preferences between university residents and non-residents.

Methods: In this cross-sectional study, 280 participants between the ages of 18 and 29 were recruited. Sociodemographic characteristics, dietary preferences and anthropometric measurements were self-reported by the participants.

Results: One-third (30.3%) of the university students were overweight or obese. It reported that 41.4% of the participants would eat a variety of foods for a balanced diet. Nearly 70.0% of university students did not consume vegetables in their daily meals, where a significantly higher percentage among university residents (74.3%) $p=0.05$. Only a small group (10.4%) of university students eat fruits daily. A total of 78.2%

university students consume fried food at least three times per week, with a significantly higher percentage among university residents (80.5%) compared to non-university residents (75.8%), $p=0.046$. The percentage of university students consuming instant food at least three times per week is about 55.3%, which is significantly higher among university residents (61.4%), $p=0.015$. Majority of the students (58.9%) eat more when feeling stressed and it is higher among university residents (65.5%), $p=0.017$. Most of the students (68.9%) will look for food that can be quickly consumed regardless of its nutrition value during examination weeks, especially among university residents (78.4%), $p=0.001$.

Conclusion: In conclusion, most of the unhealthy dietary preferences were significantly higher among the university-residents compared to non-university residents. Future study should incorporate the social and physical environmental factors in understanding the dietary practices among the Malaysian university students.

Keywords: body weight, dietary preferences, university residents, university students

PE 01-09 1. Behavior and Public Health for Obesity

Association between Intake of Functional Beverages and Obesity among Adults: A Scoping Review

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Background: Obesity remains the primary health concern globally, particularly among adults. Functional beverages, known for their health benefits could play a significant role in addressing obesity. These beverages contain ingredients that promote metabolism, reduce appetite, or enhance fat burning, making them a potential tool in weight management. This review aims to identify the association between the intake of functional beverages and obesity among adults and to analyze the existing knowledge gaps.

Methods: A systematic search was conducted in PubMed, Scopus and Google Scholar databases. This review followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) guidelines. Selected studies were from randomized controlled clinical trials, cross-sectional and cohort studies.

Results: After a thorough search of 1,327 papers based on the article title, abstract, and full text, 10 papers (3 tea, 4 coffee, 3 SSBs) were found

eligible for inclusion. Most studies (70 %) highlighted the association between caffeinated beverages and reduction of obesity (0.48 - 2.1 kg/m²), where intake of functional beverages have an impact in reducing weight and waist circumference in adults, thus decreasing occurring of obesity. The high antioxidant content in green tea and coffee such as hydroxycinnamic acid (caffeic and ferulic acids) and catechin could increase lipid oxidation resulted in weight reduction short term. However, contradictory results when the functional beverages were added with sugar (SSBs), the rate of obesity would increase due to the disruption in phospholipid metabolism.

Conclusion: Consuming functional beverages, especially caffeinated beverages lower the obesity prevalence among adults. More research is required in the future, especially for other functional beverages that are not caffeinated. Overall, the data contribute to the significance of functional beverages on weight changes aiding in future creation of innovative functional beverages to tackle obesity.

PE 01-10 1. Behavior and Public Health for Obesity

Fast Food and Sweetened Beverages Consumption and Its Association with Body Weight Status among University Students

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Background: Over the past decades, the consumption of fast foods and sweetened beverages has increased globally and became favored by people of various age groups. The objective of this study was to assess the fast food and sweetened beverages consumptions and its association with body weight status of university students.

Methods: A cross-sectional study was conducted among 220 university students aged 18 to 30 years old in Shah Alam, Malaysia. Participants self-reported their body weight, height, sociodemographic information, and dietary habits. Body mass index was calculated and used to classify the body weight status.

Results: One-third (32.7%) of university students were overweight and obese and 19.1% were underweight. A total of 10.5% and 35.0% of university students consumed fast food regularly (4-7 days/week) and sweet beverage regularly, respectively. Chi-square test showed that fast food consumption was positively associated with sweetened beverages consumption ($\chi^2=16.175$, $p=0.003$). Most university students (72.8%) consumed sweetened beverages in addition to regular meals, and it was significantly associated with their sweetened beverage consumption

frequency, $p<0.001$. More than half (69%) of university students consumed sweetened beverages as snacks throughout the day, and it was found to be positively associated with the consumption frequency, $p=0.032$. A significantly higher proportion of overweight and obese university students believed in a connection between fast food and sweetened beverages consumption with their body weight ($p<0.001$). However, frequent fast food consumption frequency was found to be lower among this group of overweight and obese university students ($p=0.020$).

Conclusion: In conclusion, one-third of university students consumed sweetened beverages and only a small group consumed fast food regularly. Fast food consumption frequency was inversely associated with body weight status. Further study should consider other dietary habits and lifestyle behavior to examine the factors related to body weight status among Malaysian university students.

Keywords: Body Weight Status, Fast Food, Obesity, Sweetened Beverages, University Students

PE 01-11 1. Behavior and Public Health for Obesity

The association between perceived stress and obesity among young adults: mediating effect of health status

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Background: The prevalence of obesity among young adults is increasing globally. Obesity in young adults has a negative impact on health in old age, regardless of obesity status in old age, so it is important to manage obesity from young adulthood. Health-related factors such as sleep, depression, stress, and subjective health perception have a particular influence on obesity in young adults. Stress is closely related to obesity because it can lead to inappropriate eating habits. Mental health conditions, including stress, are known to have a major impact on the ability to self-assess one's health status. This affects individuals' health-related behavior, and the risk of obesity is likely to increase for individuals who are unable to accurately determine their health status. Health conditions, particularly psychological ones, are interrelated, and it is therefore crucial that they be considered comprehensively. However, existing research on this is insufficient. Therefore, the present study aims to analyze the impact of stress on obesity and the mediating effect of subjective health perception among health conditions that have recently attracted attention as a risk factor for obesity in young adults in Korea.

Methods: Data were obtained from the 8th Korea National Health and Nutrition Examination Survey (2019–2021). The study participants were 3,053 individuals aged 19–34 years. This study used "HE_BMI" calculated from weight and height as the dependent variable. The level of perceived

stress was used as the main independent variable, and the subjective health perception variable was used as a mediating variable.

To analyze effect of health status on the association between stress and obesity, mediating effect analysis was used.

Results: For both men and women, higher perceived stress levels were associated with worse subjective health perception ($\beta = 0.257$, $p < 0.001$; and $\beta = 0.380$, $p < 0.001$, respectively), and "bad" subjective health perception was more likely than "good" subjective health perception to be associated with obesity ($\beta = 0.319$, $p < 0.001$; and $\beta = 0.377$, $p < 0.001$, respectively). The more stress that men and women felt, the more likely they were to suffer from obesity ($\beta = 0.136$, $p < 0.05$; and $\beta = 0.195$, $p < 0.001$, respectively). In addition, analysis of the mediating effect of subjective health perception on the effect of stress on obesity revealed that for men, stress affected obesity through subjective health perception, while for women, stress had a direct effect on obesity as well as an indirect effect through subjective health perception.

Conclusion: To effectively prevent and manage obesity in young adults, health conditions such as stress and subjective health should be considered in tandem, and more systematic strategies that differ according to gender are required.

PE 01-12 1. Behavior and Public Health for Obesity

Regulating Exposure to Bright Light during Nighttime & Day hours can lead to Improved Cardiovascular and Metabolic Health through Enhanced Vision

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Background: Over the past ten years, there has been a growing focus on the impact of circadian rhythms on metabolic disorders and Cardiac-Metabolic health management. Yet, the relationship between alterations in sleep patterns and metabolic syndrome among older individuals is still not fully understood.

Methods: In this study, 120 elderly individuals aged 18–60 years were included: Morningness(MC) (55n) Intermediate(IC) (50n) & Eveningness chronotype(EC) (15n) with T2DM. Sleep patterns (bedtime, duration, wake-up time, and exposure to bright light) were examined through 48 hours ABPM, Actigraphy by Actiwatch and interviews. Statistical analysis involved one-tailed t-tests for data comparison and Pearson coefficient for correlation calculations.

Results: Systolic/Diastolic readings of ABPM show significant change between MC and IC (0.005) but not between EC & IC (0.007). And for reliability of sleep by actigraphy shows MC (6:15 + 1:35) & EC (8:18 + 1:23) take complete sleep but IC total sleep hours (5:10 + 1:05) are very less. Disruption of Rev Erb (0.003) & Ror α (0.001) gene expression is also a risk factor for Cardio metabolic Diseases in T2DM Patients. Additionally, individuals of Young Age with Type 2 Diabetes Showed a significantly higher prevalence of exposure to light during night-time hours.

Conclusion: Delayed bedtime, consistent sleep duration, and exposure to light at night have been found to be linked to higher body mass and Cardio-metabolic health issues in the elderly, indicating a potential influence on metabolic disorders.

PE 01-13 1. Behavior and Public Health for Obesity

Association between FTO Gene Polymorphism, Nutritious Food Price Index (NPI) And Abdominal Obesity among adults in Klang Valley

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Background: Abdominal obesity (AO) is a major public health issue in Malaysia, however, the plausible association of genetic and nutritious diet affordability with AO in the local population remains understudied. This study aimed to examine the associations between AO, Nutritious Food Price Index (NPI), and FTO gene polymorphisms among adults in Klang Valley.

Methods: A cross-sectional study was conducted involving 238 individuals aged 18 years and above recruited by convenience sampling method. Waist circumference (WC) was measured and information on dietary intake, socioeconomic characteristics, and 18 FTO single nucleotide polymorphisms (SNPs) was analyzed. SPSS® 27 statistical software was used to analyze the relationships between these variables.

Results: The results showed that AO prevalence was 54.2% and there is a significant association between WC and age ($H=20.412, p<0.001$), gender

($U=-6.64, p<0.001$), occupational status ($U=-2.01, p=0.045$), ethnicity ($H=17.40, p<0.001$), marital status ($U=-4.66, p<0.001$) and monthly household income ($H=6.72, p=0.035$) except for academic qualifications. The NPI, a measure of diet affordability and food security, was found to be significantly associated with age ($H=17.598, p<0.001$), gender ($U=-2.188, p=0.029$), ethnicity ($H=11.267, p=0.004$), marital status ($U=-3.373, p=0.001$), and monthly household income ($H=8.309, p=0.016$), but not with occupational status and academic qualification. In the multivariate analyses, FTO variant rs9936385 remained significantly associated with AO without any adjustment (crude- $\beta=0.93, 95\%CI=0.10, 4.89$) as well as after adjusted for ethnicity and monthly household income (adjusted- $\beta=0.95, 95\%CI=0.08, 5.01$).

Conclusion: This study provides novel insights into the genetic and dietary determinants of AO among adults in Klang Valley, Malaysia. The findings suggest a need for targeted and culturally appropriate AO prevention programs, especially among high-risk population subgroups.

PE 01-14 1. Behavior and Public Health for Obesity

Association between Perceived Body Weight and Food Choice Motives among Adults in Selangor, Malaysia: Comparison between Pandemic and Endemic Phase of COVID-19

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Background: The emergence of COVID-19 has abruptly altered food purchasing behaviour, dietary habits, and food choice motives (FCM). Therefore, this study was conducted to investigate the association between perceived body weight and food choice motives among adults in Selangor, comparison between pandemic and endemic phase of COVID-19.

Methods: This cross-sectional study was carried out in Selangor, Malaysia among 318 adults aged 18 to 55 years old. Data was collected using a combination of a single question for perceived body weight and a 38-item Food Choice Questionnaire for determining FCM for both phases of COVID-19. Body weight and height during pandemic was self-reported and current measurements (ie. endemic phase) were measured by the researcher.

Results: The trend of obesity was increasing from pandemic (41.2%) to endemic (50.5%) phase. Nearly half of the respondents misperceived their body weight for both pandemic (47.8%) and endemic (46.9%) phases. There was a significant difference in the proportion of perceived body weight between the pandemic and endemic phases ($\chi^2=164.71, p<0.001$). The mean of all FCM during endemic were significantly higher compared to pandemic except for mood. Mood, religion and price were the most prominent motives underlying the selection of foods during pandemic while religion, price and convenience were the top three FCM during the endemic phase. However, perceived body weight was not significantly associated with FCM for both pandemic and endemic phases.

Conclusion: The findings from this study will add to the knowledge of Malaysian food choice motives and perception of body weight, especially during pandemic and endemic phases of COVID-19 in Malaysia.

PE 01-15 1. Behavior and Public Health for Obesity

Dietary Intake and Wellbeing Associated with Malnutrition among Adolescents Aged 13 to 18 Years Old Living in Orphanages in Kuala Lumpur, Malaysia

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Background: An adequate amount of nutrients is important for children for their growth and development. Children with malnutrition have a higher risk of increasing illness or infection and delay in recovery. Thus, this cross-sectional study aims to determine the association between dietary intake and wellbeing with malnutrition among children living in orphanages in Kuala Lumpur.

Methods: A total number of 257 respondents from 5 orphanage centers were randomly selected in this study. The collected participants data include height and weight to determine body mass index (BMI), dietary intake assessment (FFQ), and well-being assessment using Orphans and Vulnerable Children Wellbeing Tool.

Results: A total of 49% male and 51% female adolescence participated in this study with mean age of 15.3±1.7 years. Most of the respondents were Chinese (37%), followed by Indian (36%) and Malay (27%). About 54% of the orphans had normal BMI, while another 28%, 14% and 4% were

underweight, overweight and obese, respectively. Half of the respondents (50.2%) had lower wellbeing status while average energy intake was 2819±1350kcal and 2479±1136 for male and female respondents, respectively. Significant associations were determined between malnutrition status with dietary intake ($X^2 = 28.15, p < 0.05$) and wellbeing ($X^2 = 16.96, p < 0.05$).

Conclusion: Although more than half of the respondents in this study had normal BMI, the prevalences of under and overnutrition should be of concern also. The energy intake of the respondents exceeded the recommended nutrient intake, which could lead to an increase in body weight over time. Nutrition knowledge, healthy meal planning, and food preparation should be introduced to the orphans and caregivers at the orphanage centers to improve quality of life of this group of vulnerable children/adolescents.

Keywords: Dietary intake, wellbeing, malnutrition, quality of life, orphans

PE 01-16 1. Behavior and Public Health for Obesity

Best Nudge to Influence People's Behaviour for Better Off: Choices Architecture on Obesity Prevention

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Background: Indonesia is facing a significant increase in the Triple Burden of Nutrition (TBM): stunting, obesity, and non-communicable diseases. Stunting children reached 30.8%, obesity in children and adolescents is 21.8% with the coincidence of NCD's reaching 69.9%. Prevention strategies are the cheapest in terms of national health burden by changing people's behavior. Nudge theory is the formulation of an architecture of "gently encouraging" choices to change the decision making of certain target groups through psychology and micro/macro policies.

Methods: This study uses longitudinal dataset from the Indonesia Family Life Survey (IFLS), Worldbank and UNDP open data, and digital data. We aim to analyze and evaluate the extent to which Indonesian architectural policies and programs from National Action Plan for Food and Nutrition (RAN-PG) 2020-2024 have been effective or ineffective in persuading changes in people's behavior to reduce the obesity prevalence.

Results: RAN-PG consists of 4 strategies: (1) healthy and affordable food: home-cooking real food and halal certification for all restaurant & streetfood; (2) nutrition services: 1000 days of life services, women empowerment, and village monthly services; (3) access: transportation,

pedestrians, parks, public sports equipment, and (4) strengthening institutions central to village policies. Using a robust random effect, the obesity prevalence was 26.6% among men and 44.4% among women in 2018. As of March 2024, the obesity rates for both men and women decreased to 6.53% and 16.58% respectively. The data shows that strategies 1 and 2 are the biggest accessories in reducing obesity rates. Almost all Indonesian households cook food at home (91.5%). All food businesses are required to register for free halal certification, it encourages healthy and safe raw ingredients. The 1000 days of life program is available in all villages in Indonesia through Community Health Centers and Posyandu for routine health checks, distribution of supplements and vitamins for pregnant women, and various empowerment activities. However, access is still very poor so Indonesia is in first place as the country with the least movement (3,513 steps/day).

Conclusion: Various programs have been effective in reducing obesity rates among the Indonesian population. However, Indonesia has still not succeeded in providing the best nudge for active community behavior with overlapping regulations that cause polarization in society.

Keywords: Obesity, Nudge theory, Behavioral economics, Preventive

PE 01-17 1. Behavior and Public Health for Obesity

Barriers Towards Fruits and Vegetables Consumption among Working Adults Population in Kuala Lumpur and Selangor, Malaysia

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Background: Fruits and vegetables have high content of dietary fiber, vitamins and minerals and adequate intake have long since been associated with decrease risks of chronic diseases. Despite its' health benefits, the recent National Health and Morbidity Survey 2023 reported that 95% of Malaysian did not consume 5 servings of fruits and vegetables daily. Thus, this cross-sectional study aims to identify the association between sociodemographic characteristics and the barriers towards fruit and vegetable consumption among working adults in Kuala Lumpur and Selangor, Malaysia.

Methods: Working adults, aged 18 - 60 years old (N= 242) were recruited using purposive sampling technique. Respondents completed either an online or a physical self-administered questionnaire on their socioeconomic and demographic characteristics and barriers towards fruit and vegetables consumption.

Results: More than half of the respondents in study were female (51.7%), not married (50.5%), had bachelor's degree qualification (48.3%) and household income below USD1100 (67.8%). The highest barrier reported

was preference towards fruit and vegetables (75.2%), followed by quality (74.4%) and availability of variety of fruit and vegetables (71.5%). Education was significantly associated with availability of variety of fruit and vegetables ($\chi^2 = 13.590, p < 0.05$), quality ($\chi^2 = 14.626, p < 0.05$) and knowledge ($\chi^2 = 12.355, p < 0.05$). Income was significantly associated with most barriers except availability of fruit and vegetable varieties, quality, and preference ($p > 0.05$).

Conclusion: Working adults in this study reported low intake of fruit and vegetables then the recommended amount. than the suggested daily intake of the Malaysian Dietary Guidelines. Education and income were among the sociodemographic factors associated with the barriers towards fruit and vegetables consumption. Public health initiatives to improve fruits and vegetables intake should be customized according to sociodemographic characteristics to increase percentage of people adopting a healthier eating habit.

Keywords: Barrier, fruits, vegetables, sociodemographic, working adults

PE 01-18 1. Behavior and Public Health for Obesity

Unhealthy Lifestyle Behaviors and Poorer Sleep Quality Are Associated with Social Jetlag in Malaysian Adults

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Background: Social jetlag (SJL) is a term used to describe misalignment between biological and social time. Measured as the difference in sleep midpoints between work and free days, social jetlag has been associated with unhealthy lifestyle behaviours and adverse health outcomes. This study aimed to identify the prevalence of social jetlag and its association with lifestyle factors and demographic characteristics among adults in Malaysia.

Methods: This is a cross-sectional study of adults aged 18 to 59 years and with Internet access. Self-declared data on age, gender, and lifestyle behaviour were collected online from June 2023 to February 2024. Questionnaires used: Locally validated Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, Modified Munich Chronotype Questionnaire (M-MCTQ), Berlin questionnaire, Insomnia Severity Index and General Health Questionnaire (GHQ). Social jetlag was defined as a discrepancy of ≥ 1 h between bedtime and wake-up time on weekdays compared to weekends. Eating jet lag was calculated in hours as follows: Eating midpoint on weekends minus eating midpoint on weekdays.

Results: The sample consisted of 2072 participants (63% response rate), among whom 72.9% were females. Ages varied between 18 and 59 years (mean 32.7; standard deviation (SD), 8.7). The prevalence of SJL was 48.7.8%, with no significant difference between men and women ($p = .891$). Adults with SJL were more likely to be among the younger age group ($p = 0.02$), single ($p = 0.03$), employed ($p = 0.012$), smokers ($p = 0.018$), sleep deprived ($p < 0.001$), poorer sleep quality ($p = 0.03$), sleep back of free days ($p = 0.001$), presence of insomnia ($p = 0.03$), high risk for sleep apnea ($p = 0.018$) and lower mental well-being ($p = 0.03$). In addition, adults with SJL were more likely to have eating jetlag ($p = 0.06$). In this study, the prevalence of eating jetlag is 54.3%.

Conclusion: In conclusion, social jetlag and eating jetlag are prevalent among Malaysian adults. Our survey provides evidence of unhealthy lifestyles and health risks among adults with SJL, characterised by higher smoking habits, poorer sleep quality, shorter sleep, a high risk for sleep apnea, the presence of insomnia and lower mental well-being with potential long-term negative health outcomes.

PE 01-19 1. Behavior and Public Health for Obesity

Process Evaluation of a Peer-Led Digital Health Lifestyle Intervention (MYCardio-PEER) for Cardiovascular Disease Prevention in a Low-Income Community

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Background: Cardiovascular diseases (CVD) significantly impact low-income communities with limited access to preventative care. While peer-based interventions have shown promise in managing chronic diseases, their effectiveness in CVD prevention with digital health is underexplored. We aimed to develop and conduct process evaluation on MYCardio-PEER, an 8-week peer-led digital health intervention among at-risk low-income individuals, living in a low-and-middle-income country (LMIC).

Methods: MYCardio-PEER was developed based on the Integrated Theory of Behaviour Change. There were five steps involved in the development process: (i) review of evidence, (ii) development of behavior change matrix, (iii) creation of digital content and peer-led activities (iv) content validation, (v) feasibility and process evaluation.

Results: The 8-week MYCardio-PEER program consisted of bite-sized educational videos, infographics, and interactive activities targeting knowledge, nutrition, and lifestyle behaviors related to CVD. A total of 32 participants (59.4% male, with a mean age of 58.2±6.7 years) participated in the program. Program adherence was high with 82.4% of participants completing all the peer-led activities. Participants' satisfaction with the program was also high, with content satisfaction scoring 90.2%.

Conclusion: The high adherence rate and strong satisfaction levels observed in the MYCardio-PEER program demonstrate its considerable potential for CVD prevention in underserved populations in LMICs. These positive outcomes highlight the effectiveness of peer-led digital health interventions in improving health behaviors and preventing chronic diseases in resource-limited settings.

PE 01-20 1. Behavior and Public Health for Obesity

Associations between personal health behaviors and body weight status among university students

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Background: University life marks a crucial transition from adolescence to adulthood, shaping life-long dietary and lifestyle habits. However, poor habits developed during this period can persist into adulthood, leading to various nutritional consequences such as overweight and obesity. This study aims to investigate personal health behaviours and their impact on body weight status among university students.

Methods: This cross-sectional study involved 180 university students from private universities. Personal health behaviors included dietary habits, dietary quality, physical activity, physical fitness, and sleep habits. Body weight status was determined using body mass index (BMI), waist circumference, and body fat measurements. A cluster analysis was conducted using the K-means method to identify and group participants based on their patterns or profiles. ANOVA with post-hoc analysis was performed to determine the association between personal health behaviors and body weight status.

Results: The cluster analysis identified three distinct profiles of health behaviors among the participants. Cluster 1 (47.1%), labeled "Minimal

Health Behavior Engagement," consisted of individuals with generally lower-than-average scores across most health behavior variables, except for a slightly higher fast-food consumption. Cluster 2 (26.7%), named "High-Risk Health Behaviors," included individuals with higher-than-average scores for most health behavior variables, indicating poor sleep quality and potential behavioral addiction symptoms. Cluster 3 (11.4%), characterized as "Physically Active Health Enthusiasts," exhibited very high levels of physical activity and muscle strength, with mixed scores on other health behavior variables. The differences in waist circumference ($F=5.02$, $p=0.01$), BMI ($F=6.54$, $p=0.01$), and body fat percentages ($F=4.19$, $p=0.02$) among these clusters were statistically significant, with Cluster 3 exhibiting notably lower values than cluster 1 and 2.

Conclusion: This study provides valuable insights into the diverse health behavior profiles among university students and emphasizes the need for tailored interventions. These findings have implications for future research and public health initiatives, highlighting the importance of understanding and addressing health behavior profiles to promote healthier lifestyles among young adults.

PE 01-21 1. Behavior and Public Health for Obesity

BEHIND THE DESK: SOCIODEMOGRAPHIC AND LIFESTYLE DRIVERS OF OBESITY AMONG KUALA LUMPUR'S WORKFORCES

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Background: The spiraling rise of obesity prevalence is alarming nationwide. Overweight/obesity will have a greater chance of getting NCDs including hypertension, diabetes mellitus, and heart attack as well as cancer. This study aims to determine whether there is any association between sociodemographic characteristics, lifestyle factors, and work environment, with overweight/obesity among Malaysian working adults in Kuala Lumpur.

Methods: A cross-sectional study design is carried out among Malaysian workers aged 18 to 64 years. The data were obtained through online administered questionnaires. In this study, 290 respondents were involved using convenient sampling. Multiple logistic regression analysis was used to determine the association and odds ratio of overweight/obesity among working adults for each study factor, with a $p < 0.05$ significance value.

Results: The prevalence of overweight/obese workers in this study was 24.8%. This study found that work-related factors such as working hours, work status, work shift, type of occupation, and type of work had no association with overweight/obesity among working adults, but certain sociodemographic characteristics and lifestyle factors were associated with overweight/obesity. It was reported that male workers (aOR: 3.465, 95% CI: 1.723, 6.968) who are married (aOR: 4.392, 95% CI: 1.853, 10.410) with sleep less than 7 hours (aOR: 2.752, 95% CI: 1.350, 5.611), and those who did not have breakfast every day (aOR: 2.46, 95% CI: 1.113, 5.437) were reported to be associated with increased odds of overweight/obesity among workers.

Conclusion: Further research should be undertaken on other work condition factors like work stress, lifestyle factors such as diet quality, and specific job categories that contribute to an increase in BMI, especially among working adults in our country.

PE 01-22 1. Behavior and Public Health for Obesity

Study of results Obesity and a health risk behavior

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Background: In recent years, the use of e-cigarettes has increased in Mongolia, which can be seen by the fact that someone around us is using them. All tobacco products are addictive and involve risky behaviors. Risky behaviors are behaviors that pose a risk of harming one's own or others health, causing morbidity or mortality. Therefore, there is no study on the level of smoking dependence and risky behavior among students, which is the basis of our study. The study is aimed to evaluate the risky behavior and cigarette smoking among students who are studying the school of university.

Methods: The study was conducted by using a cross sectional design and a quantitative research method. 368 students who have been examined at University questionnaire. Statistical processing was carried out using SPSS-25, and multi-linear regression analysis was performed to analyze the relationship between the dependent and independent variables, and the relationship was considered significant at the $p < .000$, $p < .01$, and $p < .05$ levels.

Results: In the study, 87.8% of participants were female and 12.2% were male student. Furthermore, 50.2% of respondents are smokers. When the physical nicotine dependence test was taken from smoking students, moderate to high levels of dependence were identified, indicating there is behavioral risk. Examining consumption by type of tobacco, 36.4% use cigarettes and 56.4% use e-cigarettes, which is higher than other types of tobacco use. In terms of gender, it is found that men and women use it without any difference. It can be seen that 43.6% of the respondents smoke, which is close to the total number of smokers, indicating that there is a certain level of family behavior influence. Risk behavior include insecurity, violence, bullying, sadness, drug use, alcohol use, sexual orientation change, and body weight (obesity).

Conclusion: There is no science-based information on the understanding of smoking, the dependence of smoking students has been determined at a certain level, and the use of tobacco ($r=0.30$), alcohol ($r=0.39$), and TV ($r=0.38$) was moderately related to health risk factors. Age is factor influencing risk behavior. ($p < .001$)

PE 01-23 1. Behavior and Public Health for Obesity

Obesity and diabetes trend in Young Korean Adults using Korea National Health and Nutrition Examination Survey (2007-2021)

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Background: Globally, obesity has been increasing annually and leads to various complications including type 2 diabetes (T2D). In South Korea, the prevalence of both obesity and diabetes is increasing, particularly among young adults. The study aimed to investigate the relationship between obesity and T2D in young adults (aged 20-39) using the Korea National Health and Nutrition Examination Survey (KNHANES). Specifically, the study examined the trend of obesity and Type 2 diabetes (T2D) prevalence over 20 years by gender in young adults to determine whether gender-specific and age-specific obesity and diabetes prevention strategies are necessary.

Methods: Data from the 4rd (2007) to the 8th (2021) cycles of the Korea National Health and Nutrition Examination Survey (KNHANES) were used for this research. Since KNHANES utilizes a complex sampling design, weighted means and prevalence rates were calculated to ensure accurate estimates. Statistical analysis was performed using SAS (version 9.4; SAS Institute, Cary, NC, USA).

Results: The analysis of KNHANES data from 2007 to 2021 highlights a notable trend in the prevalence of obesity and T2D among young adults aged 20-39 in South Korea. In 2007, the prevalence of obesity was 25.59%, while T2D was 2.53%. Obesity showed a steady increase, with upticks around 2016 and peaking in 2020 at 37.30%, followed by a decrease to 33.72% in 2021. T2D showed fluctuations, peaking at 2.80% in 2020 and decreasing to 2.21% in 2021.

Conclusion: With the growing prevalence of obesity, early-onset T2D is becoming increasingly common among young adults. Gender-specific obesity prevention and age-specific diabetes management programs targeting adults with early-onset T2D are urgently needed. Further study is warranted to determine which strategies are effective in reducing the prevalence of obesity and early-onset T2D among the younger Korean population.

PE 01-24 1. Behavior and Public Health for Obesity

The Mediating Role of Sedentary Behaviour Between Depression and Obesity: A Population-Based Study from Rural India.

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Background: Depression and obesity are reported to be associated with one another through complex pathophysiological pathways. Depression can lead to a high sedentary lifestyle which can further exacerbate the physical health condition leading to obesity. The present study aimed to understand the association between depression and obesity through sedentary behavior as the mediating factor in a rural population from North India.

Methods: The data for the present study was derived from an ongoing research project funded by the government of India. At baseline, 2367 participants (females 55.5%) aged 30 to 75 years were recruited from 2022 to 2024. Of the total of 2367 participants, 969 individuals' data were available for depression. Depression was assessed through BDI II and Sedentary Behavior was recorded and categorized using a GPAQ questionnaire. Data analysis was performed using IBM's SPSS v22 and Jamovi software.

Results: 24.3% of depressed participants were found to be obese as compared to non-depressed individuals. No association was observed between depression and obesity in regression analysis. In mediation analysis, it revealed that there was no significant direct association of

depression with obesity ($\beta = -0.019$; $p = 0.285$), but a significant positive association was observed between depression and obesity through sedentary behavior ($\beta = 0.0087$; $p = 0.006$).

Conclusion: Depression may lead to behavioral changes like low motivation levels, and increased sedentary time, which can predispose individuals to obesity. This underscores the importance of addressing sedentary behavior and promoting regular physical exercise in preventing and management of obesity among individuals with depression.

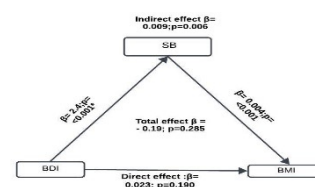


Figure: Mediation effect of depression on obesity through sedentary behavior.

SB-Sedentary behavior; BDI-Beck's Depression; Inventory; BMI -body mass index; Indirect effect= BDI ⇒ Sedentary behavior -> BMI; Total effect=BDI ⇒ BMI through SB; Direct effect= BDI ⇒ BMI

PE 01-25 1. Behavior and Public Health for Obesity

Association of Food Insecurity and Growth Status with Behavior of Orang Asli Primary School Children in Negeri Sembilan, Malaysia

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Background: Food insecurity and poor growth status is highly prevalent among Orang Asli (indigenous) community which may contribute to behavioural problem among primary school children. Thus, this study aimed to determine food insecurity and growth status influences towards behavioural aspects of primary school children.

Methods: This cross-sectional study was conducted among 196 primary school children from four Orang Asli (OA) primary schools in Negeri Sembilan, Malaysia. A structured questionnaire consisted of socio-demographic, Radimer/Cornell Food Insecurity questionnaire and Strength and Difficulty Child Behaviour questionnaire were used to obtain respondents' characteristics. Height and weight of the children were measured using SECA Stadiometer and TANITA digital weighing scale, to the nearest 0.1cm and 0.1kg, respectively. Height-for-age (HAZ) and body mass index-for-age (BAZ) z-scores of the children were calculated using WHO AnthroPlus software as indicators of the children's growth status.

Results: Majority of the OA children were male (55.1%) with mean age

of 9.4 ± 1.6 years old and mean household income of USD200 \pm 90. Most (93.8%) of the OA children came from food insecure households, with highest prevalence (41.8%) from individual food insecurity category. Most children had normal HAZ (80.6%) and BAZ (73.5%), while 11.7% and 11.2% were overweight and obese, respectively. Approximately, 61.7% of the children had normal behaviour with mean score of 11.92 ± 6.84 . Chi-square test showed that food insecurity ($\chi^2= 5.17, p>0.05$) and growth status of children ($\chi^2= 16.58, p>0.05$) were not associated with behaviour. Significant association was only observed between household income and food insecurity status ($\chi^2= 20.57, p<0.05$).

Conclusion: Majority of the OA children in this study were from low-income households experiencing food insecurity. Both food insecurity and growth status were not associated with behaviour of OA children. Further studies should be done to confirm this association.

Keywords: Orang Asli, food insecurity, growth status, behaviour

PE 01-26 1. Behavior and Public Health for Obesity

Sleep Habits and Sociodemographic Factors in Relation to Overweight and Obesity among Malaysian Preschoolers

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Background: The rising prevalence of childhood obesity is a growing concern worldwide. Understanding the influence of sociodemographic factors and sleep habits on overweight/obesity, especially among young children is important for developing effective prevention strategies. This study explores the associations of sociodemographic determinants and sleep habits with overweight/obesity among preschoolers aged 3-6 years in Peninsular Malaysia.

Methods: This cross-sectional study was part of South East Asian Nutrition Surveys (SEANUTS II). A total of 812 preschoolers (5.1 ± 1.0 years old, 50.6% boys) from urban and rural areas in four regions of Peninsular Malaysia were included in this analysis. Information on demography, socioeconomic status, and child sleep habits (bedtime, nap, and sleep duration) were obtained using parent-reported questionnaire. Anthropometric measurements including body weight and height, and BMI-for-age z-scores as defined by WHO growth standards and growth reference were used to classify body weight status of preschoolers, i.e. overweight/obese and normal weight.

Results: Prevalence of overweight/obesity among Malaysian preschoolers was 15.4%. There were significant associations between child age, sex, and ethnicity with overweight/obesity, with higher proportions of older preschoolers (aged 5-6 years, 65.6%), boys (60.8%) and ethnic Indians (18.4%) classified as overweight/obese. Binary logistic regression found that older preschoolers and boys were 1.6 times more likely to be overweight/obese than younger preschoolers and girls, while ethnic Indians were 3.4 times more likely to be overweight/obese compared to ethnic Malays. Preschoolers had an average of 10.0 hours of sleep, including 1.5 hours of naptime per day. Slightly less than half (49.3%) of preschoolers met the sleep guidelines. No significant association was found between sleep habits and overweight/obesity among preschoolers.

Conclusion: Although no association was found between sleep habits and overweight/obesity, boys, older children, and those of Indian ethnicity had higher likelihood of being overweight/obese. Thus, prevention strategies should consider these demographic factors among young Malaysian children.

PE 01-27 1. Behavior and Public Health for Obesity

Obesity upsurge during the COVID-19 pandemic seems to be related with the dietary pattern difference in Korea

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Background: During the COVID-19 pandemic, upsurge in obesity prevalence was noted especially among male adults and children in Korea. Since KNHANES revealed a continuous decrease in food/energy intake along with a small decrease in physical activity, we attempted to look for a feasible explanation by analyzing dietary pattern in terms of food intake at prepared dish level (FIAPD) by individuals' weight status and/or pandemic.

Methods: Intake data from the Nutrition Survey segment of KNHANES was used for a total of 6,162 participants aged 6 ~ 49 years from KNHANES 2018-2019 for before pandemic and 4,735 participants from KNHANES 2020-2021 for during pandemic. Difference in dietary pattern was analyzed across sex, age groups (children, adolescents, young adults and mid-adults), and weight status. Dietary pattern was compared by FIAPD in 29 dish groups by summing up intake of consumed dishes within each group.

Results: While cooked rice group showed the highest FIAPD and followed by beverages, noodles & dumplings, soups, and alcoholic drinks in males, FIAPD of first 2 groups were comparable in females followed by noodles & dumplings, fruits, and soups. Obese males showed higher FIAPD for beverages and alcoholic drinks than non-obese males whereas obese females consumed more noodles & dumplings and less fruits than non-obese females. Such pattern of more noodles & dumplings and less fruits in obese population was evident in children also. Overall FIAPD decreased during pandemic yet that of stir-fried dish group in males and salad group in females increased compared to before pandemic.

Conclusion: Difference in dietary pattern was observed between males & females, obese and non-obese groups, and age groups. FIAPD from noodles & dumplings, beverages, alcoholic drinks, and fruits appeared to be related most to obesity that future research delving deeper into dietary pattern analysis at dish level is warranted.

PE 01-28 1. Behavior and Public Health for Obesity

Effect of Mental health on Obesity

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Background: Obesity is one of the major causes of chronic diseases known worldwide and is known to affect mental health such as stress. This study aims to examine the effects of factors influencing obesity: stress, suicide thinking.

Methods: Secondary data were analyzed using a nationwide cross-sectional survey of the 9th Korean National Health and Nutrition Examination Survey 2022. Subjects were over aged 19 years (n=6,146). The influences of socio-demographic characteristics, sleep time, and subjective health, stress, suicide thinking on obesity were identified.

Results: In the case of men, the probability of being overweight was 4.8 times and obese was about 9.5 times higher than that of women, and it increased with age and with the perceived good subjective health status

and low educational level. Additionally, in the case of obese people, stress and suicidal thoughts were higher than in non-obese people, and sleep time were found to be related to obesity. In the obese group with higher stress, suicide thinking was higher than in normal people, and in the case of men compared with women, suicide thinking were higher in the overweight group (about 8.6 times) than in the obese group (about 5.8 times).

Conclusion: This study confirms the negative effect of obesity on health once again, and sleep time, suicide thinking and stress is confirmed that it is a variable that affects obesity. It was also found that maintaining mental health is a factor in preventing obesity.

Keywords: obesity, stress, suicide thinking, sleep, mental health

PE 01-29 1. Behavior and Public Health for Obesity

The Effect of Health Provider's Feedback on Physical Activity Surveillance Using Wearable Device-Smartphone Application in the elderly with Metabolic Syndrome; a 12-Week Randomized Control Study

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Introduction: Mobile health technology using apps and wearable devices is becoming increasingly popular as it allows patients to monitor their health status. Research on whether wearable devices interventions can effectively prevent metabolic syndrome in the elderly is still insufficient. The purpose of this study is to evaluate the effect of feedback on clinical indicators in the elderly with metabolic syndrome on activities measured using wearable device-smartphone apps.

Methods: Patients (> 65y) diagnosed with metabolic syndrome were recruited and prescribed to live for 12 weeks using a wrist-wearable device (B.BAND, B Life Inc, Korea). The block randomization method was used to distribute the participants between an intervention group (n=19) and control group (n=20). In the intervention group, an experienced study coordinator provided feedback on physical activity to individuals through telephone counseling every other week.

Results: The mean number of steps in the control group was 9092.86

(4473.53) steps, and the mean number of steps in the intervention group was 9,829.31(4224.11) steps. After 12 weeks, metabolic syndrome was resolved in participants. In particular, there were statistically significant differences in metabolic composition among participants who completed the intervention. The mean number of metabolic disorders components per person decreased from 3.3 to 2.9 in the control group and from 3.5 to 3.1 in the intervention group. In addition, in the intervention group, waist circumference, systolic and diastolic blood pressure, and triglyceride levels were significantly reduced, and HDL cholesterol levels were significantly increased.

Conclusion: In conclusion, we found that 12 weeks of telephone counseling intervention using wearable device-based physical activity confirmation improved the damaged metabolic components of metabolic syndrome patients. Telephone intervention can help increase physical activity and reduce waist circumference, a typical clinical indicator of metabolic syndrome.

PE 01-30 1. Behavior and Public Health for Obesity

Mental health and well-being in adolescents with obesity

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Background: Overweight and obesity has been extensively associated with mental illness and well-being. Adolescence has been known to have relatively high mental stress from appearance compared to other age groups, and is large enough to seriously affect daily life. This study examined the association of obesity on mental health and health-related quality of life in adolescence.

Methods: Data were obtained from the Korea Youth Risk Behavior Web-based Survey (2021–2022). The study participants were 101,127 students of middle and high schools. This study used "BMI" calculated from weight and height as the dependent variable. The experience of depression symptoms, subjective stress level, sleep status, and quality of life were used as the main independent variable. Complex sample logistic analysis was performed to identify the association of obesity on mental health and quality of life.

Results: Among all adolescents, the proportion of obesity was 16.9%, and boys, seniors, residents of small cities, and students with economically poor and low academic levels were more likely to be obese. Obese adolescents had a high risk of depression (OR=1.85, 95% CI=1.67-2.05) and subjective stress (OR=1.60, 95% CI=1.42-1.79). Sleep in terms of health-related quality of life did not show a statistically significant effect, but had a significant effect on quality of life (OR=1.73, 95% CI=1.60-1.83).

Conclusion: Obesity in adolescence has a clear correlation with mental health and health-related quality of life. In the future, it is necessary to consider follow-up studies considering the mutual causality between obesity and mental health through time series data.

PE 01-31 1. Behavior and Public Health for Obesity

Household Food Security and Dietary Intake of Yulo Farmers Amid Farm Commercialization in Sitio Buntog, Philippines

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Background: Hacienda Yulo is a 7,100-hectare private lot in Laguna, Philippines spanning the cities of Calamba, Cabuyao, and Sta. Rosa. Farmers who struggle with farm commercialization are usually affected by food insecurity and experience harassment related to access to healthcare systems and food security. The farmers' primary sources of food and income were being fenced off and controlled by private securities and landowners. Thus, the farming industry to produce and sell goods for families in nearby small communities has been greatly affected by the present farm commercialization in the area. As part of its background and with food insecurity among farmers, the Philippine Statistics Authority released in June 2020 the preliminary estimates of the 2018 poverty incidence among 10a of the 14 basic sectors identified in the Republic Act 8425 or the Social Reform and Poverty Alleviation Act as well as individuals residing in rural areas, in which Filipino farmers have the highest poverty incidence among the basic sectors at 31.6%. This sector also registered the highest poverty incidence in 2015, along with the fisherfolks, individuals residing in rural areas, and children who belong to families with income below the official poverty thresholds. In terms of poverty, food insecurity, and malnutrition, the Integrated Food Security Phase Classification also indicates that the most chronic food-insecure people tend to be the landless poor households, Indigenous people, and populations engaged in unsustainable livelihood strategies such as farmers, unskilled laborers, forestry workers, fishermen, and the like, that provide inadequate and often unpredictable income. Moreover, in 2021, the poverty rate in the Philippines reached 18.1 percent, with around 19.99 million Filipinos living below the poverty threshold of about 12,030 pesos per month for a family of five. This indicates that in a family of five, each member only has 80.2 pesos a day for basic daily necessities such as food and water, including their non-food needs such as housing, transportation, clothing, and school supplies.

Methods: This study is a cross-sectional descriptive survey among the Yulo farmers in Sitio Buntog- Hacienda Yulo in Canlubang, Calamba, Laguna, Philippines. The research design used a socioeconomic and demographic survey questionnaire, followed by an actual

house-to-house interview regarding their health status, farm commercialization status, and dietary data. Inclusion criteria for the respondents are farmers in Hacienda Yulo and currently residing or staying in Sitio Buntog Hacienda Yulo for a minimum of 5 years. The variables are measured using dietary assessment and demographic and socioeconomic questionnaires. A total of 53 farming households completed the survey. Results showed that the farmers are nutritionally at risk of nutrient inadequacy with a prevalence of 7-15% and macronutrient inadequacy with a prevalence of 90.3%.

Results: Based on the data collected, the farmers in Sitio Buntog inside the Hacienda in 2022 are nutritionally at risk due to the prevalence of nutrient inadequacy of households, food insecurity, and belonging to lower-income households, wherein the farmers and residents also experience water and health crises that may also be acquainted with malnutrition and low levels of their nutrient intakes, and chronic diseases in their clinical assessment in their later lives. The data also shows that an average family in Sitio Buntog only spends 41.37 pesos a day to survive and meet their daily food requirements, including personal care.

Conclusion: In conclusion, the farmers are food insecure and belong to lower-income households, and when it comes to their dietary intake, nutrient deficiencies can result in osteoporosis in adults, anemia, impaired work performance, cognitive functions, and impaired immunity, which could be acquired by the farmer of Sitio Buntog if proper intake is not observed. It is highly recommended that further research be conducted to determine new interventions that may help the farmers in the Philippines, especially in Hacienda Yulo. These further studies will also help to determine and give comparisons to the status of agriculture and food security in the Philippines.

Keywords: Farm Commercialization, Filipino farmers, food security, Hacienda Yulo, nutritional status

PE 01-32 1. Behavior and Public Health for Obesity

Utilizing Occupational Therapy Approaches to Manage Obesity: An Examination Through a Clinical Case Study

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Background: Obesity has reached epidemic proportions in Malaysia due to sedentary lifestyles and poor dietary habits, leading to significant health issues. Occupational therapy (OT) has emerged as a crucial intervention, empowering individuals to make positive lifestyle changes and engage in meaningful activities to combat obesity. Objective: This study evaluates the effectiveness of OT strategies in enhancing health outcomes by analysing the pre-and post-intervention measures of haemoglobin A1c (HbA1c) levels, body mass index (BMI), functional performance (Canadian Occupational Performance Measure), and occupational balance (Occupational Balance Questionnaire) in an obese adult.

Methods: A 35-year-old sedentary obese male engaged in bi-weekly OT sessions over a year. This single case study aimed to personalise the treatment, thoroughly examine OT interventions' effects and demonstrate their practical application in clinical settings. OT interventions included

prescribing activities integrating physical activities, behaviour modification techniques, occupational performance coaching, coping mechanisms, psychological support, and leisure and social participation.

Results: After a year, BMI decreased from 41.0 to 23.7kg/m², with HbA1c reducing from 6.5 to 4.24. He exhibited an active lifestyle with enhanced occupational performance exceeding 75.0%. Adherence to prescribed activities resulted in meeting recommended physical activity levels. An increase in Occupational Balance score by 117.4% was shown.

Conclusion: OT plays a significant role in managing obesity. Individuals may improve health outcomes, functional performance, and occupational balance through personalised interventions. The findings underscore the effectiveness of OT strategies in promoting positive lifestyle changes and facilitating sustained health improvements, emphasising the importance of addressing obesity through comprehensive, holistic approaches.

PE 01-33 1. Behavior and Public Health for Obesity

Validation of a Questionnaire Assessing Changes in Dietary Behaviors Among School Children Amid COVID-19 Pandemic in Jordan

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Objective: This study aimed to develop and validate a questionnaire to assess changes in dietary behaviours among school children in Jordan during the COVID-19 pandemic.

Methods: A cross-sectional study used a convenience sample of 253 school-aged children from public schools across Jordan. The "Dietary and Lifestyle Behavior Inventory" (DLBI) was developed, incorporating cultural and regional dietary preferences. The questionnaire's validity and reliability were assessed using the Content Validity Index (CVI) and Cronbach's Alpha for internal consistency. Exploratory factor analysis (EFA) was conducted to evaluate the underlying factor structure.

Results: The DLBI demonstrated excellent content validity with a Scale Content Validity Index (S-CVI) of 0.997 and a high level of agreement among expert reviewers (total agreement = 116). Reliability analysis showed high internal consistency for dietary behaviour scales, with Cronbach's Alpha values exceeding 0.9 for fruit (0.869) and vegetable (0.916) consumption

scales. Factor analysis revealed strong associations between dietary behaviour variables, with factor loadings ranging from 0.688 to 0.889. The study identified significant reductions in physical activity levels among children, with an average Cronbach's Alpha of 0.835 for physical activity-related items. The average time to complete the questionnaire was 15 minutes (SD = 5 minutes), with a completion rate of 45.6%.

Conclusion: The validated DLBI is a robust tool for assessing changes in dietary behaviours among school-aged children in Jordan during the COVID-19 pandemic. The findings highlight significant dietary patterns and physical activity shifts, emphasising the need for targeted nutritional interventions. This research fills a critical gap in the literature and provides a valuable resource for policymakers and health professionals to mitigate the impact of the pandemic on child nutrition and wellbeing.

Keywords: Dietary behaviours, school children, COVID-19 pandemic, Jordan, questionnaire validation, nutritional epidemiology, physical activity.

PE 01-34 1. Behavior and Public Health for Obesity

Obesity and Its Associated Factors among Fishermen in Pahang, Malaysia

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Background: Over the past decades, Malaysia has experiencing an increasing prevalence of overweight and obesity that jeopardizing the health of Malaysian. Poor dietary intake is one of the major contributors to the development of obesity. However, there is a limited study regarding obesity among fishermen despite the importance of this population to many countries. This study examined the prevalence of overweight and obesity and its association with dietary and socioeconomic status among fishermen in Pahang, Malaysia.

Methods: In this cross sectional study, 130 local fishermen who met the eligibility criteria were recruited using universal sampling. The height and weight were measured using standard procedures. The questionnaire used was 24 hour diet recall and Diet Diversity Score (DDS) and their dietary intakes were evaluated in detail. The dietary intake, socioeconomic and demographic factors were used to determine the associations with the obesity.

Results: Among the participants, 30.8% (n=40) were overweight and 19.2% (n=25) were obese. Findings revealed a significant association between obesity and DDS (p=0.019), education level (p=0.006) with higher proportion of overweight and obesity among low education level. Meanwhile other factors such as age, income, household size, and monthly expenses showed no significant. The outcome from the multinomial regression showed that, being high food diversity is a protective factor for both overweight and obesity after control for education level (p<0.05).

Conclusion: The alarming trend of overweight and obesity among fishermen warrant the need for further investigations by highlighting the importance of promoting health awareness to prevent any adverse implications towards public health.

PE 01-35 1. Behavior and Public Health for Obesity

Behavioural Correlates of Obesity in Northeast India Indigenous Population

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Background: According WHO (2024), 43% adults (>18 of age) are overweight and 16% live with obesity. India reported a prevalence of 28.6% overweight and 12.8% obese (WOF, 2024). Evidence-based obesity treatment underscores the importance of behavioural interventions. This study aims to determine the behavioural risk factors of obesity according to sex and rural-urban differences in indigenous population of Northeast India.

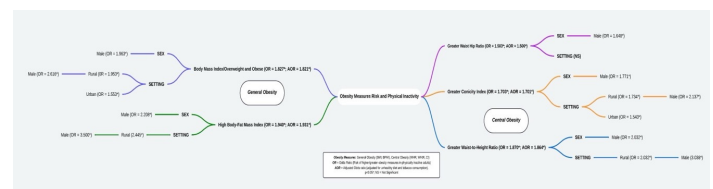
Methods (Figure 1): A cross-sectional sample was collected on 1207 (Rural = 615 and Urban = 592) Hmar population of Northeast India. Data on place of residence, sex, unhealthy diets, tobacco and alcohol consumption was collected. Data on physical activity were collected following a recalled method of 1 week according to the GPAQ, developed by the WHO (WHO 2005). Weight, height, waist circumference, and hip circumference were collected to assess obesity. BMI categories were classified according to WHO Asia-Pacific classification (WHO 2000), body fat mass index (BFMI) following a polynomial regression, WHR, WHtR and Conicity Index according to percentiles.

Results: Physical inactivity significantly increases the risk of overweight and/or obesity, greater BFMI, WHR, WHtR, and CI but the risk is different across sexes and place of residence. Significantly higher risk of obesity (BMI, BFMI, WHtR and CI) was observed in rural setting whereas in urban areas it

shows significant association only with BMI and CI. Physically inactive men show approximate 2 times higher risk of obesity compared to physically active men even after controlling for confounders like unhealthy diet and tobacco consumption. Tobacco consumption and junk food were also significantly associated with BFMI but confounded by physical activity.

Conclusion: The study of obesity should be situated within the broader contexts of community, region, and gender, as these factors significantly influence individual behaviours related to physical activity. Addressing both independent and confounding lifestyle behaviours may constitute an effective approach to enhancing prevention efforts and intervention programs.

Figure 1: Impact of Physical Inactivity on Obesity Measures Across Sexes and Residences



PE 01-36 1. Behavior and Public Health for Obesity

The Relationship Between Fast Food Consumption and The Incidence of Obesity in Children and Adolescents: A Literature Review

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Background: The Indonesian Pediatrician Association (IDAI) states that in 2023, diabetes cases in children will increase 70-fold since 2010, even the Head of the IDAI Endocrinology Coordination Work Unit, Muhammad Faizi, said that diabetes cases in children could even be higher than currently recorded. This incident cannot be separated from an uncontrolled lifestyle and children's diet that is not paid enough attention. This research aims to determine the effect of fast food consumption on the incidence of obesity in children and adolescents.

Methods: This literature review research uses a systematic review approach. Research data sources using secondary data include scientific journals that meet the inclusion and exclusion criteria. The data used is between 2019 and 2024 with the keywords, fast food, obesity, adolescent, which is research conducted in Indonesia.

Results: Based on the results of the analysis of the 11 articles used, all research results stated that there was a relationship between fast food eating habits and obesity and nutritional status in children and adolescents in Indonesia with a p value <0.05.

Conclusion: Changes in lifestyle and eating patterns in Indonesia must be the concern of all parties, one of which is education about healthy lifestyles that children must live by. Not only that, strict regulations are needed regarding the production and marketing of healthy food circulating in society.

Keyword: Fast Food, Children

PE 01-37 1. Behavior and Public Health for Obesity

Impact of Adult ADHD on Obesity: a study among young adults in Delhi NCR, India

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Background: Obesity has turned into a major public health burden worldwide, extending its effects among young adults. In recent times, the prevalence of obesity has seen a steady surge in the young adult population. In India, 40.3% adults are overweight or obese, meanwhile among young adults of Delhi NCR, India, 48.2% were either overweight or obese. Obesity being a multifactorial disease has several physical, psychological, and lifestyle risk factors contributing to its aggravation. Of which, ADHD has been identified as one of the risk factors, which has not been much explored among the Indian adult population. The prevalence of ADHD has also been reported to be rising among today's youth which consequently causes behavioural inhibitions, leading to reduced quality of life. Given the scenario, the present study aims to determine the association of ADHD with obesity among young adults in Delhi NCR, India.

Methods : The study is a cross-sectional study conducted among 1665 participants aged 18-25 years, wherein the participants are recruited via convenience sampling. Sociodemographic data was collected using

pretested and modified interview schedule. ADHD was screened using the standardized tool, ASRS v1.1. Obesity was assessed in terms general and central obesity, using standard procedures via anthropometric measurements (height, weight, waist circumference, hip circumference). The statistical data analysis was performed using SPSS software version 22.

Results: The study outcome indicate that combined-type ADHD was associated with higher risk of obesity in adults, wherein combined type ADHD posed nearly 2 folds increased odds of both general and central obesity among young adults.

Conclusion: The study outcome underscores the need for considering management of ADHD symptoms in tailoring obesity management programs, further suggesting early implementation of interventions to mitigate any future risk of obesity associated comorbidities like CVDs.

Keywords: Obesity, Adult ADHD, India

PE 01-39 1. Behavior and Public Health for Obesity

Gender Differences in the Impact of Adverse Childhood Experiences on Obesity Among Young Adults in Delhi-NCR, India

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Background: Previous research has suggested a relationship between Adverse Childhood Experiences (ACE) and obesity. However, the influence of gender on this relationship remains underexplored. This study aims to investigate gender differences in the association between ACE and obesity among young adults in Delhi-NCR, India.

Methods : This cross-sectional study enrolled 1,702 young adults aged 18-25 years of both genders (68.1% females), from two universities in Delhi-NCR, India. ACEs were evaluated using the ACE-International Questionnaire, and anthropometric measurements (weight, height, waist circumference, and hip circumference) were conducted following standardized protocols.

Results: The prevalence of overweight/obesity among females increased from 34.2% in the no ACE category to nearly 50% in the 3 and higher categories ($p = 0.001$), whereas no such trend was observed among males. Linear regression analysis revealed a significant positive association between ACE and BMI in females ($\beta = 0.177$, $p = 0.019$), but not in males. Adjusted odds ratio analysis did not indicate the risk of general or central

obesity parameters in either gender. Regarding specific ACE domains, while household mental illness [OR (95%CI) = 1.7 (1.1-2.6), $p = 0.01$] and bullying [OR (95%CI) = 3.3 (1.6-6.6), $p = 0.001$] were significantly associated to increased risk of obesity among females, incarceration of a household member [OR (95%CI) = 2.96 (1.0-9.0), $p = 0.057$] and household member treated violently [OR (95%CI) = 1.7 (1.0-2.7), $p = 0.036$] were associated with obesity among males.

Conclusion: This study revealed significant gender differences in the impact of ACE on obesity, with females showing a higher risk of obesity due to cumulative ACE exposure. Specific ACE domains also exhibited gender-specific associations. These findings underscore the importance of considering gender-specific pathways in the relationship between ACEs and obesity. Tailored interventions addressing unique gender needs are necessary to mitigate the impact of ACEs on obesity.

Keywords: ACEs; Obesity; Body Mass Index; Bullying

Poster Exhibition

2. Nutrition, Education and Exercise for Obesity

PE 02-01 2. Nutrition, Education and Exercise for Obesity

Vitamin D levels in individuals with different phenotypes of prediabetes

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Background: Studies on vitamin D levels in individuals with different phenotypes of prediabetes are rare. This study aimed to examine the associations between vitamin D levels in adults with prediabetes and among individuals in different categories of prediabetes.

Methods: The data used in this study were obtained from the National Health and Nutrition Examination Survey (NHANES) 2011–2016. We classified participants as having an isolated prediabetes defect (impaired fasting glucose [IFG], impaired glucose tolerance [IGT], or glycosylated haemoglobin A1c [HbA1c] indicative of prediabetes [IA1c]), two defects (IFG+IGT, IFG+IA1c, or IGT+IA1c), or all defects (IFG+IGT+IA1c). The concentration of 25-hydroxyvitamin D (25(OH)D) in the serum was determined by standardized liquid chromatography-tandem mass spectrometry (LC-MS/MS).

Results: Vitamin D levels were lower in individuals with IGT+IA1C-defined prediabetes than in normoglycaemic individuals (45.85±15.35 vs. 56.6±21.74, P<0.01). Multivariate linear regression analysis revealed that compared with those in normoglycaemic patients, vitamin D levels were 9.023 lower in IGT+IA1C-defined prediabetes patients (95% CI: -15.165 to -2.882, P=0.004).

Conclusion: Vitamin D levels differed according to prediabetes phenotype, and IGT+IA1C might be a better predictor of lower vitamin D levels

Table 1. Linear regression analyses on the association of Prediabetes categories and vitamin D levels

	Sample size (n)	25OHD2+25OHD3 (nmol/L)	Multivariable β (95% CI)	P
Normoglycemia	1105	56.6±21.74	1 (Ref.)	
Prediabetes categories				
IA1c	182	54.48±23.55	1.504 (-1.642 to 4.651)	0.348
IFG	508	57.67±20.80	0.002 (-2.107 to 2.111)	0.999
IGT	73	58.04±25.12	-0.056 (-4.658 to 4.546)	0.981
IFG+ IA1c	259	58.75±24.49	2.425 (-0.397 to 5.246)	0.092
IGT+ IA1c	40	45.85±15.35	-9.023 (-15.165 to -2.882)	0.004
IGT+ IFG	94	55.05±22.84	-1.866 (-6.023 to 2.292)	0.379
IA1c+ IFG+ IGT	123	54.27±28.57	0.030 (-3.799 to 3.859)	0.988

Adjusted for age, sex, body mass index, race (Hispanic, Non-Hispanic (White, Black, Asian and Other)), smoking (yes or no), drinking (yes or no), physical activity (yes or no), coronary heart disease (yes or no), calcium supplemental dose, blood collection time, diastolic blood pressure, total cholesterol, triglycerides, high-density lipoprotein cholesterol, alanine aminotransferase, calcium, phosphorus and eGFR at baseline.

PE 02-02 2. Nutrition, Education and Exercise for Obesity

A Systematic Review on the Effectiveness of Intermittent Fasting on Promoting Weight Loss and Improving Lipid Profile for Cardio Protection

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Background: Cardiovascular diseases (CVDs) are a leading cause of global morbidity and mortality, driven by various risk factors including overweight, high blood cholesterol levels, unhealthy diets, stress, diabetes, and smoking. Intermittent fasting (IF) has emerged as a promising dietary approach for mitigating these risk factors and preventing CVDs.

Methods: This systematic review of randomized clinical trials (RCTs) aimed to comprehensively assess the effectiveness of IF in promoting weight loss and improving lipid profiles for cardio protection. A rigorous search of PubMed, Scopus, ScienceDirect, Dimensions, and Google Scholar databases from 2017 to 2021 yielded 844 studies, of which 18 met the inclusion criteria. Two investigators independently screened titles and abstracts, followed by critical appraisal of full texts to determine eligibility. Included studies comprised RCTs with adult participants reporting measures of body weight, body composition, lipid profile, and blood pressure, with a BMI exceeding 24kg/m² and no exclusion based on health status or age.

Results: The systematic review revealed significant reductions in body weight, body fat mass, and waist circumference across various IF methods, including Alternate Day Fasting (ADF), Exercise + Alternate Day Fasting (E-ADF), Intermittent Fasting (IF), Time Restricted Eating (TRE), and consistent meal timing (CMT). Additionally, reductions were observed with Intermittent Energy Restriction (IER), Intermittent Calorie Restriction (ICR), continuous calorie restriction (CCR), and very low-calorie diet (VLCD). Notably, only one study reported no significant weight reduction post-IF intervention. Furthermore, improvements were observed in total cholesterol, triglycerides, and blood pressure levels following IF interventions.

Conclusion: These findings underscore the potential of IF as an effective intervention for weight loss, blood pressure reduction, and lipid profile improvement among overweight and obese adults, thus potentially lowering the risk of CVDs. Future research should focus on specific subgroups, including individuals with pre-existing cardiovascular conditions, to better understand the effects of IF on cardiovascular risk factors

PE 02-03 2. Nutrition, Education and Exercise for Obesity

Relationship between Somatotype Components and Body Composition Parameters as Indicators of Risk Factors for Cardiovascular Disease in College Students

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Background: Somatotype and body composition are considered as important health indicators for lifestyle-related diseases, including cardiovascular disease, which is caused by heart and blood vessel disorders. Somatotype is an indirect measure of body composition that provides an easy and comprehensive picture of body shape. This study aimed to examine the relationship between somatotype components and body composition parameters as risk factors for cardiovascular disease in undergraduates in Yogyakarta, Indonesia.

Methods: The research subjects were 126 undergraduates, 68 females and 58 males, aged 19 – 25 years, all subjects lived in Yogyakarta Province. Anthropometric measurements were taken including height and weight; width of humerus and femur, thickness of skin folds of triceps, biceps, subscapular, suprailiac, abdominal, thigh, and calf; as well as flexed upper arms, waist, hips, and calves. The examination includes blood pressure, body composition components (% body fat and fat-free mass), and somatotype or body type. Blood pressure was measured with a sphygmomanometer, body composition was calculated using the Slaughter formula, somatotype was determined using the Heath-Carter

somatotype method, and body mass index was classified using WHO criteria for Asians. Statistical analysis used was the Pearson correlation test to determine the relationship between variables, as well as the ANOVA test to examine differences between variables based on gender.

Results: The study found that the average height and weight, body mass index, mesomorphic component, blood pressure, and body composition of male undergraduates were greater than females. There was a positive relationship between mesomorphic and endomorphic components with % body fat, whereas ectomorphic components had a negative relationship with % body fat and fat-free mass. Blood pressure correlated positively with % body fat and fat-free mass.

Conclusion: Increasing the value of somatotype components (endomorphic and mesomorphic) leads to increased body composition and blood pressure.

Keywords: somatotype, body composition, blood pressure, student,

PE 02-04 2. Nutrition, Education and Exercise for Obesity

The program of long-term therapeutic management of obese patients

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Background: Despite advances in treatment of obesity, the long-term effectiveness of interventions to reduce and maintain body weight remains low. Modern medications can improve the efficacy of obesity treatment, but their long-term use is currently limited, and withdrawal leads to reverse weight gain in most patients. Bariatric surgery is the most effective tool for weight loss; however, weight regain after surgical treatment remains a relevant problem and occurs in a significant proportion of patients.

In order to improve the efficacy of obesity treatment we have developed a structured program of long-term therapeutic management of obese patients, including regular counseling on aspects of comprehensive lifestyle modification and tools to manage eating behavior.

Methods: The key components of the long-term management program are: 1. Initial data collection (initial counseling, in-person):

- Physical, laboratory, instrumental examination, analysis of current diet and lifestyle and eating behavior (by questionnaires and on the basis of food diary), finding out individual causes of weight gain (nutritional, behavioral, psychological, medical).
- Setting individual treatment goals and forming an individual strategy to achieve them, drawing up an individual counseling plan.
- Correction of comorbidities
- Prescription of pharmacotherapy to reduce body weight according to the indications

2. Follow-up long-term management (individual consultations: the first month - once every 1-2 weeks, 2-6 months - once every 2 weeks, then if necessary - once every 2-4 weeks; in-person or online):

- Food diary analysis, consistent, step-by-step implementation of healthy balanced eating habits based on the consensus reached with the patient
- Discussion and implementation of ways to reduce total caloric intake (methods of "portions", "plate", specifics of food selection and preparation methods, etc.)
- Introduction of the principles of mindful eating, hunger and satiety control, and diet planning
- Analysis of episodes of overeating, loss of control over eating behavior: finding out the causes, search and implementation of tools for their management and prevention
- Cognitive-behavioral therapy, work with the emotional sphere, management of reactions to stressful influences
- Counseling on physical activity, sleep, work and rest.

Results and Conclusion Implementation of the long-term therapeutic program has resulted in significant improvements in obesity treatment outcomes, including greater weight loss and maintaining. The program has demonstrated its effectiveness both when used alone and in combination with pharmacotherapy for weight loss, as well as in patients after surgical treatment of obesity.

PE 02-05 2. Nutrition, Education and Exercise for Obesity

To overcome the “Freshman 15” phenomenon: adolescents’ perception of healthy eating in early adulthood

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Background: Like the ‘freshman 15’ phenomenon, American college students are said to gain up to 15 pounds (6.8 kg) in weight during their first year of college, and Australian college students are said to gain 1.9 kg during their first year of college. Adolescents in early adulthood may experience significant weight fluctuations due to various reasons. In particular, examining perceptions of healthy eating is essential for developing a healthy lifestyle and minimizing weight gain. Additionally, dietary behaviors established in early adulthood may have long-term effects on future health and occupational competency, with implications for developing a healthy and sustainable nursing workforce. Accordingly, this study applied Q methodology to confirm the degree of weight change and type of perception of healthy eating in second-year nursing students who experienced college life for one year.

Methods: Data were collected by applying 28 statements related to perception of healthy eating to 24 second-year nursing students, and processed using the PC QUANL program.

Results: Second-year nursing students lost about 0.95kg of weight compared to first-year students, which was different from previous research results. Their perception of healthy eating was divided into four types: ‘seeking a balanced diet type’, ‘seeking variety type’, ‘avoiding eating

out type’, and ‘seeking a pleasant dining atmosphere type’. ‘Seeking a balanced diet type’ are people who do not skip meals, overeat, or picky eaters, and pursue a diet that evenly contains the five major nutrients. ‘Seeking variety type’ are people who seek meals that include a variety of foods every day, such as school lunches or dormitory meals. ‘Avoiding eating out type’ are people who think that since delivery food and instant food are often spicy and high in calories, they can eat healthy just by reducing them. ‘Seeking a pleasant dining atmosphere type’ are people who believe that while it is important to improve the quality of meals through nutritious food, the healthiest meal is to eat while having fun communicating with family with the idea of a small society at the table.

Conclusion: Second-year nursing students know what a healthy eating is, but it is not easy to actually choose a healthy eating due to fatigue or lack of time due to various evaluations and tests. In particular, when living alone or in a dormitory, it is difficult to eat vegetables and fruits, and fast food and carbonated drinks are easily accessible. Therefore, it is thought that time management and priority decision-making training for choosing healthy meals will be necessary depending on the type of nursing students’ perception of healthy eating.

Keywords: Nursing students, Healthy eating, Perception, Q-methodology

PE 02-06 2. Nutrition, Education and Exercise for Obesity

The Effect of Oral α -cyclodextrin on Glycemic Control and Body Weight in Obese Patients with Type 2 Diabetes: Case Series

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Background: α -cyclodextrin (α -CD) is a soluble dietary fiber derived from corn. In the initial studies conducted on healthy overweight and/or obese diabetic subjects, it was found that the consumption of α -CD was associated with weight loss or maintenance, as well as lower triglyceride (TG) and cholesterol levels in hyperlipidemic subjects. Furthermore, researchers found that α -CD may inhibit carbohydrate digestion, which could potentially lower postprandial glycemic responses to carbohydrate-containing diets. Thus, α -CD consumption was associated with increased insulin and leptin sensitivity. The purpose of this report is to determine whether consuming α -cyclodextrin affects glycemic control and body weight in obese patients with type 2 diabetes.

Methods: This was a single-center case series that included adults with new-onset type 2 diabetes, with or without antidiabetic medications, who presented to our facility from June to December 2023 with a body mass index above 24.9 kg/m². Pregnant patients were excluded. We collected

data from the electronic medical records. We diagnosed diabetes in these patients based on a hemoglobin A1C (HbA1C) level over 6.5%. Every participant had received 6 grams of α -CD daily via oral for 12–14 weeks, combined with a balanced diet of 20–21 kcal/kg bw/day.

Results: Three participants, one man and two women, met our diagnostic criteria. α -CD was well-tolerated, and no significant adverse effects were observed. One participant reported minimal gastrointestinal symptoms. All participants’ body weight decreased. In addition, fasting plasma glucose and HbA1C levels decreased.

Conclusion: Treatment with α -CD appears to be safe and well-tolerated. A treatment intervention promoting a balanced diet and α -CD as part of routine care can successfully reduce body weight and improve glycemic control.

PE 02-07 2. Nutrition, Education and Exercise for Obesity

Impact of Muscle Strength on Self-rated Health and Life Satisfaction in the Elderly: Findings from the Korean Longitudinal Study of Aging (2006-2018)

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Introduction: With the increasing aging population and life expectancy, it has become crucial for the elderly to maintain both physical and mental well-being throughout their lives. Sarcopenia, defined as a gradual decline in muscle mass and strength due to aging, is considered a significant health issue in elderly populations. Hand Grip Strength (HGS) is widely employed in diagnostic algorithms for sarcopenia, and reduced HGS has been identified as a predictor of dysfunction, comorbidities, mortality, and mental health, as well as quality of life. This study aims to investigate whether changes in muscle strength, as measured by hand grip strength, affect self-rated health and life satisfaction.

Methods: The data for this study were derived from the 1st (2006) and 7th (2018) waves of the Korean Longitudinal Study of Aging (KLoSA). KLoSA is a nationwide, longitudinal study aimed at providing essential data for the implementation of health and social policies regarding the rapidly aging population. In this study, 1178 participants aged 65 or older from KLoSA were categorized into four groups based on the change in hand

grip strength from 2006 to 2018 (normal normal, normal -> low, low -> normal, low -> low). The relationships between these groups and self-rated health and life satisfaction were evaluated. Low hand grip strength was defined as handgrip strength <28 kg for men and <18 kg for women.

Results: Compared to the 'low -> low' group, the odds ratio for positive self-rated health was 1.71 (95% confidence interval [CI], 1.20-2.44) in the normal ->normal group, and 1.82 (95% CI, 1.17-2.83) in the low->normal group. The odds ratio for high life satisfaction was 1.33 (95% CI, 0.94-1.89) in the normal->normal group and 1.46 (95% CI, 0.94-2.28) in the low->normal group.

Conclusion: The maintenance or improvement of muscle function is potentially associated with positive self-rated health and high life satisfaction.

Keywords: sarcopenia; hand-grip strength; self-rated health; life satisfaction

PE 02-08 2. Nutrition, Education and Exercise for Obesity

Fruits and Vegetables Consumptions Among Working Adults in Kuala Lumpur and Selangor, Malaysia

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Background: Increased fruits and vegetables consumption have been linked to a lower risk of chronic diseases and healthier weight management. The 2019 National Health and Morbidity Survey of Malaysia reported that 95% of Malaysian aged 18 and above consumed less than five servings of fruits and vegetables each day. Malaysians eat an average of 1.4 servings of fruits and 1.51 servings of vegetables per day.

Methods: This cross-sectional study involved 242 working adults aged 18 to 60 years recruited through purposive sampling technique. Self-administered questionnaires comprised of socioeconomic and demographic data and a semi - quantitative Food Frequency Questionnaire adapted from The Malaysian Adult Nutrition Survey was used to obtain individuals' daily fruit and vegetable intake.

Results: Majority of the respondents in study were female (51.7%), from Malay ethnic group (60.7%) with mean age of 33.7+11.3 years. Most respondents had bachelor's degree academic qualification (48.3%) with

total household income of less than USD1100. Approximately 97.1% of respondents eat one serving of fruits and vegetables per day, falling short of the recommended daily fruit and vegetable intake of Malaysia. Daily consumption of fruits and vegetables did not significantly correlate with age ($\chi^2 = 1.423, p > 0.05$). No significant difference was also observed in daily fruit and vegetable intake across genders ($\chi^2 = 0.223, p > 0.05$).

Conclusion: In this study, working adults with lower levels of education, age, and singleness consumed substantially fewer fruits and vegetables than the suggested daily intake of the Malaysian Dietary Guidelines. Despite the substantial health benefits of fruits and vegetables, the respondents' intake still below the recommended levels. As a result, increasing intakes should continue to be a focus of public health activities aimed at alleviating the global burden of chronic illnesses related to diet and nutrition.

Keywords: Fruits and vegetables, working adults, obesity

PE 02-09 2. Nutrition, Education and Exercise for Obesity

Protective effects of blackcurrant extract on muscle atrophy induced by palmitic acid via the AMPK/SIRT1/PGC-1 α signaling pathway

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Background: Obesity is a chronic and multifaceted disease caused by excessive accumulation of fat. This condition is associated with loss and dysfunction of skeletal muscle and muscle atrophy. Polyphenols, which are antioxidants and anti-inflammatory agents derived from plants, are beneficial in preserving muscle mass in various muscle-related diseases. This ingredient mainly improves mitochondrial function and promotes mitochondrial production to prevent muscle atrophy. In this study, we examined the effect of anthocyanin-rich blackcurrant extract (BCE) on palmitate-induced muscle atrophy in C2C12 cells.

Methods: C2C12 myotubes were treated with palmitic acid (750 μ M) to induce muscle atrophy, followed by treatment with blackcurrant extract (BCE). The protective effects of BCE against muscle atrophy were assessed by measuring the mRNA and protein levels of muscle atrophy markers, including muscle ring-finger protein 1 (MuRF-1) and ubiquitin E3-ligase muscle-specific F-box protein (MAFbx/Atrogin-1). Additionally, the regulation of mitochondrial function and related signaling pathways were assessed by measuring the protein expressions of Mitochondrial Transcription Factor A (mtTFA), Estrogen-Related Receptor Alpha (ERR α), AMPK, Sirt-1, and PGC-1 α using western blot analysis.

Results: BCE improved the mRNA and protein expressions of MuRF-1 and MAFbx/Atrogin-1, indicators of muscle atrophy, which were elevated due to treatment with palmitic acid. mtTFA is a key regulator that binds to mitochondrial DNA to promote its replication and transcription, and ERR α regulates various metabolic pathways that enhance mitochondrial biogenesis. BCE increased the activity of these two regulators. Importantly, ERR α is known to interact with PGC-1 α to enhance mitochondrial biogenesis and function. To investigate whether BCE was involved in the crucial AMPK/Sirt-1/PGC-1 α signaling pathway that regulates muscle metabolism and energy production, the protein expressions of each factor were analyzed. The results showed that BCE improved the protein expression levels of AMPK, Sirt-1, and PGC-1 α , which had been reduced by palmitate treatment.

Conclusion: Mitochondria are essential in skeletal muscle for maintaining cellular homeostasis and health, and their dysfunction can cause muscle atrophy. AMPK/Sirt1/PGC-1 α pathway regulates mitochondrial biogenesis and energy metabolism. This study suggests that BCE inhibits palmitate-induced muscle atrophy by activating AMPK/Sirt1/PGC-1 α signaling.

PE 02-10 2. Nutrition, Education and Exercise for Obesity

Effects of blackcurrant extracts on H₂O₂-induced muscle atrophy in C2C12 cells

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Background: Blackcurrants have been reported to have anti-inflammatory and antioxidant effects on oxidative stress and DNA damage. Several studies have reported that oxidative stress causes muscle atrophy through the production of reactive oxygen species. Therefore, the aim of this study was to evaluate the effects of blackcurrant extract on H₂O₂-induced muscle atrophy in C2C12 cells.

Methods: To examine the cytotoxic effects of the blackcurrant extract (BCE) on C2C12 cells, cell viability was measured using the WST assay. C2C12 myotubes were incubated without or with BCE at various concentrations (25–400 μ g/ml). The effects of BCE were determined in H₂O₂-induced C2C12 myotubes. Muscle atrophy was assessed by evaluating the mRNA expression levels of Atrogin-1 using RT-qPCR. Additionally, the protein expression levels of muscle ring finger protein-1 (MuRF-1), Atrogin-1, sirtuin-1 (Sirt1), AMP-activated protein kinase (AMPK), and phospho-AMPK were analyzed by Western blot.

Results: MuRF-1 and Atrogin-1 are recognized as significant markers of muscle atrophy. RT-qPCR analysis showed increased mRNA expression of Atrogin-1 in H₂O₂-induced C2C12 myotubes. Western blot analysis further confirmed the increased protein levels of MuRF-1 and Atrogin-1 in H₂O₂-induced C2C12 myotubes. In contrast, BCE treatment resulted in decreased Atrogin-1 mRNA expression and protein expression of MuRF-1 and Atrogin-1 in H₂O₂-induced C2C12 myotubes. Furthermore, H₂O₂ treatment exhibited decreased protein levels of Sirt1 and activation of AMPK. AMPK and Sirt1 are identified as significant markers for mitochondrial biogenesis. BCE treatment increased the protein expression of Sirt1 and the activation of AMPK.

Conclusion: These results demonstrate that BCE could protect H₂O₂-induced muscle atrophy by activating the AMPK/Sirt1 signaling pathway.

PE 02-11 2. Nutrition, Education and Exercise for Obesity

Effects of an Aquatic Exercise Program on Muscle Function, Balance, and Quality of Life in Overweight/Obese Women with Knee Osteoarthritis

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Background: Overweight and obesity increase the risk of knee osteoarthritis (KOA) due to the mechanical load placed on weight-bearing joints, resulting in pain and functional limitations that make activities difficult. This can lead to weakness in the knee muscles, which can reduce physical function and impair daily activities. Exercise interventions are essential for people with knee osteoarthritis, but implementing these interventions can be difficult due to the potential risk of pain and injury. Aquatic exercise programs offer benefits to patients with knee osteoarthritis (OA) and can be an effective treatment option for this pathological condition.

Methods: In this study, 30 elderly women diagnosed with knee osteoarthritis were randomly assigned to either a no-exercise control group (CG=15) or an aquatic exercise group (AG=15). Aquatic exercise program was performed three times per week for eight weeks in a pool. Muscle function was evaluated by measuring peak torque of the knee muscles using an isokinetic dynamometer (Biodex Medical Systems, Shirley, NY, USA). Static balance was assessed through the Single Leg Stance Test (SLS), and knee pain intensity was quantified using a visual

analog scale (VAS). Furthermore, health-related quality of life (HRQOL) was determined utilizing the validated Korean version of the EQ-5D-5L.

Results: The AG group significantly improved knee muscle function over time, with increases in extension of 60°/s ($p < .001$) and 180°/s ($p < .05$) and flexion of 60°/s ($p < .01$). Balance measures also showed a significant improvement in the AG group ($p < .01$), while the CG group showed a significant decrease ($p < .01$). Knee pain (VAS) and quality of life (EQ-5D) also showed significant improvement in the AG group, while there was no significant change in the CG group.

Conclusion: These findings suggest that water exercise improves muscular function, balance, and knee pain in overweight/obese women with osteoarthritis and contributes to their HRQOL.

Keywords: knee osteoarthritis, aquatic exercise, muscle function, balance, quality of life

PE 02-12 2. Nutrition, Education and Exercise for Obesity

Development and Pilot Testing of a Telenutrition Course for Improving Competency in Virtual Nutrition Care

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Background: Telenutrition enhances access to nutrition care and improves health outcomes.^{1,2} Educational programs for health professionals now emphasize the necessity of including competency-based telehealth training in the curriculum, but many nutrition programs in the U.S. have yet to integrate it. This research aims to develop and pilot-test a competency-based telenutrition course for preparing nutrition students for entry-level practice.

Methods: A backward course design and Miller's framework for competency-based education (CBE)^{3,4} were employed to create the course. Module topics included virtual care basics, goal setting, motivational interviewing, coaching techniques, and behavior change theories. Assessment areas included student knowledge (knows), competence (knows how), performance (shows how), and action abilities (does). An initial cohort of students (n=5) was recruited to pilot-test the course using summative and formative assessment methods.

Results: The class consisted of nine online modules (knows), three in-class scripted role-modeling activities (knows how) and in-person

demonstrations (shows), and one simulated telehealth coaching session (does). Assessments included quizzes, active peer and instructor feedback, and student self-reflection. Data indicated that 100% of students strongly agreed or agreed that role-playing, practice sessions, and reflections were essential to improving their knowledge and confidence and preparing them for real-life virtual encounters. All students perceived increased confidence in their telehealth abilities and demonstrated entry-level competence, thereby showing the practical effectiveness of the CBE curriculum in this cohort. Qualitative feedback from students will be used to enhance the course content, and enrollment will be expanded for further testing.

Conclusion: Telenutrition education is essential to equipping entry-level professionals with the skills and confidence to deliver safe and effective telehealth services to improve patient outcomes. Including competency-based telenutrition training in educational programs is necessary to prepare the dietetics workforce for the expanding mode of virtual care delivery and to keep pace with other health professional training.

PE 02-13 2. Nutrition, Education and Exercise for Obesity

Adequate Protein Intake in Combination with Exercise Increased Muscle Mass and Muscle Strength in Cancer Patients with Sarcopenic Obesity: A Case Report

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Background: Sarcopenic obesity, characterized by a loss of muscle mass and an increase in fat mass, is associated with poor prognosis, prolonged hospitalization, and increased mortality, particularly in cancer patients. Effective management strategies include adequate protein intake, resistance training, and aerobic exercise. Physical activity can enhance insulin sensitivity, reduce oxidative stress and inflammation, and promote muscle mass gains in cancer patients with sarcopenic obesity.

Case Presentation: A 62-year-old woman with breast cancer presented with sarcopenic obesity (reduced muscle mass, high body fat). To counteract this, an adequate protein intake (1.2 g/kg body weight) and a daily regimen of morning walks with light barbell weightlifting (0.5–1 kg) for 30 minutes were prescribed. This case exemplifies the potential of a multi-modal approach for managing sarcopenic obesity in oncology, potentially promoting functional capacity and treatment efficacy.

Results: Resistance training and aerobic exercise were implemented to enhance muscle mass, anaerobic endurance, and skeletal muscle size. Dietary

intake was closely monitored, ensuring adequate protein consumption (1.2 g/kg body weight) as recommended. Resistance training and aerobic exercise education were also provided. On the 4th visit, bioelectrical impedance analysis (BIA) revealed a significant increase in muscle mass and a decrease in body fat percentage. Initially, muscle mass was 17.8% and body fat percentage was 36%. After exercising 3 to 5 times a week for 30 minutes in a month, muscle mass increased to 24%, and body fat percentage decreased to 30%. Additionally, handgrip strength improved, with initial values of 19 kg for the right hand and 10 kg for the left hand increasing to 25 kg and 15 kg, respectively.

Conclusion: An adequate intake of protein, complemented by resistance training and aerobic exercise, can effectively ameliorate the condition of sarcopenic obesity in cancer patients. This strategy also improving the quality of life.

Keywords: Resistance training, aerobic, protein intake, cancer, sarcopenic obesity

PE 02-14 2. Nutrition, Education and Exercise for Obesity

The Food Insecurity-Adiposity Paradox: A Comparison of Different Adiposity Measures

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Background: Extensive research has indicated the paradox of food insecurity and obesity; however, most studies used anthropometric measures like body mass index (BMI) or waist circumference (WC), which may not accurately assess adiposity, especially in Koreans. This study examined the association between food insecurity and obesity risk by comparing three adiposity indicators: estimated percent body fat, BMI, and WC.

Methods: This study used data from the Korea National Health and Nutrition Examination Survey 2019–2021 (n=14,135 aged 19 years and older). Food insecurity was assessed using an 18-item modified version of the US Household Food Security/Hunger Survey Module, with scores of 3–18 indicating food insecurity. Three different obesity measures were defined: body fat percentage (estimated from the prediction equation) of 25% for men or 35% for women, BMI of 25 kg/m², and WC of 90 cm for men or 85 cm for women. Logistic regression models were used to estimate odds ratios (OR) with 95% CIs after adjusting for confounders.

Results: From 2019 to 2021, 4% of households experienced food insecurity. Food insecurity was positively associated with body fat percentage-defined obesity (OR, 1.29; 95% CI, 1.02–1.63), while negatively associated with BMI-defined obesity (OR, 0.77; 95% CI, 0.62–0.96) and not associated with WC-defined obesity (OR, 1.17; 95% CI, 0.93–1.47). When stratified by residential area (P interaction=0.045), a positive association between food insecurity and body fat percentage-defined obesity was observed in urban residents (OR, 1.43; 95% CI, 1.11–1.86), but not in rural residents (OR, 0.84; 95% CI, 0.51–1.39).

Conclusion: Food insecurity was linked to obesity, as defined by a higher body fat percentage, among Korean adults aged 19 years and older, particularly those living in urban areas. Food insecurity might demonstrate a stronger association with body fat percentage than with BMI or WC.

PE 02-15 2. Nutrition, Education and Exercise for Obesity

Effect of Fermented Growth Oyster (FGO) extract on Bone Health in Postmenopausal Women: A Multicenter, randomized, double-blind, placebo-controlled trial

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Background: Fermented growth oyster (FGO) extract has been proven beneficial to bone health by inhibiting osteoclastogenesis while promoting osteoblastogenesis. However, no known clinical investigation has been conducted on its effect on bone metabolism.

Methods: A multicenter randomized, double-blind, placebo-controlled clinical trial for 24 weeks aims to evaluate the efficacy of FGO on bone health in postmenopausal women. One hundred twenty participants were randomly divided into the experiment group (EG) and control group (CG). Osteocalcin (OC), urine deoxypyridinoline (DPD), C-telopeptide of type-1 collagen (CTX), and N-telopeptide of type -1 collagen (NTX), bone-specific alkaline phosphatase (BALP), DPD/OC ratio, calcium (Ca), bone mass density (BMD), estrogen and growth hormone (GH), the Western Ontario

and McMaster Universities Osteoarthritis Index (WOMAC) score and Kupperman index were assessed at baseline and the end of the trial

Results: The OC ($p < 0.001$) and BALP ($p = 0.02$) levels were significantly increased in EG, while the DPD/OC ratio ($p = 0.024$) significantly decreased, representing an increase in bone formation and a lowering of bone turnover rate. There were no significant differences in the case of DPD, Ca, CTX, NTX, BMD, estrogen, WOMAC score, and Kupperman index.

Conclusion: In conclusion, intake of FGO over 24 weeks improved bone health in postmenopausal women by promoting bone formation and lowering the bone turnover rate

PE 02-16 2. Nutrition, Education and Exercise for Obesity

Impact of personalized small frequent meal pattern diet, Pranayama, Cardio exercises on Body weight, insulin resistance, and other clinical parameters: Endocrinologist experience from South India.

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Background: The international guidelines for Polycystic Ovary Syndrome (PCOS) advocate for a patient-centered approach rather than a conventional treatment protocol. The objective of our study is to comprehend the primary health concerns of PCOS patients and assess the changes in various clinical parameters following a personalized treatment for a duration of 6 months.

Methods: We conducted a retrospective analysis of the case-records of PCOS patients enrolled into the PCOS clinic. The PCOS clinic consists of a dietician (personalised small frequent high fibre diet with weekly review), an exercise counsellor (monthly review, stress on cardio exercises 3 hours a week), a psychologist (review as per need, stress on pranayama for 15 mins a day) and an endocrinologist (2 months review). We compared the participants HOMA-IR, BMI, Waist circumference, main PCOS related concern at baseline and after 6 months of treatment. Appropriate statistical analysis was done.

Results: Overall, 91 case-records were available for analysis. The mean age of patients was 28 years. Changes in clinical parameters are mentioned in table 1 and PCOS concerns are mentioned in Table 2

Conclusion: Tailored pharmacological interventions and lifestyle modifications reduced insulin resistance, mitigated psychosocial stressors, and improved quality of life in women with polycystic ovary syndrome (PCOS).

Table 1: Changes in Clinical Parameters of PCOS

Clinical Parameters, Unit Number of patients (N)	Baseline Mean (SD)	6-months Mean (SD)	Difference Mean 95% CI	P-value
Body-mass index, kg/m ² (N = 90)	27.7 (3.6)	26.3 (3.1)	-1.49 (-1.85, -1.13)	<0.05
Waist circumference, cm (N = 68)	91.5 (7.7)	89.5 (7.2)	-3.12 (-3.64, -2.59)	<0.05
HOMA IR (N = 69)	3.4 (0.9)	2.9 (0.7)	-0.60 (-0.73, -0.47)	<0.05
Body-fat, % (N = 74)	30.5 (5.8)	28.8 (4.6)	-1.77 (-2.17, -1.37)	<0.05

SD: standard deviation

Table 2: Patients with Clinical Manifestations of PCOS

Clinical Manifestations	Baseline, N (%)	6-months, N (%)	P-value
Menstrual Abnormalities	63 (69.2%)	21 (23.1%)	<0.05
Hirsutism	47 (51.6%)	10 (11%)	<0.05
Acne	25 (27.5%)	2 (2.2%)	<0.05
Fertility Concern	19 (20.9%)	4 (4.4%)	<0.05
Acanthosis Nigricans	75 (82.4%)	68 (74.7%)	0.21
Skin Tags	22 (24.4)	19 (20.9)	0.57

PE 02-17 2. Nutrition, Education and Exercise for Obesity

Effect of combined diet and exercise interventions on visceral and subcutaneous fat in an obese woman with cervical cancer: A Case Report

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Background: Obesity is a pathological increased fat mass, which is associated with an increased health risk, including cervical cancer.^{1,2} Low visceral and low fat mass body composition has a favorable overall survival among patients with cervical cancer.³ Adipose tissue expansion and dysfunction increase inflammation, reactive oxygen species (ROS) production, mitochondrial dysfunction, and insulin production. Exercise can improve mitochondrial function, promote antioxidant system, and glucose transportation. There was a significant effect of nutrition and exercise interventions on body weight, fat, and lean mass in adults diagnosed with cancer.⁴

Methods: A 54-year-old obese woman with cervical cancer receiving chemoradiotherapy has high visceral and subcutaneous fat. A combine intervention on life style modification of 1500 kcal/d diet with 50-60% carbohydrate, 15-20% protein, and 25-30% fat, aerobic exercise and resistance training were prescribed. This case demonstrates the importance of multidisciplinary and multimodal treatment in managing obesity in oncology.

Results: The nutrition intervention was performed in 3 visits. She followed 1500 kcal/day diet consisting of 50-60% carbohydrate, 15-20% protein, and

25-30% fat. The aerobic exercise was ≥ 150 mins of moderate intensity and resistance training ≥ 3 times/week. In addition, the patient was instructed to consume n-3 fatty acids. Body composition was assessed using a bioelectrical impedance analysis (BIA). Weight loss was 0,9 kg (1.3%) in 13 days and 1.3 kg (2.9%) in 26 days. Furthermore, visceral fat was reduced from 10 to 9.5 and subcutaneous fat was reduced from 33.5% to 33.0%. The handgrip was significantly higher from 20.8 to 22.7 kg on right hand and 16.8 kg to 18.0 kg on left hand.

Conclusion: A combined diet and exercise interventions have successfully reduced body weight, visceral, and subcutaneous fat in obesity with cancer.

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PE 02-18 2. Nutrition, Education and Exercise for Obesity

Age-specific association of physical activity on visceral obesity by CT scan

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Background: Obesity is a chronic disease that needs to be managed worldwide. High-intensity physical activity has a positive effect on the improvement and prevention of metabolic diseases. The purpose of this study was to investigate the age-specific association of physical activity on abdominal and visceral obesity.

Methods: The study involved 456 health check-up participants who underwent abdominal computed tomography scans for the assessment of visceral fat area from January 2017 to December 2017. Physical activity levels were categorized as none-to-low-intensity or moderate to vigorous-intensity based on the International Physical Activity Questionnaire. Logistic regression analysis, adjusted for covariates, assessed the association of physical activity with abdominal and visceral obesity across 10-year age intervals

Results: The moderate-to-vigorous physical activity group showed 56.5%

visceral obesity, while the none-to-low-intensity physical activity group had 63.2%. . Covariates included sex, BMI, marital status, smoking, alcohol consumption, past medical history (hypertension, diabetes mellitus, dyslipidemia, cerebrovascular disease, cardiovascular disease, liver disease, osteoporosis), and any cancers . After adjusting for these covariates, no significant differences in abdominal obesity were observed across all age group. Most age groups exhibited no significant differences in abdominal or visceral obesity according to physical activity. However, the 50 to 59 age group demonstrated a noteworthy association between visceral obesity and none-to-low-intensity physical activity (odds ratio 3.79, 95% confidence interval 1.12–12.84).

Conclusion: This study highlights a distinct age-related response to physical activity, emphasizing the 50 to 59 age group's significant association between visceral obesity and none-to-low intensity physical activity.

PE 02-19 2. Nutrition, Education and Exercise for Obesity

Consumer Preferences for Food Retailers and Purchasing Patterns in Urban Poor Areas of Kuala Lumpur, Malaysia

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Background: The rising rates of overweight and obesity (O/O) are a significant concern, especially in urban poor areas. However, factors associated with food retail have rarely been studied. Hence, this study aimed to examine consumer preferences for food retailers and purchasing patterns among urban poor in Kuala Lumpur, so that factors contributing to O/O can be better understood.

Methods This cross-sectional study is part of the South East Asian Obesogenic Food Environment (SEAOFE) study. Consumer intercept survey was conducted at hypermarkets, supermarkets, convenience stores, and traditional stores at selected urban poor areas in Kuala Lumpur. Sociodemographic information, including gender, age, self-reported weight and height, and food retail-related data from adults aged 18 years and above were collected. Body mass index (BMI) was classified based on WHO 1998 guidelines.

Results: A total of 1004 consumers (35.5% males; 64.5% females) who were

predominantly aged 18-40 years (68%) participated. Mean weight, height, and BMI were 64.9±15.4 kg, 160.7±11.5 cm, and 24.9±5.5 kg/m², respectively, with nearly half categorized as O/O (42.0%). Significant association was found between consumer's preferences for food retailers and their BMI (p<0.001). Supermarkets were the preferred shopping venues for nearly half of the consumers (45.6%), including those in the O/O categories, while traditional stores were the least preferred (8.2%). At supermarkets, the most purchased food products were fresh foods (52.3%), followed by processed foods (29.7%) and beverages (18.0%).

Conclusion: The study revealed an association between consumer preferences for food retailers and BMI of urban poor population. While fresh foods were the most commonly purchased items at supermarkets, there were also significant purchases of processed foods and beverages. Future research should explore healthy food availability at retailers and actual consumption patterns to promote better purchasing decisions and healthier behaviors, ultimately reducing O/O rates in urban poor areas.

PE 02-20 2. Nutrition, Education and Exercise for Obesity

Relationships between Cardiorespiratory Fitness, Leisure-Time Physical Activity and Heart Rate Recovery in Women with Overweight and Obesity

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Background: A delayed heart rate recovery (HRR) immediately after exercise is a marker of impaired parasympathetic reactivity and an independent predictor of all-cause and cardiovascular disease (CVD)-related mortality in men. We examined the associations between cardiorespiratory fitness, leisure-time physical activity and HRR in women with overweight and obesity.

Methods: Forty-nine physically inactive premenopausal women with overweight and obesity (age: 28.3 ± 7.0 years, BMI: 25.5 ± 1.9 kg/m²) participated in the study. Cardiorespiratory fitness was measured by maximum oxygen consumption during a graded treadmill test using indirect calorimetry. HRR was calculated as the difference between peak heart rate (HR) and HR at 1, 2, 3 and 5 minutes after cessation of the maximal treadmill test. Leisure-time physical activity was assessed by the

International Physical Activity Questionnaire, and body composition was measured by bioelectrical impedance analysis.

Results: Cardiorespiratory fitness was significantly associated with absolute HRR at 1 (r=0.347), 2 (r=0.639), 3 (r=0.664) and 5 (r=0.650) minutes after cessation of the maximal treadmill test, and these observations remained significant after controlling for BMI or waist circumference. High levels of vigorous-intensity physical activity is associated with absolute HRR at 2 (r=0.347), 3 (r=0.356) and 5 (r=0.332) minutes, and these remained significant after further adjusting for BMI or waist circumference.

Conclusion: HRR is a marker of cardiorespiratory fitness and vigorous-intensity physical activity levels independent of BMI and abdominal obesity in women with overweight and obesity.

PE 02-21 2. Nutrition, Education and Exercise for Obesity

Comparison of Dynamic Balance Ability According to Body Fat Percentage in Female College Students

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Background: Obesity is a major risk factor for various chronic diseases and musculoskeletal disorders. Female students with higher body fat percentages are likely to experience limitations in functional movement, which can exacerbate musculoskeletal issues. This study aims to examine the differences in functional movement based on body fat percentage among female college students.

Methods Thirty-four female college students were measured body composition, functional movement screening (FMS), and lower quarter Y-balance test (LQ-YBT). An independent samples t-test was conducted to compare FMS & LQ-YBT scores between the groups. All statistical analyses were performed using SPSS 29.0, with a significance level set at $p < .05$.

Results: The BMI of female college students (20.06 ± 1.41 years) was within the normal range (20.98 ± 2.50 kg/m²), but their body fat percentage (%BF) was high ($30.14 \pm 4.71\%$). In the FMS, hurdle step-right ($t=2.1909$, $df=32$, $p=0.0359$), inline lunge-left ($t=2.5584$, $df=32$, $p=0.0155$), and Right ($t=2.3635$, $df=32$, $p=0.0243$) showed statistically significant differences between the groups. In the LQ-YBT, left anterior reach ($t=2.7854$, $df=32$, $p=0.0089$) showed a statistically significant difference between the groups.

Conclusion: The study found significantly differences between the groups in FMS, including hurdle step-right, inline lunge-left and right. Additionally, a significant difference was observed in the LQ-YBT for left anterior reach. These results suggest that body fat percentage may impact functional movement in female college students.

PE 02-22 2. Nutrition, Education and Exercise for Obesity

Obesity's Effects on Upper and Lower Limb Stability: An Analysis of Female College Students

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Background: Obesity is a serious health issue with increasing prevalence worldwide. Despite advancements in understanding its multifactorial nature, there's limited information on the structural and functional limitations caused by obesity. This study investigates the impact of obesity levels on functional movement.

Methods: Thirty-four female college students underwent body composition analysis, Functional Movement Screening, and Upper and Lower Quarter Y-Balance Tests. Pearson correlation and simple linear regression analyses were used to examine relationships and impacts of body fat percentage (%BF) on these tests.

Results: The BMI of female college students (20.06 ± 1.41 years) was within the normal range (20.98 ± 2.50 kg/m²), but their body fat percentage (%BF) was high ($30.14 \pm 4.71\%$). Analysis of the correlation between %BF and UQ-YBT revealed significant negative correlations with Right Inferior Lateral reach (UQYBT-Rt-IL) and Right Composite Score (UQYBT-CS) ($r=-0.363$,

-0.345 , $p < .05$). A significant negative correlation was also found between %BF and LQ-YBT with left anterior reach (LQYBT-Lt-AR) ($r=-0.468$, $p < .01$). Regression analysis showed that %BF had impacts of 13.2%, 11.9%, and 21.9% on UQYBT-Rt-IL, UQYBT-Rt-CS, and LQYBT-Lt-AR, respectively, with each 1% increase in %BF resulting in decreases of 0.116%, 0.161%, and 0.643% in function. Analysis of the correlation between %BF and FMS revealed significant negative relationships with Left-Inline Lunge (FMS-Lt-IL), Right-Inline Lunge (FMS-Rt-IL), and Trunk Stability Push Up (FMS-TSP) ($r=-0.372$, -0.353 , -0.349 , $p < .05$). Regression analysis showed that %BF had impacts of 13.8%, 12.5%, and 12.2% on FMS-Lt-IL, FMS-Rt-IL, and FMS-TSP, respectively, with each 1% increase in %BF resulting in decreases of 0.052 points for FMS-Lt-IL and FMS-Rt-IL, and 0.042 points for FMS-TSP.

Conclusion: Increased body fat percentage in female college students reduces dynamic stability and core stability during functional movements. Exercise guidance to enhance core stability is necessary to mitigate these effects.

PE 02-23 2. Nutrition, Education and Exercise for Obesity

The Effects of Different Breathing Techniques on Lower Extremity Muscular Function and Balance Ability in Overweight Males

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Background: Obesity and overweight have been reported to affect the function of core muscles, with higher body mass index (BMI) associated with decreased balance ability. The bracing and hollowing breathing techniques are the most widely known methods to activate core muscles. This study aims to investigate the effects of different breathing techniques on lower limb muscle function and postural stability in overweight males and to develop core activation strategies for functional improvement based on these findings.

Methods: This study was conducted on 10 Overweight males (24±2.31 aged) in their twenties without back or musculoskeletal issues, the study involved pre-experiment training in both breathing techniques. It assessed maximal strength, endurance, and power during knee flexion and extension, alongside postural stability, with both eyes open and closed, using the non-parametric Wilcoxon signed-rank test for analysis. Statistical significance for all results was set at $p < .05$.

Results: Except for certain specific measurements (right flexor muscle maximal strength, left flexor muscle endurance, and right extensor muscle power), statistical analysis showed significant differences in Knee muscle function favoring the bracing technique ($p < .05$). While postural stability tests showed no significant overall differences between the bracing techniques.

Conclusion: Bracing breathing enhances lower limb strength, endurance, and power in overweight males, positively influencing muscle training more than the hollowing technique. However, in terms of postural stability, the hollowing technique may be more advantageous for tasks requiring high balance acuity, such as one-legged standing. In contrast, the bracing technique appears to be more effective for simpler stability tasks. These findings are thought to be due to differences in the muscle groups activated by each breathing technique and changes in the center of gravity caused by being overweight. Therefore, further detailed research considering posture and musculoskeletal influences is necessary.

PE 02-24 2. Nutrition, Education and Exercise for Obesity

Differential Regulatory Effects of Exercise and Hypocaloric Diet on Adipose Thermogenesis and Inflammation in Obese Mice

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Background: Adipose tissue (AT) inflammation and thermogenesis are critical regulatory factors contributing to obesity-associated metabolic dysregulation. While diet and exercise are known to attenuate obesity, the impacts of a hypocaloric diet and exercise on weight loss-associated AT metabolism and their underlying mechanisms remain unelucidated. Here, we investigate the effects of equivalent weight loss induced by either exercise or calorie reduction on metabolic dysregulation, AT inflammation, and thermogenesis in obese mice.

Methods: Obese mice fed high-fat diets (HFD) were exercise trained (EX, n=8) or weight-matched to EX via caloric reduction (CR, n=8), and compared with ad libitum HFD-fed mice (Con, n=8). Metabolic parameters were assessed upon 8 weeks of exercise, and inflammatory indicators were examined using flow cytometry, histological analysis, and biochemical assays.

Results: EX and CR both reduced adiposity and improved glucose tolerance and insulin sensitivity. While EX and CR both reduced macrophage accumulation in AT, CR, but not EX, decreased circulating neutrophil and monocyte numbers. Gene expression analysis revealed that only EX significantly increased the expression of anti-inflammatory genes *Adipoq* and *Ym1* in visceral AT. EX also enhanced the expression of fat oxidation-related genes in visceral AT, including *Ppara*, *Pgc1a*, and *Acox1*. Additionally, EX upregulated thermogenesis genes in subcutaneous AT, including *Ucp1*, *Cidea*, and *Prdm16*.

Conclusion: Both EX and CR reduced AT inflammation, however, EX led to more robust changes in anti-inflammatory gene expressions, increased fat oxidation, and enhanced indices of thermogenesis function. Our findings indicate that exercise uniquely regulates AT function, which may be attributed to the metabolic benefits of exercise.

PE 02-25 2. Nutrition, Education and Exercise for Obesity

Enhancing the Completeness of Food and Nutrient Database (FNDB) for Processed Foods Based on the Nutrition Labels

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Background: Although diet is the most important component in obesity management, nutrition label (NL) on processed foods in Korea lists only 9 nutrients, not enough for consumer’s informed choice. To enhance the NL use, information on additional nutrients (AN) such as dietary fiber, added sugars and potassium is needed.

Methods & Materials: Based on the difference in nutrient list of NL between US and Korea, we attempted to secure AN information on the Korean processed food exported to US. After extracting relevant information from the USDA Global Branded Food Products Database, we performed web scraping/crawling to obtain product descriptions, nutritional information, ingredients, serving sizes, and images from the corresponding US websites of 2 major companies. Resulting data was compiled into a database and compared with domestic products using images, names, NL, etc. to verify identity.

Results: About 60% of the products examined turned out to be similar in image & name and 78% of them were matched well with calorie values within the variance allowed by US FDA and MFDS regulations. Paired t-tests on nutrient content/100g of the matched pairs showed no significant differences

except for trans fat, due to different reference amounts, verifying the identity of the matched pairs. Information on AN was secured from the NL of the identical products in US.

Table. Nutrient content comparison between the matched processed foods in pairs

Nutrients	from Korean NL Mean (SD)	from US NL Mean (SD)	Difference Mean (SD)	p value
Energy (kcal/100g)	364.84 (145.27)	361.28 (145.71)	-3.57 (17.20)	0.137
Total Fat (g/100g)	13.27 (12.62)	12.74 (12.48)	-0.53 (2.32)	0.105
Saturated Fat (g/100g)	4.78 (3.55)	4.68 (3.64)	-0.10 (1.09)	0.522
Trans Fat (g/100g)	0.03 (0.09)	0.00 (0.00)	-0.03 (0.09)	0.042
Cholesterol (mg/100g)	4.91 (9.13)	3.08 (6.04)	-1.82 (7.78)	0.094
Sodium (mg/100g)	900.66 (586.46)	878.74 (590.62)	-21.92 (115.78)	0.174
Protein (g/100g)	6.59 (2.92)	6.55 (2.99)	-0.03 (0.90)	0.797
Carbohydrate (g/100g)	54.68 (20.47)	55.23 (21.32)	0.55 (2.74)	0.150
Total Sugars (g/100g)	7.10 (7.89)	6.99 (7.00)	-0.25 (2.61)	0.499

Conclusion: This method successfully complemented the AN information on processed foods in Korea. Enhancing the completeness of FNDB by predicting and/or estimating missing values with other approaches including big data-based machine learning and/or AI is warranted.

PE 02-26 2. Nutrition, Education and Exercise for Obesity

Analysis of News Articles on Physical Activity and Obesity among People with Disabilities: Application of Topic Modeling

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Background: People with disabilities, who are also overweight or obese, face significant barriers to participating in regular physical activity due to physical, social, and environmental challenges. To manage obesity in this population, physical activity should be supported and monitored at a societal level. Analyzing news articles through topic modeling can reveal public awareness and opinions on these issues. Therefore, the purpose of this study was to identify trends and key themes in news articles related to physical activity and obesity or people with disabilities using topic modeling.

Methods: Using the Big Kinds search engine, a total of 7,166 online news articles from January 1990 to July 2024 were collected with specific keywords, such as “people with disabilities”, “exercise”, “sports”, “physical activity”, “obesity”, and/or “overweight”. From these, 243 relevant articles were selected. Topic modeling and text mining techniques were applied to identify major themes and keywords from these articles. The Coherence Score was calculated to determine the appropriate number of topics. All data processing was performed using Google Colab.

Results: The top 5 results of the TF(Term Frequency) keyword analysis are as follows: “Health”, “Program”, “Management”, “Operation”, “Rehabilitation”. The top 5 results of the TF-IDF (Term Frequency -Inverse Document

Frequency) analysis are as follows: “Classroom”, “Rehabilitation”, “Public Health Center”, “Education”, “Sports Center”. A total of 10 topics were identified. After analyzing the relevant articles for each topic, topic names were determined: 1. Health Management and Prescription Strategies for Obese People with Disabilities, 2. Examples of Sports Club Operations for People with Disabilities Abroad, 3. Citizen Participation Cultural Sports Events, 4. Public Health Center Programs for Preventing Obesity in People with Disabilities, 5. University-Hosted Sports Camps for Families with Children with Developmental Disabilities, 6. Weight Management Programs for People with Chronic Disease, 7. Home Visits and Exercise Classes for People with Severely Physical Disabilities, 8. Community Projects for Health Promotion of People with Disabilities, 9. Physical Activity Programs for Inactive People with Disabilities, 10. Support for Weight Management among Employees with Disabilities at Standard Workplaces.

Conclusion: The analysis of news articles shows that support for promoting physical activity levels of people with various types and levels of disabilities, who are overweight or obese, has increased in both public and private sectors. To ensure that physical activity for people with disabilities becomes a regular part of ordinary life rather than a special or occasional task, easily accessible and inclusive events and programs should be expanded.

PE 02-27 2. Nutrition, Education and Exercise for Obesity

Dietary intake by obesity phenotype among young adults in Jeju

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Background: While body mass index (BMI) a common measure of obesity, it does not distinguish differences in body composition. Thus, this study aimed to investigate the association between dietary intake and obesity phenotype among young adults.

Methods: A total of 333 free-living adults aged 19–39 years residing in Jeju, were included in this study. Using bioelectrical impedance analysis (Inbody 770), Obesity was defined using both body mass index (BMI, ≥ 25 kg/m²) and body fat percentage ($\geq 25\%$ for men and $\geq 30\%$ for women). Obesity phenotypes were then categorized as normal, normal weight obese (NWO), high weight normal (HWN), and obese. Dietary intake was assessed using a 1-day 24-hour recall method.

Results: Among total participants, 28.5% were the NWO group with a higher

body fat but normal BMI and 7.2% were in the HWN group with a higher BMI but normal body fat. 22.2% were defined as obese using both BMI and body fat. The NWO and obese groups tended to be females, whereas the HWN group tended to be males ($P < 0.0001$). Physical activity level was highest in the HWN group ($P < 0.0001$). The NWO group had the highest proportion of consuming below the estimated average requirement for vitamin B1 and iron ($P < 0.05$ for all). Fruit intake was significantly by obesity phenotype with a lowest intake in the NWO group (10.1 g) and a highest intake in the HWN group (60.1g) ($P = 0.0381$).

Conclusion: Dietary intake was different by obesity phenotype among young adults in Jeju and the NWO group showed a relatively poor nutritional status. Future prospective studies are required to investigate the role of diet in body composition changes in Koreans.

PE 02-28 2. Nutrition, Education and Exercise for Obesity

Effects of Lithospermum erythrorhizon extract on muscle function in adults older than 50 years of age: a randomized, double-blinded, and placebo-controlled trial

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Background: Several previous studies have indicated that Lithospermum erythrorhizon extract(LEE) may have the ability to prevent skeletal muscle atrophy.

Methods: Therefore, we conducted a randomized, double-blind, and placebo-controlled study to investigate the effects of the LEE on muscle strength, muscle mass, muscle function, and metabolic markers in healthy adults; the safety of the compound was also evaluated. We examined the peak torque at 60°/s knee extension/flexion, handgrip strength, skeletal muscle mass, physical performance, and metabolic parameters at baseline, as well as after 0 and 12 weeks of intervention.

Results: Either 1000 mg of LEE or a placebo was administered to 100

healthy adults each day for 12 weeks; no differences in handgrip strength, muscle mass, and physical performance were observed between the two groups. However, the right-60°/s knee extension/flexion peak torque, the right-muscle power extension/flexion, and albumin concentration of subjects in the LEE group was found to be significantly better than that of subjects in the control group ($P < 0.05$).

Conclusion: In summary, Lithospermum erythrorhizon extract may be useful in improving muscle function in adults older than 50 years of age.

Conclusion: Lithospermum erythrorhizon; muscle function; muscle strength

PE 02-29 2. Nutrition, Education and Exercise for Obesity

Effect of Resistance and Aerobic Exercise Program On the Cardio Metabolic Profile and Thyroid Function in Obese and Overweight Females with Subclinical Hypothyroidism.

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Background: The Aim of this research was Comparing the effects of a 12-week combined exercise program including aerobic and strength training on thyroid function and cardio metabolic profile across groups of obese women and those with subclinical hypothyroidism.

Methods: The study comprised 24 women diagnosed with subclinical hypothyroidism, BMI \geq 25 kg/m², and TSH values within 5–10 mU/L in the previous 6 months. The group designated as obese consisted of 24 women who were obese and had a body mass index (BMI) of $>$ 25 kg/m² without hypothyroidism. Hormones related to thyroid function, body composition, blood lipid levels, and blood pressure (BP) were measured prior to and following the 12-week intervention in both groups. One week before the study began and one week after the twelfth training week ended was when the data was collected. Each workout was performed four times a week.

Results: After completing the 12-week training program, the BMI, body fat percentage, and systolic blood pressure of the subclinical hypothyroid group significantly improved (p 0.05), while the BMI, waist circumference, systolic blood pressure, and diastolic blood pressure of the obese group improved similarly (p 0.05). Blood lipid levels in the obese group differed statistically significantly from those in the subclinical hypothyroid group. The 12-week fitness training program had no discernible effect on thyroid-related hormones in either group.

Conclusion: An exercise training program did not have the same significant impact on blood lipids and thyroid-related hormones in patients with subclinical hypothyroidism. Further research is needed to determine whether exercise training can effectively alter thyroid hormones in patients with subclinical hypothyroidism.

PE 02-30 2. Nutrition, Education and Exercise for Obesity

Identifying Telehealth Competencies for Dietetics Education and Practice: A Path Toward Improving Health Outcomes for Patients Living with Obesity

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Background: STelenutrition has become instrumental in expanding access to nutrition care.¹ Developing telehealth competencies (skills, knowledge, and behaviors) is paramount for ensuring safe and effective care.² Competencies are established in medicine and nursing but are lacking in dietetics. This research aims to develop competencies to inform curriculum and practice. This initial research phase involves conducting a literature review to compile a preliminary list of competencies.

Methods: To identify peer-reviewed papers published in English between 2014 and 2024, the PubMed database was searched using (tele*[Title]) AND (competenc*[Title] OR skills [Title] OR curriculum [Title]) as the search string. A manual search of reference lists from review papers was also undertaken. Two authors screened titles, abstracts, and full-text articles and excluded those that were not relevant, did not provide a list of the competencies, or were opinion or guidance articles. Data were extracted from each paper based on The Guidance on Conducting and Reporting Delphi Studies checklist and included the following: author, publication year, country, profession, purpose, research methodology, and results.

Results: The PubMed search yielded 267 potential articles. After excluding those not meeting the inclusion criteria, nine articles were included (four from medicine, three from nursing, one from psychiatry, and one from allied health professions). Four papers were identified from the reference list of included papers. The competencies from the 13 articles were organized by theme and will serve as the initial list of competencies to be considered for incorporation into a modified e-Delphi study to gain expert-level consensus.

Conclusion: This research addresses a significant gap in dietetics training by identifying the necessary skills and knowledge to provide safe and effective telehealth services. The integration of telehealth competencies into the curriculum will prepare the workforce for the virtual healthcare landscape, improving patient care and management of diet-related chronic diseases such as obesity.

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PE 02-31 2. Nutrition, Education and Exercise for Obesity

Effect of Pumpkin (Cucurbita) Seeds supplementation on Body mass index, Blood pressure, and Hba1c level in patient with Metabolic Syndrome

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Background: The metabolic syndrome is the co-occurrence of risk factors including insulin resistance, type 2 diabetes mellitus, visceral obesity, atherogenic dyslipidemia, and high blood pressure. The use of herbal medicine as an alternative treatment is growing in patients with metabolic syndrome. This study aimed to assess the effects of pumpkin seed powder supplementation on Blood pressure (BP), Body mass index (BMI) and HbA1c level in patients with Metabolic Syndrome.

Methods: This study was conducted on 43 metabolic syndrome patients (22 case group (with pumpkin seed intervention) + 21 controls (without intervention)). The patients were randomized to take pumpkin seed powder (10gm/day) with standard conventional treatment and another group continued with standard conventional treatment only. BP, BMI and HbA1c assessments were completed in all patients at the baseline (beginning of enrollment) and after 3 months i.e., follow-up.

Results: The study participants had an average age of 47±7.05 years. There were no significant changes in study parameters at baseline of both the groups. HbA1c showed significant decrease ($p=0.0112$) in case group from baseline to follow-up. However, BMI ($p = 0.6108$), SBP ($p = 0.1192$) and DBP ($p = 0.7771$) did not show any significant change on comparing their respective baseline to follow-up in the case group. Moreover, in the control group, BMI ($p = 0.4703$), SBP ($p = 0.4142$), DBP ($p = 0.1099$) and HbA1c ($p=0.2707$), did not show any significant change on comparing their respective baseline to follow-ups.

Conclusion: The study concludes that Metabolic Syndrome patients show decrease in HbA1c level in case group from baseline to follow-up that show pumpkin seed supplementation may decrease the glycemic profile. Minor improvements in BMI & BP were noted but without significant changes. These findings emphasize that pumpkin seed supplementation might improve glycaemic profile, BMI and BP in metabolic syndrome patients.

PE 02-32 2. Nutrition, Education and Exercise for Obesity

A Self-perceived Proficiency of Endocrinologists and Trainees in Nutrition Before and After Nutrition Therapy Workshop

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Background: Endocrinologists and primary care physicians are faced with challenges of limitations of time and expertise when dealing with patients with diabetes and obesity. A Nutrition Therapy Workshop was conceived by the Philippine College of Endocrinology Diabetes and Metabolism-Obesity Lipid and Nutrition council (PCEDM OLN) out of a need to to equip endocrinologists with the proper use of nutrition therapy as a necessary tool to help manage and prevent common nutrition-related diseases, such as diabetes, obesity, dyslipidemia, hypertension, and malnutrition in the outpatient setting. Whether such learning workshops have an impact on knowledge, self-perceived proficiency in nutrition management attitudes and practices in nutrition therapy is not known.

Methods: We performed a survey to determine the self-perceived proficiency in nutrition among endocrinologists and trainees attending Nutrition Therapy Workshop and a focus group discussion to document challenges and best practices of endocrinologists in the Philippines when advising nutrition to patients with diabetes, obesity and hypertension. Questions on prior experience with nutrition workshops were answerable by yes or no; Self perceived proficiency questions, attitudes and practices questions were answered on a Likert scale of 1 to 5. A role playing workshop followed by focus group discussion was done by small group and learnings

on challenges and best practices were synthesized in the plenary session.

Results: 48.6% of attendees were trainees (residents in internal medicine or fellows in training in endocrinology); The remaining 52.4% of participants were practicing endocrinologists. Majority of participants (79%) had heard of nutrition therapy prior to the workshop. Majority of respondents (71%) had not attended a Nutrition Workshop prior to this workshop. We observed an increase in the Likert score on the self-perceived proficiency from an average score of 3.26 on all 3 questions to 4.38; Attitude toward the importance of nutrition therapy was not significantly different pre and post workshop. The proportion of who would use nutrition therapy more than once a week in their practice increased compared to before the workshop (38% pre workshop to 84% post workshop). Challenges documented were divided in to Practice Gaps, Knowledge Gaps and Practical Challenges. Best practices identified varied from skill in developing rapport, shared decision making, empathy and person forward language.

Conclusion: Attendance in a nutrition therapy workshop improves self-perceived proficiency of endocrinologists and trainees in nutrition therapy; These may have an impact on attitudes on the use of nutrition therapy in clinical practice.

PE 02-33 2. Nutrition, Education and Exercise for Obesity

The Effect of a Multidisciplinary Lifestyle Intervention on Obesity Status, Body Composition, Physical Fitness, and Cardiometabolic Risk Markers in Children and Adolescents with Obesity

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Background: Globally, the prevalence of childhood and teenage obesity has risen during the last several decades. Prior research has indicated that childhood and teenage obesity raises the risk of cardiovascular disease (CVD) in childhood and adolescence as well as the incidence of metabolic syndrome (MetS) and CVD, including hypertension (HTN), Type 2 diabetes mellitus (T2DM), dyslipidemia (DL), and arteriosclerosis in adulthood.

Methods: 103 participants aged between 6 and 16 years (63 boys and 40 girls), with a BMI \geq 85th percentile of age and sex-specific were assigned to receive either standard care or an exercise intervention for a period of 16 weeks. Overweight was defined as a BMI \geq 85th percentile for age and sex, while mild to moderate obesity was defined as a BMI \geq 25 kg/m² or \geq 95th percentile for age and sex, while severe obesity was defined as a BMI \geq 35 kg/m² or \geq 120% of the 95th percentile

Results: The 103 individuals had a mean age of 12.56 ± 1.96 years, 38.8% of them were female, 34.0% had severe obesity, and 80.6% had a BMI \geq 97th percentile for age and sex. Between the usual care and exercise groups at baseline, there were no significant differences in the proportion of severe obesity (31.0% versus 40.6%, $p = 0.34$) or the proportion of BMI \geq 97th percentile for age and sex (81.7% versus 78.1%, $p = 0.67$).

Conclusion: In comparison to the usual care group, the exercise group had reduced percentages of body fat and cardio metabolic risk indicators after a 16-week multimodal lifestyle intervention, while their leg muscle strength and LM were higher. It is anticipated that education and circuit training activities will help obese children and adolescents improve their body composition, physical fitness, and cardio metabolic risk indicators

PE 02-34 2. Nutrition, Education and Exercise for Obesity

Impact of Obesity on Physical Function and Balance in Taekwondo Poomsae Athletes

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Background: In Taekwondo sparring, weight management is essential due to weight class competitions. However, in Poomsae competitions, the results are determined by the accuracy and expression of the movements, regardless of the athlete's weight. Consequently, Poomsae athletes do not manage their weight. However, obesity has been reported to decrease physical function and affect postural stability. Therefore, this study aims to investigate the impact of obesity on the performance of Poomsae athletes who do not manage their weight.

Methods: The study was conducted on 40 university Taekwondo Poomsae athletes (19.6 ± 1.10 aged), measuring body composition, physical function (sergeant jump, 20m sprint), balance (center of pressure displacement, speed), and Poomsae performance (Geumgang and Pyongwon). The collected data were analyzed for differences between obese and non-obese groups using independent t-tests in Jamovi 2.5.6. Additionally, the relationships between the measured factors were analyzed using Pearson correlation. Statistical significance for all results was set at $p < .05$.

Results: There were no significant differences in physical function, balance, and Poomsae performance between the normal weight group and the obese group (Weight: 58.9 ± 6.40 vs 72.1 ± 5.94 ; BMI: 20.8 ± 1.23 vs 24.7 ± 1.48). However, weight showed a positive correlation with the sergeant jump ($r = .448$, $p = .001$) and a negative correlation with the 20m sprint ($r = -.475$, $p = .002$). Poomsae performance in Pyongwon showed a significant positive correlation with center of pressure displacement speed ($r = .354$, $p = .027$) and distance ($r = .421$, $p = .008$).

Conclusion: Body weight has been shown to be related to power and agility, but it did not have a significant impact on the performance of Taekwondo Poomsae athletes. These results are thought to be due to the athletes' learned motor control abilities from their existing training regimen and the fact that the athletes in the study did not have a high level of obesity. Therefore, further detailed research considering a wider range of obesity levels is necessary.

Poster Exhibition

3. Epidemiology of Obesity and Metabolic Syndrome

PE 03-01 3. Epidemiology of Obesity and Metabolic Syndrome

Gestational Weight Gain in Mongolian Women: Multicenter, cohort study

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Background: Obesity and overweight rates are increasing in all age groups globally, especially in low- and middle-income countries. The study aimed to assess gestational weight gain according to the Institute of Medicine recommendations for each pre-pregnancy body mass index in Mongolian women.

Methods: We conducted a multicenter, prospective cohort study among pregnant women who attended antenatal care in health centers in two districts of Ulaanbaatar, from February 21 to March 25, 2022. The study of ethics was approved at a meeting of the Ethics Committee of the Mongolian National University of Medical Sciences (2022/3-02). Structured questionnaires and physical measurements were performed during pregnancy. Moreover, we obtained data from women's medical records after giving birth. Pre-pregnancy BMI was classified as underweight (<18.5 kg/m²), normal (18.5-24.9kg/m²), overweight (25.0-29.9 kg/m²), and obese (≥30 kg/m²). Gestational weight gain was categorized as inadequate, adequate, and excessive based on the United States Institute of Medicine criteria (IOM).

Results: A total of 468 pregnant women were enrolled in the study. Gestational weight gain (GWG) was assessed for 352 (75.2%) women. The mean age was 30.34±6.02 (18-46 years). According to pre-pregnancy BMI, 9.1% (n=32), 59.1% (n=208), 23.3% (n=82), and 8.5% (n=30) of women were underweight, normal weight, overweight and obese, respectively. The mean GWG was 17.17±6.38 kg for underweight, 15.08±7.36 kg for normal weight, 11.75±6.29 kg for overweight, and 9.05±6.37 kg for obese women (p<0.001). Adequate GWG occurred in 46.9%, 23.1%, 32.9%, and 33.3% of the groups. More than the recommended GWG (excessive) occurred in 37.5%, 40.9%, 46.3%, and 43.3% of underweight, normal weight, overweight and obese women respectively. Only 28.4% (n=100) of women had adequate gestational weight gain during pregnancy.

Conclusion: This study found that despite the lower mean GWG of overweight and obese women gained more than the IOM recommendations for GWG. Furthermore, healthcare professionals should advise appropriate weight gain during pregnancy at antenatal visits.

PE 03-02 3. Epidemiology of Obesity and Metabolic Syndrome

Comparison of Metabolic Syndrome in Indonesian and South Korean Populations: Results for National Health Surveys

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Background: Metabolic syndrome (MetS) elevates the risk of cardiometabolic diseases and mortality. Its prevalence is rising, particularly in the Asia-Pacific region. Asians, who constitute over 60% of the global population, face higher cardiometabolic risk at equivalent BMI levels compared to Caucasians. Therefore, a large data study on the Asian population considering country-specific differences is necessary. This study compares the prevalence of MetS and its components between Indonesia and South Korea.

Methods: Participants aged 19 and older were included from the 2018 Indonesian Basic Health Survey (RISKESDAS) and the 2018 Korean National and Nutrition Health Examination Survey (KNHANES). MetS was defined according to the Joint Interim Statement criteria, requiring at least three out of five cardiometabolic abnormalities. The participants were stratified by sex and age, with cut-offs at 30 and 50 years (young adults: <30 years old; middle-aged adults: 30-50 years old; and older adults: ≥50 years old). Data were analyzed separately for each country and weighted to correct for differences in geographical density.

Results: The study included 23,045 participants (45.6% men and 54.4% women) from RISKESDAS and 5,950 participants (50.3% men and 49.7% women) from KNHANES. The overall prevalence of MetS was similar in both countries (33.3% in Indonesia vs. 32.9% in South Korea). However, Indonesian men had a lower MetS prevalence than South Korean men (25.4% vs. 34.7%), while Indonesian women had a higher prevalence than South Korean women (39.9% vs. 31.2%). In terms of MetS components, Indonesians exhibited a lower prevalence of hypertriglyceridemia but higher rates of elevated blood pressure compared to South Koreans. Age stratification revealed higher MetS prevalence in young adult Indonesian men and women compared to their South Korean counterparts. This trend reversed in middle-aged men, and older adult women in both countries had similar MetS prevalences.

Conclusion: The overall prevalence of MetS in Indonesia was comparable to South Korea. However, gender and age stratifications showed differences, highlighting the need for country-specific interventions to reduce the burden of MetS and related cardiometabolic diseases.

PE 03-03 3. Epidemiology of Obesity and Metabolic Syndrome

Metabolic-predicted Obesity Phenotypes and Risk of Colorectal Cancer in Malaysia: Decoding the Obesity Paradox

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Background: In Malaysia, the 'obesity paradox' reveals a higher proportion of obese individuals not developing metabolic dysfunctions, highlighting a research gap in understanding the link between obesity and colorectal cancer (CRC) risk. The diverse obesity-related metabolites contribute to a complex metabolic landscape, potentially influencing CRC risk. This multicentric retrospective matched case-control study explores the association between the metabolic-predicted obesity phenotypes (MetSOBs) and CRC risk in selected hospitals.

Methods: A total of 140 histologically confirmed CRC cases and 280 matched cancer-free controls were recruited from five public hospitals in Malaysia. They were categorized into MetSOBs phenotypes according to the metabolic syndrome (MetS) criteria as defined by the International Diabetes Federation and BMI (≥ 25 kg/m²): metabolically healthy normal weight (MHNW), metabolically unhealthy normal weight (MUNW), metabolically healthy overweight/obese (MHO) and metabolically unhealthy overweight/obese (MUO). Cox regression was employed to

determine the association between MetSOBs and the risk of CRC.

Results: MetS was significantly more prevalent among cases compared to controls (57.1% vs. 39.3%; $\chi^2=12.01$, $p = 0.001$). The prevalence of overweight was 27.9%, while obesity was 11.4% among the CRC cases. MUNW and MUO subjects were more prevalent among those aged <60 years old, females, Malays, and those with higher monthly income. With metabolic dysfunction defined as ≥ 3 MetS criteria, CRC cases had significantly higher proportions of MUNW (28.6% vs. 15.7%) and MUO (28.6% vs. 23.6%) phenotypes than cancer-free controls ($\chi^2 = 14.16$, $p = 0.003$). MUNW subjects had a 2.8-times higher odds of CRC risk (AOR=2.27, 95% CI = 1.56, 4.93) while MUO subjects had 79% increased odds of CRC risk, compared to MHNW subjects (AOR = 1.79, 95% CI = 1.04, 3.08).

Conclusion: This pioneering research established MetSOBs phenotypes as a valuable tool for predicting CRC in the Malaysian population for personalized risk assessments and innovative preventive interventions.

PE 03-04 3. Epidemiology of Obesity and Metabolic Syndrome

Predicting Metabolic Syndrome in Obese Adults: Integrating Gut Microbiome Diversity and Dietary Patterns with Machine Learning

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Background: The gut microbiome is key to metabolic processes and metabolic syndrome (MetS), especially in obese individuals. Diet impacts gut microbiota, but the combined effect of microbiome profiles and dietary patterns on predicting MetS is unclear. This study uses machine learning to investigate how gut microbiome diversity and diet predict MetS onset in obese adults, guiding personalized nutrition strategies.

Methods: We conducted a retrospective cohort analysis using data from the American Gut Project and UK Biobank, involving 10,000 obese adults aged 35-60. Participants provided stool samples for 16S rRNA sequencing to profile gut microbiota and completed food frequency questionnaires (FFQs) for dietary intake. Gut microbiome data were analyzed to determine microbial diversity and key taxa. Dietary data were categorized into macronutrients, micronutrients, and specific patterns (Mediterranean, Western). We employed a multi-layer ensemble model combining Convolutional Neural Networks (CNNs) for microbiome data and Gradient Boosting Machines (GBMs) for dietary data. The model was optimized

using a genetic algorithm and validated through 10-fold cross-validation.

Results: The ensemble model achieved an accuracy of 94.1% (95% CI: 92.9% - 95.3%) and an AUC-ROC of 0.97 (95% CI: 0.96 - 0.98). Sensitivity and specificity were 90.5% (95% CI: 88.4% - 92.6%) and 92.8% (95% CI: 91.0% - 94.6%), respectively. Key predictive features included the relative abundance of Bacteroidetes, Firmicutes, and a high intake of dietary fiber. Participants adhering to a Mediterranean diet had a 2.5-fold reduced risk of developing MetS (HR: 0.40, 95% CI: 0.32 - 0.50). High Bacteroidetes levels combined with high-fiber intake were associated with the lowest MetS risk (HR: 0.22, 95% CI: 0.18 - 0.27).

Conclusion: Integrating gut microbiome and diet data with machine learning accurately predicts MetS. The diet-microbiota interaction is key to metabolic health and suggests personalized dietary strategies to reduce MetS risk. Future research will validate these results and develop targeted dietary interventions.

PE 03-05 3. Epidemiology of Obesity and Metabolic Syndrome

No association of rs121907892 with hyperuricemia and other metabolic parameters in Thai population

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Background: Hyperuricemia is defined as an elevated serum uric acid level. Nowadays, the disease burden of hyperuricemia is increasing worldwide. Among other countries, Thai people suffer from gout attack, significantly increased risk in those who have hyperuricemia, which is the most common risk factor for developing gout. A higher serum uric acid (UA) is associated with metabolic syndrome. Studies have shown that the genetic variation of Solute Carrier family 22 member 12 (SLC22A12) can also result in hyperuricemia, which is expressed at the apical side of the renal proximal tubule. The single nucleotide polymorphisms (SNP) at the loci stated above can lead to UA underexcretion. This study aimed to study the association between the rs121907892 variant and hyperuricemia.

Methods: In a cross-sectional study involving subjects from Nakornnayok, Thailand, 597 blood samples were collected from healthy people with age range of 20-60 years old. The SNP variant of rs121907892 was analyzed

by using TaqMan SNP Genotyping Assays by StepOnePlus® Real-Time PCR Systems (Applied Biosystems, USA).

Results: The prevalence of hyperuricemia in this study was 24.79%, which was more common in females than in males, with the prevalence of male and female was 43.2% and 56.8%. The prevalence of metabolic syndrome was 12.40%, and also the prevalence of metabolic syndrome with hyperuricemia was 4.19%. The 597 participants were interpreted as GG genotype of rs121907892. The AA and AG genotypes were not found in this population. This result has shown that rs121907892 was consensually not associated with hyperuricemia and other metabolic parameters.

Conclusion: These results indicated that the variation of rs121907892 was not found. There is only GG genotype, known as wildtype, in this study.

PE 03-06 3. Epidemiology of Obesity and Metabolic Syndrome

Trends in prevalence of obesity and related cardio-metabolic and renal complications in Korea: a nationwide study 2007-2022

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Background: As obesity has increased, the burden of obesity related comorbidities accelerates. However, the prevalence and current status of obesity and its related comorbidities in Korean has not been evaluated.

Methods: Data from the 2007–2022 Korean National Health and Nutrition Examination Surveys database were analyzed (n=93,761). The prevalence of hypertension, diabetes, dyslipidemia, steatotic liver disease (SLD), cardiovascular diseases (CVD), chronic kidney disease (CKD) and cancer according to obesity and central obesity was investigated. The prevalence of obesity and its related comorbidities were also analyzed according to age groups and sexes.

Results: Prevalence of individuals with obesity has steady increased from 31.5% in 2007-2009 to 37.4% in 2020-2022. Among individuals with

obesity, the prevalence of hypertension, diabetes, dyslipidemia, CKD and SLD also has increased. These increases were found across the age groups and both sexes. Among individuals with obesity, the proportions of metabolic dysfunction associated steatotic liver disease (MASLD) and MASLD with increased alcohol intake were increased. The increase in CKD prevalence was prominent in young (19-39 years) and middle age groups (40-59 years). The prevalence of CVD and cancer in population with obesity has increased, whereas the prevalence of CVD and cancer in old age group (≥ 60 years) has been plateau. When analyzing according to central obesity, similar results were observed.

Conclusion: With the increase in obesity, the prevalence of obesity related comorbidities in the Korean population has been rising. Young and middle aged population with obesity are vulnerable to obesity related comorbidities.

PE 03-07 3. Epidemiology of Obesity and Metabolic Syndrome

Association between obesity and the triglyceride glucose index as insulin resistance marker

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Background: The triglyceride glucose (TyG) index is an inexpensive clinical surrogate marker for insulin resistance. However, the relationship between TyG index and various body composition maker for obesity remains unclear. We evaluated the relationship between TyG index and various body composition maker for obesity using a large- scale population dataset from the Korea National Health and Nutrition Examination Survey (KNHANES) between 2008 and 2010.

Methods: We performed a cross-sectional study that included 19947 participants aged ≥ 19 years using the KNHANES. We divided the participants into TyG index quartiles. We evaluated the risk for highest quartiles of TyG index in the obesity defined by various body composition makers. The TyG index was calculated as $\ln [\text{triglyceride (mg/dL)} \times \text{fasting plasma glucose (mg/dL)} / 2]$. Dual-energy X-ray absorptiometry was used to measure the body composition.

Results: Obesity by body mass index was associated with 2.987 time (95% CI: 2.794-3.193) higher risk for higher TyG index. Obesity by Waist circumference was associated with 3.170 time (95% CI: 2.959-3.396) higher risk for higher TyG index. Obesity by fat% was associated with 2.075 time (95% CI: 1.942-2.217) higher risk for higher TyG index. Among the subject with Obesity by BMI, WC (area under curve; AUC=0.610) was more associated with higher TyG index comparing fat% (AUC=0.418). Obesity. Subjects with obesity by both BMI and WC was 3.874 time (95%CI: 3.586-4.185) higher risk for higher TyG index comparing with subjects without obesity. Subjects with obesity by BMI or WC not both was 2.597 time (95%CI: 2.378-2.836) higher risk for higher TyG index comparing with subjects without obesity.

Conclusion: Higher TyG index was associated obesity by BMI, WC, and fat%. However, comparing BMI and WC, fat% was relatively lower associated with higher TyG index.

PE 03-08 3. Epidemiology of Obesity and Metabolic Syndrome

Linking Food Habits, Obesity and Smoking With Colorectal Cancer: Genetic And Epigenetic Insights

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Background: The prevalence of obesity and colorectal cancer (CRC) has increasing marginally in recent decades. The role of environment and life style is seen even in families inheriting muted high penetrance genes. Some of the environmental factors, non-vegetarian diet including red meat intake, smoking and drinking habit may be the high risk factor of colorectal cancer in India. The mutation in PTEN gene have been identified with high frequency in many sporadic malignant tumours. Involvement of PTEN promoter methylation has been reported in various cancer types but no such study has been made to evaluate the role of the PTEN tumour suppressor gene in colorectal cancer in Indian population.

Methods: A total of 223 tumour specimens diagnosed with CRC and their matched control tissue along with their clinical parameters were collected from the patients admitted to G.B. Pant Hospital, New Delhi. The clinicopathological parameters were determined by pathologist of the hospital. All cases were followed-up by their case documents. The χ^2 -test was used to analyze the association of PTEN hyper methylation with clinico-pathologic characteristics in colorectal carcinoma patients. $P < 0.05$ was considered statistically significant.

Results: Out of total 223 cases studied, 114 (51%) of the CRC specimens have shown PTEN hypermethylation, 57% are smoker and interestingly 89% are obese among the all 223 patients studied so far. Further, hypermethylation was more common in late stage tumors (III & IV) than in early stage tumors (I & II) (39% versus 63%) ($P=0.0003$). Interestingly, out of total 114 methylation positive cases, 81(71%) are smoker and all are obese. All the poorly differentiated patients have both smoking and non-vegetarian habits.

Conclusion: There is strong evidence from our study is that the consumption of moderate amount of non-vegetarian diet and smoking can promote colorectal cancer. On that basis we were also able to provide evidence for an association of PTEN promoter hypermethylation with colorectal cancer and metastases. Our data suggest that obesity is regarded as one of the key environmental risk factors for the pathogenesis of CRC. Avoiding of having excess non-vegetarian diet and smoking can act as a primary prevention for CRC in both men and women. However, further studies are warranted to elucidate the role of obesity in colorectal carcinogenesis.

PE 03-09 3. Epidemiology of Obesity and Metabolic Syndrome

EFFECT OF YOGA INTERVENTIONS ON SARCOPENIA – A REVIEW

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Background: Decline in skeletal muscle mass, also known as sarcopenia is more prevalent among older women as compared to older men. It is a component of fragility syndrome which indicates a significant health issue related to the progressive decline of muscle tissue quality and strength.

Methods: A systematic, thorough search using different databases like Cochrane Systematic Reviews, Google Scholar and PubMed was done for relevant literature on the topic.

Results: 15 studies met inclusion criteria with a total sample of 2069. The review revealed significant effects (5% level of significance) favouring the yoga group for the various physical function outcomes compared with active controls. Six studies measured gait speed, showing significant effectiveness (p<0.05). Ten studies measured balance, showing significant

effect, three studies measured physical function, handgrip strength and quality of life showing significant effect on sarcopenia compared to baseline (p<0.05).

Conclusion: Significant effects favouring yoga were found for balance, flexibility, strength, depression, perceived physical health and functional performance. Thus, it can be suggested that yoga has beneficial effects which can be used as an alternative method, which is easy to perform, safe to adopt as well as plays an integral part in one's daily life in alleviating diseases and promoting health with no side effects.

Keywords : sarcopenia, yoga, gait speed, muscle strength, balance, flexibility

PE 03-10 3. Epidemiology of Obesity and Metabolic Syndrome

Prevalence of Metabolic Syndrome among Rural Adult Population in Mansa District of Punjab, India

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Background: Metabolic syndrome (MetS) is a major health concern, particularly in populations undergoing socio-economic and lifestyle transitions. The main objective was to determine the prevalence of metabolic syndrome among rural population of Punjab adults.

Methods: The present study attempts to understand the prevalence of MetS. The present study involved the screening of 2328 participants between the age range of 30-75 years of either sex. Thus 1835 participants finally included in the study; those who did not give blood sample, were excluded from the study. The detailed socio-demographic, anthropometric and physiological data were collected using standard tools and protocols. Blood sample were used to estimate the lipid profile and glucose level using an Automated Biochemical Analyzer (Erba). The statistical analysis was done using SPSS-27 and MS Excel.

Results: The overall prevalence of MetS was found to be 36.8% (38.6% in males and 35.4% in females) by ATP-III criteria. MetS was found to be higher in the age group between 50-59 years (25.8%) followed by 60-69 years (25.6%), 40-49 years (22.1%), 30-39 years (16.7%) and 70+ years (9.8%) respectively.

Conclusion: The present study highlights the increasing prevalence of MetS among the rural population of north India, especially among age group 50-59 and 60-69 years. Thus, early detection and improved treatment provision are urgently required in addition to lifestyle modification and physical exercise to combat the increasing prevalence of MetS and reduce the burden of cardiovascular diseases.

Table: Age-wise and sex-wise distribution of MetS among study population

Variables	MetSN (%)	χ ² , p-value
Sex		
Male	309 (38.6)	1.96, 0.161
Female	366 (35.4)	
Age Groups		
30-39 Years	113 (16.7)	28.96, <0.001*
40-49 Years	149 (22.1)	
50-59 Years	174 (25.8)	
60-69 Years	173 (25.6)	
70+ Years	66 (9.8)	
Total = 675 (36.8)		

PE 03-11 3. Epidemiology of Obesity and Metabolic Syndrome

Triglyceride Glucose Index Trajectory Is Related To Overall And Cardiovascular Mortality: A Competing Risk Analysis

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Background: The link between changes in insulin resistance and the risk of overall and cardiovascular disease (CVD) mortality remains unclear. This study aimed to examine the association between triglyceride-glucose (TyG) index trajectories and the risk of overall and CVD-specific mortality using data from the Korea National Health Insurance Service-National Sample Cohort.

Methods: Data from 233,546 adults aged ≥ 19 years were analyzed. During the median 4-year exposure period (2009–2014), participants were classified into increasing, stable, or decreasing TyG index trajectory groups. During the median 8.13-year event accrual period (2015–2021), information on specific causes and dates of mortality was collected. Cox proportional hazard regression analysis was used to estimate the risk of overall mortality, and competing risk analysis was performed for CVD death, considering non-CVD death as competing risks.

Results: There were 7918 mortality events (651 CVD deaths and 7267 non-CVD deaths) were captured. Compared with the stable group, the fully-adjusted hazard ratios (95% confidence intervals) in the increasing group were 1.09 (1.03–1.15) for overall mortality and 1.23 (1.01–1.50) for CVD mortality. The significant relationship for overall mortality persisted in subgroups aged < 50 years, men, and those with obesity, hypertension, and diabetes. For CVD mortality, it was significant in subgroups aged 50–69 years, those with obesity, and diabetes.

Conclusion: An increasing trend in TyG index was independently associated with overall and CVD mortality. Serial monitoring of the TyG index and prioritizing strategies to reduce insulin resistance should be considered to lower mortality risk.

PE 03-12 3. Epidemiology of Obesity and Metabolic Syndrome

Age and Gender-Specific Body Composition assessed by Bioelectrical Impedance Analysis: 2022 Korea National Health and Nutrition Examination Survey

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Background: In 2021, the prevalence of overweight and obesity among OECD countries was 57.8%, highlighting obesity as a major global health concern. The Body Mass Index does not account for the distribution of adipose tissue. Consequently, there is increasing advocacy for defining obesity from a more comprehensive perspective that includes additional medical and functional factors. This study aims to present the distribution of body composition indices by gender and age among the Korean population.

Methods: The Korea National Health and Nutrition Examination Survey data was extracted using two-stage stratified cluster sampling, a complex sampling design method that accounts for factors such as stratification, clustering, and weighting. This study used data from the 9th KNHANES, conducted in 2022. Participants underwent a body composition assessment by Bioelectrical Impedance Analysis using the InBody 970 (Biospace, Korea), measuring lean body mass, muscle mass, and body water. Subjects were categorized by gender and age. Weighted means

and standard errors were computed while accounting for the complex survey design.

Results: We analyzed a total of 4,425 participants aged 20 years or older who participated in body composition testing. Among men, the highest body fat mass was 20.1 kg, observed in those in their 30s. For women, the highest body fat mass was 20.4 kg, observed in those in their 60s. The average ratio of body fat mass to lean body mass was 0.3 for men and 0.5 for women, indicating a significant gender difference. Both men and women showed an increase in the body fat mass to lean body mass ratio as age advanced.

Conclusion: This study aims to redefine obesity by incorporating body composition indices, considering variations by gender and age, and emphasizes the need for more precise body composition analysis. These findings contribute to the development of enhanced health promotion strategies and personalized obesity treatment approaches.

PE 03-13 3. Epidemiology of Obesity and Metabolic Syndrome

Association of different obesity Phenotype, liver steatosis and fibrosis, wellbeing and muscle strength in Indian Adults with Non-Alcoholic Fatty Liver Disease

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Background: NAFLD represents a significant health concern globally, particularly among Indian adults, where prevalence rates are on the rise.

Methods: This Cross-sectional study included 200 patients (n=50 each group) aged \geq years diagnosed for fatty liver by transient elastography. BMI (WHO criteria) and metabolic syndrome (ATP-III classification) was used to define obesity phenotypes as MHNO, MUNO, MHO and MUO. Fibrosis, sleep quality and QoL were assessed using FIB-4, PSQI and SF-36 questionnaire respectively. Hydraulic handgrip dynamometer was used to measure muscle strength.

Results: The mean BMI in MHO and MUO group was 32 ± 2.1 kg/m² and 30.7 ± 3.6 kg/m² respectively whereas it was 23 ± 1.2 and 24.4 ± 1.8 among MHNO and MUNO group. The mean age of patients among MUO group is the highest (43 ± 4.3) years followed by MHO (39 ± 9.6), MUNO (34 ± 5.4) and MHNO (33 ± 15.2). Cap scores were highest in MHO group (325 ± 36) as compared to the other three groups (MUO:MUNO:MHNO 330 ± 28 : 319 ± 9.1 : 317 ± 21). Liver fibrosis demonstrated a progressive increase across phenotypes, with mean scores of 0.82 ± 0.3 (MHNO), 0.94

± 0.5 (MUNO), 1.41 ± 0.2 (MHO), and 1.5 ± 0.6 (MUO) ($p < 0.001$). Sleep Quality scores were significantly higher in MUO (MS:9) and MHO (MS:6) compared to MUNO (MS:3) and MHNO (MS:2) groups ($p < 0.01$). Among QoL scores MUO (43 ± 11.6) and MUNO (43 ± 14.2) participants reports lower scores compared to MHO (55 ± 23.4) and MHNO (62.5 ± 19.4) individuals ($p < 0.001$). Muscle strength was significantly diminished in MUO (Male:31.4 kg and Female 22.4 kg in dominant hand) and MUNO (Male: 30.7 kg and Female 20.1 kg) groups compared to MHO (Male: 37.6 kg and Female: 28.6 kg) and MHNO (Male: 36.7 kg and female 26.9 kg) counterparts ($p < 0.01$).

Conclusion: CAP scores demonstrate a graded escalation from MHNO to MUO signifying a robust association between obesity phenotypes and liver fibrosis severity. Sleep quality was poor in MUO and MHO and there is diminished QoL among MUNO and MHNO groups indicating a substantial influence of metabolic health on sleep and overall, well-being. A decrement in muscle strength is observed in MUO and MUNO in comparison to MHO and MHNO, accentuating the adverse impact of metabolic dysfunction on muscular performance.

Poster Exhibition

4. Digital Therapeutics and Big Data Study

PE 04-01 4. Digital Therapeutics and Big Data Study

The Impact of Wearable Technology and Geo-Fencing Devices on Physiological Data Management and Quality of Life in Adolescents with Type 2 Diabetes and Obesity

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Methods: A cohort of 1050 obese adolescent patients with type 2 diabetes, evenly distributed across genders, wore the wearable monitoring devices and geo-fencing devices for 30 days, alongside completing a questionnaire to provide additional insights. Daily monitoring of blood pressure, blood glucose levels, step count, calorie expenditure, motion time, sleep patterns, calorie consumption, and heart rate will be recorded for analysis. The wearable bands will issue alert cues with sensing alerts if patients move out of the geo-fenced area, persisting until they return within the designated boundary.

Results: Preliminary findings reveal a notable normalization of heart rate ($p < 0.05$), increased calorie expenditure, significant reductions in blood

glucose and blood pressure levels ($p < 0.01$), and a substantial increase in sleep duration among physically active obese patients with type 2 diabetes compared to their less active counterparts, as assessed by professional physiotherapists. Furthermore, lifestyle modifications among less physically active patients resulted in improved memory and reduced instances of wandering, necessitating lower medication doses.

Conclusions: In conclusion, this study underscores the potential of wearable devices to provide real-time assistive feedback to obese adolescents with type 2 diabetes, thereby fostering health awareness, promoting exercise, and inspiring further research endeavors

PE 04-02 4. Digital Therapeutics and Big Data Study

Effectiveness of Mobile Health in Improving Gestational Weight Gain among Pregnancy Women in Malaysia

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Background: Conventional nutrition education is often inadequate, especially in socially unequal societies, leading to disparities in maternal health. This 6-month cluster randomized controlled trial examined the use of mobile health (mHealth) applications as a more accessible and personalized nutrition education approach on gestational weight gain (GWG) among pregnant mothers.

Methods: This study evaluated the effectiveness of the "Ibu Sihat" smartphone application in delivering nutritional interventions to improve pregnancy outcome (GWG) among pregnant women. The study randomized 290 pregnant women into three groups: control (conventional nutrition counselling, $n=98$), intervention group 1 (IG1, mHealth alone, $n=97$), and intervention group 2 (IG2, mHealth with personalized Medical Nutrition Therapy, MNT, $n=95$). Respondents' body weights were measured at baseline, 3 months (T1) and 6 months (T2) and weekly GWG of the respondents were calculated.

Results: Mean pre-pregnancy weight of the respondents was 60.0 ± 13.6 kg. Over 30% of the respondents were overweight or obese. At baseline, more than 87% of the respondents did not meet the recommended weekly GWG. There was no significant difference on weekly GWG between groups. At T1, IG2 had the highest percentage of the respondent (48.4%) achieving the recommended GWG. Similar scenario was observed at T2, with approximately two-thirds of the respondents achieved recommendation of GWG. Notably, none of the respondents in IG2 experienced excessive GWG at T2. There was no significant difference between control and IG1 groups on the achievement of recommended GWG.

Conclusion: The study highlights that inappropriate GWG was prevalent among pregnant mothers in Malaysia. Conventional nutrition education is insufficient in addressing disparities in maternal health, particularly regarding GWG. Together with personalised MNT, mHealth applications demonstrated its potential as an effective tool in reducing excessive GWG among pregnant women.

PE 04-03 4. Digital Therapeutics and Big Data Study

The Prevalence of Eating Jet Lag and Its Associated Factors among Malaysian Adults: A Nationwide, Online Web-Based Cross-Sectional Survey

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Background: Eating jet lag (EJL) has been reported associated with irregular mealtime and BMI respectively among Japanese male college students and Spanish university students, in contrast, no association reported of EJL with physical activity, eating duration window, sleep duration and chronotype. Health status such as glucose and adiposity level positively associated with higher SJL among Type 2 Diabetes Mellitus patients in India. Although previous studies reported association of EJL with various related factors, there are inconsistency of findings which lead to the importance of exploring EJL and its associated factors among Malaysian adults, in addition of determining the eating jet lag prevalence among Malaysian adults population.

Methods: A total of 2650 Malaysian adults (18 – 59 years old) responded to a web-based cross-sectional survey with the final sample comprised of 2451 participants (mean age 33 ± 1.59 years). EJL (the difference in midpoint of eating between workdays and free days) categorized as <1 hour and ≥1 hour. The chi-square test was utilized to test for significant associations between EJL groups with sociodemographic factors, selected health status, eating behaviors and social jet lag.

Results: The mean value of EJL was 1.05 (1.11) hours with prevalence of EJL ≥1hr among 1949 participants was 45.8%. Participants with EJL ≥1hr significantly younger, 31.6 (8.4) years, than EJL <1hr, 33.9 (8.8) years, also had significant difference among gender and ethnic distribution. However, there were no significant difference in the presence of selected health status such as BMI, tobacco and alcohol consumption and non-communicable disease (NCD) between EJL groups. Participants with higher EJL significantly more likely to has shorter eating duration window during workdays and free days with the mean 12:01 (2:41) hours and 9:56 (3:36) hours respectively together with significant mealtime variability (p<.001) for Breakfast, Morning Tea, Lunch, Dinner and Supper between workdays and free days. SJL, insomnia and daytime sleepiness also associated with EJL groups.

Conclusion: EJL associated with sociodemographic factors, shorter mealtime variability, higher SJL and sleep habits such as presence of insomnia and fatigue. Further analysis should be administrated to explore the predictors of EJL among Malaysian adults.

PE 04-04 3. Epidemiology of Obesity and Metabolic Syndrome

Usage of a Mobile Food Diary Program among Liposuction and Non-Surgical Patients

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Background: Mobile food diary programs have become increasingly popular for tracking dietary intake. It's not well understood how much dieters use mobile food diaries. This study aims to analyze the usage patterns of a mobile food diary program among new customers of obesity clinic.

Methods: We analyzed data from 18,212 new customers who registered between January and November 2022. The usage of the mobile food diary program was tracked for each customer, and the percentage of customers who used the program at least once was calculated. Additionally, we examined the usage patterns among liposuction customers and non-surgery customers.

Results: Among the 18,212 new customers, 1,734 (9.52%) used the mobile food diary program at least once. The usage percentage was similar between surgery customers (9.72%) and non-surgery customers (9.4%). The number of diary entries increased over time since registration,

peaking around 50 days post-registration for liposuction customers and 30 days for non-surgery customers, before declining. The difference in the duration of the mobile food diary is likely due to the difference in the duration of the follow up. Liposuction customers typically have a longer follow-up period compared to non-surgery customers, which may contribute to their longer engagement with the mobile food diary program. Additionally, the decline in usage after the peak suggests that customers may lose motivation or interest in using the program over time, regardless of the type of treatment they received.

Conclusion: The majority of new customers did not use the mobile food diary program, highlighting the need for strategies to encourage initial usage. Moreover, usage tended to decline after the peak, suggesting the importance of maintaining customer engagement. Implementing incentives for first-time use and developing features to promote long-term participation could potentially improve the utilization of the mobile food diary program.

PE 04-05 4. Digital Therapeutics and Big Data Study

Comparing Cardiovascular Outcomes in Diabetes: Initial Statin Monotherapy vs. Statin Plus Ezetimibe Combination with Consideration of Baseline Metabolic Status

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Background: Some studies have shown that combining statins with ezetimibe reduces low-density lipoprotein (LDL) cholesterol more effectively than higher-intensity statin monotherapy. Statins may induce insulin resistance, affecting their long-term efficacy in preventing cardiovascular events. Due to limited data on these therapies, we evaluated the long-term effects of statin-ezetimibe combination therapy versus statin monotherapy on major cardiovascular outcomes.

Methods: This population-based cohort study used National Health Insurance Service data on South Korean adults without prior anti-dyslipidemic medication use before 2010. Patients on statin monotherapy were 1:1 propensity score-matched with those on a lower-potency statin and ezetimibe combination therapy. The primary endpoints were 3-point major adverse cardiovascular events (3P-MACE): myocardial infarction, stroke, and cardiovascular disease (CVD).

Results: The study included 21,458 individuals in the primary prevention cohort and 10,094 in the secondary prevention cohort. Statin and ezetimibe combination therapy significantly reduced the incidence of the primary endpoint (4.85 vs. 3.25 per 1,000 person-years; HR 0.67, 95% CI 0.56–0.81 in the primary cohort, and 19.5 vs. 15.7 per 1,000 person-years; HR 0.80, 95% CI 0.70–0.91 in the secondary cohort) compared to statin monotherapy. Notably, the effects on reducing 3P-MACE were more efficient in patients with high body mass index and uncontrolled systolic blood pressure in patients without previous CVD.

Conclusion: This cohort study demonstrates that initiating statin-ezetimibe therapy reduces cardiovascular events in patients compared to statin monotherapy.

PE 04-06 3. Epidemiology of Obesity and Metabolic Syndrome

Designing a Social Media Intervention Framework to Reduce Consumption of High Energy-Dense Foods and Sugar-Sweetened Beverages Among Adolescents

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Background: In Malaysia, one in three adolescents is overweight or obese, with significant consumption of carbonated beverages and fast food. Social media significantly exposes adolescents to high energy-dense (HED) foods and sugar-sweetened beverages (SSBs). With adolescents' widespread smartphone and social media use, digital platforms are crucial for nutrition interventions. However, studies show low engagement and marginal results. Therefore, this study aimed to develop a theoretically grounded framework for a social media intervention to limit HED foods and SSBs consumption among adolescents.

Methods: This qualitative study consists of three phases: 1) Needs analysis through a systematic literature review and in-depth interviews with 15 adolescents; 2) Design and development using the Fuzzy Delphi Method with 12 social media content creators and policymakers; and 3) Validity assessment using the Nominal Group Technique with eight nutritionists and dietitians.

Results: Phase I revealed a lack of digital or technologically related models in existing nutrition interventions, with social media being the most popular platform. Nineteen factors influencing adolescents' use of social media for nutrition interventions were identified, including user characteristics, environmental factors, and social media features. In Phase II, all proposed items for the framework were accepted by the expert panel based on threshold values, expert agreement percentages, and fuzzy scores, with no additional items suggested. Phase III showed the framework's validation by experts, with agreement percentages between 91% and 98% for each item and no new items added.

Conclusion: In conclusion, the validated social media intervention framework aims to reduce adolescents' consumption of HED foods and SSBs, providing healthcare professionals, policymakers, organizations, and stakeholders with the knowledge to develop and enhance effective social media-based nutrition interventions.

Poster Exhibition

5. Diabetes and Obesity

PE 05-01 5. Diabetes and Obesity

Elucidating the Anti-diabetic Properties of Phenolic Compounds in Stingless Bee Honey

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Background: The increase in Type 2 Diabetes Mellitus prevalence has prompted numerous research studies to find an alternative to managing the disease through the oxidant-antioxidant balance, mainly through bioactive compounds in natural products. This study aimed to investigate the antioxidant activity and antidiabetic properties of phenolic-rich extract (PRE) from Stingless bee honey (SBH) as a therapeutic agent to restore the redox balance using both *in-vitro* and *in-vivo* models.

Methods: *In vitro* study, the antidiabetic potential of PRE was determined based on the inhibition against α -amylase and α -glucosidase enzymes. The glucose uptake and cellular antioxidant analyses were performed on 3T3-L1 adipocytes and L6 muscle cells, respectively. *In-vivo* study, the antidiabetic potential was assessed using a high-fat diet-fed and nicotinamide/streptozotocin-induced diabetic rat model. The glucose tolerance and lipid profile of diabetic rats were analyzed. The gene and protein expression involved in insulin signaling and glucose sensing pathways in insulin-sensitive tissues was also investigated. Data were assessed using Tukey's test or two-way ANOVA and Dunnett's multiple comparisons tests.

Results: The results from α -amylase and α -glucosidase inhibitory assays suggested that PRE exhibited significantly ($p < 0.05$) higher anti-diabetic activities than SBH. PRE also has good glucose uptake stimulating and reactive oxygen species (ROS) scavenging effects in 3T3-L1 adipocytes and L6 muscle cells. Findings from *in vivo* study showed that PRE improves lipid profile by lowering total cholesterol and triglycerides levels. PRE regulatory effects on insulin signaling and glucose sensing pathway-related genes were tissue-specific, with liver, skeletal muscle and adipose tissues exhibiting significant transcription for *Irs1*, *PI3kca*, *Akt* and *Glut4* genes. Hepatic translational analyses of PRE reveal an increase in *AKT*, *IRS1*, and *GLUT4* proteins, indicating an increase in glucose uptake via *IRS/AKT* activation.

Conclusion: The data suggested that PRE from SBH exhibited a high potential for ameliorating glucose uptake and intracellular oxidative stress, which could moderate diabetes mellitus.

PE 05-02 5. Diabetes and Obesity

Effectiveness of Nutritional Education Intervention on Body Weight Control among Type 2 Diabetes Patients: A Systematic Review-Meta Analysis

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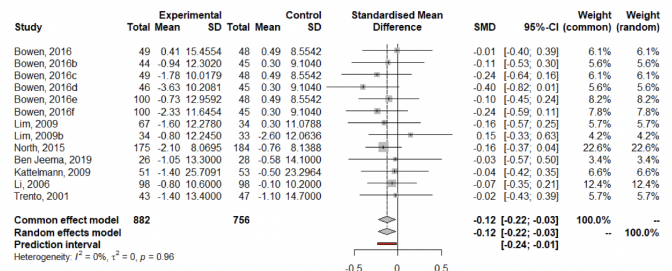
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Background: Type 2 diabetes mellitus (T2DM) is a non-communicable disease that increases every year and has complex consequences. Diabetes management plays an important role in addressing the disease. Several studies have determined on the effectiveness of nutrition education on diabetes management. This systematic review and meta-analyses to examine the effectiveness of nutritional education intervention on body weight control in T2DM patient.

Methods: Studies involving individuals with type 2 diabetes aged 18+, evaluating their nutritional education and body weight effects, should be conducted in English are included. We used two databases for conducting this systematic review: PubMed and Scopus and performed Boolean operation. The quality of selected studies was evaluated using Cochrane Risk Bias Tools for Randomized trials, MINORS for experimental studies, and Hoy's table for observational studies.

Results: Thirteen studies were included in the meta-analysis. Patients who received nutritional education had weight reduction of 0.12 kg ($n = 882$, $MD = -0.12$; $I^2 = 0\%$, $95\% CI -0.22$ to -0.03) compared to patients who received usual care. In subgroup analysis, we performed it by length of intervention, delivery method, curriculum. Effect size in the experimental group with duration ≤ 3 months decreased by 0.08 ($MD = -0.08$; $95\% CI -0.22$ to 0.07) and with duration >3 months significantly decreased by 0.16 ($MD = -0.16$; $95\% CI -0.30$ to -0.03) compared to the control group. Effect size in the experimental group with individual session significantly

decreased by 0.15 ($MD = -0.15$; $95\% CI -0.28$ to -0.03) and group session decreased by 0.07 ($MD = -0.07$; $95\% CI -0.24$ to 0.10) compared to the control group. Effect size in the experimental group with diet only curriculum significantly decreased by 0.14 ($MD = -0.14$; $95\% CI -0.28$ to -0.01) and with lifestyle curriculum decreased by 0.10 ($MD = -0.10$; $95\% CI -0.25$ to 0.04) compared to the control group.



Conclusion: Nutritional education intervention had positive impact on body weight control of T2DM patient, although showed some small reduction. Furthermore, the nutritional education is regarded to be more beneficial when offered diet-only education with individual approach and long-term duration (more than 3 months). This finding provide support for the role of nutritional education in diabetes management, also stated the importance of establishing appropriate programs that have optimal outcomes for diabetes management needs to be carried out effectively.

PE 05-03 5. Diabetes and Obesity

A case of diabetes remission patient with ketosis prone type 2 diabetes through weight loss, who needed multiple insulin therapy

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Background: The increase in diabetics is a problem with the increase in the obese population. There are many types of diabetes, among them, ketosis prone type 2 diabetes usually needs insulin therapy.

Case: A 28-year-old man without past medical history visited to the emergency room with nausea, vomiting and weight loss. His height was 170cm and body weight was 69kg (body mass index: 23 kg/m²). Before weight loss, his body weight was 88kg (body mass index: 30 kg/m²). He showed high glucose (321mg/dL) and high anion gap metabolic acidosis (pH 7.0, HCO₃ 2.9mmol/L, anion gap 32). His hemoglobin A1c level was 9.7%, fasting c-peptide level 0.39ng/dL, and anti-GAD Ab was negative.

He was diagnosed with ketosis prone type 2 diabetes. He was treated with insulin therapy. After his disease stabilization, his insulin dose was reduced. After seven months of active diet management and exercise, he reached a weight loss of 62kg (11%) and stopped insulin. Previously, there were cases where type 2 diabetes remission was reached with more than 15% active weight loss. We report a case of reaching diabetes remission by weight loss and diet control in a ketosis prone type 2 diabetes patient requiring insulin therapy.

Conclusion: Clinicians should recall the importance of active weight management through this case.

PE 05-04 5. Diabetes and Obesity

Cobalt Nanoparticles as Therapeutic Agents: Unraveling Their Antidiabetic Potential and Impact on Oxidative Stress in Fat-Fed and Streptozotocin-Treated Rats

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Objective: The present study investigated the impact of cobalt nanoparticles (CONPs) on serum parameters of renal function, on oxidative stress markers (malondialdehyde [MDA] and 8-isoprostane), serum creatinine and on expression level of insulin receptor, glucose transporter 4 (GLUT4), glucokinase genes and heat-shock proteins (HSPs) in rats.

Methods: Male Wistar rats (n=64, 10 weeks old) were divided into four groups. Group 1 received a standard diet (12% of calories as fat). Group 2 received a standard diet, plus CONPs; received a single daily oral dose of CONPs of 100 mg/kg in suspension. Group 3 received a high-fat diet (40% of calories as fat) for 2 weeks, and was then injected with streptozotocin (STZ) on day 14 (STZ, 40 mg/kg intraperitoneally). Group 4 was treated in the same way as group 3 (HFD/STZ), but was supplemented with CONPs 100mg /kg/body weight/day. Renal damage was assessed by measuring ACR (albumin to creatinine Ratio) and GFR (glomerular filtration rate), serum creatinine, proteinuria, enzymuria, renin-angiotensin system, lipid peroxidation and activities of polyol pathway enzymes.

Results: Experimental diabetic rats group showed hyperglycemia with almost four fold high blood glucose levels. CONPs supplementation lowered kidney concentrations of MDA, 8-isoprostane levels, serum urea-N, and creatinine, and reduced the severity of renal damage in the STZ-treated group (i.e., the diabetes-induced group). The expression of insulin receptor, GLUT-4, glucokinase genes and HSPs was lower in the STZ group that received CONPs than in the group that did not. Markers of podocyte damage in kidney and GFR were normalized by CONPs treatment. No significant effect of CONPs supplementation was detected in regard to the overall measured parameters in the control group.

Conclusion: It may be concluded that efficacy of CONPs in reducing renal risk factors and impairment without any harmful side effect in experimental diabetes rats.

PE 05-05 5. Diabetes and Obesity

Protective Effect of hesperidin against High Fat Diet induced Obese Diabetic Wistar Rats via reduction of cytokines and Nrf2 Pathway

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Background: Liver steatosis (fatty liver) is frequently found during the conditions such as diabetes and obesity. The current experimental study was scrutinized the protective effect of hesperidin against high fat diet (HFD) induced obese diabetic Wistar rats via alteration of nuclear factor erythroid 2-related factor 2 (Nrf2) pathways.

Methods: Wistar rats were grouped into following groups as follows: normal, HFD, HFD treated with hesperidin (10, 20 and 40 mg/kg) and glibenclamide (2.5 mg/kg), respectively. Rats were received the oral fructose solution (60%), palm oil (25%) for 4 weeks. After experimental induction, serum and hepatic tissue samples were collected to estimation the glycemic status, lipid profiles, antioxidant status, oxidative and stress markers and estimation the hepatic histopathology. Nrf2 transcription and nuclear level were also estimated.

Results: HFD showed rats showed the marked reduction in the hepatic extraction and hepatic steatosis after the hesperidin treatment. The present result showed that hesperidin prevents the occurrence of fatty liver, increasing the glycemic status, reduction oxidative stress and enhancing the antioxidant status. Hesperidin significantly ($P < 0.001$) reduced the hepatic parameter includes alanine transaminase, alkaline phosphatase, aspartate transaminase; pro-inflammatory cytokines such as interleukin-6, tumor necrosis factor- α , and monocyte chemoattractant protein-1, respectively. Moreover, hesperidin significantly ($P < 0.001$) down-regulated the nuclear Nrf2 activity.

Conclusion: We can conclude that hesperidin reduced the blood glucose level, increased insulin sensitivity and also reduce the inflammation via reduction of cytokines and Nrf2 pathway.

PE 05-06 5. Diabetes and Obesity

Biological Importance And Therapeutic Effectiveness Of Astilbin On Diabetes And Related Secondary Complication 'Diabetic Nephropathy' Through Different Molecular Mechanism

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Background: Herbal medicine comprises the biological application and uses of medicinal plants and their derived products in the traditional system of medicine as well as in modern medicine. Astilbin is a natural flavonoid compound found to be present in the *Smilax aristolochiifolia* and *Smilax glabra*. Astilbin have been well known for their anti-inflammatory activity in medicine. Diabetic nephropathy is one of the major complication of all the diabetes patients and responsible for end-stage renal disorders of human being. Astilbin have been known for their inhibitory potential against carbohydrates-hydrolyzing enzymes which is one of the main factors of hyperglycemic condition in the Human being.

Methods: In order to know the therapeutic effectiveness of astilbin for the treatment of diabetes and related secondary complication, here in the present investigation scientific data of different scientific research were analyzed. However biological effect of astilbin on α -amylase and yeast α -glucosidase has also been performed through scientific data analysis of scientific work in order to know their therapeutic potential against diabetes and related secondary complications. All the other pharmacological data have also been correlated with the medicinal potential in the present work to get better results.

Results: Biological potential of astilbin against pancreatic α -amylase and yeast α -glucosidase have been investigated in the present work through scientific data analysis of different scientific research work in order to know the biological importance of astilbin on diabetes and related secondary complications. Scientific data analysis revealed significant effect of astilbin against α -amylase and yeast α -glucosidase enzymes. Another scientific data analysis revealed the therapeutic effectiveness of astilbin for their inhibitory potential on rat lens and recombinant human aldose reductase, which signified its biological potential to control and prevent osmotic pressure in the hyperglycemia condition. However some research works scientific data also suggest that astilbin inhibit connective tissue growth factor (CTGF) which could be potential tools for the treatment of diabetic nephropathy.

Conclusion: Scientific data analysis of different scientific research work revealed the biological importance of astilbin in medicine for the treatment of diabetes and diabetic nephropathy.

PE 05-07 5. Diabetes and Obesity

Antiglycation Activity of *Benincasa hispida* and Its Potential in Reducing Serum Advanced Glycation End Products in Patients with Diabetes

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Background: *Benincasa hispida* (*B. hispida*), also known as winter melon is often enjoyed as vegetable in Asian cuisines. Previous literature suggested that *B. hispida* may have an antiglycation effect. Advanced glycation end products (AGEs) have been associated with diabetes-related microvascular and macrovascular complications. The development of potential AGEs inhibitors can be considered in the management of diabetes. Our study aims to investigate the antiglycation activity of *B. hispida* and to evaluate its effect on serum AGEs of patients with diabetes.

Methods: The round fruit pulp of Malaysian-grown *B. hispida* was extracted in distilled water at 60°C for 30 minutes. The antiglycation activity of *B. hispida* aqueous extract was studied in vitro by albumin-glucose assay, albumin-methylglyoxal assay, and post-Amadori screening assay. Powdered drink formulated with *B. hispida* was prepared and a 12-week intervention was conducted involving 50 participants with BMI >23 kg/m² and diagnosed with type 2 diabetes from outpatient clinic Hospital

Universiti Sains Malaysia. The participants were randomly assigned into intervention or control group. Serum AGEs were determined using human AGEs enzyme-linked immunosorbent assay at baseline, and 12 weeks after the beginning of intervention.

Results: *In vitro* studies revealed that *B. hispida* has a significant inhibitory effect on the formation of AGEs. Besides, *B. hispida* aqueous extract at the concentration of 5 and 10 mg/mL manifested 55.9 and 69.6% inhibition of AGE formation, respectively. The 12-week intervention study showed that participants who received *B. hispida* powdered drink had a greater reduction in mean difference of serum AGEs (Δ -0.11 ng/mL, 95% CI: -0.32, 0.10) than placebo (Δ -0.05 ng/mL, 95% CI: -0.32, 0.22).

Conclusion: *B. hispida* can be exploited as a functional food ingredient beneficial in management of diabetes due to its antiglycation properties and potential to reduce serum AGEs in patients with diabetes.

PE 05-08 5. Diabetes and Obesity

Blood Pressure Variability and End-Stage Kidney Disease Among Individuals with Type 2 Diabetes: a nationwide cohort study

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Background: Longitudinal evidence of the relationship between blood pressure (BP) variability and end-stage kidney disease (ESKD) among individuals with type 2 diabetes is limited. Therefore, we evaluated the association between BP variability and ESKD in Korean adults with type 2 diabetes.

Methods: The study utilized data from the Korean National Health Insurance Service database, comprising health checkups conducted between 2004 and 2015. We enrolled 36,421 adults aged \geq 19 years with type 2 diabetes who underwent at least two health checkups and were followed-up until the end of 2017. BP variability measured using the coefficient of variation, standard deviation, and variability independent of the mean. Hazard ratios (HRs) and 95% confidence intervals (CIs) for ESKD determined using multivariate Cox proportional hazards regression analysis.

Results: During a median follow-up of 8.05 years, 290 patients with ESKD were identified. The highest quartile of systolic or diastolic BP variability presented a higher risk of ESKD than did the lowest quartile of systolic or diastolic BP variability. The group with the highest systolic and diastolic BP variability had a 77% higher risk of ESKD than did those in the lowest three quartiles of both systolic and diastolic BP variability. These associations were present in younger individuals without comorbidities.

Conclusion: Among individuals with type 2 diabetes, increased BP variability was associated with an increased risk of ESKD. These associations were similarly observed in younger individuals without comorbidities. Maintaining a consistent BP seems to be important to prevent progress to ESKD in individuals with type 2 diabetes.

PE 05-09 5. Diabetes and Obesity

Impact of Kayakalpa Yoga on Type 2 Diabetes Mellitus Individuals via Mitochondriogenesis

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Background: Approximately one in 11 adults globally has Diabetes Mellitus (DM), with cases projected to rise from 529 million in 2021 to 1.31 billion by 2050, causing 1.5 million deaths annually. Type 2 Diabetes Mellitus (T2DM) results from insulin resistance or insufficient insulin production. Mitochondrial dysfunction contributes to DM by impairing cell function and insulin resistance. Affordable treatment, including insulin, is essential, aiming to halt diabetes and obesity by 2025. Kayakalpa yoga (KY), a complementary therapy, enhances mitochondrial biogenesis and β -cell activity. This study evaluates short-term KY's impact on mitochondrial energetics in T2DM patients.

Methods: Informed consent was obtained from T2DM volunteers practicing KY for a month. Blood samples were collected after assessing BMI and blood pressure. Biochemical analyses for blood glucose, serum creatinine, and lipid profiles (total cholesterol, triglycerides, HDL, LDL, VLDL) were performed using commercial kits. Antioxidant levels were analyzed by measuring GSH and enzymatic antioxidants (SOD, CAT, GPx, GST). Oxidative stress was assessed using the DCFDA method. Mitochondrial membrane potential (MMP) and ATP levels were measured

using TMRM staining and ATP lite kits. Gene expression for mitochondrial biogenesis (PGC1 α , Nrf2, TFAM), dynamics (hFIS1, DRP1, MFN1/2, OPA1), and insulin-specific markers (GLUT4) was conducted using RT-PCR. Mitochondrial ETC protein levels (COX6A1) were examined using western blotting.

Results: Participants with normal blood pressure, BMI, heart rate, lipid profiles and with DM were selected. KY practitioners showed decreased glucose and cholesterol levels compared to non-practitioners. T2DM patients practicing KY for a month had significant increase in GSH and enzymatic antioxidants, while reducing ROS levels, indicating decreased oxidative stress. Enhanced mitochondrial function was evident from increased MMP, mitochondrial mass and increased mitochondrial energetics gene expression, and elevated mitochondrial ETC proteins (COX6A1) in KY practitioners.

Conclusion: Overall, results suggest that regular KY practice positively impacts controlling T2DM progression by improving mitochondrial function via the PGC1 α /Nrf2 pathway.

PE 05-10 5. Diabetes and Obesity

Therapeutic Potential of Palm-Derived Mixed Carotenoids in Managing Type 2 Diabetes

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Background: Obesity-induced type 2 diabetes mellitus (T2DM) exacerbates insulin resistance due to oxidative stress, resulting in metabolic dysregulation. While synthetic drugs like metformin are prescribed to manage T2DM, they often come with uncomfortable side effects, highlighting the need for alternative natural treatments. Palm-derived mixed carotenoids (PDMC) potentiate as a natural source of antioxidants with antidiabetic properties in managing the disease.

Methods: Two concentrations of PDMC extract (8% and 20%) were employed in the study. The antioxidant potential was determined utilizing the DPPH and ABTS assays. The inhibitory activity of PDMC on diabetic enzymes was evaluated through both percentage inhibition and IC₅₀ values. The cytotoxicity of PDMC samples on C₂Cl₂ and 3T3-L1 cells were assessed using the MTT assay. In addition, the uptake ability of 2-NBDG glucose analogues was examined in differentiated C₂Cl₂ and 3T3-L1 cells treated with PDMC following palmitic acid induction.

Results: The scavenging ability of 8% and 20% PDMC on DPPH assay demonstrated a dose-dependent increase with 96.4% and 96.2% activity at the highest concentration (1000 μ g/ml), respectively. In the ABTS assay, the highest activity was 75.62% (400 μ g/ml) for 8% PDMC and 83.53% (200 μ g/ml) for 20% PDMC. Furthermore, both 8% and 20% PDMC exhibited significant inhibition of α -amylase and glucosidase activity ($p < 0.05$) compared to acarbose. The cytotoxicity IC₅₀ values for 8% and 20% PDMC on C₂Cl₂ cells were 192 μ g/ml and 902 μ g/ml, respectively, while on 3T3-L1 cells were 856 μ g/ml and 928 μ g/ml, respectively. In addition, both concentrations of PDMC (8% and 20%) demonstrated enhanced 2-NBDG uptake with increasing dosage in differentiated C₂Cl₂ and 3T3-L1 cells induced with palmitic acid, highlighting their potential to improve glucose uptake and metabolism.

Conclusion: These findings support further exploration of PDMC as a promising natural intervention for combating T2DM and its associated complications, offering a potentially safer and effective alternative treatment.

PE 05-11 5. Diabetes and Obesity

Effects of Hydrogen Water Intake on Lipid Regulation in Mice.

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Background: Recent studies have shown that hydrogen can improve metabolic disorders. Hydrogen is effective in the treatment of metabolic diseases such as obesity and diabetes. Hydrogen has attracted attention for its potential therapeutic effects due to its antioxidant, anti-inflammatory and anti-apoptotic properties. Its ability to selectively reduce harmful reactive oxygen species and modulate signaling pathways makes it a promising candidate for the treatment of metabolic diseases. This study aims to investigate the mechanisms by which hydrogen water intake affects energy metabolism focusing on its effects on lipid and glucose metabolism.

Methods: Eight-week-old male C57BL/6J mice were divided into two groups: one group received distilled water and the other group received hydrogen water for four weeks. Body composition was measured before and after treatment using computed tomography. Energy regulation factors, including adenosine monophosphate-activated protein kinase (AMPK), carnitine palmitoyltransferase I (CPT1b) in skeletal muscle, and adipose triglyceride lipase (ATGL) in the liver, were determined by Western

blot. Blood biochemistry tests were performed to measure alanine aminotransferase (ALT) and non-esterified fatty acid (NEFA). In addition, glucose metabolism was evaluated by a glucose tolerance test.

Results: The group that received hydrogen water for four weeks showed a lower percentage of body fat. In addition, activation levels of AMPK, a master factor of energy metabolism, CPT1b, an enzyme involved in fatty acid uptake, and ATGL, an enzyme that breaks down triglycerides were found to be activated, although NEFA level was reduced in the group received hydrogen water. However, no changes in ALT level and glucose metabolic capacity were observed.

Conclusion: Four weeks of hydrogen water intake resulted in a decrease in body fat percentage, activation of AMPK/CPT1b and AMPK/ATGL signaling pathway. These results suggest that hydrogen water intake increases lipolysis and fatty acid uptake. However, hydrogen water did not affect glucose metabolism.

PE 05-12 5. Diabetes and Obesity

Obesity and Diabetes: Sex and Age Difference Among the Jats of Haryana, India

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Background: The burden of obesity is growing at an alarming rate with WHO (2024) reporting more than a billion people living with obesity which could significantly increase the risk of type 2 diabetic mellitus. The study aims to address the prevalence of obesity and diabetes among the Jat population of Haryana, India according to sex and age.

Methods: A cross-sectional study was conducted among the Jat community of Palwal district, Haryana, involving 1108 adults aged 30 years and above. Data on sex, age, weight, height and fasting blood sugar levels were collected through household surveys and standard measurements. General obesity was assessed using WHO Asia-Pacific BMI criteria and Type 2 Diabetes using the Indian Council of Medical Research (ICMR) guidelines. Statistical analysis included frequency distribution, chi-square tests, linear regression and logistic regression.

Results: Among the Jats, 16% were overweight, and 37.9% were obese. However, only 2.2% had Type 2 diabetes and no significant association was found with overweight/obesity and Type 2 diabetes. Odds ratio analysis show that females had an almost 2-fold risk of being overweight/obese. As for age, overweight increases with age, while obesity decreases with age. Linear regression revealed a significant negative association between BMI and age, where there was a decrease in BMI with increasing age (Table 1).

Conclusion: Our findings have two implications. Firstly, there is an urgent need for obesity intervention among the Jats of Haryana, especially among women. The notable contrast between the high prevalence of obesity and the markedly low prevalence of type 2 diabetes hints at potential genetic and epigenetic factors that might confer protection against diabetes which calls for further studies. Second, prevention and management of overweight and obesity based on age is especially important as overweight increases with age, while obesity decreases with age.

Table 1 – Prevalence and Risk of Overweight and Obesity According to Sex and Age.

General Obesity	Overweight n = 175 (16 %)	Obese n = 425 (37.9 %)	Overweight and/or Obese n = 590 (53.9%)	Odds Ratio (CI), p-value
Sex				
Male (Reference)	50 (15.9)	86 (27.3)	136 (43.2)	1.837 (1.410 – 2.393), P < 0.001
Female	125 (16)	329 (42.2)	455 (58.3)	
χ² and p-value	20.556, p < 0.001			
Age				
31-40 Years	2 (8.7)	10 (43.5)	12 (52.2)	(-) 0.054 ((-) 0.082 – (-) 0.027), p < 0.05
41-50 Years	60 (15.7)	169 (44.1)	229 (59.9)	
51-60 Years	61 (16.1)	145 (38.3)	206 (54.4)	
61-70 Years	32 (14.5)	72 (32.7)	104 (47.3)	
71 Years and above	20 (22.2)	19 (21.1)	39 (43.3)	
χ² and p-value	22.821, < 0.01			

PE 05-13 5. Diabetes and Obesity

Aerobic Exercise Training and its effects on Energy Expenditure in Obese Individuals: Insights from Physiological Cost Index

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Background: Obese individual tends to expend more energy in particular task as compared to normal Weight individuals. Aerobic exercise has been the subject of investigation to improve energy expenditure. It is difficult to calculate oxygen consumption clinically due to expensive equipment required to measure it. Physiological cost index is one the indirect ways of calculate energy expenditure.

Methods: This was an Interventional study, convenient sampling, sample size of 30 individuals. Inclusion Criteria: Obese adults (WHO Classification), age 18 to 30 years, both genders willing to participate. Exclusion Criteria: Presence of any musculoskeletal, neuromuscular, cardiovascular problems, Obese individuals who are engaged in any other Form of exercise schedule. Presence of any other co-morbidities affecting the PCI like Smoking, Alcohol consumption etc. Outcome measure- Physiological Cost Index (PCI) assessed by 6 MWT and values were put in McGregor's

equation: $HR_{walking} - HR_{baseline}$ by walking speed, expressed in beats per meter. A sub maximal 6-minute walk test (6MWT) was performed and the distance walked, walking speed and vitals were recorded pre training and post training. The physiological cost index for everyone was calculated. The individuals then Underwent aerobic exercise training imparted for 3 days for 4 consecutive weeks. The data was statistically analyzed using student paired t test.

Results: Aerobic exercise showed a significant decrease in the physiological cost index after 4 weeks. ($p = <0.001$).

Conclusion: Aerobic exercise training significantly enhances energy expenditure in obese individuals measured through Physiological Cost Index.

PE 05-14 5. Diabetes and Obesity

Type 2 diabetes remission and the contributing factors after bariatric surgery

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Background: The aim of this study was to ascertain the remission rate of type 2 diabetes mellitus (T2DM) and to investigate the potential contributing factors after bariatric surgery.

Methods: A one-year retrospective analysis was conducted on morbidly obese patients with T2DM who had undergone either Roux-en-Y gastric bypass (RYGB) or laparoscopic sleeve gastrectomy (LSG) from January 2019 to July 2021. Complete remission was defined as an HbA1c $<5.7\%$ and a fasting glucose <100 mg/dL in the absence of anti-diabetes medicine.

Results: A total of 70 patients, 47.1% (N = 33) experienced complete remission of T2DM over one year after bariatric surgery. Subjects with complete remission were younger, more obese, and had a shorter duration of T2DM compared to those who never experienced remission. They also exhibited better HbA1c, higher insulin secretion indices, and worse insulin resistance indices before surgery. However, there was not

notable difference in remission rate between RYGB and LSG.

In a multivariate model, total muscle mass (OR = 1.24, 95% CI 1.02-1.51, $P = 0.028$), HbA1c (OR = 0.20, 95% CI 0.06 - 0.69, $P = 0.011$), and fasting C-peptide (OR 2.35, 95% CI 1.06 - 5.18, $P = 0.035$) were significantly associated with complete remission of T2DM, whereas obesity indices such as body mass index (BMI), total fat mass, or waist circumference were not. Area under the receiver operating characteristic curve (AUC) of our logistic model which was adjusted for total muscle mass, HbA1c, and fasting C-peptide was superior to pre-operative IMS scores, but it was similar to ABCD score.

Conclusion: The complete remission of T2DM after bariatric surgery is dependent on preoperative muscle mass, HbA1c level, and beta-cell function, regardless of obesity parameters.

PE 05-15 5. Diabetes and Obesity

Factors Influencing Adherence to Refill and Medication in Adults Taking Medication for Diabetes and Metabolic Syndrome: A Preliminary Finding

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Background: Adherence to refill and medication is essential for disease control and treatment in patients taking medication for diabetes. This study aimed to examine factors influencing adherence to refill and medication in adults taking medication for diabetes and metabolic syndrome.

Methods: This study analyzed outcomes data in a longitudinal study conducted on 130 patients taking medication for diabetes and metabolic syndrome from a university-affiliated hospital. Data were collected using structured questionnaires. Medication adherence was measured by the Adherence to refills and medications scale (ARMS) and factors influencing MA were measured by Information-Motivation-Behavioral skills (IMB) model-based questionnaires: medication knowledge, motivation, self-efficacy for medication, and diabetes social support. The lower ARMS score indicates higher MA. Hierarchical regression analysis was used to analyze factors influencing MA.

Results: Hierarchical multiple regression model accounted for 62.1% of the variance in MA ($p < .001$). Higher MA motivation ($\beta = -.563, p < .001$), self-efficacy for MA ($\beta = -.314, p < .05$), and social support ($\beta = -.143, p < .001$) were statistically significant higher MA (the lower ARMS score indicates higher MA). However, the medication knowledge was not a significant factor influencing MA.

Conclusion: Higher medication motivation, self-efficacy, and social support appear to be the critical factors contributing to MA. The study findings suggest that IMB model should be guided for designing interventions to promote the MA. Intervention strategies based on the IMB model are required to improve MA for Korean patients taking medications. *This work was partly supported by the National Research Foundation of Korea grant funded by the Korea government (MSIT). (No. 2021R1A2C2007858).

PE 05-16 5. Diabetes and Obesity

Identification of cellular targets in diabetic kidney disease by single-cell transcriptome profiling

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Background: Diabetic kidney disease (DKD) is the leading cause of end-stage kidney disease. Kidney is a highly complex organ; thus, the pathogenesis involves the complexity inherent within renal tissues. Advanced single-cell RNA sequencing is expected to offer insights into the cell-specific transcriptional responses in the kidney to DKD and elucidate potential mechanisms of action for two widely used drugs.

Methods: To investigate cellular changes in response to drug treatment in DKD, renoprotective agents, SGLT2 inhibitor (SGLT2i) and Mineralocorticoid Receptor Antagonist (Finerenone), were administered to db/db mice for 14 weeks. Subsequently, a comprehensive analysis encompassed the examination of blood glucose levels, renal function indicators, histopathological alterations. In the isolated kidney tissues, we analyzed single cell RNA sequencing and performed the differential expression gene (DEG) changes between normal, DKD and drug-treated groups.

Results: Single-cell transcriptional profiling analysis identified a total of 12 cell types in kidney tissues. Investigation into alterations in gene expression and essential functions, such as immune response, regulation of energy metabolism, and activation of mitochondria, revealed distinct expression patterns during the mitigation of impaired renal function by SGLT2i and/or Finerenone. Notably, Proximal Tubule (PT) cells, which predominantly engage in metabolic activities, exhibited restored fatty acid metabolism-related functions and regulated cell proliferation upon delayed progression of renal impairment. The validation of biomarkers in an animal model of DKD entailed a thorough analysis of Bulk-RNA sequencing using HK-2 cells.

Conclusion: Overall, our study presents a comprehensive single-cell transcriptomic landscape of DKD. This groundwork can be leveraged for the eventual development of therapeutic intervention, identifying the candidate genes involved in pathophysiologic changes in DKD.

PE 05-17 5. Diabetes and Obesity

Effect on glycemic control of KDPS-hLSM in overweight patients with Type 2 Diabetes

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Background: In Korea, the prevalence of type 2 diabetes mellitus (T2DM) has been rising due to an increase in obesity rates and changes in lifestyle. Overweight and obesity are significant risk factors for the development and progression of T2DM. While lifestyle modification (LSM) is a fundamental treatment approach for diabetes, but there has been a lack of structured LSM program in Korea. Therefore, we aimed to apply KDPS-hLSM (Korea Diabetes Prevention Study-Hospital-based Lifestyle Modification) program to the patients with diabetes and assess its effectiveness. Specifically, we aimed to evaluate the impact of KDPS-hLSM on glycemic control and weight management in overweight/obese Korean patients with T2DM.

Methods: Adults aged 30-75 years with T2DM (HbA1c between 7% and 9%) and a BMI $\geq 23\text{kg/m}^2$ were enrolled. We implemented the initial 6-month intensive phase of the KDPS-hLSM program, which included four intensive nutrition interventions by a clinical dietitian and seven on-site sessions, along with eight phone calls by a health coordinator to promote 10 healthy habits. Changes in metabolic parameters were compared before and after the 6-month intervention. This research was conducted with financial support from the Korean Society for the Study of Obesity (KSSO).

Results: From July 2021 to November 2022, a total of 20 subjects were screened, with one failing to meet the inclusion criteria. A total of 19 subjects were enrolled (mean age: 57.3 ± 8.3 years; 73.7% women; 68.4% family history of type 2 DM; mean BMI $27.8 \pm 2.4\text{kg/m}^2$; and 78.9% with hypertension). Among them, 15 completed the KDPS-hLSM. Subjects showed significant improvements in body parameters and glycemic index. Body weight decreased by 1.4kg ($P < 0.00$), waist circumference fell by 1.2cm ($P < 0.00$), and body fat mass decreased by 1.3kg ($P < 0.00$). HbA1c showed a significant decrease of 0.6%, and CGM metrics indicated a trend of improvement in blood glucose levels.

Conclusion: The KDPS-hLSM program helped improve physical and glycemic-related parameters in overweight/obese patients with Type 2 Diabetes. The results of this study are expected to the development of a standardized lifestyle modification program. Larger and long-term studies are needed to secure additional scientific evidence.

PE 05-18 5. Diabetes and Obesity

Perceptions of healthy lifestyle in Korean adults with early-onset T2D

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Background: In diabetes care, maintaining a healthy lifestyle, including proper diet and exercise, is essential for effective self-care. With the rising incidence of early-onset type 2 diabetes (T2D), there is an increasing need to develop age-specific lifestyle coaching. This study aims to explore the perceptions and current lifestyle regimen practices in Korean adults diagnosed with T2D before the age of 40.

Methods: A qualitative descriptive research method was used. A total of 35 participants (men: $n=19$, 54.3%) were recruited between June 2023 and February 2024. Each interview, conducted either face-to-face or via video call, lasted 40 to 120 minutes and utilized semi-structured questions. The interview data were analyzed using inductive content analysis methods.

Results: Despite recognizing the importance of diet and exercise, Korean adults with early-onset T2D have shown a low level of adherence to a healthy lifestyle regimen due to an improper understanding of T2D. Many participants reported focusing on calories, a limited menu (e.g., one-food diet), and having irregular eating patterns with unhealthy snacking to control their weight. Regarding exercise, aerobic activities were frequently reported, accompanied by complaints of boredom,

muscle weakness, and inadequate motivation. Peer support appears crucial for making behavioral changes while family support exhibited a dual nature, providing both encouragement and restriction. In particular, the perception of family support varied by gender, which impacted adherence to lifestyle regimens.

Conclusion: Developing problem-solving skills in context to overcome various restrictions is essential for encouraging Korean adults with early-onset T2D to adhere to lifestyle regimens. Additionally, self-efficacy and motivation are key to progressing through the stages of change from contemplation to preparation, action, and maintenance. Since peer norms and support are important factors in modifying lifestyle behaviors in this age group, creating a community including eCommunity that shares similar interests may be the first step towards building a healthier community. Digital apps that provide monitoring, feedback (as potential solutions for confronting problems), and motivation may be useful tools for improving adherence to lifestyle regimens. Further research is warranted to determine which behavioral strategies should be incorporated into an age-specific lifestyle coaching and/or the digital apps.

PE 05-19 5. Diabetes and Obesity

Role of PLC β 4 in regulating metabolic functions of AgRP neurons under different diet conditions

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Background: Energy homeostasis involves complex communication between the central nervous system (CNS) and peripheral organs. The agouti-related protein (AgRP)-expressing neurons in the arcuate nucleus of the hypothalamus are key metabolic signals in the CNS. Although phospholipase C β 4 (PLC β 4) is an intracellular signaling molecule downstream of Gq protein alpha subunit, its exact roles in AgRP neurons remain unclear. This study aims to elucidate the impact of PLC β 4 on the metabolic functions of AgRP neurons.

Methods: Using Cre-lox system, PLC β 4 was ablated in the AgRP neurons in male mice (AgRP^{PLC β 4-KO}). Starting at 5 weeks of age, mice were switched to a high-fat diet (HFD) for 15-17 weeks or remained on a chow diet. Food intake, body weight, and body composition were monitored. Metabolic parameters, including oxygen consumption, carbon dioxide production, substrate utilization, and energy expenditure were assessed. Glucose tolerance test (GTT) and insulin tolerance tests (ITT) were performed. Organ weights were measured post-experiment.

Results: Weekly body weight, food intake and food intake after overnight fasting were unchanged across both diet groups. In the HFD-fed AgRP^{PLC β 4-KO} mice, overall energy expenditure was unchanged, but the respiratory exchange ratio remained elevated. HFD-fed AgRP^{PLC β 4-KO} mice showed a significant increase in fat content, particularly in the liver, with increased lipid droplet number and size. The chow group exhibited no genetic differences in metabolic parameters. HFD-fed AgRP^{PLC β 4-KO} mice had attenuated insulin sensitivity but normal glucose tolerance. We also noted compromised diurnal feeding and locomotion patterns in the HFD-fed AgRP^{PLC β 4-KO} mice. Patch clamp recordings revealed a suppression in AgRP neuronal activity in HFD-fed AgRP^{PLC β 4-KO} mice.

Conclusion: Deletion of PLC β 4 in AgRP neurons disrupts lipid and glucose homeostasis under HFD conditions, leading to maladaptive energy fuel adjustments, hepatic lipid accumulation and reduced insulin response. The animals also showed compromised diurnal feeding and locomotion patterns. However, chow-fed knockouts exhibited no significant metabolic differences. Therefore, we suggest that PLC β 4 in AgRP is necessary for normal metabolic adaptation to HFD conditions, but is dispensable in normal diet conditions.

PE 05-20 5. Diabetes and Obesity

Associations between combined unhealthy lifestyles and risk of new-onset type 2 diabetes in individuals with obesity

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Background: While obesity, characterized by excessive adipose tissue accumulation, significantly increases the risk of developing type 2 diabetes (T2D), this risk is further influenced by additional unhealthy lifestyle. This study aims to investigate the combined impact of multiple unhealthy lifestyle factors—smoking, alcohol consumption, and physical inactivity—on the incidence of T2D in obese individuals.

Methods: Using the Korean National Health Insurance Service-National Sample Cohort database, we analyzed 152,718 individuals with obesity aged ≥ 20 years who underwent health check-ups between 2009 and 2015. We developed an unhealthy lifestyle score based on the information of each lifestyle factor such as ever-smoking, heavy drinking, and physical inactivity. The associations between lifestyle factors and incident ischemic stroke were examined using multivariable Cox proportional hazards regression models.

Results: Of 152,718 participants (mean age, 46.9 years; 59.2% men), 16,094 (10.5%) developed T2D during 7.3 years of mean follow-up. Obese individuals with smoking history or physical inactivity had increased T2D risk (hazard ratio [HR]: 1.33, 95% confidence interval [CI]: 1.27–1.39 and HR: 1.06, 95% CI: 1.03–1.10, respectively) compared to never smokers or physically active individuals. The T2D risk rose with higher unhealthy lifestyle scores (P for trend <0.001); scores of 2 (HR: 1.30, 95% CI: 1.23–1.37) and 3 (HR: 1.29, 95% CI: 1.18–1.41) had higher risks compared to the score of 0. This association was more pronounced among men and individuals with no impaired fasting glucose.

Conclusion: Smoking and physical inactivity are important risk factors for T2D in individuals with obesity. Two or more unhealthy lifestyles is associated with substantial risk elevation in T2D. Interventions targeting multiple unhealthy lifestyles concurrently may be crucial for preventing T2D in this population.

PE 05-21 5. Diabetes and Obesity

The Relationship Between HbA1c Levels and the Incidence of Diabetic Foot Ulcers in Patients with Type 2 Diabetes Mellitus at RSUD dr. Soedono Madiun

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Background: Diabetes is a chronic disease that has seen a rise in prevalence and is among the top ten leading causes of death globally. Patients with type 2 diabetes mellitus (T2DM) and uncontrolled glucose levels are at increased risk for both microvascular and macrovascular complications. A common complication among T2DM patients is diabetic foot ulcers. The long-term glycemic control indicator for T2DM patients is HbA1c

Methods: This study employed a case-control design. The research was conducted in the medical records unit of RSUD dr. Soedono Madiun from February to April 2024. The study population included T2DM patients hospitalized at RSUD dr. Soedono Madiun from January 1, 2022, to December 31, 2023. The research sample comprised 56 T2DM patients, with 28 patients having diabetic foot ulcers (case group) and 28 patients without diabetic foot ulcers (control group). Bivariate analysis in this study utilized the Chi-square test and independent sample T-test.

Results: Among the 28 subjects in the case group, 4 individuals (14.3%) had controlled HbA1c levels, while 24 subjects (85.7%) had uncontrolled HbA1c levels. In the control group, 11 subjects (39.3%) had controlled HbA1c levels, and 17 subjects (60.7%) had uncontrolled HbA1c levels. The Chi-square test analysis indicated a significant association between HbA1c levels and the incidence of diabetic foot ulcers in T2DM patients, with a p-value of 0.035 ($p < 0.05$). The independent sample T-test also demonstrated a significant difference in mean HbA1c levels between patients with and without ulcers, with a p-value of 0.001 ($p < 0.05$). The mean HbA1c level in the case group was 10.214%, compared to 7.943% in the control group. The odds ratio in this study was 3.88, which means uncontrolled HbA1c has 3.88 times greater risk of diabetic ulcers.

Conclusion: There is a significant association between HbA1c levels and the incidence of diabetic foot ulcers in T2DM patients.

PE 05-22 5. Diabetes and Obesity

Role of cyclooxygenase 2 (COX2) gene in type 2 diabetes mellitus

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Objective: The aim of this investigation was to understand the relationship between COX2 gene expression and variants (-765G>C and -1195A>G) in T2DM cases versus controls, as well as expression analysis on a gender basis.

Methods: After institutional ethical approval and individual written consent, 5 mL blood samples were collected from 472 subjects (221 controls and 251 T2DM cases). All subjects' lipid profiles and anthropometric data were checked, and genotypes were analysed using polymerase chain reaction-restriction length polymorphism. The expression analysis was carried out using real-time polymerase chain reaction with relative quantification and (GAPDH-Internal control), followed by western blot analysis. SPSS (V21), Prism (V), and Roch software's were used for statistical analysis.

Results: Individuals with the COX2 -765G/C 'CC' genotype were 2.43 times more likely to develop T2DM ($P=0.017$). This is supported by the fact that "C*" has been identified as a significant risk allele for T2DM ($P=0.022$).

Individuals with the COX2-1195A>G 'GG' genotype were significantly less likely to develop T2DM. Furthermore, the impacts of COX2 variants on clinical and biochemical parameters support the importance of genetic factors in T2DM susceptibility. Additionally, the haplotype analysis of both variants demonstrated that 'GG*' conferred notable protection against T2DM ($P=0.004$). Type 2 diabetes was found to have slightly higher COX2 expression. However, when analyzing expression on a gender basis, a significant difference was observed in T2DM male cases ($P=0.03$) compared to controls, while no such association was found in T2DM females. T2DM patients with the 'GC+CC' COX2 -765G/C genotype had significantly higher COX2 expression than controls ($P < 0.05$).

Conclusion: We draw the conclusion that GG* haplotype individuals have a low risk of developing diabetes. Understanding of the genetic and molecular elements of T2DM is improved by the study of COX2 gene variants and expression studies as potential future paths for customized diabetic management strategies.

PE 05-23 5. Diabetes and Obesity

Food Supplement for Obesity and Diabetes Mellitus: A herbal (*Orthosiphon stamineus*) Consumption

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Background: The use of herbs as a food supplement is in increasing demand due to evidence of efficacy in treating a variety of disorders. *Orthosiphon stamineus*, commonly known as Java tea or cat's whiskers, offers a promising herbal approach for managing obesity and diabetes mellitus. One of the most common ways to consume *Orthosiphon stamineus* is by brewing it as tea and the extracts is also available in capsule or tablet form. Obesity and diabetes mellitus, particularly type 2 diabetes, are closely linked, with obesity often leading to the development of diabetes. The objective of this study is to explore the effect of food supplement consumption of *orthosiphon stamineus* on obesity and diabetes mellitus.

Methods: The scoping review methodology was conducted in this study. Comprehensive searches based on the concepts of health research were conducted in Web of Science (WoS), PubMed, Scopus, and Google Scholar. All full-text, peer-reviewed publications from 2010 to 2024 were gathered using these databases.

Results: Google Scholar produced a total of 3780 results and the PubMed produced a total of 17 relevant articles. The results from the Scopus and Web of Science (WoS) searches were 33 and 17, respectively. After screening, only 10 articles are relevant for this study. Studies show, obesity, especially excess abdominal fat, is a major risk factor for insulin resistance, leading to type 2 diabetes. *Orthosiphon stamineus* may aid in weight loss by boosting metabolism, promoting fat breakdown, reduce inflammation, high in antioxidants and helping lower blood sugar levels which is often associated with obesity and valuable natural treatment for diabetes mellitus.

Conclusion: *Orthosiphon stamineus* shows promise as a natural aid in managing obesity and diabetes mellitus. Its benefits in regulating blood sugar, enhancing metabolism, and providing antioxidant and anti-inflammatory properties make it a valuable addition to a health regimen.

PE 05-24 5. Diabetes and Obesity

Thigh Muscle Quality and Its Contribution to the Incidence of Type 2 Diabetes Mellitus

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Objective: The role of low-density muscle (LDM) area in predicting diabetes is not well understood. The aim of this study was to investigate the association between LDM area at the midthigh level and the risk of incident diabetes.

Methods: In this prospective study, a total of 2,137 East Asian individuals (age 57.4 ± 16.9 years and body mass index 25.0 ± 3.9 kg/m², male 48.3%) with one or more cardiometabolic risk factors but not diabetes was enrolled. A noncontrast cross-sectional scan of the midthigh was obtained, and area ranges 0–30 Hounsfield was defined as LDM. The association between LDM area and incident diabetes was evaluated, and the optimal threshold of LDM to identify incidence of diabetes was determined. The prognostic ability of adding LDM area to traditional metabolic risk factors was also assessed.

Results: During a mean follow-up of 7.4 years, 201 males (19.5%) and 156 females (14.1%) developed diabetes. Participants who progressed to diabetes had higher baseline values for HbA1c (6.1 ± 0.3 vs. $5.7 \pm 0.4\%$)

and larger LDM areas (48.8 ± 14.2 vs 38.1 ± 13.2 cm²). The threshold for defining a large LDM area was 44.7 cm² for males and 38.3 cm² for females. A large LDM area was identified as a significant predicting factor for incident diabetes (HR 2.54, 95% CI 1.86–3.46 for males; HR 3.11, 95% CI 2.22–4.37 for females). Adding LDM area to traditional risk factors improved the predictive ability for diabetes progression, with area under the receive operating characteristic curve values of 0.838 for males and 0.908 for females.

Conclusion: This is the first study suggesting that a large LDM area is a significant predictor of incident diabetes. Interventions targeting LDM reduction, such as physical exercise programs, should be highlighted to prevent diabetes progression and improve cardiometabolic health outcomes.

PE 05-25 5. Diabetes and Obesity

Primary Cilia in the Hypothalamic AgRP Neurons Mediate Metabolic Effects of Butyrate

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Background: The microbiota-derived short-chain fatty acid (SCFA) butyrate is known to act beyond the gut to influence host metabolism, including its central nervous system regulation of appetite and energy homeostasis. However, mechanistic insights into central butyrate metabolic actions are undetermined.

Hypothalamic primary cilia have recently been demonstrated to play a critical role in the regulation of whole body energy homeostasis. In the current study, we examined whether the SCFA butyrate directly modulates hypothalamic primary cilia function to promote its metabolic actions.

Methods: To determine whether central butyrate administration is sufficient to promote systemic metabolic effects, butyrate was delivered directly into the third ventricle via intracerebroventricular cannula. To investigate whether hypothalamic primary cilia is required for butyrate's metabolic actions, we stereotaxically injected Cre recombinant virus into the hypothalamus of Ift88F/F mice or employed primary cilia-specific neuronal knockout mouse models targeting three different neurons, then examined in response to butyrate treatment.

Results: Here, we showed that butyrate directly modulates primary cilia of the agouti-related peptide (AgRP) neurons in the hypothalamus arcuate nuclei to promote its anorexigenic and metabolic effects on glucose homeostasis. Butyrate treatments, either via peripheral or central administration, markedly increased histone acetylation and ciliogenesis in the hypothalamus, suppressing food intake to benefit whole-body metabolism. Disruption of primary cilia in the entire hypothalamus or specifically in the AgRP neurons, but not in the pro-opiomelanocortin (POMC) or ventromedial hypothalamus (VMH) neurons, abolished butyrate metabolic effects

Conclusion: These findings reveal that the SCFA butyrate directly targets primary cilia in the hypothalamic neurons, particularly those of the AgRP neuronal population, to exert its anorexigenic action and glucose homeostasis.

PE 05-26 5. Diabetes and Obesity

Effect of Sodium-glucose cotransporter 2 inhibitors on cardiovascular risk in overweight and obese participants: A meta-analysis of randomized controlled trials

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Objective: Sodium-Glucose Cotransporter 2 (SGLT2) inhibitors are primarily used to treatment of type 2 diabetes; however, they have also been reported to promote weight loss. We performed a meta-analysis to consolidate evidence from randomized clinical trials that assessed the effects of SGLT2 inhibitors on cardiovascular risk in overweight and obese participants.

Methods: We searched MEDLINE, EMBASE, Web of Science, and the Cochrane Library for data from randomized controlled trials involving SGLT2 inhibitors that reported cardiovascular outcomes in overweight and obese individuals. Random effects models and inverse variance weighting were used to calculate relative risks (RR) with 95% confidence intervals (CI).

Results: We extracted and analyzed the data from seven studies, including 17,810 participants treated with SGLT2 inhibitors and 14,876 participants treated with a placebo. The risk of cardiovascular events, including cardiovascular death, myocardial infarction, ischemic stroke,

and hospitalization for heart failure, significantly decreased in participants treated with SGLT2 inhibitors (RR = 0.722; 95% CI, 0.639–0.821).

Conclusion: Significant improvements in cardiovascular outcomes are expected when SGLT2 inhibitors are used to treatments for diabetes, chronic kidney disease, or heart failure in overweight and obese individuals

PE 05-27 5. Diabetes and Obesity

Empagliflozin, an SGLT2 inhibitor, prevented palmitate-induced lipotoxicity through enhanced fatty acid oxidation and reduced stress signals

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Aim/Hypothesis: Sodium-glucose cotransporter 2 (SGLT2) plays a crucial role in glucose absorption. Empagliflozin, an SGLT2 inhibitor, targets renal pathophysiological defects in type 2 diabetes. While significantly lowering blood glucose, SGLT2 inhibitors have also emerged as potential cardioprotective agents, especially beneficial in early heart disease stages. However, their direct effects on cardiomyocytes remain unexplored. This study investigated the molecular mechanisms of empagliflozin (EMPA) in mitigating palmitate (PA)-induced cardiomyopathy in H9c2 cells.

Methods: H9C2 cells were treated with palmitate, with and without the SGLT2 inhibitor. Subsequently, insulin resistance, 2-NBDG uptake, and immunoblotting with insulin signaling pathway antibodies were measured. Beta-oxidation and cardiac metabolism were analyzed using q-RT-PCR and oxygen consumption rate (OCR). Additionally,

cardiomyocyte apoptosis was assessed through DNA fragmentation assays and immunoblotting for cleaved caspase 3.

Results: EMPA significantly reduced PA-induced impairment in insulin sensitivity, glucose uptake, cellular apoptosis, inflammation, and ER stress. EMPA also increased AMP levels, activated the AMPK pathway, and elevated carnitine palmitoyl transferase 1 (CPT1) gene expression. These effects collectively enhanced fatty acid oxidation and decreased stress signals.

Conclusion: This study reveals a new mechanism of EMPA's protective effects against PA-induced cardiomyocyte injury, offering fresh therapeutic insights into its role as a cardioprotective agent.

PE 05-28 5. Diabetes and Obesity

LMK-235, an HDAC inhibitor, prevented diabetic skeletal muscle atrophy

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Aim/Hypothesis: Histone deacetylase (HDAC) has been identified as a significant pathogenic factor in the development of muscle atrophy. Recent studies indicate that some HDAC inhibitors can effectively mitigate muscle atrophy, insulin resistance, and diabetes. However, the effects of LMK-235 on diabetic skeletal muscle atrophy have not been sufficiently explored. This research investigates the preventative properties of LMK-235 and its underlying molecular mechanisms in diabetic muscle atrophy, using db/db mice as the experimental model

Methods: To assess the impact of LMK-235 on diabetic muscle atrophy, db/db mice were randomly divided into three groups: a control group, a db/db group, and a db/db plus LMK-235 group. The mice received LMK-235 (10 mg/kg/i.p) for 4 weeks. The body weight of the mice was monitored. After euthanasia, muscle tissue was excised, dissected, and weighed. Hematoxylin and eosin stain was used for each section of muscle tissue. The cross-sectional area of these stained sections was analyzed using ImageJ software. To explore the molecular mechanisms of LMK-235, several muscle atrophy-related factors were examined using RT-PCR.

Results: LMK-235 administration in db/db mice effectively mitigated muscle weight loss and insulin resistance. MRI examination of hindlimb muscle mass and fat accumulation revealed that LMK-235 not only reduced fat accumulation but also ameliorated muscle loss. The Tibialis anterior muscle and gastrocnemius muscle showed significant atrophy in db/db mice. LMK-235 treatment prevented weight loss in these muscles and significantly restored muscle fiber size. Notably, LMK-235 significantly reduced the expression of atrophy-related genes such as MURF1 and Atrogin-1 in the Tibialis anterior muscle.

Conclusion: This study examined the impact of LMK-235 on diabetic muscle atrophy in db/db mice. LMK-235 demonstrated a mitigating effect on muscle atrophy by reducing the expression of atrophy-related genes. These findings suggest that LMK-235 could provide a basis for developing therapeutic drugs targeting muscular or metabolic diseases associated with atrophy.

PE 05-29 5. Diabetes and Obesity

The Relationship Between Intellectual Developmental Disability and Depression in Type 2 Diabetes Patients : A Focus on Obesity.

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Background: Obesity is known to be an important risk factor for complications in type 2 diabetics. And, Intellectual Developmental Disabilities (IDD) is also known to increase the risk of depression. This study aims to investigate whether obesity significantly interacts with the risk of depression in type 2 diabetic patients with IDD.

Methods: Data were analyzed from the Korea's National Health Insurance Service dataset. A total of 1,819,869 type 2 diabetics aged 20 years and older who underwent health examinations in 2015-2016 were followed up until December 31, 2022 (median follow-up period of 5.81 years) for the outcome. IDD was defined as cases classified with the disability type code for intellectual disability, and obesity was defined as a body mass index of 25 or higher. The relationship between IDD, obesity, and the outcome was analyzed using Cox regression models, yielding hazard ratios (HR) and 95% confidence intervals (CIs).

Results: Analysis of the basic characteristics was done. The average age of the group with IDD was 52.0 years, and the average age of the group without IDD was 54.8 years, which was younger on average. Compared to

individuals without IDD, patients with IDD were more likely to be Female, Low income, but less likely to be Current smoker, Drinker, Regular exercise, Hypertension, Dyslipidemia. The risk of depression was compared according to the presence of IDD and obesity. For non-obese individuals, the HR for depression in those with IDD compared to those without was 1.81 (95% CI: 1.63-2.01). In obese individuals, the HR for depression in those with IDD compared to those without was 1.66 (95% CI: 1.50-1.84).

Conclusion: In type 2 diabetics, the risk of depression increased with the presence of IDD, but there was no significant difference in the risk of depression when considering obesity status. Therefore, for type 2 diabetics with IDD, management and support for developmental disabilities may be crucial.

PE 05-30 5. Diabetes and Obesity

Management of obesity in patients with Type 2 diabetes

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Background: Diabetes and its related factors, such as diabetes medications and alterations in glucose metabolism, contribute to an increased risk of obesity. Commonly recommended glucose-lowering medications may lead to weight gain. Owing to the awareness of these complications and the significant relationship between obesity and diabetes, there is a need for a shift in the advance of managing obesity in patients with T2DM to improve clinical outcomes.

Methods: 185 patients who were overweight and obese and were followed up in a diabetes clinic in a county referral hospital were sampled. The patient's treatment was evaluated and randomly assigned to an intervention or control group and followed up for one year.

Results: Baseline results- At the beginning 134 of the participants were overweight and 31 were obese. The majority of patients with overweight and obese were on Insulin and sulphonylurea drugs compared to their counterparts who were on glucagon-like peptide-1 agonists, sodium-glucose cotransporter-2 inhibitors, Dipeptidyl-peptidase 4 inhibitors,

and metformin. The patient's condition was individually evaluated and treatment was adjusted to regimens that would promote weight loss and improve cardiac health. Other non-pharmacological interventions such as physical activity and dietary practice were also included and the participants were followed closely. At mid-intervention, 48% of the patients had lost weight and had achieved optimal glycemic control compared to before intervention. At the end of the intervention, 86% of the participants had achieved significant weight loss and achieved optimal diabetes control.

Conclusion: Common glucose-lowering treatments, according to current diabetes guidelines, impact on weight. Medications such as metformin, glucagon-like peptide-1 agonists, sodium-glucose cotransporter 2 inhibitors, and Dipeptidyl-peptidase 4 inhibitors, help in weight loss and improve overall cardiovascular health. Obesity should also be considered when choosing medical therapy for T2DM.

PE 05-31 5. Diabetes and Obesity

High Glucose Aggravates the Detrimental Effects of Pancreatic Stellate Cells on Beta-Cell Function

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Background: Type 2 diabetes mellitus (T2DM) is a clinical syndrome characterized by elevated blood glucose caused by a combination of insulin resistance and progressive failure of insulin secretion by the β -cells in pancreatic islets of Langerhans. The cellular mechanisms underlying β -cell failure in T2DM are not well understood, but several recent studies suggest that pancreatic stellate cells (PSCs) might play an important role in this process. We here assess the effects of PSCs on β -cell function and apoptosis in vivo and in vitro.

Methods: PSCs were transplanted into Wistar and Goto-Kakizaki (GK) rats. Sixteen weeks after transplantation, β -cell function, apoptosis, and islet fibrosis were assessed. In vitro the effects of PSCs conditioned medium (PSCs-CM) and/or high concentration of glucose on INS-1 cell function

was assessed by measuring insulin secretion, INS-1 cell survival, apoptosis, and endoplasmic reticulum stress (ER stress) associated CHOP expression.

Results: PSCs transplantation exacerbated the impaired β -cell function in GK rats, but had no significant effects in Wistar rats. *In vitro*, PSCs-CM caused impaired INS-1 cell viability and insulin secretion and increased apoptosis, which were more pronounced in the presence of high glucose.

Conclusion: Our study demonstrates that PSCs induce β -cell failure in vitro and in vivo. In this model, PSCs do not initiate the onset of T2DM but act to amplify the consequences of the hyperglycemic, inflammatory environment, enhancing the development of β -cell fibrosis and their ultimate functional failure.

PE 05-32 5. Diabetes and Obesity

Effect of proprioceptive neuromuscular facilitation on blood Glucose level and quality of life among Type 2 Diabetes Mellitus

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Background: Diabetes mellitus (DM) is a challenging problem for health care providers worldwide. Physical activity is the cornerstone for managing type 2 diabetes mellitus (T2DM). Exercise has a role in metabolic health and has a positive impact on insulin responsiveness. Proprioceptive Neuromuscular Facilitation (PNF) is a concept of treatment for motor learning and motor control, and it works by stimulating muscles and joint proprioceptors.

Methods: Four hundred five patients were randomly allocated into three groups as per inclusion and exclusion criteria. All recruited patients were assessed for their blood glucose level and quality of life scale. Patients in Control (Group-A) and Experimental groups (Group B & C) underwent for 12 weeks of protocol having brisk walking (30 minutes per day, 150minutes per week and 5days per week) with diet chart as per the recommendations of National Institute of Nutrition. Patients in experimental group B were given PNF strengthening using elastic resistance band in diagonal patterns (D1Flexion, D2Flexion, D1 extension and D2 extension) for upper limbs and lower limbs. 10 repetitions each was given for three times per week, resistance of elastic resistance band was selected based on 10 repetition maximum (RM) and 10 RM was rechecked after 4 weeks. Patients in experimental group C were given PNF stretching using Hold-Relax method in diagonal patterns (D1Flexion,

D2Flexion, D1 extension and D2 extension) for upper limbs and lower limbs. 10 repetitions each was given for three times per week.

Results: Blood glucose levels improved significantly in all groups over the course of 12 weeks. Between group analysis revealed significant improvement in PNF Strengthening Group (Group B) compared to Control (Group A) and PNF Stretching Group (Group C) ($p < 0.05$). Role limitation due to physical health, physical endurance, general health, and emotional and mental health improved in all groups significantly over the period of 12 weeks. Between group analysis revealed significant improvement in PNF strengthening ($p < 0.05$). Treatment satisfaction, symptom botherlessness, financial worries, and diet satisfaction were not improved in all groups over the period of 12 weeks. Between group analysis revealed non-significant improvement in all three groups ($p > 0.05$).

Conclusion: Both proprioceptive neuromuscular facilitation strengthening and stretching were found to be effective, whereas PNF strengthening had been more effective than PNF stretching in controlling blood glucose levels and improving quality of life among people with type 2 diabetes mellitus.

PE 05-33 5. Diabetes and Obesity

Correlations between obesity and overweight in middle-aged workers and the risk of cardiovascular disease based on metabolic risk variables.

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Background: Cardiovascular disease (CVD) and obesity are not well understood, especially in the case of people with known risk factors for the condition. Data from the study were examined in subsequent analyses. Particularly among people with hypertension, hyper-low-density lipoprotein (LDL)-cholesterolemia, or diabetes, we investigated the relationship between the degree of obesity and risk of CVD and its subtypes.

Methods: The current analysis made use of pooled data from 4486 adults (3638 men and 948 women) that were recruited between 2012 and 2018. To estimate the hazard ratios (HRs) and 95% confidence intervals (CIs) for the relationships between the risk of CVD and its subtypes, such as stroke and coronary heart disease (CHD), and the degree of obesity measured using body mass index (BMI), we utilized the multivariable Cox proportional hazard model.

Results: There were 98 CVDs over a median of 6 years (40 CHDs and

59 strokes). The risks of CVD, CHD, and total stroke were positively and substantially linked with a BMI of > 27.5 as opposed to 21.0–22.9 kg/m². 15.9%, 5.8%, and 8.7% of the correlations between obesity and CVD were mediated by hypertension, 5.8% by hyper-LDL cholesterol, and 28.3% by their combined effects. BMI > 25.0 (overweight/obesity) compared to BMI < 25 kg/m² was linked to an increased risk of CVD in people with and without hypertension, but only in those who had hyper-LDL cholesterol and no diabetes, according to the stratified analyses based on the presence of risk factors.

Conclusion: Overweight/obesity was associated with the risk of CVD and its subtypes. About 30% of the risk was explained by hypertension, hyper-LDL-cholesterolemia, and diabetes, of which hypertension accounted for approximately the half of the explained risk. However, overweight/obesity increased the risk of CVD even in those without hypertension. These findings highlight the importance of controlling and preventing overweight/obesity regardless of chronic disease status.

PE 05-34 5. Diabetes and Obesity

How far we should care about education, wealth, and macroeconomic variables to prevent diabetes prevalence among pregnant women?

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Background: Gestational diabetes mellitus (GDM) is considered a globally common pregnancy complication with complex disease mechanisms, which leads to an increased risk of developing type 2 diabetes in both mother and child. In contrast, several risk factors may contribute to its onset. This study aimed to summarize, analyze, and evaluate various risk factors associated with GDM among low-income countries.

Methods: Gestational diabetes mellitus (GDM) is considered a globally common pregnancy complication with complex disease mechanisms, which leads to an increased risk of developing type 2 diabetes in both mother and child. In contrast, several risk factors may contribute to its onset. This study aimed to summarize, analyze, and evaluate various risk factors associated with GDM among low-income countries.

Results: Data were analyzed by robust random effect estimation with STATA MP.14. The prevalence of GDM is estimated at an overall 16%, in the first pregnancy is 3.4%, and in the second pregnancy is 4.6%. The highest prevalence of GDM is in Malaysia (19%), followed by Indonesia (10.6%),

Thailand (9.7%), Philippines (7.1%), and Vietnam (6.1%). The prevalence of GDM among pregnant women increased with increase in adult female illiterate rate, labor force participation and female share of employment. Meanwhile, increasing in health expenditure, GDP per capita, and HDI will decrease the prevalence of GDM among pregnant women.

Conclusion: The high prevalence of GDM among pregnant women indicates diabetes to be a major public health problem in ASEAN countries. The government needs to pay attention to socioeconomic factors to reduce cases of diabetes in pregnant women by increasing health expenditure, GDP per capita, and HDI. In addition, providing supporting access for working mothers and strategies to reduce the number of illiteracies among women will give positive changes regarding pregnant women's health issues in ASEAN-5.

Keywords: Diabetes, Pregnant women, Wealth on health, Education attainment, Socioeconomic status

PE 05-35 5. Diabetes and Obesity

Association between Metabolic Syndrome and Diabetes Mellitus

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Background: Patients with diabetes mellitus experience an increase in micro and macro vascular problems as a result of lifestyle modifications that cause metabolic syndrome. The study's primary goals were to determine whether metabolic syndrome was present and assess the gender-related differences in each of the syndrome's components using criteria from the National Cholesterol Education Programme Adult Treatment Panel III (NCEP ATP III) and the International Diabetic Federation (IDF).

Methods: A cross-sectional study including 550 individuals with type II diabetes was carried out. Every study participant between the ages of 30 and 80 was enrolled. The study excluded subjects who had type I diabetes and women who were pregnant.

Results: Using the IDF and NCEP ATP III criteria, the prevalence of

metabolic syndrome in the diabetic community was determined to be 42.28% and 28.85%, respectively. According to the IDF and NCEP ATP III criteria, it was noted that the prevalence was higher in females than in males and was deemed to be statistically significant ($p < 0.001$). Blood pressure was raised by central obesity, and female patients' lowered levels of high-density lipoprotein were noticeably higher. In this study population, central obesity was the most common risk factor, followed by hypertension. Based on a comparative examination of the IDF and NCEP ATP III criteria, diabetes patients with metabolic syndrome were found to have considerably higher levels of all metabolic risk components when compared to those without the condition.

Conclusion: According to the study's findings, metabolic syndrome was incredibly common in the diabetic community, particularly in female participants

PE 05-36 5. Diabetes and Obesity

An Application of machine learning algorithms to research data in order to predict uncontrolled diabetes mellitus related obesity.

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Background: Uncontrolled diabetes mellitus (UDM) is defined clinically as having a hemoglobin A1c (HbA1c) level above 7.0% or sporadic blood glucose readings higher than 180 (mg/dL). Uncontrolled diabetes mellitus presents with a wide range of symptoms, but the presence of micro- and macrovascular issues makes it easy to diagnose. Healthcare providers can use a prediction model that incorporates multiple patient characteristics to detect UDM patients early on, allowing for prompt intervention and therapy. Therefore, the goal of this research is to use different ML algorithms to investigate different patient traits and biomarkers in UDM prediction.

Methods: Patients older than eighteen years who had diabetes were included in this study. Among the data's component pieces are biospecimens, electronic health records (EHRs), digital health technologies, physical measurements, and health surveys. The data utilized in this study were processed using R version 4.0.2 (the R Project for Statistical Computing). Extreme gradient boost, random forest, logistic regression, and weighted ensemble models were the methods applied. Individuals who have a history of uncontrolled diabetes were considered cases under the International Classification of Diseases code. Basic demographic, biomarker, and hematological index data are among the features included in the model.

Results: The random forest model performed well in predicting uncontrolled diabetes compared to the weighted ensemble model (accuracy: 0.78, 95% CI: 0.77-0.79), the logistic regression (accuracy: 0.62, 95% CI: 0.61-0.63), and the extreme gradient boost (accuracy: 0.76, 95% CI: 0.77-0.77). The receiver characteristics curve's area under the random forest model has a minimum value of 0.5 and a maximum value of 0.76. Significant markers of uncontrolled diabetes included height, aspartate aminotransferase, potassium levels, body weight, and heart rate. When it came to predicting uncontrolled diabetes, the random forest model did remarkably well. Significant markers of uncontrolled diabetes included physical measurements and serum electrolytes.

Conclusion: In conclusion, this study evaluated how well machine learning algorithms predict UDM. The results demonstrated that, in comparison to other machine learning methods, random forest (RF)-based models were more effective at predicting UDM. Additionally, the study found that physical assessments, blood indices, and serum potassium concentrations were crucial indicators of UDM. By factoring in these clinical traits, machine learning approaches may be utilised to predict uncontrolled diabetes.

PE 05-37 5. Diabetes and Obesity

The Role of Galectin-3 to Predict Mild Cognitive Impairment in Type 2 Diabetes

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Background: Type 2 diabetes mellitus (T2DM) is closely linked to mild cognitive impairment (MCI), which often progresses to dementia. Early detection and intervention during the MCI stage are crucial yet challenged by the absence of specific symptoms and effective screening methods. This study aimed to investigate the role of galectin-3 (coded by LGALS3 gene), as a biomarker for MCI in T2DM patients and to develop and validate a predictive nomogram integrating galectin-3 with clinical risk factors for MCI prediction.

Methods: A total of 329 hospitalized T2DM patients were recruited and randomly allocated into a training cohort (n=231) and a validation cohort (n=98) using 7:3 ratio. Demographic data and neuropsychological assessments were recorded for all participants. Plasma levels of galectin-3 were measured using ELISA assay. We employed Spearman's correlation and multivariable linear regression to analyze the relationship between galectin-3 levels and cognitive performance. Furthermore, univariate and multivariate logistic regression analyses were conducted to identify independent risk factors for MCI in T2DM patients. Based on these analyses, a predictive nomogram incorporating galectin-3 and clinical predictors was developed. The model's performance was evaluated in terms of discrimination, calibration, and clinical utility.

Results: Galectin-3 was identified as an independent risk factor for MCI,

with significant correlations to cognitive decline in T2DM patients. The developed nomogram, incorporating Gal-3, age, and education levels, demonstrated excellent predictive performance with an AUC of 0.813 in the training cohort and 0.775 in the validation cohort. The model outperformed the baseline galectin-3 model and showed a higher net benefit in clinical decision-making.

Conclusion: Our findings emphasize the utility of Gal-3 as a viable biomarker for early detection of MCI in T2DM patients. The validated nomogram offers a practical tool for clinical decision-making, facilitating early interventions to potentially delay the progression of cognitive impairment.

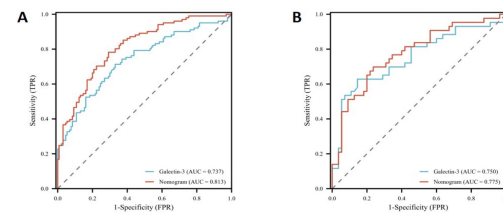


Figure 1 ROC Curves of the Galectin-3 and Nomogram Models for the Training (A) and Validation (B) Cohorts.

PE 05-38 5. Diabetes and Obesity

SGLT2 Inhibitors And Nonalcoholic Fatty Liver Disease (NAFLD): Meta-Analysis of Randomized Trials Evaluating Hepatic Steatosis And Fibrosis

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Background: Nonalcoholic fatty liver disease (NAFLD) is increasingly recognized as a prevalent hepatic disorder, affecting approximately 12.2% of individuals in the Philippines and between 10% to 30% of the U.S. population. Its development is closely associated with metabolic conditions (e.g. obesity, T2DM and hypertension). Sodium-Glucose Cotransporter 2 (SGLT2) inhibitors, a class of glucose-lowering medications, have shown cardiovascular benefits beyond glycemic control, raising interest in their potential impact on NAFLD. Thus, this meta-analysis aims to evaluate the efficacy of SGLT2 inhibitors in improving hepatic steatosis and fibrosis in NAFLD patients utilizing imaging biomarkers.

Methods: A comprehensive electronic database search was conducted to identify studies published from inception through December 2024, with no language restrictions applied. Randomized controlled trials (RCTs) that assessed the effects of SGLT2 inhibitors on NAFLD were included. Primary outcomes included the Controlled Attenuation Parameter (CAP) and Liver Stiffness Measurement (LSM). Data were extracted, and study quality was evaluated using the Newcastle-Ottawa Quality Assessment tool. Statistical analysis was conducted using RevMan 5.4, with results presented as weighted mean differences (WMD) and 95% confidence intervals (CI).

Results: A total of ten studies were included, comprising 616 patients.

The analysis revealed that SGLT2 inhibitors significantly reduced CAP, with a mean difference of -11.35 dB/m (95% CI: -18.54 to -4.16 , $p = 0.002$) and decreased LSM, with a mean difference of -0.82 kPa (95% CI: -1.35 to -0.30 , $p = 0.002$).

Conclusion: SGLT2 inhibitors effectively reduce hepatic steatosis and may positively influence liver fibrosis in patients with NAFLD. However, further research with comprehensive methodologies and longer follow-up is needed to validate these findings and optimize clinical application.

PE 05-39 5. Diabetes and Obesity

Association between type II diabetes mellitus and Organic Cation Transporter 1 (OCT1) gene polymorphism in patients from North Indian population.

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Background: Diabetes mellitus has become a most important health problem worldwide in recent times.

Aims and objective: To investigate the possible association of organic cation transporter- 1(OCT1) gene polymorphism (A-G) in type II Diabetes mellitus.

Methods: 100 diagnosed T2DM patients were recruited for the study and the genotypes for OCT-1 gene polymorphism using polymerase chain reaction (PCR) followed by restriction fragment length polymorphism (RFLP) were done.

Results: We did not find any significant association between GG homozygous alleles ($p < 0.079$) and AG heterozygous alleles ($p = 0.209$) in type 2 diabetes mellitus patients compared to the control. In this case-control study, the frequency of the G allele of OCT-1 was found significant in alcoholic type 2 diabetes mellitus patients ($p = 0.026^*$).

Conclusion: OCT-1 gene G allelic polymorphism is associated with type 2 diabetes mellitus patients in the north Indian population.

PE 05-40 5. Diabetes and Obesity

Biological Effect Of Hernandezine In Medicine For The Treatment Of Type 2 Diabetes Through Its Molecular Mechanism On Different Cells And Tissues Of Diabetic Mice

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Background: Plants-derived bioactive compounds are useful to the human being for the preparation of food material and drugs in the modern age. Nature is the source of all the raw materials that we need. Traditional and complementary medicine is a substantial health resource for preventing and managing the health conditions of aging populations. Hernandezine isolated from *Thalictrum simplex* has inhibited protein kinase C signaling in human peripheral blood T cells and repression of lipopolysaccharide (LPS) induced tumor necrosis factor- α (TNF- α) generation in human macrophage cells.

Methods: Biological effect of hernandezine in different cells and tissues, including primary hepatocytes, skeletal myotubes cell lines, as well as tissues from diabetic (db/db) mice has been investigated through scientific data analysis of different scientific research works. Further, biological potential of hernandezine for their effectiveness on the body weight and blood glucose in type 2 diabetes mellitus (T2DM) has been

investigated through scientific data analysis of different scientific research works. Other pharmacological potential of hernandezine has also been investigated in the present work through scientific data analysis in order to know its biological potential on T2DM.

Results: Scientific data analysis of the present work revealed that long-term oral hernandezine treatment potently reduced body weight and blood glucose in T2DM mouse models by increasing glucose disposal and reducing lipogenesis. However, hernandezine also activates AMPK by suppressing its dephosphorylation. Further, hernandezine effectively alleviated hyperglycemia signified its impact on risk of causing cardiac hypertrophy, and might be used as a potential therapeutic agents for the treatment of T2DM.

Conclusion: Present work scientific data signified the therapeutic effectiveness of hernandezine in medicine for the treatment of T2DM.

PE 05-41 5. Diabetes and Obesity

The Global Impact of Obesity on Health Spending: A Comparative Study of Japan and South Korea (2015-2021)

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Background: Obesity poses a burgeoning global public health challenge, carrying substantial health and economic consequences. There is a lack of research addressing the potential medical cost savings achievable through the alleviation of abnormal weight. The goal of this study is to provide estimations of the impact of obesity and overweight on healthcare expenditures.

Methods: Using data obtained from OECD.Stat, Japan and South Korea were selected to see how Obesity affects Health spending. This study employed data from 2015-2021 and then analyzed using Regression Data analysis.

Results: From the results of data regression, it is known that variables of Obesity have a significantly positive influence on health spending. These economic costs amount to an average of 1.8% of the gross domestic product (GDP) across the two countries. Our results indicate significant economic impacts of obesity that transcend national borders and economic variations.

Conclusion: These impacts are projected to escalate if prevailing trends persist. These findings underscore the urgency for advocacy efforts to enhance awareness regarding the societal implications of obesity. Additionally, they emphasize the necessity for policy interventions to tackle the underlying systemic factors contributing to obesity.

PE 05-42 5. Diabetes and Obesity

Quality of Life Diabetes Patients in Indonesia using Indonesia Family Life Survey

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Background: Diabetes disease is one of the most common diseases in Indonesia. The 2023 International Diabetes Foundation shows that Indonesia is in the fifth position in the world with the highest number of people suffering from diabetes. This study analyzes the quality of life of patients with diabetes disease in Indonesia.

Methods: The study uses IFLS-5 (Indonesia Family Life Survey-5) data. Descriptive tabulations are used in this study. The number of respondents was 583 respondents with diabetes disease. The analysis carried out was the quality of life of diabetes patients in terms of Physical Functioning, Activities of Daily Living (ADL) and Instrumental Activities of Daily Living.

Results: The results show that from a physical functioning perspective, out of 583 respondents, 20.75% had difficulty carrying a heavy load (like a pail of water) for 20 meters, 6.17% had difficulty sweeping the house

floor yard, 217 patients or 37.22% had difficulty walk for 5 kilometers, 13.38% had difficulty drawing a pail of water from a while, 35 patients or 6% had difficulty bowing, squats, knees and 21 people with diabetes had difficulty standing up from sitting on the floor without help. If seen from the Activities of Daily Living (ADL), 3.6% find it difficult to dress without help, 3.09% patients find it difficult to eat, 31 patients have to control urination or defecation. When viewed from the quality of life based on Instrumental Activities of Daily Living, 12.18% have difficult to prepare hot meals, and 6.17% patients had difficulty taking medicine.

Conclusion: So it can be seen that the quality of life for diabetes sufferers in Indonesia is quite good as can be seen from the negative impact. It can be seen that what really influences quality is the physical function of diabetes sufferers, such as difficulty walking for 5 kilometers.

PE 05-43 5. Diabetes and Obesity

The Influence of Socio-Economic Factors, Mental Health, and Sleep Disorders on Diabetes Sufferers In Indonesia

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Background: Indonesian diabetes is one of the most common diseases in Indonesia. This research analyzes the influence of socio-economic factors, mental health and sleep disorders on diabetes sufferers in Indonesia.

Methods: The method used is logit model analysis with IFLS (Indonesia Family Life Survey) 5 data. The dependent variable is a binary variable in the form of 1 being a diabetes sufferer, 0 not being a sufferer. The independent variables are age, gender, educational status and income as a socio-economic indicator, stress as an indicator of mental health, and difficulty sleeping, an indicator of sleep disorders. The number of respondents was 188 respondents.

Results: The results show that age and income significantly positively influence a person's chances of developing diabetes, while gender and marital status are not significant. If seen from mental health, it is not significantly positive. And if we look at sleep disturbances, there is a significant positive chance of suffering from diabetes

Conclusion: So it can be concluded, diabetes sufferers must maintain their health from an early age, not have a lot of income because they can spend on non-nutritious food, and maintain quality sleep to reduce the risk of suffering from diabetes.

PE 05-44 5. Diabetes and Obesity

Anti-obesity effect of revesterol against Streptozotocin/High Fat induced Obese in Diabetic rats via alteration of NF-κB pathway

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Background: besity is the fast-growing disease worldwide due to consumption of high fat diet and changes the life style. Inflammatory reaction plays an important role in the expansion of obesity. Revesterol (flavonoid) already proofed their anti-inflammatory effect against chronic inflammatory model. In this protocol, we try to comfort the anti-obesity effect of revesterol against the Streptozotocin (STZ)/High Fat diet (HFD) induced Obese in Diabetic rats via alteration of NF-κB pathway.

Methods: STZ was used for induction of diabetes and rats were received the HFD throughout the protocol. The rats were received the oral administration of revesterol (5, 10 and 15 mg/kg). food intake, water intake, blood glucose level and body weight were estimated at different time intervals. At end of the protocol, the biochemical parameters were estimated.

Results: Revesterol treatment significantly ($P < 0.001$) reduced the body weight, food intake and water intake as compared to STZ/HFD

induced obese rats. Revesterol significantly ($P < 0.001$) reduced the level of blood glucose level, non-essential fatty acid and increased the level of plasma insulin, adiponectin as compared to STZ/HFD induced obese rats. Revesterol significantly ($P < 0.001$) down-regulated the level of total cholesterol (TC), low density lipoprotein (LDL), triglyceride (TG), very low-density lipoprotein (VLDL) and up-regulated the level of high density lipoprotein (HDL). Revesterol significantly ($P < 0.001$) suppressed the level of MDA and boosted the level of SOD, GPx, GSH, CAT; reduced the level of hepatic parameters viz., AST, ALT and ALP; decreased the level of cytokines such as TNF- α , IL-1 β , IL-6 and inflammatory parameters includes COX-2, PGE2 and NF- κ B, respectively.

Conclusion: On the basis of result, we can say that revesterol is a potent phyto-constituent to reduces the obesity via suppression of NF- κ B pathway.

Keywords: Obesity, Inflammation, Antioxidant, NF- κ B pathway

PE 05-45 5. Diabetes and Obesity

Genetic elements of obesity paradox in atherosclerosis identified in an intercross between two hyperlipidemic mouse strains

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Background: Obesity paradox, referring to the protective role of overweight and obesity in atherosclerosis or other diseases, has been observed in humans and mice, yet studies to address the underlying genetic basis are scarce. The discordance of sex differences in body weight and atherosclerosis makes mice an appealing model for investigating the paradoxical relationship between the two traits.

Methods: T154 female and 145 male F2 mice were generated from BALB/cJ and LP/J apolipoprotein E-deficient mice and challenged with a Western diet for 12 weeks. Atherosclerotic lesion size in aortic root, body weight, plasma lipid and glucose levels of F2 mice were measured and genotypes determined with miniMUGA SNP arrays.

Results: Quantitative trait locus (QTL) analysis of all F2 mice with sex

as a covariate revealed 4 significant QTLs on chromosomes (Chr) 3, 6, 13 and 15 for atherosclerosis. Chr15 atherosclerosis QTL overlapped with a significant QTL for body weight near 35 Mb. After adjusting for variation in body weight, Chr15 atherosclerosis QTL downgraded from significant to suggestive linkage. Body weight was inversely correlated with atherosclerotic lesion sizes in male and all F2 mice. Using public data collected from two backcross populations, we demonstrated strong correlations between body weight and fat mass in mice ($r \geq 0.77$; $p \leq 7.0E-62$).

Conclusion: The colocalization of QTLs with opposing effects on body fat and atherosclerosis underlies the paradoxical relationship between the two traits.

PE 05-46 5. Diabetes and Obesity

Association between Fatty Liver and Colonic Polyp

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Background: Metabolic syndrome components such as obesity and hyperlipidemia are considered the most common etiological factors for colon polyps as well contributing to the pathogenesis of fatty liver disease. We aimed to assess the relationship between fatty liver and colon polyps.

Objectives: To determine the possible association between ultrasound fatty liver stage and colonic polyps.

Methods: This retrospective cohort observational study conducted at the Intermed Hospital in Ulaanbaatar, Mongolia, included subjects who underwent screening colonoscopy over a 3 months period. Data were extracted from the patient charts and included demographics, anthropometric measurements, vital signs, underlying diseases, medical therapy, laboratory data, and results of the abdomen ultrasound. The colonoscopy report extracted polyp were also evaluated.

Results: A total of 105 patients were enrolled in study; 52.3% of patients were males. Their mean age was 48.48 11.56 years. Fatty liver stages that are determined by abdominal ultrasonography: Mild fatty liver accounts

for 25.7%, moderate fatty liver 26.7%, severe fatty liver 4.8%. Polyps are determined by colonoscopy. 42.8% of patients were evaluated polyps. Fatty liver stages were determined colon polyps. 9(20%) polyps were in mild fatty liver stage, 17 (37.7%) polyps were in moderate fatty liver stage, 2(4%) polyps were in severe fatty liver stage. Colon polyps and fatty liver abdominal ultrasonography is a statistically significant difference (OR-2.52, $P < 0.01$ 95%CI 1.36-1.98. The multivariate analysis, after adjusting for, age, BMI, glucose, HBA1c, triglycerides, HDL, LDL, total cholesterol, showed that the presence of was associated with increased risk for colon polyps ($P < 0.01$). Colon polyps were more common in overweight men ($P < 0.01$).

Conclusion: Colon polyps and fatty liver abdominal ultrasonography is a statistically significant difference. Fatty liver is specifically associated with an increased risk of colorectal adenomatous and hyperplastic polyps in men.

Key words: Fatty liver, colon polyp, metabolic dysfunction associated fatty liver disease

PE 05-47 5. Diabetes and Obesity

Phytochemical and Pharmacological Evidence for the Use of Soursop Leaves (*Annona muricata* L) Extract in Traditional Medicine from Diabetes in Indonesia

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Background: In Indonesia, diabetes is ranked as the third most deadly disease. Diabetes mellitus (DM) is a clinical syndrome of metabolic disorders. Diabetes mellitus (DM) is a chronic disease whose prevalence increases every year. Hyperglycemia is the cause of many complications. Soursop leaves (*Annona muricata* L) are believed to have many health benefits, one of which is lowering blood sugar levels. The purpose of this study was to study the phytochemical content and pharmacological evidence of the use of soursop leaf extract in the traditional treatment of diabetes.

Methods: An electronic database was utilized in this study for the purpose of review. The information gathered from the publications published in 2019 through 2023 serves as proof from Indonesia.

Results: Based on research obtained soursop leaf content that is beneficial for blood sugar are flavonoids and tannins. Flavonoids are substances that have the effect of lowering blood sugar levels. Some mechanisms include inhibiting glucose absorption in the intestine, triggering insulin release, and improving blood sugar tolerance. Tannin activates the activation of

Mitogen Activated Protein Kinase (MAPK) and Phosphoinositide (PI3K) so that more glucose will be taken into cells and levels in the blood decrease. Some previous studies that conducted research related to the effects of soursop leaf extract on blood sugar levels showed the results of a single administration of soursop leaf extract in rats was shown to reduce blood glucose levels by 75% at a dose of 100 mg / kg compared to the initial value. Meanwhile, the long-term administration of *Annona muricata* leaf extract, which is 28 days, proved to be able to provide many benefits for diabetic rats. It was stated that the administration of 180 milligrams (mg) of *Annona muricata* leaf extract and 5 mg of glibenclamide caused a promising decrease in blood sugar.

Conclusion: Based on this study, it proves that the phytochemical content and pharmacology of the use of soursop leaf extract in the traditional treatment of diabetes show good results and can be used as an alternative in medicine to stabilize blood sugar in diabetic patients.

PE 05-48 5. Diabetes and Obesity

ASSOCIATED FACTORS OF TYPE 2 DIABETES MELLITUS IN INDONESIAN ADOLESCENTS

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Background: The type 2 diabetes is a common condition that causes the level of sugar (glucose) in the blood to become too high, chronic health condition that can lead to other serious health issues such as heart disease, stroke, blindness, and kidney failure. According to data from the Institute for Health Metrics and Evaluation, diabetes was Indonesia's 3rd highest cause of death in 2019, namely around 57.42 deaths per 100,000 population. Data from the International Diabetes Federation (IDF) found that the number of diabetics in 2021 in Indonesia has increased rapidly in the last ten years. This number is expected to reach 28.57 million in 2045 or 47% greater than 19.47 million in 2021. Diabetes suffered by adolescents is likely caused by lifestyle and health problems. Factors such as genetics can increase a teenager's risk of developing diabetes, but many unhealthy lifestyles are the main problem that causes young people to develop diabetes eventually. This study aims to determine associated factors of type 2 diabetes mellitus in Indonesian adolescents.

Methods: The method used was studying secondary data from published journals and evaluated by searching in PubMed, EMBASE, and the Cochrane Library database. Of the several journals collected, 20 articles were selected. The search for articles included the following criteria; the articles must be published in the last 10 years (from 2014-2024) and the

sampled was adolescent in Indonesia.

Results: Based on the dependent variable, it was found that 18 factors were related to type 2 diabetes mellitus in adolescent in Indonesia. Those factors were physical activity, history of hypertension, high triglycerides, history of dyslipidemia, exercise habits, body mass index (BMI), education level, low economic income, consumption of fast food, consumption of instant drinks, smoking habits, heredity, age, obesity, insulin resistance, blood sugar levels, consumption of fruits-vegetables and unhealthy lifestyle. Need to increase health promotion about the factors that cause the incidence of type 2 diabetes mellitus and its prevention in adolescents.

Conclusion: It is recommended to increase health promotion about the factors that cause the incidence of type 2 diabetes mellitus and its prevention in adolescents. Furthermore, type 2 diabetes mellitus in adolescents should be prevented as early as possible.

Keyword: Diabetes, type 2 diabetes mellitus, adolescence, Indonesia

Poster Exhibition

6. Dyslipidemia, Hypertension and Obesity

PE 06-01 6. Dyslipidemia, Hypertension and Obesity

Application of a Metabolite Risk Score Model for Dyslipidemia in Koreans

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Background: Metabolites interact with diseases in a complex manner rather than acting in isolation. In this context, a metabolite risk score (MRS), which captures the collective impact of metabolites, offers a novel perspective on disease prediction. Therefore, the present study aimed to explore the predictive effects of MRS on dyslipidemia.

Methods: To construct and validate the MRS, discovery and validation sets were established, each comprising 50 healthy individuals (KCD code: Z00) and 50 dyslipidemia patients (KCD codes: E78.2 and E78.5). UPLC-MS/MS analysis was conducted for metabolomics. The MRS was developed with key dyslipidemia-related metabolites using a weighted approach based on standardized β -coefficient values from regression analysis.

Results: In the discovery set, 12 metabolites were selected based on $VIP \geq 1.5$ and FDR-adjusted p -value < 0.05 . Among them, N-acetylisoputrescine- γ -lactam and eicosapentaenoic acid were revealed as key dyslipidemia-related metabolites. These key metabolites were used to construct the MRS with the equation of $\sum \beta_i M_i$, where β_i represents the standardized β -coefficient and M_i represents a score (0 or 1) for each key metabolite, determined by its cut-off value. In the discovery set, the MRS significantly predicted dyslipidemia and showed improved performance when combined with traditional markers (lipid profiles) (Fig. 1A). In the

validation set, the MRS predicted dyslipidemia with 76.1% accuracy, which increased to 86.0% when combined with lipid profiles (Fig. 1B). The results suggest that the MRS alone exhibited sufficient predictive ability ($> 70.0\%$) in real-world settings, and its predictive ability was further enhanced with lipid profiles.

Conclusion: MRS is a proper tool for diagnosing diseases based on metabolite interactions. Further development through additional studies is necessary. Ultimately, MRS is expected to be practically applied to early disease diagnosis, facilitating easier disease management.

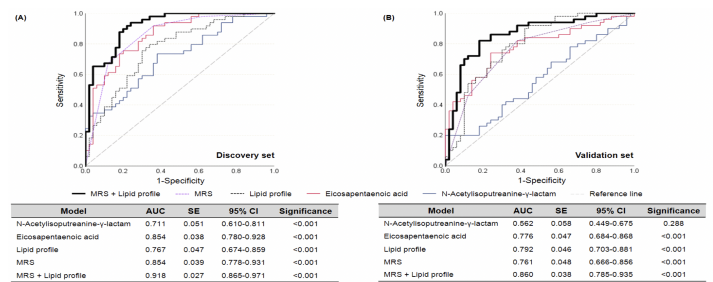


Figure 1. Prediction abilities of the key metabolites, lipid profiles, MRS, and combination of MRS and lipid profiles for dyslipidemia.

PE 06-02 6. Dyslipidemia, Hypertension and Obesity

Assessment of Anti-Hypercholesterolemic Effect of *Liberica Coffee* pulp Yogurt in Female Sprague Dawley Rat's Models

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Background: Hypercholesterolemia is considered one of the leading causes of death around 2.6 million deaths every year globally which is contributing to an increasing number of people dying due to heart attack or stroke. Nowadays people seeking a lot of treatment or alternative way to reduce the cholesterol in body. The purpose of this study is to study the effectiveness of consuming *Liberica coffee* (LC) pulp yoghurt on hypercholesterolemia induced in female rats.

Methods: The LC pulp was obtained from University Putra Malaysia, was grounded and extract using Moka pot method. Yogurt was then prepared using full cream milk cooperated with LC pulp. Rats was divided into six different group which is control group (G1) with normal diet, negative control I (G2) with high cholesterol diet (HCD), negative control II (G3) with HCD and plain yogurt, positive control (G4) with HCD and 20mg/kg simvastatin, low dose (G5) with HCD and 8.6mg/100g LC yogurt and lastly high dose (G6) with HCD and 25.6 mg/100h LC yogurt daily for 8 weeks. End of week 8 all rats was culled; blood and tissue were collected for further studies.

Results: The results showed that the G6 group rats have the significant ($p < 0.05$) lowest body weight and calorie intake compare positive control group. This is correlated to reduction of organ weight as well. For lipid

profile, total cholesterol level in G6 group show significant reduction ($p < 0.05$) compared to other treatment groups. Kidney and liver profile show no significant changes across all group. Histology of liver and kidney also show no remarkable changes among all group. However, visceral fat from G2 and G3 show hypertrophy cell compared to other group rats. The presence of caffeine in the yoghurt increases the concentration of calcium ion which causes a net reduction in the expression of lipid regulatory genes leading in a net increase in LDL-c clearance, that would eventually affect the adipose tissue formation along with the body weight of rat.

Conclusion: Overall, in this study LC pulp yoghurt with the highest dosage of at 25.7mg/100g has proven to be effective in reducing hypercholesterolemia. This suggest that even waste product of LC pulp can be used to reduced hypercholesteraemic, promoting both health and sustainability.

reduction. Furthermore, the nutritional education is regarded to be more beneficial when offered diet-only education with individual approach and long-term duration (more than 3 months). This finding provide support for the role of nutritional education in diabetes management, also stated the importance of establishing appropriate programs that have optimal outcomes for diabetes management needs to be carried out effectively.

PE 06-03 6. Dyslipidemia, Hypertension and Obesity

Relations of Triglyceride and Health Characteristics of patients received with Percutaneous Coronary Intervention

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Background: Recently, the mortality of heart diseases being increased continuously. Especially mortality of coronary artery diseases had 44.7% among heart diseases. Annually, percutaneous coronary intervention(PCI) applied for patients with coronary artery diseases increased and their complication increased also. Thus, health characteristics of patients with PCI seems have important factors seriously.

Methods: Data were collected using structured questionnaire with 132 patients with PCI in Pusan National University Hospital. The collected data were analyzed using descriptive statistics: t-test, ANOVA, Pearson Correlation Coefficients with the SPSS 28.0 program.

Results: The average age of the subjects was 63.50±5.85 and men

accounted for 78.9%. There was a statistically significant difference in health behavior according to their level of education ($t = -3.60, p < .001$), average monthly income ($t = -4.45, p < .001$), comorbidity ($t = -2.31, p < .05$), triglyceride ($t = -2.77, p < .01$).

Health behavior showed statistically significant positive correlation with social support ($r = .43, p < .001$), self-efficacy ($r = .59, p < .001$).

Conclusion: Based on these results, we suggest that triglyceride, economic status, comorbidity, social support, and self-efficacy were considered for developing education program for PCI.

PE 06-04 6. Dyslipidemia, Hypertension and Obesity

Protective effect of dapagliflozin on obesity related cardiac dysfunction in high fat high diet induced obesity in mice via modulating redox homeostasis and (PI3K)-Akt and AMPK-mTOR Signaling pathway signalling

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Background: A major risk factor for obesity, cardiac dysfunction, cardiovascular disease, and chronic heart failure, is a global health concern that is only becoming worse. An innovative class of hypoglycemic medications known as sodium-glucose cotransporter 2 inhibitors (SGLT2i) increases the excretion of glucose from urine and hence lowers blood glucose levels by specifically blocking the reabsorption of glucose and sodium from the proximal renal tubule. With its N-terminal domain suppressing oxidative stress and its COOH-terminal domain inhibiting mTOR, Sestrin2 is a new stress-inducible protein. Seldom does it have kinase activity. Here, we tested the concept that dapagliflozin ameliorates obesity-related heart dysfunction by modulating the cellular antioxidant system and AMPK-mTOR signalling pathway by using the high-fat diet (HFD)-induced obesity model.

Methods: Following 12 weeks of high-fat diet (HFD) feeding, the mice were either administered with or without 10 mg/kg of dapagliflozin for a total of 8 weeks. Every week, food consumption and body weight (BW) were recorded. Body composition and metabolic profiles, including lipids, adipokine, glucose homeostasis, and plasma insulin, were assessed following an 8-week course of dapagliflozin treatment. Along with measuring mitochondrial reactive oxygen species, we also carried out a histological analysis.

Results: By administering dapagliflozin to HFD-fed mice, metabolic problems were alleviated and body weight and total body fat were decreased. Additionally, mitochondrial damage cardiac function, cardiac hypertrophy/fibrosis and cardiac fat buildup were all decreased by dapagliflozin. Furthermore, AMPK and endothelial nitric oxide synthase phosphorylation were both markedly elevated by dapagliflozin, although Akt and mTOR phosphorylation was suppressed. Sestrin2 levels were also dramatically enhanced. In mice given a high-fat diet (HFD), the positive benefits were somewhat reduced. Remarkably, dapagliflozin administration increased the oxidative stress response mediated by Nrf2/HO-1, indicating potential anti-inflammatory and antioxidant properties. As a result, by controlling AMPK-mTOR signaling and preserving redox balance, dapagliflozin ameliorated obesity-related cardiac dysfunction.

Conclusion: The cardiovascular protection of SGLT2i i.e dapagliflozin in obesity is explained by a new mechanism revealed by these studies. Because they offer viable treatment options for obesity-related cardiac dysfunction, these encouraging results will have a significant positive influence on the area of heart failure research.

PE 06-05 6. Dyslipidemia, Hypertension and Obesity

Biological Potential Of β -sitosterol As Potent Angiotensin Converting Enzyme (ACE) Inhibitors With Their Anti-Hypertension Activity In Medicine

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Background: medicine for the treatment of human disorders due to their therapeutic potential and pharmacological activities. Medicinal plants play a vital role in the human health complications and have been used as source of food and medicine for centuries. Phytosterols is a steroidal compounds having similar structure of cholesterol and used as food supplements. β -sitosterol is the natural occurring phytosterols having steroidal moiety and cholesterol-lowering property.

Methods: Biological potential of β -sitosterol against angiotensin-converting enzyme has been investigated in the present work through scientific data analysis in order to develop better molecule from the natural sources for the treatment of hypertension and associated disorders. Different scientific data of β -sitosterol have been analyzed in order to know the therapeutic potential of β -sitosterol in medicine for their anti-hypertensive activity. However other scientific data were also analyzed to co-related with the other available pharmacological data of β -sitosterol in the scientific study to know their anti-hypertensive activity. Scientific data of molecular simulation studies of β -sitosterol with

angiotensin-converting enzyme have also been analyzed in the present work.

Results: Scientific data analysis of β -sitosterol revealed the biological potential and therapeutic effectiveness of β -sitosterol in medicine. Scientific data analysis signified that β -sitosterol could be used for the treatment of hypertension and other associated secondary complications. Further, scientific study also signified the importance of angiotensin-converting enzyme (ACE) in medicine for the treatment of hypertension. Scientific data analysis also revealed that β -sitosterol decreased serum total cholesterol, serum triacylglycerols and low-density lipoprotein cholesterol which justified their anti-atherosclerosis property. Further, β -sitosterol also reduced cholesterol levels by competing with cholesterol for absorption in the intestine and valuable for cardiovascular protection.

Conclusion: Present investigation scientific data revealed the antihypertensive potential of β -sitosterol and could be used as a candidate for the treatment of cardiovascular complications.

PE 06-06 6. Dyslipidemia, Hypertension and Obesity

Association Between Adiposity Measures And Blood Pressure Among Adults In Klang Valley, Malaysia

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Background: public health, it is crucial to examine the relationship between adiposity measures and blood pressure for better prevention and treatment methods. This study aimed to explore the association between adiposity measures and blood pressure among adult in Klang Valley, Malaysia.

Methods: This cross-sectional study involved 249 adults (125 male; 124 female) aged between 18 and 30 years old. Standardized procedures were employed to determine anthropometric measurements, body composition, and blood pressure, while simultaneously gathering socio-demographic information from participants. Body mass index (BMI), waist-to-hip ratio (WHR), body adiposity index (BAI), and body shape index (ABSI) were calculated.

Results: Males exhibited higher body weight, height, waist circumference (WC), and systolic blood pressure (SBP) compared to females ($p < 0.001$), along with higher WHR ($p < 0.01$) and ABSI ($p < 0.05$). Systolic blood pressure

(SBP) exhibited the highest correlation ($p < 0.001$) with WC ($r = 0.48$), and weaker correlations ($p < 0.05$) were observed with body weight ($r = 0.39$), BMI ($r = 0.27$), ABSI ($r = 0.27$), and BAI ($r = 0.21$). Weak correlations ($p < 0.05$) were observed between diastolic blood pressure (DBP) and WC ($r = 0.36$), body weight ($r = 0.27$), ABSI ($r = 0.22$), BMI ($r = 0.19$), BAI ($r = 0.18$), and body fat percentage (%BF) ($r = 0.14$). Participants with abdominal obesity had higher odds of being prehypertensive or hypertensive (adjusted odds ratio [aOR] 7.54; 95% CI 3.58, 15.88), followed by participants with overweight and obesity (aOR 2.02; 95% CI 1.02, 3.98) after adjusting for sex. Multiple linear regression showed WC was positively associated with both SBP and DBP.

Conclusion: The WC had the strongest predictive ability for both SBP and DBP. These findings highlight the critical importance of monitoring and addressing central adiposity in the prediction and management of blood pressure levels.

PE 06-07 6. Dyslipidemia, Hypertension and Obesity

Diet Design for a Controlled-Feeding Trial to Determine Salt-Sensitivity of Blood Pressure in Middle-Aged Women

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Background: A low-sodium diet is often prescribed for managing hypertension, although its effectiveness is limited to about half of adherents, primarily those who exhibit salt sensitivity.¹ Controlled feeding trials are pivotal in establishing causal links between sodium intake and blood pressure and refining precision nutrition approaches to tailor dietary guidance to risk profiles within population subgroups. The design of menus constitutes a critical component of these trials. We aim to formulate two menu cycles for a randomized, two-arm crossover, controlled feeding trial to evaluate individual blood pressure responses to salt intake.

Methods: Using a practical manual design procedure, we created 7-day menu cycles for 1,600 and 2,000 kcal levels. These menus were designed to meet low sodium (1150 mg) and high sodium (5750 mg) targets predetermined by the outpatient reference method for assessing salt sensitivity.² Potassium content is held constant between diet versions. Food selections were based on commonly consumed foods in the region. Calorie levels will be prescribed based on individual energy requirements.

Results: Seven-day, 1,600, and 2,000 kcal, low-sodium menu cycles consisting of three meals and snacks daily were created. Menu selections

included foods that will be prepared in the teaching kitchen, commercially available pre-packaged frozen items, and sodium-free bottled water. The high-sodium menu consists of the low-sodium menu cycle (~1150 mg of sodium) supplemented with two bullion packets (2200 mg of sodium) to be mixed with water and salt packets added to prepared foods (2400 mg of sodium).

Conclusion: The developed two-week menus offer a standardized dietary plan for future controlled feeding studies to examine salt sensitivity in blood pressure. Documenting the diet and menu design procedures can enhance future study budgetary planning and consistency in implementing the dietary protocol across studies using the outpatient reference method.

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PE 06-08 6. Dyslipidemia, Hypertension and Obesity

The Inadequacy of Body Mass Index: A Comparative Analysis of Obesity Indices and Their Association with Cardiometabolic Risk Factors in A Rural South Indian Population

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Background: Studies describing the 'Asian Indian Phenotype' have shown that Indians are at a higher risk of developing cardiometabolic diseases (CMD) despite lower BMIs compared to Caucasians. This study used a novel classification system that combines BMI with a central obesity marker and investigated its sex-specific associations with CMD.

Methods: We used baseline cross-sectional data (n=3,397) from the ongoing Srinivasapura Aging, Neuro Senescence and Cognition (SANSCOG) study, involving participants ≥ 45 years. Five obesity indices were used: Body Mass Index (BMI); Waist Circumference (WC) based on IDF, WHO, and ATP criteria; Waist-Hip Ratio (WHR); Waist-Height Ratio (WHtR); and visceral fat percentage (VFP). The overlap between central obesity indices and BMI was studied using Cohen's Kappa (K). Multivariate multinomial logistic regression was employed to analyze the association between obesity indices and CMD.

Results: Overlap among participants indicated that BMI showed fair agreement with VFP (female,K=0.367; male,K=0.308) and WC with IDF criteria (female,K=0.497; male,K=0.529), moderate agreement with WHtR (female,K=0.442; male,K=0.573), and poor agreement with WHR

(female,K=0.157; male,K=0.243). Across both sexes, a strong association was observed between CMD and abnormal BMI combined with any of the four central obesity indices studied (p<0.001). The odds of having diabetes (females:OR=8.98,CI=4.74-19.30;males:OR=6.77,CI=4.22-11.47), hypertension (females:OR=2.43,CI=1.61-3.74;males:OR=2.02,CI=1.42-2.90),and dyslipidaemia (females:OR=2.79,CI=1.27-5.81;males:OR=3.83,CI=2.27-6.39) were significantly higher in participants with abnormal BMI and abnormal WHR as compared to those with normal BMI and WHR (p<0.001). Normal-weight males with CMD had increased odds of having an abnormal WHR, especially in those with diabetes (OR=3.51,CI=2.14-6.04;p<0.001) and dyslipidaemia (OR=2.04,CI=1.22-3.37;p<0.01).

Conclusion: Our analysis demonstrated that combining WHR and BMI is significantly more effective than BMI alone in identifying high-risk groups for CMD in both sexes in the South Indian population. This combined metric is particularly useful in identifying the previously overlooked group with normal-weight obesity or 'occult obesity', providing a more accurate assessment of cardiometabolic risk in males.

PE 06-09 6. Dyslipidemia, Hypertension and Obesity

The Correlation Between Metabolic Syndrome And Serum Ferritin Levels In Mongolian Men

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Background: It was hypothesized that the percentage of increased serum ferritin is high due to the fact that Mongolians consume iron-rich meat from sheep and cattle every day. Some study have shown ferritin is associated with various cardiometabolic risk factors such as dyslipidemia and insulin resistance in adults.

Methods: A cross-sectional study involved 610 men who underwent preventive examination of the institution from the Health preventive center, Erdenet Medical Hospital in 2022. We analyzed serum levels T-Chol, TG, HDL, LDL, GLU and evaluated them in relation to ferritin levels. The clinical characteristics of the groups were compared using Independent Samples test. Serum ferritin level ≥ 430 ng/ml in men, it was considered elevated. According to Mongolian guidelines for dyslipidemia, T-cholesterol >5.2 , Triglycerides >2.3 , HDL <1.0 , LDL >3.4 were considered abnormal and glucose >6.1 mmol/L was considered hyperglycemia. According to the IDF classification, metabolic syndrome was classified.

Results: Serum ferritin levels were 419.75 ± 297.77 ng/ml. The percentage of elevated serum ferritin was 34.2%. Central obesity was 52.4 percent of all men, arterial hypertension was 26.9%, and metabolic syndrome was 21.8%. The percentage of dyslipidemia and hyperglycemia was higher in the group with elevated serum ferritin. In the group with elevated serum ferritin, 51.1 % of participants had a high TC level, 11.3 % had a low HDL level, 40 % had a high LDL level, 14.1 % had a high TG level and 23.3% had hyperglycemia. Metabolic syndrome was 28.9% in the group with elevated ferritin and 17.2% in the normal group, and there were differences between the two groups. ($p=0.001$). The mean serum ferritin level in the group of men with metabolic syndrome was 522.7 ± 32 ng/ml, while that in the group of men without metabolic syndrome was 390.6 ± 28 ng/ml.

Conclusion: Ferritin was higher in the metabolic syndrome group.

PE 06-10 6. Dyslipidemia, Hypertension and Obesity

Exploring the Efficacy of *Aspalathus linearis* and *Citrus bergamia* in Combating Hypercholesterolemia and Obesity: Enzyme Inhibition, Antioxidant Activity, and Phytochemical Analysis

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Background: Hypercholesterolemia, characterized by elevated low-density lipoprotein cholesterol (LDL-C) levels, and obesity, defined by excess body fat accumulation, are significant health concerns. While statins and orlistat are the commonly used drugs to manage LDL-C, their long-term usage are associated with adverse effects. Consequently, there is a growing interest in herbal alternatives that may mitigate these conditions with less or no side effects.

Methods: This study investigated the biological activity of *Aspalathus linearis* (*A. linearis*) and *Citrus bergamia* (*C. bergamia*) extracts through in-vitro enzyme inhibition assays targeting HMG-CoA reductase, pancreatic lipase and cholesterol esterase. Antioxidant activities were assessed using DPPH, ABTS, and FRAP assays. High-Resolution Mass Spectrometry (HRMS) was employed to identify the phytochemicals present in these extracts.

Results: *A. linearis* and *C. bergamia* extracts demonstrated significant inhibitory effects on key-enzymes: 82% and 44.5% inhibition against HMG-CoA reductase, respectively; 62.46% and 56.91% inhibition against

pancreatic lipase, respectively; and 70.94% and 84.90% inhibition against cholesterol esterase, respectively. The antioxidant activity of *A. linearis* and *C. bergamia* extracts, assessed via DPPH, showed IC₅₀ values of 90.10 µg/ml and 260.4 µg/ml, respectively. The ABTS assay revealed IC₅₀ values of 10.86 µg/ml and 37.92 µg/ml, respectively, while the FRAP assay showed IC₅₀ values of 139.7 µg/ml and 370.1 µg/ml, respectively. Overall, extracts from *A. linearis* and *C. bergamia* exhibited high antioxidant activities in DPPH, ABTS, and FRAP assays. Based on HRMS analysis, *A. linearis* was found to contain 16 flavonoids, while *C. bergamia* contain 2 flavanols, 4 oxygen heterocycles, 1 limonoid, 1 flavone-O-glycoside, and 2 flavonoids.

Conclusion: The selected herbs, rich in diverse phytochemicals, demonstrated significant enzyme inhibition and antioxidant capacities, offering promising prospects in ameliorating hypercholesterolemia and obesity. Currently the ongoing research is focusing on in-silico molecular docking analysis and in-vivo studies, to elucidate the compounds accountable for the effects and to further explore their therapeutic applications.

PE 06-11 6. Dyslipidemia, Hypertension and Obesity

The Association Between Body Mass Index, Hyperlipidemia, and Smoking with Graves Orbitopathy Incidence: A Systematic Review and Meta-Analysis

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Background: Graves' orbitopathy (GO) was associated with reduced quality of life and, ultimately, vision loss. The substantial morbidity linked to this disease should be reduced by emphasizing disease prevention, given the limited therapeutic options. We investigate the association between body mass index (BMI), hyperlipidemia, and smoking as risk factors for GO patients.

Methods: A literature search was performed in the PubMed database to retrieve studies. Patients with GO were included in this study. Relevant studies meeting defined eligibility criteria were selected and reviewed systematically according to the PRISMA flowchart and RevMan 5.4 was used for data analysis. BMI, hyperlipidemia, and smoking were considered as exposure, and incidence of GO was considered as outcome.

Results: There were 678 articles throughout 2019-2024 in the database. Five articles with 7871 patients were included for meta-analysis after screening for duplication with inclusion and exclusion criteria. Our

analysis showed that higher BMI (mean difference [MD]: 1.29, 95% confidence interval [CI] 0.01–2.57; I²: 87%) and hyperlipidemia (odds ratio (OR): 2.64, 95% CI 0.19–36.02; I²: 71%) were associated with higher chance to develop GO in GD patient, although this had high heterogeneity among the studies. Smoking was associated with higher risk to develop GO in GD (OR: 1.87, 95% CI 1.34–2.62; I²: 33%), with low heterogeneity among the studies.

Conclusion: We found that higher BMI, hyperlipidemia, and smoking could increase the risk of GO. Furthermore, higher BMI in overweight and obesity patients, hyperlipidemia and smoking habits should be modified to prevent or lower the risk of GO in GD patients.

Keywords: body mass index, Graves orbitopathy, hyperlipidemia, incidence, risk factor, smoking

PE 06-12 6. Dyslipidemia, Hypertension and Obesity

Case Study: Self-Awareness in Weight Loss Management Enhance Improvement in Metabolic Parameter

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Background: Metabolism is a dedicated network of enzyme and metabolite-derived mechanism that is hallmark of life activities. Weight loss is associated with metabolic changes, mostly favorable to improving the overall health of an individual. Although many individuals attempt to lose weight, not everyone achieves optimal success. Self-awareness of current weight and metabolic condition can help an individual prevent more weight gain and severe metabolic problems.

Methods: A 38 year old obese female was selected to conduct the study that suffering from hypertension and dyslipidemia for the last 2 years, and also in current laboratory findings there was increasing HbA1C parameter. The patient was given a healthy balanced diet meal plan including 120 mg orlistat twice daily and diethylpropion 25 mg twice daily. After month of medication and healthy proper balanced diet, patient exhibited 10% of body weight with a little bit of uncomfortable side effect of the medication. In the second month, without the medication, patient

intensively continue the healthy proper balanced diet with adequate protein intake 1-1.2 g/bw/day. We measured the primary outcome variables are body weight, blood pressure, waist circumference, HbA1C, and cholesterol level.

Results: The Patient exhibited 10% and 15% of body weight in the first and second month, respectively. After successful manage 25% weight loss in two months patient also demonstrated improvement in blood pressure (decrease from 160/100 mg/dL to 120 mg/80 mg/dL) and waist circumference (decrease 8%). Additionally, from laboratory parameters patient exhibited 22% of HbA1C and 8% of cholesterol serum level.

Conclusion: Balance diet with adequate protein intake can effectively normalize metabolic parameter after significant of loss of body weight. Self-awareness is a major factor for weight loss. As the physician, we need to explore the patient awareness and behavior to get the suitable therapy.

PE 06-13 6. Dyslipidemia, Hypertension and Obesity

Involvement of endocan in vascular dysfunction in angiotensin II-induced hypertensive mice

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Background: Hypertension is a major risk factor for cardiovascular disease and a leading cause of death worldwide. Vascular endothelial dysfunction plays an important role in the initiation and maintenance of hypertension. Endocan (endothelial cell-specific molecule-1), a soluble proteoglycan primarily expressed in endothelial cells, has recently been found to have elevated in serum of hypertensive patients. Clinical studies suggest that this elevation may be associated with endothelial dysfunction in hypertension. However, there is insufficient research data on the involvement of endocan in vascular dysfunction in hypertension. The aim of this study is to investigate the involvement of endocan in vascular endothelial dysfunction associated with hypertension and to explore its underlying mechanisms.

Methods: Eight-week-old male C57BL/6 mice administered with normal saline or endocan (0.6mg/kg by intraperitoneal injection every two days) or angiotensin II (1000 ng/kg/min) by osmotic minipumps for 4 weeks. Systolic blood pressure was determined using the tail-cuff system. After mice were sacrificed, the serum endocan levels were measured in all groups of mice using a mouse endocan enzyme-linked immunosorbent assay (ELISA) kit. Vascular function was investigated in mesenteric

resistance arteries using a multi-wire myograph system. Human umbilical vein endothelial cells (HUVECs) was treated with angiotensin II at different concentrations (0, 0.01, 0.1, 1, 10 uM) for 24 hours

Results: Administration of endocan significantly increased systolic blood pressure. Endothelium-dependent relaxation (EDR) was significantly reduced in the mesenteric resistance arteries from endocan-treated mice compared to vehicle-treated mice. However, there was no difference in vascular relaxation induced by sodium nitroprusside administration between the two groups. Furthermore, endothelium-dependent relaxation was significantly reduced in angiotensin II-induced hypertensive mice which was associated with increase in serum endocan level. Treatment of angiotensin II to HUVECs induced concentration-dependent elevation of endocan levels in cell culture medium and cell lysate.

Conclusion: In this study, we suggest that increase in circulating endocan level causes vascular dysfunction by impairing vascular relaxation, which may lead to elevated blood pressure.

PE 06-14 6. Dyslipidemia, Hypertension and Obesity

Double Burden of Malnutrition And Hypertension Among Bhil Tribe Of Jaisalmer, Rajasthan

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Background: Hypertension has emerged as a global health burden, specifically in developing countries. This burden is more noticeable among indigenous and tribal groups that were once considered to be less prone to such complex disorders. Malnutrition (undernutrition and overnutrition) poses enhanced risk for developing hypertension. Lifestyle, nutritional and epidemiological transitions among the tribal populations has increased the risk of hypertension among such populations. Simultaneous co-existence of undernutrition and overnutrition among tribal populations exemplifies obesity paradox. Therefore, the present study is an attempt to assess the burden of hypertension and malnutrition and their associated risk factors among Bhil tribal population of Rajasthan state, India.

Methods: The present study was conducted among 210 Bhil adults (84 males, 126 females), of Rajasthan, India. Waist Circumference (WC), Waist-to-Hip Ratio (WHR), Waist Height Ratio (WHtR) and BMI were measured using a standard protocol. Blood Pressure was obtained using an Automatic Digital Blood Pressure machine and categorised on the basis of American Heart Association (AHA) guidelines. Sociodemographic variables were collected using an interview schedule.

Results: The study reveals a high burden of hypertension (elevated blood pressure-11.7%, 27.7%-stage 1, and 12.6%-stage 2) and malnutrition (overweight/obese-34.78%) and undernutrition (22.7%). There is a significant association between WHR and hypertension (p-value 0.005). MUAC shows a strong positive correlation with systolic blood pressure (p-value < 0.001) after adjusting for sociodemographic variables. Individuals with high waist circumference have a fourfold increased risk of hypertension stage 2 (p-value 0.002).

Conclusion: These results highlight malnutrition as a potential risk factor for hypertension, emphasizing the need for targeted interventions to improve nutrition and reduce hypertension within this community. The study underscores the importance of culturally sensitive public health policies to address these health issues, ultimately aiming to enhance health outcomes and quality of life for the Bhil population.

Keywords: Blood Pressure, BMI, WC, WHR, WHtR, Bhil.

PE 06-15 6. Dyslipidemia, Hypertension and Obesity

Hypertension Prevalence and Its Association with Sociodemographic and Lifestyle Factors: An Anthropological Study Among the Bhils of Jaisalmer, Rajasthan, India

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Background: Hypertension is one of the major risk factors for various cardio-metabolic diseases. In India, there is an increasing trend in hypertension prevalence among the general population and tribal populations. Several studies show that, sociodemographic and lifestyle factors such as physical inactivity, smoking, high salt intake, and excess alcohol consumption. This present study aims to determine the prevalence of hypertension and its association with Sociodemographic and Lifestyle Factors among the Bhils of Jaisalmer, Rajasthan.

Methods: A cross-sectional study encompassing a total of 151 participants, 55 Males, and 96 Females were recruited for this study. Data on all the socio-demographic and lifestyle variables, such as age, sex, education, literacy, marital status, physical activity, salt consumption, alcohol consumption, smoking, and green leafy vegetables were collected from the participants. Systolic and Diastolic blood pressure were obtained by using an automatic digital Blood pressure machine. Descriptive statistics and chi-square analyses were performed to determine the prevalence of hypertension and its association with sociodemographic and lifestyle variables. The data was analyzed in SPSS software version 22.

Results: The overall prevalence of hypertension among this tribal population is 58.6%. Among males, the prevalence was 80% which is significantly higher compared to their female counterparts (46.3%). males and 46.3 % of females are

hypertensive. Further, Age (less than 35 years=49.2%; more than 35 years= 65.9%), Occupation (employed=50.9%; unemployed= 77.3%), smoking status (nonsmoker= 54.2%; smoker = 75.0%), salt consumption (consume extra salt= 97.5%; Don't consume extra salt=14.3%) is significantly associated with hypertension (Table 1).

Conclusion: The prevalence of hypertension in the present study is quite alarming, with more than half of the population affected. There is a critical need for targeted interventions and public health strategies to address hypertension within this demographic, with particular emphasis on high-risk groups identified by age, occupational status, smoking habits, and dietary practices.

Table1. Hypertension Prevalence and Its Association with Sociodemographic and Lifestyle Factors

Variable	Non-Hypertension N (%)	Hypertension N (%)	Chi-square value, P value
Age			4.212, 0.040
Less than 35 Years	33 (50.8%)	32 (49.2%)	
35 Years and above	29 (34.1%)	56 (65.9%)	
Sex			16.299, 0.000
Male	11 (20.0%)	44 (80.0%)	
Female	51 (53.7%)	44 (46.3%)	
Occupation			8.889, 0.003
Employed	52 (49.1%)	54 (50.9%)	
Unemployed	10 (22.7%)	34 (77.3%)	
Salt Intake			106.61, 0.000
Consume extra salt	2 (2.5%)	78 (97.5%)	
Don't consume extra salt	60 (85.7%)	10 (14.3%)	
Smoking			4.212, 0.040
Non- Smoker	54 (45.8%)	64 (54.2%)	
Smoker	8 (25.0%)	24 (75.0%)	

PE 06-16 6. Dyslipidemia, Hypertension and Obesity

Obesity and Dyslipidemia among young adults of Delhi NCR, India.

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Background: Obesity is a well-established risk factor for dyslipidemia which contributes to cardiovascular diseases (CVDs). The prevalence of both obesity and dyslipidemia is rising globally and increasingly affecting younger populations as well. Therefore, this study aims to explore the association between obesity indices and the risk of dyslipidemia among young adults in Delhi, NCR, India.

Methods: The present study is a cross-sectional study carried out among 3375 college-going young adults from Delhi NCR, India. Data was collected on sociodemography and lifestyle variables. Obesity indices was determined by anthropometric measurements. Blood samples were collected and serum was separated for biochemical analysis. SPSS 22 was used for statistical analysis.

Results: Results: When examining the distribution of obesity indices in lipid variables, general obesity, as indicated by overweight/obese BMI, was significantly higher in individuals with high TC, LDLC, and high TG. Abdominal obesity, defined by high WC and high WHtR, was significantly higher in those with high TC, low HDLC, high LDLC, and high TG. Additionally, high WHR was significantly associated with low HDLC, high LDLC, and abnormal TG levels. Odds ratio analysis after adjusting for confounding factors (age and sex) reveal that Overweight/ Obese, high

WC, high WHR and high WHtR are significantly associated with increased risk for high TC and high TG. Overweight/Obese also posed increased risk for low HDLC. High WC and high WHtR posed increased risk for high LDLC.

Conclusion: This study highlights the importance of understanding population-specific mechanisms of risk factors and underscores the need for targeted interventions and programs tailored for young adults to mitigate the risk of metabolic disorders and other comorbidities.

Table: Distribution and association of obesity indices with lipid variables in the study population

Obesity indices	TC		p-value	OR (95% CI)	HDL		p-value	OR (95% CI)	LDL		p-value	OR (95% CI)	TG		p-value	OR (95% CI)
	Normal N (%)	At risk N (%)			Normal N (%)	At risk N (%)			Normal N (%)	At risk N (%)			Normal N (%)	At risk N (%)		
BMI	1185 (70.1%)	502 (29.9%)	0.000*	reference	952 (57.8%)	788 (42.2%)	0.166	reference	1212 (72.9%)	377 (27.1%)	0.000*	reference	1091 (65.9%)	584 (34.1%)	0.000*	reference
Overweight	910 (54.4%)	784 (45.6%)	0.000*	1.886* (1.174-3.027)	407 (24.2%)	188 (10.8%)	0.000*	1.515* (1.012-2.278)	823 (48.3%)	87 (5.1%)	0.000*	1.775 (1.094-3.172)	400 (23.8%)	143 (8.6%)	0.000*	2.581* (2.001-3.354)
Obese	223 (13.4%)	161 (9.6%)	0.001*	reference	157 (9.3%)	769 (45.7%)	0.000*	reference	2266 (134.3%)	64 (3.7%)	0.000*	reference	1960 (116.8%)	344 (20.4%)	0.000*	reference
High	619 (34.4%)	53 (3.1%)	0.325	1.528* (1.031-2.260)	413 (24.6%)	279 (16.4%)	0.000*	0.798 (0.632-1.003)	651 (39.3%)	41 (2.4%)	0.044*	1.239-3.229 (19.2%)	467 (28.2%)	225 (13.7%)	0.000*	2.379* (2.227-3.514)
WHR	1875 (111.5%)	95 (5.7%)	0.325	reference	1341 (80.1%)	631 (39.9%)	0.000*	reference	1916 (115.2%)	59 (3.5%)	0.044*	reference	1658 (99.3%)	312 (18.9%)	0.000*	reference
High	985 (59.3%)	59 (3.5%)	0.000*	1.071* (0.731-1.576)	628 (37.9%)	416 (25.2%)	0.001*	1.158 (0.941-1.421)	999 (59.9%)	46 (2.8%)	0.000*	1.529 (0.956-2.443)	768 (46.0%)	276 (16.5%)	0.000*	2.142* (1.710-2.697)
WHtR	2040 (121.2%)	90 (5.4%)	0.000*	reference	1434 (86.7%)	707 (42.5%)	0.001*	reference	2086 (126.5%)	58 (3.4%)	0.000*	reference	1838 (111.5%)	300 (18.5%)	0.000*	reference
High	828 (49.4%)	66 (3.9%)	0.000*	1.494* (1.034-2.161)	550 (33.1%)	344 (20.6%)	0.001*	1.228 (0.990-1.538)	847 (50.6%)	48 (2.9%)	0.000*	1.772 (1.122-2.798)	602 (36.4%)	293 (17.7%)	0.000*	2.815* (2.276-3.483)

PE 06-17 6. Dyslipidemia, Hypertension and Obesity

Cardiometabolic Risk Factors Change among Health Professionals during the COVID-19 Pandemic at A Medical Center in Southern Taiwan – A Three-year Follow-up

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Objectives: Obesity and obesity-related cardiometabolic disorders became more significant during the COVID-19 pandemic periods. The purpose of this study is to evaluate the change of cardiometabolic risks among health professionals during the COVID-19 pandemic at a medical center in Taiwan.

Methods: This is a cohort study design conducted from 2019 to 2022. The participants have participated in annual physical check-up during those three years. Cardiometabolic risk factors were measured using standard methods. We also collected weight status change using BMI during this period. We used McNemar test and Wilcoxon Sign Rank test to evaluate the differences between and among subgroups. We used a logistic regression to examine the risk of increase cardiometabolic risk among different weight status change subgroups.

Results: A total of 2,217 participants, consisting of 1,641 females and 576 males, were included in this study, with a mean age of 40.2 ± 10.2 years (ranging from 24 to 65 years). During the COVID-19 pandemic, 72 (4.4%)

participants' weight status changed from normal weight to overweight or obesity and 530 (32.3%) females remained overweight or obese during this period. Among males, the percentage was 6.8% and 61.1%, respectively ($p < 0.01$). Participants who remained overweight or obese have more adverse cardiometabolic risks. For example, compared with normal weight subjects, the mean SBP (131.0 ± 18.1 mmHg) and fasting glucose (94.4 ± 13.52 mg/dl) were higher in overweight subjects ($p < 0.01$). More interestingly, among females, those who remained overweight or obese has 4.12 (95%CI 3.22-5.27) times higher risk for abnormal SBP and 2.98 (2.05-4.32) times higher risk for abnormal glucose level than those with normal weight status.

Conclusions: From this study, those remained overweight or obese developed more adverse cardiometabolic risks such as high blood pressure, hyperglycemia and dyslipidemia. Prevention programs may be needed to prevent these adverse cardiometabolic risks during a pandemic and quarantine period.

PE 06-18 6. Dyslipidemia, Hypertension and Obesity

Predicting Hypertension: Comparative Impact of General and Abdominal Obesity in Rural Punjab, India

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Background: Hypertension is a significant public health concern in India, leading to an increased risk of premature mortality. Both general and abdominal obesity are recognized as major risk factors for developing various cardiovascular diseases (CVD), including hypertension. This study aims to determine whether abdominal or general obesity better predicts hypertension among the rural population of Punjab, India.

Methods: This cross-sectional study was conducted among 2310 individuals of both sexes, aged 30-75 years, residing in Mansa, Punjab, India. Sociodemographic data were collected using a pre-tested interview schedule. Blood pressure and anthropometric measurements (weight, height, waist circumference, and hip circumference) were obtained using standardized protocols. Statistical analyses were performed using SPSS software.

Results: Correlation analysis revealed that waist circumference (WC), an indicator of abdominal obesity, had the strongest correlation with both systolic blood pressure (SBP) and diastolic blood pressure (DBP) compared to BMI, waist-to-hip ratio (WHR), and waist-to-height ratio (WHtR). Adjusted odds ratio analysis showed that individuals with

higher WC are at a greater risk for prehypertension (OR=1.602; $p=0.004$) and hypertension (OR=3.018; $p<0.001$). However, higher BMI was also associated with increased risks for prehypertension (OR=1.717; $p=0.001$) and hypertension (OR=3.180; $p<0.001$). Underweight individuals were found to be protective against hypertension (OR=0.547; $p=0.046$).

Conclusion: The findings indicate that while abdominal obesity, as measured by WC, is a strong predictor of hypertension, the role of general obesity measured by BMI should not be ignored. Both types of obesity are important in assessing cardiovascular risk. Intervention programs should prioritize reducing WC and BMI through behavioral changes and lifestyle modifications, including diet and exercise, to effectively reduce the incidence of hypertension and improve public health in rural Punjab.

PE 06-19 6. Dyslipidemia, Hypertension and Obesity

Biological Potential and Therapeutic Benefit of Tricetin on Atherosclerosis with their Molecular Mechanism through Scientific Data Analysis in Medicine

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Background: Traditional medicines have been used in the history for the maintenance of health, prevention and improvement of human health. Phytochemicals are pure, active plant chemicals found to be present in the flower, leaf, seed, stem, root, vegetables, herbs, and fruits. Phytochemicals have been utilized as a source of Nutraceuticals by human beings for a long time to treat disease in medicine. A large number of useful drugs used for the treatment of human health complications in the modern age were also derived from natural source.

Methods: Numerous scientific databases has been searched and analyzed in the present investigation in order to know the health beneficial aspects of tricetin in medicine. Biological potential and therapeutic benefit of tricetin on atherosclerosis has been investigated through scientific data analysis of various scientific research works. Pharmacological activities of tricetin have been also investigated in the present investigation to know the health beneficial aspects of tricetin against atherosclerosis.

Results: Scientific data analysis of different scientific research works revealed the biological importance of tricetin in medicine. Scientific data analysis revealed the biological potential and therapeutic benefit of tricetin in atherosclerosis as tricetin suppressed oxidized low-density lipoprotein (ox-LDL)-induced expression of pro-inflammatory monocyte chemotactic protein-1 (MCP-1) and interleukin-1 β (IL-1 β) which signified their effectiveness against atherosclerosis in medicine. Further, other pharmacological investigation also supports the present work for their effectiveness on atherosclerosis.

Conclusion: Scientific data analysis revealed the biological potential and therapeutic benefit of tricetin in atherosclerosis.

Poster Exhibition

7. Other Comorbidities of Obesity and Metabolic Syndrome

PE 07-01 7. Other Comorbidities of Obesity and Metabolic Syndrome

How Spouses Influence Metabolic Syndrome

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Background: There is little known about the influence of shared lifestyle behaviors on the concordance of chronic diseases in couples. The present study assessed the association of spousal metabolic syndrome and lifestyle behaviors with their own metabolic syndrome in Korean couples.

Methods: Using data from the Korea National Health and Nutrition Examination Survey 2019-2021, 1824 couples with complete data including metabolic syndrome parameters, sociodemographic information, health behaviors, and nutritional information for both spouses were included in the study. The analysis was performed using general linear model and logistic regression.

Results: In 10.7% of couples, both partners had metabolic syndrome, with the highest concordance rate for hyperglycemia (28.7%) among the components of metabolic syndrome. Couples had 52.6-88.9% concordance in sociodemographic characteristics, 1.3-39.7% concordance in health behaviors, and 3.7-16.3% concordance in nutritional status. In multivariate analysis, the odds of having metabolic syndrome in both partners were 1.04-1.52 times higher with increasing mean age of the couple, both having poor subjective health, and both consuming excessive carbohydrates, whereas the odds were 26-38% lower with both having higher education and regular strength exercise. When considering their own factors and spouse's metabolic syndrome, the

odds of having a husband or wife with metabolic syndrome were higher with increasing mean age of the couple, having a spouse with metabolic syndrome, their own poor subjective health, and their own smoking. The odds of the husband having metabolic syndrome increased by his alcohol consumption and sedentary behavior, but decreased by his strength exercise and adequate protein intake. The odds ratio of the wife having metabolic syndrome was increased by her excessive carbohydrate intake, but decreased by her alcohol consumption and regular strength exercise. When considering both the husband's and wife's characteristics together, the odds of having metabolic syndrome increased with the average age of the couple, the presence of metabolic syndrome in the spouse, and their own poor subjective health, but decreased with their higher education and regular strength exercise. The odds ratio for metabolic syndrome was increased in husbands by their spouse's smoking and in wives by their own and their spouse's excessive carbohydrate intake. The odds of having metabolic syndrome in wives were decreased by higher spousal education, subjective poor health of the spouse, and increased sedentary behavior of the spouse.

Conclusion: The results suggest that concordant social factors, health behaviors, and nutritional status in couples are associated with concordant metabolic syndrome in couples, and that these factors and the metabolic syndrome of the spouse are associated with the metabolic syndrome of the individual.

PE 07-02 7. Other Comorbidities of Obesity and Metabolic Syndrome

Role and relationship between vitamin D and arterial stiffness in non-dialysis-dependent chronic kidney disease in old aged patients

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Background: The role of vitamin D in the prevention and treatment of diseases associated with aging has not been well studied. With the discovery of vitamin D receptors in the nervous, cardiovascular and endocrine systems, the role of vitamin D and its impact on these systems has become an important area of research. Vitamin D deficiency is common in chronic kidney disease (CKD) in old aged population. This study aimed to investigate the association between vitamin D and arterial stiffness in patients with non-dialysis-dependent CKD (CKD ND) in old aged patients.

Methods: In present study, 140 patients aged ≥ 68 years with CKD ND were divided into two groups: vitamin D deficient ($25(\text{OH})\text{D} < 20$ ng/ml)

and vitamin D non-deficient ($25(\text{OH})\text{D} \geq 20$ ng/ml). Brachial-ankle pulse wave velocity (baPWV), a good marker for arterial stiffness, was calculated.

Results: The prevalence of vitamin D deficiency was 78.1% and the mean concentration of $25(\text{OH})\text{D}$ was 18 ± 8 ng/ml. $25(\text{OH})\text{D}$ inversely correlated with baPWV. Multiple linear regression analysis showed that vitamin D level was independently associated with baPWV in patients with CKD ND ($P < 0.001$). The model accounted for 48% of total variance of baPWV.

Conclusion: Vitamin D deficiency is common in CKD ND, and a low $25(\text{OH})\text{D}$ level is significantly associated with increased arterial stiffness in old aged patients.

PE 07-03 7. Other Comorbidities of Obesity and Metabolic Syndrome

Self-Management Support Needs and Priorities for Metabolic Syndrome: An Importance-Performance Analysis

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Background: Purpose: This study aimed to analyze the difference in the importance and performance of the educational content and identify the needs and priorities of patients at risk for metabolic syndrome participating in a comprehensive self-management support program.

Methods: This study analyzed baseline data in an ongoing longitudinal study conducted on 211 patients taking medication for metabolic syndrome from a university-affiliated hospital in South Korea. A 10-point, 13-item Revised Lifestyle Evaluation Scale for Metabolic Syndrome asked about the importance and performance of content in a self-management support program. Needs and priorities were examined through an importance-performance analysis (IPA), the Borich needs assessment, and the locus for focus model.

Results: The average of importance and performance of the content for a self-management support program were 9.15 (SD 0.40) and 6.69 (SD 1.60) out of 10, respectively. Except for regular follow up (visiting hospital), the average scores for the importance of all educational items

were statistically significantly higher than the scores for performance ($p < .001$). The IPA identified the items that needed focused effort as 'self-monitoring blood pressure', 'blood sugar test', 'diet control', 'physical activity', and 'symptoms/complications management'. The results regarding the priorities of educational needs using the Borich needs assessment and the locus for focus model showed that the highest priorities were 'diet control' and 'physical activity' followed by 'weight control' and 'symptoms/complications management'.

Conclusion: Overall, high importance and low performance indicate a need for improvement in a self-management support program for metabolic syndrome. Since the demand was high in lifestyle modification and symptoms/complications management, various supports are urgently needed to strengthen a self-management support program in the future. These results can be used as evidence for developing a comprehensive self-management support program for patients at risk for metabolic syndrome that reflects the patients' needs and priorities. *This work was supported by the National Research Foundation of Korea grant funded by the Korea government (MSIT). (No. 2021R1A2C2007858).

PE 07-04 7. Other Comorbidities of Obesity and Metabolic Syndrome

The Atherogenic Index of Plasma is associated with Handgrip Strength in Elderly Women with Obesity – A Nationwide Study in Korea

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Background: The worldwide obesity prevalence has increased among the elderly. Age-related changes of body composition include increase in body fat mass and decrease in muscle mass – leading to sarcopenic obesity. These changes are more prominent in elderly women than elderly men. This study aims to investigate whether the handgrip strength (HGS) is associated with the atherogenic index of plasma, a novel index for cardiovascular disease, among Korean elderly women with obesity.

Methods: We analyzed data of 1430 Korean women age of > 65 years obtained from the seventh Korean National Health and Nutritional Examination Survey (KNHNES). The elderly women with BMI >25 were grouped into obese group. We categorized the atherosclerotic index of plasma (AIP) values into quartiles and defined low muscle strength as HGS less than 16.80kg. We used analysis of covariance (ANCOVA) to compare adjusted mean HGS and the multivariate logistic regression to calculate the odds ratios (ORs) and 95% confidence intervals (CIs) for low muscle

strength according to the AIP quartiles.

Results: The AIP value was significantly higher in obese group than non-obese group (0.43 vs 0.35, $P < 0.001$). Mean handgrip strength of the highest AIP quartile was significantly lower than that of the lowest AIP quartile in obese group (Q1: 21.59kg, Q4: 18.39, $P < 0.001$), but the differences were statistically insignificant in non-obese group. In obese group, the OR of low muscle strength was significantly greater in the highest AIP quartile than in the lower AIP quartiles (Q1: OR ref., Q2: OR 2.136, Q3: OR 4.443, Q4: OR 4.580).

Conclusion: Higher AIP value was associated with reduced handgrip strength in the elderly women with obesity. Clinicians should pay attention to elderly women with low muscle strength and obesity for increased cardiovascular disease risk.

PE 07-05 7. Other Comorbidities of Obesity and Metabolic Syndrome

Uneven Mealtime Protein Distribution, Lower Sun Exposure and Physical Activity are Determinants of Sarcopenic Obesity among Community-Dwelling Older Adults in Malaysia

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Background: Increasing age is commonly associated with body composition changes, characterized by an increase in fat mass and a steady decrease in muscle mass. Such changes can lead to clinical and functional phenotypes, including sarcopenic obesity. Sarcopenic obesity poses significant health risks for older adults and is understudied in Malaysia.

Methods: This cross-sectional study aimed to determine the prevalence of sarcopenic obesity and its associated factors among community-dwelling older adults aged 60 and above in Klang Valley, Malaysia. Sarcopenia was ascertained according to the Asian Working Group on Sarcopenia criteria while obesity was defined using universal cutoff for waist circumference. Body Impedance Analysis (BIA) was used to measure skeletal muscle mass. Multivariable logistic regression analysis was employed to delineate the determinants of sarcopenic obesity.

Results: A total of 194 older adults with mean age (SD) of 69 (6) years old were recruited. The prevalence of sarcopenic alone and sarcopenic obesity were 18.6% and 12.4%, respectively. There were significant negative associations between components of sarcopenia namely hand grip strength ($r=-0.562$, $p<0.01$) and skeletal muscle mass index ($r=-0.471$, $p<0.01$) with waist circumference. In the multivariable logistic regression analysis, older age (OR = 2.47, 95% CI: 1.64 – 4.50), reduced sun exposure (OR = 3.28, 95% CI: 2.71– 6.23), lower level of physical activity (OR = 1.89, 95% CI: 1.56 –3.12) and uneven protein distribution across meals (OR = 1.74, 95% CI: 1.21–2.88) contributed to higher risk of sarcopenic obesity.

Conclusion: This study underscores sarcopenic obesity is prevalent among older adults and the modifiable nature of several risk factors. Recognizing the impact of sarcopenic obesity on health and well-being of older adults, further research is imperative to elucidate its mechanisms of action, optimize dietary and lifestyle interventions, and translate research findings into clinical practice.

PE 07-06 7. Other Comorbidities of Obesity and Metabolic Syndrome

The Role of Leucine Intake on Glycemic Control in a Type 2 Diabetic Obese Patient with Severe Burn Injuries: A Case Report

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Background: The combination of obesity, type 2 diabetes mellitus (T2DM), and burn injuries leads to pronounced hyperglycemia, increasing morbidity and mortality rates. Recent studies have shown that leucine improves glycemic control. This case report aims to evaluate the impact of leucine intake on glycemic control in a type 2 diabetic obese patient with severe burn injuries.

Case: A 47-year-old obese female (BMI 27.2 kg/m²) was admitted to the High Care Unit (HCU) with 36% Body Surface Area (BSA) burns and uncontrolled T2DM. Upon admission, her fasting blood glucose (FBG) level was 426 mg/dL. She was hospitalized for 21 days. The average leucine intake was 81±29.1 mg/kgBW/day and average energy intake was 23±10 kcal/kgBW/day. She was hemodynamically stable, with controlled FBG levels, and her basal insulin was gradually reduced until completely withdrawn on day-17. Her mean FBG level reached 158±91 mg/dL. A significant negative correlation ($r = -0.67$, $p = 0.012$) was observed between leucine intake and FBG levels. No hospital-related malnutrition or sepsis signs were observed. The patient was discharged in stable condition with no insulin required.

Discussion: Leucine improves glycemic control by enhancing insulin sensitivity and inhibiting hepatic gluconeogenesis. The patient's leucine intake was about double the recommended amount. Zhang et al. demonstrated that doubling leucine intake significantly lowers FBG levels in mice. Similarly, Jiang et al. showed that high leucine intake improves glucose metabolism by increasing glucose transporter type 4 (GLUT4) expression in muscle and reducing adiposity through increased phosphorylation of adenosine monophosphate-activated protein kinase (AMPK).

Conclusion: Doubling leucine intake in a type 2 diabetic obese patient with severe burn injuries helped improve glycemic control and reduced insulin requirements. Further research is needed to determine the optimal leucine dosage and its long-term effects on glycemic control in such patients.

Conclusion: leucine intake, type 2 diabetic obese patient, burns

PE 07-07 7. Other Comorbidities of Obesity and Metabolic Syndrome

Usefulness of Relative Handgrip Strength as a Predictor of Incident Chronic Kidney Disease According to Gender: A Cohort Study in Koreans

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Background: Handgrip strength (HGS) is an indicator of many diseases such as pneumonia, cardiovascular disease and cancer. HGS can also predict renal function in chronic kidney disease (CKD) patients, but the value of HGS as a predictor of new-onset CKD is unknown

Methods: 173,195 subjects were recruited from a nationwide cohort and were followed for 4.1 years. After exclusions, 35,637 participants remained in the final study, and CKD developed in 1062 individuals during the follow-up period. Lifestyle, anthropometric and laboratory data were evaluated in relation to the risk of CKD.

Results: The participants were subdivided into quartiles according to relative handgrip strength (RGS). Multivariate Cox regression demonstrated that RGS was inversely associated with incident CKD. Compared with the lowest quartile, the hazard ratios (HRs) [95% confidence intervals (CIs)] for incident CKD for the highest quartile

(Q4) was 0.62 (0.45 – 0.86) after adjusting for covariates in men, 1.03 (0.69 – 1.56) in pre-menopause women and 0.92 (0.69 – 1.24) in post-menopause women. The incidence of CKD decreased as RGS increased. The receiver operating characteristic (ROC) curve showed that baseline RGS had predictive power for new-onset CKD. Area under the curve (AUC) (95% CIs) was 0.597 (0.571 – 0.623) in men, 0.506 (0.468 – 0.545) in pre-menopause women and 0.541 (0.513 – 0.568) in post-menopause women. Kaplan Meier curve found that trends in the difference for cumulative incidence of CKD according to baseline RGS quartiles remained unchanged in men and post-menopause women during follow-up time.

Conclusion: This is the novel study demonstrating that RGS is associated with incident CKD in both men and women. The relationship between RGS and incident CKD is more significant in men than in women. RGS can be used in clinical practice to evaluate renal prognosis. Regular measurement of handgrip strength is essential to CKD detection especially in men.

PE 07-08 7. Other Comorbidities of Obesity and Metabolic Syndrome

Association Between Sarcopenic Obesity and Arterial Stiffness in Korean Adults

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Background: This study investigated the association between sarcopenic obesity and arterial stiffness using bioelectrical impedance analysis.

Methods: This retrospective cross-sectional study included 20,601 participants who visited the health promotion center of the university hospital from January 2016 to December 2023. Sarcopenia was defined using height-adjusted appendicular skeletal muscle mass [(ASM/height²) <7.0 in men and <5.7 women] by bioelectrical impedance analysis (BIA). Obesity was defined using BMI or waist circumference. Arterial stiffness was measured using brachial-ankle pulse wave velocity (baPWV). The participants were divided into four groups: normal, obesity, sarcopenia, and sarcopenic obesity. The baPWV values were compared among four groups to examine the associations between sarcopenic obesity and arterial stiffness using adjusted multivariate analyses.

Results: The mean baPWV of the sarcopenic obesity group was significantly higher (P<0.001) than that of the other groups. Compared to the normal group without sarcopenia or obesity, the odds ratio (95% CI) for the sarcopenic obesity group was 2.40 (1.07-5.38) after adjusting for age, sex, smoking, exercise, heavy alcohol, hypertension, dyslipidemia.

Conclusion: Sarcopenic obesity is significantly associated with increased arterial stiffness.

Figure 2. Prevalence of a high baPWV according to the sarcopenic obesity phenotype

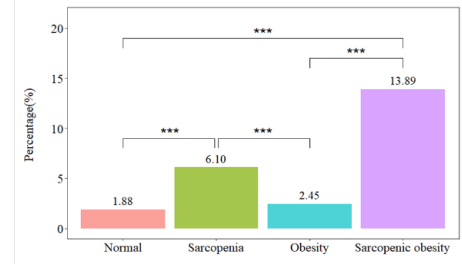


Table 2. Comparison for baPWV according to the sarcopenic obesity phenotype

Variable	Model 1		Model 2		Model 3	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Normal	reference		reference		reference	
Sarcopenia	2.11 (1.63, 2.73)	<0.001	2.12 (1.64, 2.74)	<0.001	2.19 (1.69, 2.85)	<0.001
Obesity	1.26 (1.02, 1.55)	0.031	1.25 (1.01, 1.53)	0.037	1.03 (0.83, 1.27)	0.805
Sarcopenic obesity	2.85 (1.26, 6.46)	0.012	2.81 (1.24, 6.37)	0.014	2.40 (1.07, 5.38)	0.035

PE 07-09 7. Other Comorbidities of Obesity and Metabolic Syndrome

Relationship between Obesity and Iron Deficiency among Children: A Scoping Review

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Background: Obesity, which ranked as the fifth leading cause of mortality worldwide, is a low-grade inflammatory chronic illness that negatively affects public health. While obesity is undoubtedly a condition, it also leads to the onset of new ones and aggravates ones that already exist, including iron deficiency (ID). Iron deficiency (ID) is the most common nutritional deficiency found in children, which cause them to have iron deficiency anemia (IDA). A higher prevalence of ID may be found in children with obesity. This review aimed to examine the relationship between obesity and iron deficiency among children.

Methods: A systematic search was conducted in PubMed and Scopus databases using the keywords 'iron deficiency', 'obesity', 'children'. This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR) guidelines.

Results: A total of 2057 articles were obtained from the database search of

which the scoping review identified 11 relevant research articles and were included for data extraction. It was found that children with higher BMI, overweight or obesity were at higher risk of iron deficiency. Lower serum ferritin and higher hepcidin level were found in obese children due to low-grade inflammatory condition, which contributed to iron deficiency.

Conclusion: A higher prevalence of iron deficiency was found in children with obesity, and overweight and obese children were at higher risk of iron deficient as compared to normal weight and underweight children. It has been suggested that hepcidin, a regulator of iron homeostasis act as a potential mediator of the association between obesity and iron deficiency, and further studies are warranted to understand the underlying mechanism and confirm the association in this review. The present findings will encourage health policy and planners to make health interventions, such as weight loss program to improve the poor iron status among obese children.

PE 07-10 7. Other Comorbidities of Obesity and Metabolic Syndrome

Metabolic Syndrome and Multiple Cholelithiasis in Young Adult: A Case Report

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Background: Cholelithiasis is typically uncommon in young adults, with a higher prevalence observed in females over 40 years old who are overweight and fertile. Recent reports indicate an increased incidence of the disease in younger adults. Besides genetic factor, a high-calorie diet with high fat and obesity are the most reasonable cause for gallstone formation. In such cases, long-term comprehensive management is certainly needed.

Case description: A 19-year-old man was hospitalized with upper abdominal pain triggered by consuming fatty foods, which had fluctuated for 8 months. There was a history of jaundice and light-colored stool. The patient's caloric intake exceeded 3000 kcal/day, with 38% composed of fat. His BMI was 33.6 kg/m², abdominal circumference was 120 cm, and blood pressure was 142/88 mmHg, with a history of dyslipidemia. The BIA result showed increased fat mass (30%) and visceral fat (3.5 L). The patient underwent cholecystectomy, and a low-fat diet was prescribed to prevent symptoms of fat malabsorption. Before discharge, the patient received education focusing on a low-fat and high-fiber diet, daily exercise, and

regular visits to the physician clinical nutrition specialist.

Discussion: Both obesity and metabolic syndrome are associated with cholecystitis. Chronic hypercaloric nutrition, especially a high-fat diet, increases cholesterol synthesis and secretion, heightens the risk of gallstones, as observed in this patient. Within eight days post-cholecystectomy, there was no sign of fat malabsorption. Small, frequent feedings with a low-fat and high-fiber in post-cholecystectomy and in metabolic syndrome, resulted in clinical and laboratory improvements.

Conclusion: Comprehensive nutritional intervention, including an individualized meal plan, is necessary to prevent further complications after cholecystectomy. A combination of a low-calorie diet and exercise is key to reducing body weight and preventing further complications related to metabolic syndrome

Conclusion: Obesity, cholelithiasis, metabolic syndrome

PE 07-11 7. Other Comorbidities of Obesity and Metabolic Syndrome

Prevalence and risk factors of metabolic dysfunction-associated fatty liver disease in Korean air force army inclusive of pilots: 2020-2022

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Background: Recently, the importance of Metabolic Dysfunction-Associated Fatty Liver Disease (MAFLD) has been highlighted as an alternative to non-alcoholic fatty liver disease (NAFLD). However, there is still a lack of sufficient research on MAFLD in the Korean population. Furthermore, there is a lack of studies on its characteristics of MAFLD within the military population. This study aims to investigate the prevalence of MAFLD and associated risk factors in the Air Force population aged over 40 years old, as well as within occupational group (non-pilots vs. pilots).

Methods: A total of 1044 subjects who underwent health checkups at Korean Air Force Aerospace medical center from January 2020 to December 2022 were categorized into non-MAFLD (N=728, 69.7%) and MAFLD (N=316, 30.3%). Demographic, anthropometrics, vital signs, biochemical and blood examination results were collected and compared between two groups. Independent risk factors associated MAFLD were investigated using multivariate logistic regression analysis.

Results: The body mass index (BMI, OR=3.23, 95% CI: 2.24-4.70), alanine aminotransferase (ALT, OR=1.81, 95% CI: 1.35-2.47), uric acid (UA, OR=1.48, 95% CI: 1.21-1.82), fasting plasma glucose (FPG, OR=1.35, 95% CI: 1.09-1.69), high-density lipoprotein cholesterol (HDL, OR=0.73, 95%

CI: 0.57-0.93), low density lipoprotein cholesterol (LDL, OR=1.27, 95% CI: 1.04-1.56), albumin (ALB, OR=1.36, 95% CI: 1.06-1.75), triglycerides (TG, OR=1.30, 95% CI: 1.07-1.61), and regular exercise (OR=2.75, 95% CI: 1.10-7.31) were independently associated with MAFLD in total analysis group. In the non-pilot group, only BMI (OR=3.41, 95% CI: 1.76-6.96), diabetes (OR=8.32, 95% CI: 1.79-41.25), and ALT (OR=1.91, 95% CI: 1.03-3.59) were identified as independent factors associated with MAFLD. However, this lack of statistical detection is attributed to the small sample size of the non-pilot group. Overall, the strength of association between MAFLD and other risk factors was similar to that observed in the total analysis group. In the pilot group, BMI (OR=3.77, 95% CI: 2.35-6.19), UA (OR=1.83, 95% CI: 1.40-2.42), ALT (OR=1.98, 95% CI: 1.18-2.20), TG (OR=1.50, 95% CI: 1.09-2.10), and dyslipidemia (OR=7.97, 95% CI: 1.32-57.35) were independently associated factors for MAFLD. When comparing risk factors for MAFLD between non-pilots and pilots, the association magnitude of UA in pilots was statistically higher than that in non-pilots (OR=1.13, 95% CI: 0.79-1.60), as indicated by the odds ratio (difference between two ORs=0.71, $p < 0.001$).

Conclusion: There was a difference in the prevalence of MAFLD between pilot and non-pilot group. In particular, UA could be used to as a specific risk factor in pilots comparing with non-pilots.

PE 07-12 7. Other Comorbidities of Obesity and Metabolic Syndrome

Association of Cardiometabolic Components and Obesity with Risk of Colorectal Cancer: A Multicentric Matched Case-Control Study

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Background: Colorectal cancer (CRC) is the third most prevalent cancer to be diagnosed and the second leading cause of cancer-related death. It shared several metabolic risk factors with cardiovascular disease and type 2 diabetes. Despite the link, it remains to be established how markers of cardiometabolic conditions are associated with the onset of CRC. The aim of this study is to determine the association between cardiometabolic components and the risk of colorectal cancer.

Methods: This case-control recruited 100 cases (individuals with CRC) and controls (individuals without cancer) from five local public hospitals. Blood was drawn and was tested for adiponectin, leptin, interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF- α), plasminogen activator inhibitor-1 (PAI-1), and C-reactive protein (CRP) plasma concentration using standard laboratory techniques. Binary logistic regression was used to test the strength of the association between two or more cardiovascular disease biomarkers and CRC risk. SPSS version 26 was used for data analysis.

Results: Cases had significantly higher body fat percentage, waist circumference, and blood pressure. Biochemical results indicated higher fasting blood glucose, total cholesterol, and LDL in some cases, while HDL and Apo A1 were lower. The results of binary logistic regression showed that waist circumference (OR:1.98, 95% CI: 1.07 – 3.70), blood pressure (OR: 4.92, 95% CI: 2.57 – 9.45), fasting blood glucose (OR: 1.84, 95% CI: 1.03 – 3.31), total cholesterol (OR: 7.81, 95% CI: 3.51 – 17.38), HDL (OR: 3.83, 95% CI: 2.06 – 7.13), LDL (OR: 5.79, 95% CI: 2.25 – 14.88), APO A1 (OR: 2.34, 95% CI:1.15– 4.77), PAI-1 (OR: 2.34, 95% CI: 1.01 – 5.42) and C-reactive protein (OR: 13.23, 95% CI: 4.55 – 38.47) were significant associated with CRC. High BMI, high body fat, and high waist-hip ratio showed a non-significant direct association with the risk of CRC.

Conclusion: These findings underscored the importance of monitoring cardiometabolic health in the prevention and early detection of colorectal cancer. Integrating these parameters into clinical practice may improve risk assessment and management strategies for colorectal cancer.

PE 07-13 7. Other Comorbidities of Obesity and Metabolic Syndrome

Effect of Weight Loss on Metabolic Parameters in Adult Obese Patient: A Case Report

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Background: Obesity is a major health problem that predisposes a person to developing of chronic diseases such as type 2 diabetes, non-alcoholic fatty liver disease. The prevalence of obesity is on the rise globally, including in Indonesia. This case report aims to describe physical and metabolic changes in a 22-year-old male patient with obesity and comorbidities who admitted to our polyclinic after a follow-up period of seven months.

Methods: A 22-year-old male patient visited our polyclinic with his mother because of increasing fasting blood glucose, lipid profile, and liver enzymes, and he wanted to lose weight. He had no other complaints. His eating behaviour and daily activities: skipping meals, eating processed food, and having sugar-sweetened beverages, no regular exercise. Patient was diagnosed with morbid obesity, non-alcoholic fatty liver disease, type 2 diabetes, and dyslipidemia. Patient received lifestyle modification therapy (healthy balanced diet and exercise plan) and pharmacotherapy consisting of vitamin D 1000 IU/day, orlistat 120 mg, α -cyclodextrine 1000 mg, and vitamin B6 20 mg, respectively, given twice a day, also metformin 500 mg three times a day from the internist. Patient did regular visit for 7 months. His weight, body composition, and metabolic parameters were detected as decreased/improvement (Table 1).

Results:

Table 1. Patient's anthropometric values and biochemical values

Anthropometric values	Before follow-up	After follow-up
Height (cm)	185	185
Weight (kg)	129.3	110.1
BMI (kg/m ²)	37.8	32.2
Fat percentage	35.4	29
Fat mass (kg)	45.8	31.9
Skeletal muscle mass (kg)	79.2	74.2
Fat free mass index (kg/m ²)	24,4	22,8
Visceral fat level	17	14
Biochemical values		
Fasting blood glucose (mg/dl)	232	103
Cholesterol (mg/dl)	200	151
HDL-cholesterol (mg/dl)	33	37
LDL-cholesterol (mg/dl)	141	95
Triglycerid (mg/dl)	288	97
AST (U/L)	75	31
ALT (U/L)	102	29

A direct link is shown between weight loss and improvement in metabolic parameters such as blood glucose, lipid profiles, and comorbidities such as non-alcoholic fatty liver disease, type 2 diabetes.

Conclusion: Weight loss in obese patient is associated with metabolic changes, mostly favorable to improving the overall health of an individual.

PE 07-14 7. Other Comorbidities of Obesity and Metabolic Syndrome

Case report and literature review of 9 patients with obesity hypoventilation syndrome who required hospitalization for 10 years at a single institution

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Background: Obesity-hypoventilation syndrome (OHS) is a serious complication associated with increased mortality in obese patients. However, its incidence and clinical characteristics are not well-documented.

Methods: This observational retrospective case series conducted using electronic medical records from single center, Jeonbuk National University Hospital. Patients aged 19 years or older hospitalized for obesity-related hypopnea (ICD code E66.2) from January 2014 to December 2023 were selected.

Results: The study included nine patients (3 men and 6 women). The mean age was 50.2 ± 16.3 years, and the mean BMI was 50.0 ± 13.1 kg/m². All patients were classified as class III obesity. The underlying diseases included type 2 diabetes in seven patients, hypertension in seven, and both conditions in six. Three patients were on psychiatric medications: one for depression, one for mental retardation, and one for dementia.

None had cerebrovascular disease before the diagnosis of OHS. One patient had hypertrophic cardiomyopathy; however, all patients exhibited normal ejection fraction on echocardiography. Only one patient had a history of endometrial cancer. Six patients had been hospitalized in the intensive care unit for mechanical ventilation. None had undergone bariatric surgery, and only two were administered liraglutide for obesity treatment. Two patients with the highest BMIs (>60 kg/m²) died suddenly within 2 years of their OHS diagnosis (78.1 kg/m² and 62 kg/m², respectively).

Conclusion: In our study, OHS appeared to be more frequent in women, with all but two patients being between 35 and 65 years of age. The leading cause of death was an extremely high BMI. Considering that only 2 patients received obesity treatment, active intervention by clinicians is necessary for the treatment of severely obese patients. Therefore, both clinicians should be made aware of the high mortality rate associated with OHS and the critical importance of treating obesity.

PE 07-15 7. Other Comorbidities of Obesity and Metabolic Syndrome

Effects of Dietary Advanced Glycation End Products on Primary Dysmenorrhea

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Background: Dysmenorrhea, commonly occurring in women of reproductive age, can impact their daily lives and work performance. The hypothesis of primary dysmenorrhea is higher levels of prostaglandins in the uterus, which lead to inflammation. High-temperature processing in diet can increase the production of advanced glycation end products (AGEs), currently associated with obesity and capable of inducing inflammatory responses, thereby contributing to the onset of various diseases. To date, there has been no research exploring the correlation between dietary AGEs and dysmenorrhea.

Methods: This study comprised animal and human studies. In the animal experiment, C57BL/6J female mice were fed with low AGEs (L-AGE) and high AGEs (H-AGE) diets for 45 weeks. The uteri were collected, fixed in paraffin, and processed into sections for immunohistochemical staining. The human study was a cross-sectional study involving women of reproductive age with no gynecological history. Collected anthropometry,

three-day dietary records, menstrual distress questionnaire (MDQ), short-form McGill pain questionnaire (MPQ), and visual analog scale (VAS).

Results: The animal experiment showed higher expression levels of AGE markers carboxyethyl-lysine (CEL) and receptors for AGE (RAGE) in the H-AGE group. The human study recruited 308 participants with an average age of 24 years, and an average VAS score of 4.6, indicating moderate pain. The VAS scores were categorized into mild, moderate, and severe levels. Moderate and severe dysmenorrhea participants consumed more AGEs under the same calorie intake compared to those with mild symptoms. Additionally, a significant positive correlation between dietary AGEs and VAS scores was observed under equivalent calorie intake.

Conclusion: Under equivalent calorie intake, dietary AGEs are one of the factors influencing female dysmenorrhea. Reducing dietary AGE intake may prevent the onset of dysmenorrhea in women.

PE 07-16 7. Other Comorbidities of Obesity and Metabolic Syndrome

Effects of Advanced Glycation End Products on Blue Light-Induced Retinal Damage in Mice

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Background: The modern lifestyle that uses electronic devices for a long time exposes the eyes to a greater extent of high energy short wavelength blue light (BL). Accumulation of advanced glycation end products (AGEs) in the human body, attributed to factors such as aging, diabetes, or highly processed foods, has been associated with oxidative stress and inflammatory responses upon binding with their receptor, receptor for AGEs, (RAGE). This cascade of events is implicated in the progression of metabolic syndrome and related chronic diseases.

Methods: The study aimed to investigate whether high-temperature processing high AGEs diet (H-AGE) exacerbates BL-induced retinal damage. Male ICR mice 9 weeks old were randomly assigned to five groups: control, H-AGE, BL, H-AGE + BL, and H-AGE + BL + ALT-711 (AGE inhibitor), the study durations were 12 and 28 weeks.

Results: Visual acuity and Hematoxylin & Eosin staining showed

BL-induced damage at 12 weeks, while H-AGE exacerbated BL-induced damage at 28 weeks, which was alleviated by ALT-711. Immunofluorescence staining showed significantly increased expression of AGE-related proteins such as CML, CEL, and RAGE in H-AGE group compared with control and H-AGE + BL + ALT-711 groups. Significantly increased expression of DNA oxidative stress marker 8-OHdG in H-AGE and BL compared with control group, and significantly increased expression in H-AGE + BL groups compared with H-AGE and BL groups. Significantly increased expression of inflammation marker TNF- α in the BL and H-AGE + BL groups compared with than others. Significantly increased expression of p-NF- κ B and TUNEL in the H-AGE + BL group compared with others.

Conclusion: High-temperature processing H-AGE diet leads to the accumulation of AGEs in the retina, potentially exacerbating BL-induced oxidative stress and inflammatory responses via interaction with RAGE, ultimately leading to apoptosis of photoreceptor cells and retinal damage.

PE 07-17 7. Other Comorbidities of Obesity and Metabolic Syndrome

Acute Kidney Injury due to Hypertensive Emergency in a Patient with Metabolic Syndrome: A Case Report

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Background: Metabolic syndrome (MS) is a collection of metabolic dysregulations that include insulin resistance, atherogenic dyslipidemia, central obesity, and hypertension. MS is linked with hypertension. A hypertensive emergency is defined as a rapid, significant increase in blood pressure accompanied by symptoms of organ damage, such as acute kidney injury. This study presents a case of acute kidney injury due to a hypertensive emergency in a patient with metabolic syndrome who presented at the emergency room (ER) of Karubaga Public Health Center (PHC) for primary care.

Methods: We reported on a 50-year-old woman with a history of obesity and uncontrolled hypertensive emergency, who was admitted to our primary care facility due to severe headache, flank pain, and reduced urine output. Laboratory tests revealed acute renal failure: serum creatinine (Scr 1.69 mg/dl, BUN 14.77 mg/dl), elevated total cholesterol, and triglycerides (TC 211.5 mg/dL, TG 242 mg/dL). Renal ultrasound showed normal kidney size. Urinalysis revealed nitrit (+), proteinuria (+3), and hematuria (+3).

The patient was referred to the General Hospital of Karubaga for further intervention.

Results: Our evaluation showed that metabolic syndrome and uncontrolled hypertension are connected, complex, and time-dependent. Metabolic syndrome increases renal sympathetic nerve activity (RSNA), leading to heightened renal sodium reabsorption, while compensatory glomerular hyperfiltration contributes to hypertension and kidney damage in metabolic syndrome.

Conclusion: Metabolic abnormalities, prolonged obesity, dyslipidemia, and uncontrolled hypertension can cause acute kidney injury. Managing this complex clinical scenario effectively requires a multidisciplinary decision-making algorithm.

Keywords: Metabolic syndrome, hypertension, acute kidney injury

PE 07-18 7. Other Comorbidities of Obesity and Metabolic Syndrome

Relation between ABCG2 rs2231142 Variant and BMI with Hyperuricemia in Thai

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Background: Genetic variants and obesity are risk factors for hyperuricemia (HUA). The ABCG2 rs2231142 variant was identified from genome-wide association studies as one of the most crucial genetic variants for HUA in various ethnicities. However, no large-scale studies in Thailand have revealed this association. The objective of this study to determine the association between rs2231142 variant and HUA in Thai population.

Methods: A total of 597 participants of Thai ancestry aged 20-70 years were enrolled in this study. All participants provided physical information through questionnaires and underwent anthropometric measurement, blood drawing for biochemical and genotyping test. HUA was defined as a serum uric acid level >7.0 mg/dL in men, >6.0 mg/dL in women. The association and interaction between ABCG2 rs2231142 variants and related factors such as body mass index (BMI), lipid profiles on serum uric acid level were analyzed using the SNPStat webtool program and SPSS version 17.0.

Results: Our study revealed that 148 cases (24.79%) had HUA. The prevalence of HUA was 39.10% in men and 19.72% in women. The minor allele frequency (T allele) of rs2231142 in our study was 0.21. There was no association between rs2231142 variant and HUA in this study. We found a strong association between BMI and an increasing risk of being HUA (OR: 1.106, 95% CI: 1.064-1.149). Individuals carrying the G/T genotype had a significantly higher BMI than those with the T/T genotype ($p < 0.05$). Interestingly, we did not observe any effects on interaction between rs2231142 variants and BMI on the increasing risk of HUA.

Conclusion: In summary, we did not observe any significant association between rs2231142 variants and HUA. However, we did identify a robust correlation between BMI and HUA risk, with each unit increase in BMI associated with a 10.6% higher likelihood of being diagnosed with HUA. Notably, individuals carrying the G/T genotype exhibited a significantly higher BMI compared to those with the T/T genotype. Interestingly, while investigating the interaction between rs2231142 variants and BMI on HUA risk, we did not find any discernible effects.

PE 07-19 7. Other Comorbidities of Obesity and Metabolic Syndrome

General and Central Obesity and its Associated Comorbidities in Gairsan, Uttarakhand, India

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Background: Obesity-related comorbidities such as high blood glucose and hypertension significantly contribute to the development of cardiovascular disease, which is one of the leading causes of death. This study aims to assess the burden of obesity and its associated comorbidities, including hypertension and diabetes in Gairsan, Uttarakhand, India.

Methods: A cross-sectional study was conducted on 181 individuals (92 adolescents and 89 adults) in Gairsan, Uttarakhand, India. Data on weight, height, systolic and diastolic blood pressure, and blood glucose levels were collected directly from the participants after obtaining informed consent. Correlation analysis was performed to identify associated variables, followed by chi-square and regression analysis.

Results: The prevalence of general obesity was significantly higher among adults (30.3%) compared to adolescents (3.3%), indicating an increased risk of obesity with age. Among adults, the prevalence of central obesity was 32.6% based on WC, 48.4% based on WHR, and 50.6% based on WHtR, while it was approximately one-fourth of these rates among adolescents. Hypertension prevalence is alarming in both adolescent (48.9%) and adults (69.7%) while only 1 adolescent and 4 adults shows high blood glucose. WHR was significantly associated with blood glucose levels ($\chi^2 = 3.769, p < 0.05$), and WHtR was significantly associated with hypertension ($\chi^2 = 4.326, p < 0.05$). Additionally, odds ratio analysis revealed that the risk of having a high WHtR was 2.5 times significantly higher among individuals with hypertension.

Conclusion: General obesity (BMI) and central obesity (WC, WHR and WHtR) exhibit significant prevalence among adults. Concurrently, hypertension is notably high in both adolescent and adult populations. Implementing a comprehensive public health strategy to address central obesity has the potential to markedly reduce the prevalence of associated health risks, such as hypertension, and reciprocally, addressing hypertension can mitigate central obesity.

Table 1: Obesity and its Associated Comorbidities

Measures of Obesity	Adolescents (n = 92)	Adults (n = 89)
Frequency (Percentage)		
General Obesity		
Overweight	10 (10.9)	19 (21.3)
Obesity	3 (3.3)	27 (30.3)
Central Obesity		
High WC	23 (25)	29 (32.6)
High WHR	23 (25)	52 (48.4)
High WHtR	24 (26.1)	45 (50.6)
Hypertension	45 (48.9)	62 (69.7)
High Blood Glucose	1 (1.3)	4 (4.9)
Anaemia	30 (49.6)	37 (57.8)
Chi-square		
WHR & Blood glucose	Not Significant	3.769, p < 0.05
WHtR & Hypertension	Not Significant	4.326, p < 0.05
Odds Ratio		
WHR & Blood Glucose	Not Significant	Not Significant
WHtR & Hypertension	Not Significant	2.576 (1.045-6.351), p < 0.01

PE 07-20 7. Other Comorbidities of Obesity and Metabolic Syndrome

Sleep Quality, Diet Quality, and Weight Status of Young Adults Residing in Malaysia: A Comparative Cross-Sectional Study between COVID-19-Recovered Patients and Non-COVID-19 Patients

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Background: The COVID-19 pandemic may have impacted individuals' sleep quality, diet quality, and weight status. Therefore, this study aimed to compare the sleep quality, diet quality, and weight status of COVID-19-recovered patients and non-COVID-19 patients residing in Klang Valley, Malaysia.

Methods: Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI), while diet quality was assessed through the Diet Quality Questionnaire (DQQ). Body weight before the pandemic was self-reported, whereas current height and weight were measured using the SECA 213 portable stadiometer and TANITA electronic scale, respectively. In addition, young adults were also required to report their COVID-19 diagnostic status based on the registered status on MySejahtera App.

Results: This cross-sectional study involved 271 young adults in Klang Valley (n female= 182, n male= 89, mean age= 21.45 ± 2.313 years), wherein 43.2% of the respondents were COVID-19-recovered patients. No significant difference in the PSQI score (t= 1.031, p= 0.303) was observed

between COVID-19-recovered patients (7.65 ± 3.30) and non-COVID-19 patients (8.06 ± 3.28). In regards to diet quality, the Food Group Diversity Score (FGDS) attained by COVID-19-recovered patients (6.10 ± 2.15) was also comparable to that of non-COVID-19 patients (6.55 ± 2.27) (t= 1.627, p= 0.105). Interestingly, emerging findings also revealed that slightly more than half of the respondents (57.9%) gained weight due to the pandemic. Further analysis using Pearson's Correlation showed that there were no interaction effects between sleep quality, diet quality, and weight status of young adults regardless of their COVID-19 diagnosis status (COVID-19-recovered patients: r= -0.032, p= 0.733; non-COVID-19 patients: r= -0.057, p= 0.481).

Conclusion: Efforts should be made to raise public awareness of the importance of having good sleep quality, good diet quality, and healthy body weight.

Keywords: sleep quality, diet quality, weight status, COVID-19-recovered patients, non-COVID-19 patients, long COVID.

PE 07-21 7. Other Comorbidities of Obesity and Metabolic Syndrome

Association of the risk of hyperuricemia with rs75786299 and combination of metabolic parameters in the Thai population

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Background: Hyperuricemia is a metabolic condition associated with various health risks, including gout and cardiovascular diseases, influenced significantly by genetic factors such as urate transporter genes. The single nucleotide polymorphism (SNP) rs75786299 within SLC22A12 genes has been studied for its potential role in regulating uric acid levels. This research explores the association between the rs75786299 variant and hyperuricemia risk, alongside other metabolic parameters, within the Thai population.

Methods: This cross-sectional study was from Nakornnayork, Thailand, enrolling 596 participants from annual checkup. Single nucleotide polymorphism (wildtype: G/G, variation: G/A and A/A) was analyzed using TaqMan SNP Genotyping Assays by StepOnePlus® Real-Time PCR Systems.

Results: Results from the study revealed a predominant GG genotype

frequency (99.16%) and a less frequent GA genotype (0.84%) among participants (n=596) from check.mp. While no statistically significant difference in uric acid levels was observed between GG (5.54 mg/dL) and GA (6.71 mg/dL) genotypes (p = 0.069), however significant associations were found with other metabolic factors. Specifically, individuals with hypertension exhibited higher uric acid levels compared to healthy (5.81 mg/dL vs. 5.44 mg/dL, p = 0.004), as did those with hypertriglyceridemia; TG ≥ 150 (6.12 mg/dL vs. 5.37 mg/dL, p < 0.000) and obese participants; BMI ≥ 25 (5.90 mg/dL vs. 5.27 mg/dL, p < 0.000). Conversely, impaired fasting glucose and diabetes mellitus group; fasting blood sugar level ≥ 100 did not show a significant association with uric acid levels.

Conclusion: These findings suggest that the genetic variation of rs75786299 does not significantly with uric acid level while the higher blood pressure, triglycerides and BMI, the more increasing uric acid level are notable factors associated in the Thai population.

PE 07-22 7. Other Comorbidities of Obesity and Metabolic Syndrome

The Genetic Variation of rs3825016 of SLC22A12 and Serum Uric Acid Levels: A Cross-Sectional Study

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Background: Hyperuricemia is a well-established risk factor for various diseases including gout and metabolic syndrome. Genetic factors are known to significantly influence uric acid levels, and the SLC22A12 gene, which encodes urate transporter URAT1, plays a critical role in renal uric acid reabsorption. Previous studies have suggested the relationship between genetic variation of SLC22A12 and risk of hyperuricemia. However, SLC22A12 with rs3825016 has not been identified as a potential genetic marker associated with serum uric acid levels.

Methods: We performed a cross-sectional study involving participants from Nakornnayork, Thailand, to determine the association between rs3825016 and serum uric acid levels among four groups: 1) hyperuricemia (HUA), 2) metabolic syndrome with hyperuricemia (MET/HUA), 3) metabolic syndrome (MET), and 4) healthy controls. Single nucleotide polymorphism (wildtype: C/C, variation: C/T and T/T) was analyzed using TaqMan SNP Genotyping Assays by StepOnePlus® Real-Time PCR Systems.

Results: Total of 598 participants were included. In MET (n=148), participants with C/T genotype displayed higher mean of serum uric acid levels compared to wildtype (9.25 vs 7.90 mg/dL). However, in the remaining group, participants with variant genotype tended to express lower serum uric acid levels than wildtype. As in MET/HUA (n=25), mean serum uric acid levels for the wildtype and variant genotypes were 8.99, and 8.61 mg/dL. Similarly to MET (n=74), mean serum uric acid levels in wildtype and variant genotype were 5.64 and 5.48 mg/dL. As well as in control group (n=351), mean serum uric acid levels were 5.15 mg/dL for wildtype, and 4.99 mg/dL for variant genotype.

Conclusion: There is no association between rs3825016 and serum uric acid levels among four groups. Genetic variation of SLC22A12 might be risk factor of hyperuricemia in previous studies, but it might not be for rs3825016 in Thai. However, further study with larger sample sizes are needed to confirm the association.

PE 07-23 7. Other Comorbidities of Obesity and Metabolic Syndrome

Machine Learning-Driven Discovery of Exosomal miRNA Signatures for Pulmonary Hypertension in Obesity-Related Metabolic Syndrome

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Background: Pulmonary hypertension (PH) is often missed in obese individuals with Metabolic Syndrome (MetS). The molecular connection between obesity, MetS, and PH remains unclear. This study examines how adipose tissue-derived exosomal miRNAs contribute to PH. Using machine learning, we aim to identify biomarkers and treatment targets for PH in these patients.

Methods: We analyzed data from 3,000 participants (aged 40-70, BMI \geq 30) in the NIH Exosome Consortium. We focused on 1,000 with detailed five-year follow-up, including those who developed PH. Exosomes were isolated from serum, characterized, and miRNAs extracted and sequenced. We identified differentially expressed miRNAs after normalization. A hybrid machine learning model using Support Vector Machines (SVM) and Long Short-Term Memory (LSTM) networks was created. SVM identified baseline miRNA markers, and LSTM predicted PH onset by analyzing miRNA changes over time. The model was validated with 10-fold cross-validation and tested on the Framingham Heart Study dataset for robustness.

Results: We identified 15 key exosomal miRNAs significantly linked to PH development, including miR-126, miR-155, and miR-223. Also, miR-126 levels were 4.2 times higher in those who developed PH (95% CI: 3.8-4.6, $p < 0.001$). The hybrid SVM-LSTM model achieved an AUC-ROC of 0.94 for predicting PH within two years, with a precision of 0.91 and recall of 0.88, indicating high accuracy. The LSTM component effectively captured the miRNA expression changes over time, aiding in early prediction. In external validation with the Framingham cohort, the model maintained high performance with an AUC-ROC of 0.91, confirming its potential as a predictive tool for PH across different populations.

Conclusion: This study uses machine learning to identify miRNAs predicting PH in obese individuals with MetS. Key biomarkers enable early diagnosis and personalized treatment. The SVM-LSTM model tracks miRNA changes effectively, aiding PH management. Future work should validate these findings in larger cohorts.

PE 07-24 7. Other Comorbidities of Obesity and Metabolic Syndrome

Risk of Diabetes Related to Changes in Waist Circumference among Korean Adults

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Background: Central obesity, measured by waist circumference (WC), is an important risk factor of type 2 diabetes mellitus (T2DM). Whereas high WC is reported to increase the risk of T2DM, the effect of WC changes in individuals was not clearly established, especially in Korean adults. Therefore, the aim of this study was to investigate the relationship between changes in WC and the incidence of T2DM in Korean adults.

Methods: Using Korean National Health Information Database of the National Health Insurance Service from 2008 to 2019, we identified the onset of diabetes in individuals who are newly diagnosed with diabetes codes (E10-E14) during the enrollment period. The annual average of WC changes was calculated prior to DM diagnosis. To evaluate the risk of diabetes according to the central obesity and annual changes of WC, hazard ratios (HR) and 95% confidence intervals (CI) are estimated using cox proportional hazard regression.

Results: The incidence of diabetes was approximately 1,491.5 per 100,000 person-years in total and increased with age in both sexes. Those with central obesity have higher risk to develop diabetes in both men (HR 1.16, 95% CI 1.12-2.10) and women (HR 1.07, 95% CI 1.03-1.12). Additionally, groups with more than a 2cm increment in WC increased the risk of diabetes across all BMI groups. Especially, those in the middle age group (40-59 years) with more than a 2cm increase in WC showed approximately four times higher incidence of diabetes in both men (HR 4.04, 95% CI 3.8-4.3) and women (HR 4.24, 95% CI 4.01-4.48).

Conclusion: The increase in WC was significantly related to a higher risk of diabetes in both sexes and across all age groups of Korean adults, regardless of BMI. In conclusion, the change of WC might be a reliable indicator to estimate the risk of diabetes incidence.

PE 07-25 7. Other Comorbidities of Obesity and Metabolic Syndrome

Beyond Muscle Mass: Physical Function as a Key Predictor of Fall and Fracture Risk in Sarcopenia and Sarcopenic Obesity

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Background: Sarcopenia, characterized by a loss of muscle mass and physical function, poses an increased fall risk, particularly when combined with obesity. This combination heightens fall risk more than either condition alone. Falls are a leading cause of fractures in the elderly, influenced by factors such as gender, genetics, lifestyle, and body composition. Recent studies have shown conflicting views on the relationship between muscle mass and fracture risk. This study aims to investigate the correlation between muscle mass and fracture risk in elderly populations and identify key factors that can predict fracture risk.

Methods: This study involved 51 elderly women, categorized into four groups: Normal (NG), Sarcopenia (SG), Obesity (OG), and Sarcopenic Obesity (SOG). Sarcopenia was diagnosed according to the criteria set by the Korean Working Group for Sarcopenia's (KWGS) and sarcopenic obesity was defined as the presence of sarcopenia combined with a body fat percentage $\geq 35\%$. Fracture risk was assessed using the FRAX algorithm, and bone mineral density (BMD) was measured using Dual-Energy X-ray Absorptiometry (DEXA).

Results: The SOG exhibited higher fracture risk, lower appendicular skeletal muscle index (ASMI), lower BMD, and reduced values in all physical function variables compared to the NG. Notably, the SOG showed significantly lower grip strength and slower TUG speed compared to the SG. ASMI did not correlate with BMD, fracture risk, or physical function variables. In contrast, physical function variables correlated with both fracture risk and BMD. A gait speed of less than 1m/s was associated with a 12.45-fold increase in the risk of hip fracture exceeding 3%, which is considered clinically significant.

Conclusion: Sarcopenic obesity increases the risk of fractures more than either sarcopenia or obesity alone. This elevated risk is primarily attributed to a decline in physical function rather than a decrease in muscle mass. Additionally, gait speed has been identified as a useful predictor of fracture risk. To effectively prevent fractures in individuals with sarcopenic obesity, exercise interventions aimed at improving gait speed are essential.

PE 07-26 7. Other Comorbidities of Obesity and Metabolic Syndrome

Effects of a heat-processed diet high in advanced glycation end products on skeletal muscle fiber transition in non-obese mice

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Background: Metabolically obese normal weight (MNOW) means people in normal body weight (body mass index $<25 \text{ kg/m}^2$) with increased body fat especially visceral fat. The amount and distribution of adipose tissue may alter skeletal muscle energy metabolism. Emerging evidence indicates that the prevalence of MNOW is increasing due to sedentary lifestyles and unhealthy dietary pattern. A study also shows a positive correlation between highly advanced glycation end products (HAGE) and abdominal obesity. However, the effect of long-term administration of the HAGE diet on skeletal muscle metabolism in mice remains unclear. Thus, the purpose of this study is to investigate the impact of long-term HAGE diet on adipose tissue and skeletal muscle metabolism in mice.

Methods: Male C57BL/6J mice ($n = 30$) were randomly assigned to two groups at three weeks of age: the control group and the HAGE group. The control group received a standard chow diet, while the HAGE group received a heat-processed diet. After conducting the wire hanging test,

mice were sacrificed at 16, 32, and 48 weeks of age, corresponding to adolescence, early adulthood, and middle age in humans. Adipose tissue and skeletal muscle samples were collected for further analysis.

Results: In body composition, long-term HAGE diet did not have impact on body weight but increase visceral adiposity in mice. Result of H&E staining did not show muscle atrophy in all ages. However, a decline of average falling score was found in HAGE group at 32 and 48 week-old. Immunofluorescence staining revealed changes in the ratio of fast-twitch and slow-twitch fiber, suggesting that HAGE diet may lead to fiber transition in mice.

Conclusion: The long-term HAGE diet significantly increased visceral adiposity in mice while concurrently reducing muscle strength and endurance without inducing obesity, likely due to a transition in muscle fiber types.

PE 07-27 7. Other Comorbidities of Obesity and Metabolic Syndrome

Case Report: Management of Deep Venous Thrombosis in Obese Female With Type 2 Diabetes at Limited Resources Hospital

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Background: Obesity is a predisposing factor of chronic venous insufficiency as well as venous stasis. Among diabetes patients, females appear to be associated with a higher relative risk increase in VTE than males, especially during perimenopause. It took proper comprehensive care to produce a positive clinical result.

Case description: A 50-year-old female presented with left leg swelling and pitting edema. Her BMI was 32. Well's Score DVT is 3. Laboratory result shows HbA1c 8.9%. Vascular ultrasound shows non compressible left femoral vein with thrombus. She was treated with Fondaparinux 7.5 mg s.c for 5 days, Warfarin started from 2 mg dose with target INR values of 2.0 to 2.5. Sitagliptin 100 mg, and glimepiride 4 mg also stocking compression. After seven days she was discharged from hospital and anticoagulants are given for up to six months with monitoring INR every week

Figure 1. Vascular ultrasound

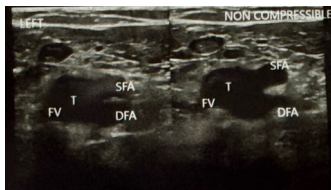
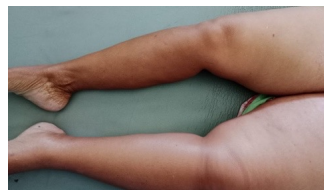


Figure 2. Clinical appearance.



Discussion: Patients with metabolic syndrome and diabetes could have a risk of vascular thrombosis because of associated endothelial dysfunction, increased platelet reactivity, and activation of the pro-inflammatory and pro-atherogenic mediators released by adipose cells. The cost and availability of direct oral anticoagulants is the limitation for venous thromboembolism treatment and in resource-limited settings. Warfarin use was associated with a significant decrease in total cost of care. However, with narrow therapeutic window, closely INR monitoring is required for warfarin. Glucose control also important for reduce vascular inflammation and prevent for recurrence.

Conclusion: The oldest and cheapest anticoagulant is warfarin. Warfarin works well but requires regular blood work. Newer anticoagulants do not require blood work to be done but are much more expensive. In resource-limited settings, warfarin still can be used for treatment deep vein thrombosis.

PE 07-28 7. Other Comorbidities of Obesity and Metabolic Syndrome

Polycystic Ovary Syndrome and Cardiometabolic Risk Factors in Young Adult Females in Delhi NCR

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Background: Polycystic Ovary Syndrome (PCOS) is a prevalent endocrine disorder among women of reproductive age, characterized by irregular menstrual cycles, hyperandrogenism, and polycystic ovaries. PCOS is often associated with various metabolic and cardiovascular abnormalities. This study aims to compare the physiological variables between young adult females with and without PCOS in the Delhi NCR region to identify key health metrics that differ significantly between these groups.

Methods: A cross-sectional study design was employed, involving 1081 young adult females aged 18-25 years from the Delhi NCR region. Participants were categorized into PCOS and non-PCOS groups based on clinical diagnosis. Data were collected on Body Mass Index (BMI), blood pressure, waist circumference, Waist-Hip Ratio (WHR), Waist-to-Height Ratio (WHtR), and lipid profiles (total cholesterol, high-density lipoprotein, low-density lipoprotein, very low-density lipoprotein, and triglycerides). Statistical analyses, including chi-square tests and logistic regression, were conducted to determine significant differences and predictors of PCOS.

Results: The analysis revealed significant differences in BMI, waist circumference, WHR, WHtR, VLDL, and TG levels between the PCOS and non-PCOS groups. Obesity was more prevalent in the PCOS group (49.2% vs. 21.4%), along with higher rates of elevated waist circumference (45.9% vs. 23.2%), WHR (27.0% vs. 15.4%), and WHtR (51.5% vs. 28.9%). VLDL and TG levels were also significantly higher in the PCOS group (25.3% vs. 14.3% and 24.71% vs. 14.0%, respectively; $p < 0.01$). Blood pressure, total cholesterol, high-density lipoprotein, and low-density lipoprotein levels did not show significant differences between the groups. Logistic regression identified obesity, high waist circumference, elevated WHR, WHtR, VLDL, and TG as significant predictors of PCOS.

Conclusion: The study underscores the importance of monitoring BMI, waist circumference, WHR, WHtR, VLDL, and TG levels in young adult females with PCOS. These physiological variables are significantly altered in the PCOS population and can serve as critical markers for early intervention. Targeted strategies to manage obesity and dyslipidemia are essential to mitigate the health risks associated with PCOS in young women in the Delhi NCR region.

PE 07-29 7. Other Comorbidities of Obesity and Metabolic Syndrome

Cluster Analysis of Nutritional and Lifestyle Factors Associated with Metabolic Dysfunction-associated Steatotic Liver Disease: Findings from the Korean Genome and Epidemiology Study

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Background: As the global prevalence of metabolic-dysfunction associated steatotic liver disease (MASLD) continues to rise, early detection of MASLD is crucial. In addition to the predefined cardiometabolic criteria for MASLD, various factors such as age, dietary intakes, and lifestyle factors are closely linked to MASLD. However, recent studies have mainly focused on the impact of individual risk factors on MASLD development rather than considering the combined effects of various risk factors. Therefore, we aimed to investigate the combined effects of age, dietary intakes of carbohydrate, protein, and fat, physical activity, smoking status, and alcohol consumption on MASLD development, hoping to enhance current understanding of high-risk individuals for MASLD.

Methods: We assessed a total of 4,670 participants from the Korean Genome and Epidemiology Study. Cluster analysis was performed using the K-means clustering method to generate distinct clusters based on age, proportions of macronutrients intake, alcohol intake, smoking

amount, and physical activity. Cox proportional hazard regression analysis was performed to assess the association between MASLD incidence and different clusters.

Results: A total of four clusters were generated, mainly characterized by the youngest age in cluster 1, the lowest carbohydrate intake in cluster 2, the highest age in cluster 3, and the highest alcohol intake and the highest amount of smoking in cluster 4, respectively. Cluster 3 and 4 showed significantly higher cumulative incidence rates of MASLD.

Conclusion: Distinct clusters exhibiting various risk-factor phenotype for MASLD were identified in this study, in which old age, smoking and alcohol consumption were significantly associated with a higher risk of MASLD. Our findings support the importance of early screening of high-risk groups for MASLD and the need for individualized approaches in managing MASLD.

PE 07-30 7. Other Comorbidities of Obesity and Metabolic Syndrome

Visceral Adiposity Index, Metabolic Syndrome as defined by the International Diabetes Federation Definition and Colorectal Cancer Risk in Malaysia

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Background: The visceral adiposity index (VAI), which quantifies visceral fat dysfunction, is recognized as a key marker for non-communicable diseases including metabolic syndrome (MetS), and certain cancers. This study aims to evaluate the role of VAI as a biomarker of MetS and colorectal cancer (CRC) risk.

Methods: Histologically confirmed CRC patients and matched cancer-free controls (140:280) from five local hospitals were assessed for MetS based on the International Diabetes Federation (IDF) criteria. The VAI combines anthropometric measurements of body mass index and waist circumference with blood lipid parameters, namely triglycerides and high-density lipoprotein cholesterol. The data were analysed using SPSS. Multiple variable Cox regression analysis was used to measure the strength of the association between VAI, MetS, and CRC risk.

Results: The mean VAI was significantly higher among females ($t = 17.96$, $p < 0.001$) and was highest among Malays ($F = 6.42$, $p = 0.002$). VAI was significantly higher among subjects with MetS ($t = -0.919$, $p < 0.001$). Multiple Cox regression analyses showed that an increase in a unit of VAI significantly increases the risk of CRC by 28% (AOR = 1.29, 95% CI = 1.05, 1.58). The study showed MetS significantly raised CRC risk more than two-fold (COR = 2.25, 95% CI = 1.44-3.50) and independently nearly three-fold (AOR = 2.61, 95% CI = 1.53 - 4.47).

Conclusion: Both VAI and MetS were independently associated with the risk of CRC. Thus, VAI and MetS could be explored as cost-effective and convenient tools for CRC assessment in Malaysia population.

Keywords: Visceral adiposity index (VAI), Metabolic syndrome, Colorectal cancer (CRC), International diabetes federation (IDF)

PE 07-31 7. Other Comorbidities of Obesity and Metabolic Syndrome

Nonalcoholic Fatty Liver Disease Changes Linked to Hepatocellular Carcinoma Risk: A Nationwide Cohort Study

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Background: Nonalcoholic fatty liver disease (NAFLD) is an increasingly common cause of hepatocellular carcinoma (HCC). And NAFLD is reversible; however, the effect of changes in NAFLD status on HCC risk is unknown. We aimed to investigate the effects of changes and persistence in NAFLD status on HCC risk.

Methods: This nationwide cohort study included 1,050,476 adults without HCC cancer who underwent 2 consecutive biennial health screenings provided by the Korean National Health Insurance System between 2009 and 2012 and were followed up until 2017. The fatty liver index 30 and more was used as a diagnostic biomarker for NAFLD. Participants were categorized into the NAFLD-free, NAFLD-recovered, NAFLD-developed, or NAFLD-persistent group. The primary outcome was newly diagnosed HCC using ICD-10 codes during follow-up until 31 December 2018. Cox regression analysis was used to estimate hazard ratios (HRs) and 95% confidence intervals (95% CIs).

Results: Among subjects, 5,345 subjects (0.51%) were identified as having HCC, during 5.1 years median follow up. Compared with the NAFLD-free group, the NAFLD-persistent group had the highest risk of HCC (HR, 1.76; 95% CI, 1.64–1.88), followed by the NAFLD-recovered group (HR, 1.23; 95% CI, 1.12–1.36) and the NAFLD-developed (HR, 1.23; 95% CI, 1.10–1.39) after adjusting for potential confounders (P for trend <.001). The NAFLD-recovered group was associated with a lower risk of HCC than that in the NAFLD-persistent group (P <.001). The association between changes in NAFLD status and HCC risk differed according to age group. Compared with the NAFLD-free group, the NAFLD-persistent group had the highest risk of HCC in age 40 and over. The NAFLD-recovered group had the highest risk of HCC in age 60 and over. The NAFLD-developed group had the highest risk of HCC in age 70 and over.

Conclusion: In this study, recovering from NAFLD was associated with a reduced risk of HCC compared with persistent NAFLD, suggesting that HCC risk can be altered by changes in NAFLD status and cumulative exposure time of NAFLD status.

PE 07-32 7. Other Comorbidities of Obesity and Metabolic Syndrome

Association between steatotic liver disease (SLD) and gynecologic cancer: population-based study

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Background: It is unclear whether there is an association between steatotic liver disease (SLD) and gynecologic cancer. We investigated the association between steatotic liver disease (SLD) and gynecologic cancer in the general population.

Methods: This was a retrospective, observational, cohort study using data from the National Health Information Database from 2009 to 2018 and included 2,133,321 subjects, aged ≥40 years (premenopausal: 886,822 & postmenopausal: 1,246,499). We were divided into six groups based on steatosis status by fatty liver index (FLI), cardiometabolic risk factor, alcohol intake and concomitant liver disease; no steatosis (NS; FLI <30), metabolic dysfunction-associated steatotic liver disease (MASLD), metabolic alcohol-associated liver disease (MetALD), alcohol-associated liver disease (ALD), specific etiology SLD, and cryptogenic SLD. The primary outcome was newly diagnosed cervical, uterine, or ovary cancer using ICD-10 codes during follow-up until 31 December 2018. Cox regression analysis was used to estimate hazard ratios (HRs) and 95% confidence intervals (95% CIs).

Results: Among subjects, 1,626,472 subjects (23.8%) were identified as having SLD [premenopausal: 121,784 (13.7%) & postmenopausal: 385,065 (30.9%)]. During the follow-up period (8.3 years), 1,879 (0.25 case/1000py) cervical, 1,822 (0.24 case/1000py) uterine and 2,448 (0.33 case/1000py) ovary cancer cases were identified in premenopausal subjects and 2,750 (0.27 case/1000py) cervical, 1,921 (0.19 case/1000py) uterine and 3,433 (0.33 case/1000py) ovary cancer cases in postmenopausal subjects. Comparing with NS, MASLD was associated with uterine (HR 1.17, 95% CI 1.46–1.84), and ovary (HR 1.22, 95% CI 1.09–1.37) cancer, and MetALD was associated with cervical (HR 1.87, 95% CI 1.21–2.89) cancer in premenopausal subjects. Among postmenopausal subjects, MASLD was associated with cervical (HR 1.12, 95% CI 1.03–1.22), uterine (HR 1.49, 95% CI 1.35–1.64), and ovary (HR 1.16, 95% CI 1.08–1.25) cancer comparing with NS. However, other SLD classes were not associated with gynecologic cancer.

Conclusion: In this large population study, MASLD was associated with higher risk of gynecologic cancer.

PE 07-33 7. Other Comorbidities of Obesity and Metabolic Syndrome

A Meta-Analysis Evaluating the Efficacy of Liraglutide in Reducing Cardiovascular Complications Among Patients with Type 2 Diabetes

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Background: The objective of this study was to determine the efficacy of Liraglutide in reducing cardiovascular complications

Methods: Literature searches of electronic databases (PubMed and ScienceDirect) were performed to identify relevant studies. Relevant journals included were electronically searched for randomized controlled trials (RCTs) regarding the use of Liraglutide versus placebo in reducing the rate of cardiovascular complications. Data extraction and quality assessment were done by independent reviewers. Statistical analysis of the study was accomplished using Cochrane Systematic Review Software Review Manager. A p-value of less than 0.05 for the observed effect size was considered statistically significant.

Results: A total of 2 RCTs with 16, 977 patients were included in this meta-analysis. The results showed that in the Liraglutide group, there is a lower rate of the following: MACE (risk ratio of 0.86 [0.78, 0.95]), cardiovascular events (risk ratio 0.75 [0.63, 0.89]), and all-cause mortality (risk ratio 0.81 [0.70, 0.93]), but is not statistically significant when compared to the placebo group in terms of non-fatal myocardial infarction and non-fatal stroke. There is no significant difference in rates of severe adverse events in general ($p > 0.05$). However, Liraglutide caused significant reduction in rates of severe hypoglycemia as an independent secondary outcome ($p < 0.05$).

Conclusion: Compared with placebo, Liraglutide provided a significant reduction in MACE, cardiovascular events, all-cause mortality and severe hypoglycemia as an adverse event.

PE 07-34 7. Other Comorbidities of Obesity and Metabolic Syndrome

Relationship Between Non-Alcoholic Fatty Liver Disease On Sleep Quality, Anxiety, Depression And Quality Of Life In Among School Going Adolescent In Prayagraj City, India

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Background: Poor sleep has been linked to an increased risk of non-alcoholic fatty liver disease (NAFLD) and may exacerbate disease progression. Understanding the factors influencing sleep quality in NAFLD patients is crucial, as it can impact various aspects of life, and individuals with NAFLD often experience higher levels of depression and anxiety compared to others. Despite this, there is limited research on anxiety and depression associated with NAFLD, particularly in Asian populations. The aim of this study was to assess the frequency, magnitude, and significance of anxiety, sleep quality, and depression among school-going adolescents with NAFLD in Prayagraj City, India.

Methods: A cross-sectional survey was conducted among students in four classes (9th to 12th grades) across ten government schools in Prayagraj city, India. A section was randomly selected from each school for each grade using the lottery method. Forty students were chosen from each school, resulting in a total sample size of 470. This clinical trial study focused on NAFLD patients with mild-to-moderate symptoms, divided into case and control groups based on a hepatic steatosis index (HSI) value ≥ 36 . Stress perception was evaluated using a stress perception rate.

All participants completed self-administered questionnaires assessing symptom severity, the Hospital Anxiety and Depression Scale (HADS), and the NAFLD-specific quality of life (NAFLD-QOL) questionnaire.

Results: Among school adolescents, anxiety was observed in 32.1% of NAFLD patients compared to 26.6% of healthy subjects, while depression was observed in 34.5% of NAFLD patients compared to 17.2% of healthy subjects ($p < 0.05$ for both). Both anxiety and depression were associated with self-reported symptom severity ($p < 0.05$ for both). Multivariate analysis revealed symptom severity as the most significant predictor of anxiety and depression. Self-reported symptom severity and depression were independently associated with overall NAFLD-QOL scores. There was no significant association between NAFLD occurrence and meal frequencies over one week.

Conclusion: The findings underscore the importance of assessing anxiety and depression in NAFLD patients. Early and effective identification of these psychological factors is crucial for preventing the onset and progression of psychiatric disorders in individuals with NAFLD.

PE 07-35 7. Other Comorbidities of Obesity and Metabolic Syndrome

Adipose Tissue-Derived Extracellular Vesicles from Obese Mice Suppressed Splenocyte-Mediated Pancreatic Cancer Cell Death

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Background: Obesity is a risk factor for pancreatic cancer and negatively contributes to the immune system. However, the mechanisms by which obesity mediates these actions are still poorly understood. Recent studies have demonstrated that extracellular vesicles are key mediators of communication between cells and may influence various aspects of cancer progression. We aim to explore the influence of extracellular vesicles (EVs) derived from adipose tissue of obese mice on cytokine production within the interactions between cancer cells and immune cells.

Methods: We isolated EVs from the adipose tissue of both C57BL6/J mice and Ob/Ob mice. Subsequently, we treated EVs with Panc02 cells, the murine ductal pancreatic cancer cell line, which were co-cultured with splenocytes. Viability and SMAD4 gene expression were examined in Panc02 cells, and cytokine concentrations of IL-6, IL-4, IL-12, and IL-12p70 were measured in the cultured medium.

Results: Interestingly, we observed a significant reduction in splenocyte-mediated Panc02 cell death when treated with EVs derived from the adipose tissue of Ob/Ob mice, compared to those from C57BL6/J mice. Additionally, EVs from Ob/Ob mice-derived adipose tissue significantly increased the levels of IL-4, IL-2, and IL-12p70 in the culture media of Panc02 cells co-cultured with splenocytes, compared to EVs from C57BL6/J mice-derived adipose tissue.

Conclusion: Adipose tissue-derived EVs from obese mice suppressed splenocyte-mediated Panc02 cell death and upregulated IL-4, IL-2, and IL-12p70 in cultured medium.

PE 07-36 7. Other Comorbidities of Obesity and Metabolic Syndrome

The Association Between Sarcopenia Severity and Metabolic Syndrome in Middle-Aged and Older Adults

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Background: Metabolic syndrome (MetS) is associated with the high risk of cardiovascular disease, type 2 diabetes, and mortality. Sarcopenia is characterized by a decline in muscle mass and strength, and many studies have consistently reported an association between sarcopenia and MetS. However, most previous studies have focused on the relationship between muscle mass and MetS. There have been few studies on the association between sarcopenia severity and MetS. Therefore, we aimed to investigate the association between sarcopenia severity and MetS.

Methods: This study included 2,397 participants (1,061 male and 1,336 female) aged ≥ 45 years from the Korea National Health and Nutrition Examination Survey. MetS was defined as having ≥ 3 of risk factors. Pre-sarcopenia was defined as low muscle mass only, and dynapenia was defined as low muscle strength only. Sarcopenia was defined as the presence of both low muscle mass and low muscle strength. A survey logistic regression analysis was used to determine the association

between sarcopenia severity and MetS after adjusting for covariates.

Results: The odds ratio (OR) for MetS was 1.71 (95% confidence interval [CI] = 1.07–2.73) in the sarcopenia group compared to the normal group (reference). Dynapenia (OR = 0.81; 95% CI: 0.55–1.19) and pre-sarcopenia (OR = 1.17; 95% CI: 0.83–1.64) groups were not significantly associated with an increased risk of MetS. In sensitivity analyses, only the sarcopenia group was significantly associated with an increased risk of MetS in men (OR = 3.57; 95% CI: 1.34–9.50) and older adults aged ≥ 65 years (OR = 1.64; 95% CI: 1.01–2.66).

Conclusion: Our study showed that sarcopenia was associated with an increased risk of MetS, but not with low muscle mass or strength alone. Therefore, our findings suggest that the combination of low muscle mass and low strength should be considered for the prevention of MetS.

PE 07-37 7. Other Comorbidities of Obesity and Metabolic Syndrome

Metabolic Syndrome in Infertile Women with Polycystic Ovarian Syndrome

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Background: Polycystic ovary syndrome (PCOS) affects 10–18% of women of reproductive aged women. Insulin resistance (IR) appears to be important in the pathogenesis of PCOS and subsequent metabolic syndrome. The prevalence of metabolic syndrome is as high as 33% in women with PCOS, and is associated with long-term consequences such as cardiovascular disease (CVD), diabetes type II, cancers, sleep apnoea and psychological problems. Conventionally, management of PCOS has focused on infertility, anovulation and hirsutism; thus, there is a need to increase clinicians' awareness of metabolic syndrome. The enormity of the health burden of metabolic syndrome means that accurate identification and timely intervention are extremely important. By detecting metabolic syndrome in infertile women with PCOS, they can reduce body weight before pregnancy and improve their health by correcting metabolic disorder. The aim of the present study was to determine the prevalence of metabolic syndrome (MS) in infertile Mongolian women with polycystic ovary syndrome (PCOS) using the IDF criteria.

Methods: We used the cross-sectional and case control study designs. Total 1340 infertility women enrolled in this study. Among 116 women with PCOS were found by Rotterdam's criteria at the Infertility and reproductive department, National Center for Maternal and Child Health, between December, 2018-2019. IDF diagnostic criteria for MS was used. The PCOS patients divided into following groups: (1) with MS (n=42) and (2) without MS (n=74)

Results: Among the 1334 infertile women studied, 8.5% (114) had a PCOS, of which 44.7% had Rotterdam 3 symptoms, the diagnosis was confirmed by following symptoms, 3.5% had oligo-anovulation and hyperandrogenism, 12.3% had hyperandrogenism and polycystic ovaries, 39.5% had oligo-anovulation cycles and polycystic ovaries. The average age is 28.7±4.1, primary infertility 57%, family don't have children 81.6%, overweight 34.2%, obesity 29.4%, oligo-anovulation cycle 80.7%, hirsutism 61.5%, acne 50.9%, and MS 36.8%. The mean of AMH (7.0±4.2 ng/ml, p=0.001) and the occurrence of MS (64.3%, p=0.01) were observed in women whose diagnosis was confirmed by Rotterdam 3 criteria. The variables including age (30.9±4.9), body mass (75.9±11.6kg) and also some metabolic parameters which is hypertension (133.6/88.4±13.6 mm Hg), WC (94.1±8.6 cm) and high triglyceride (1.8±1.0 mmol/l) were observed in MS group compared to without MS group.

Conclusion:

1. We found out that the prevalence of metabolic syndrome was 36.8 % among infertility women with PCOS.
2. The present this study found that women with PCOS who were diagnosed according to the three criteria of Rotterdam, a had much higher prevalence of metabolic syndrome than was conducted than other phenotype groups. Age, BMI, WC, amenorrhea, acne and acanthosis nigricans were highly related to metabolic syndrome.

PE 07-38 7. Other Comorbidities of Obesity and Metabolic Syndrome

Mobile Lifestyle Intervention with High-Protein Meal Replacement Improves Liver Function in Patients with Obesity and Metabolic dysfunction Associated Steatotic Liver Disease: A Pilot Randomized Controlled Trial

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Background: While many studies have explored dietary substitutes and mobile apps separately, a combined approach to metabolic dysfunction-associated steatotic liver disease (MASLD) has not been investigated. This study evaluated short-term mobile interventions coupled with partial meal replacement in patients with MASLD.

Methods: Sixty adults with MASLD and a body mass index ≥ 25 kg/m² from a health examination center were randomized into an intervention group using a mobile app with partial meal replacements or a control group receiving standard educational materials. Liver enzyme levels, lipid profiles, and anthropometric measurements were assessed at baseline and after 4 weeks. Twenty-five participants in the intervention group and 24 in the control group completed the trial.

Results: Significant reductions were observed in the intervention group for alanine aminotransferase (-28.32 versus [vs.] -10.67, p = 0.006) and gamma-glutamyl transferase (-27.76 vs. 2.79, p=0.014). No significant changes in aspartate aminotransferase, body weight, or waist circumference were noted in the intervention group.

Conclusion: Four weeks of mobile lifestyle intervention incorporating partial meal replacements improved liver enzyme profiles in patients with MASLD. This strategy demonstrated the potential for mitigating elevated liver enzyme levels without altering body weight or waist circumference. Comprehensive and longer-term research is needed to substantiate and elaborate these preliminary outcomes.

PE 07-39 7. Other Comorbidities of Obesity and Metabolic Syndrome

Role of body mass index in cognitive impairment: Findings from a cross-sectional study in rural Punjab, India

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Background: The association between Body mass index (BMI) and cognitive impairment (CI) is a critical area of public health research, particularly in regions with significant nutritional and socio-economic challenges. This study explores the direct relationship between BMI status and CI among the adult population in rural Punjab, India.

Methods: A cross-sectional study was conducted on a cohort of 1,206 individuals aged 18 and above including both the sexes. Data related to sociodemographic variables was collected by using pretested and modified interview schedule. Rowland Universal Dementia Assessment Scale was utilized (RUDAS) for cognitive evaluation. Standing height vertex and body weight were collected using anthropometer rod and digital weighing balance respectively. Body Mass Index (BMI) was calculated and categorized using Asia pacific cut-offs. Statistical analysis was performed using SPSS software version 22.

Results: Results indicated a significantly higher prevalence of CI was found among underweight individuals compared to those with normal, overweight and obese individuals. Binary logistic regression model, adjusted for potential confounders such as age, gender and education status, revealed that underweight individuals had 1.872-folds significant increased risk for having CI (p-value: 0.04). However, overweight and obesity were not found to be associated with CI in this population.

Conclusion: This association underscores the importance of addressing nutritional deficiencies as a potential modifiable risk factor for cognitive decline in ageing populations. The findings advocate for integrated nutritional and cognitive health interventions to mitigate the dual burden of malnutrition and CI in rural Punjab. Future research should focus on longitudinal studies to establish causality and explore underlying mechanisms linking underweight status to cognitive decline.

PE 07-40 7. Other Comorbidities of Obesity and Metabolic Syndrome

Metabolic Syndrome Increases the Risk and Neurologic Outcome of Moyamoya Disease

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Background: Moyamoya disease (MMD) is rare disease with ill-defined etiology. Although metabolic syndrome (MetS) is highly associated with endothelial dysfunction in many organs, the correlation between MetS and the development and progression of MMD has not been studied.

Methods: This nation scale retrospective observational study was based on Korean National Health Insurance Service database from 2009-2012. From this database, 6,891,400 participants aged between 20-40 years were enrolled. The median follow-up period was 9.65 (Interquartile range: 8.55-10.24) years. The hazard ratio (HR) of MMD development and ischemic stroke event was measured by Cox regression analysis after adjusting age, sex, income, smoking, drinking, and regular exercise. The HR of MMD with respect to MetS was measured and subgroup analysis was performed based on sex.

Results: During the study period, 1,754 participants (incidence rate:

2.94 per 100,000 person year) developed MMD. People who developed MMD had different proportion of smoking status and higher proportion of female, diabetes, hypertension, dyslipidemia, and higher baseline Body Mass Index compared with those who did not developed MMD (p < 0.0001). Overall, the HR for the presence of MetS for developing MMD was 2.94 (95% CI: 2.60, 3.94). The risk of developing MMD stepwisely increased as the number of MetS components increased. Females had a higher MMD risk than males in every MetS components. Among newly diagnosed MMD, MetS was associated with an increased risk of ischemic stroke (HR 2.86, 95% CI: 1.50-5.45).

Conclusion: The presence of MetS is associated with the development and progression of MMD in Korean young adults

Keywords: Metabolic syndrome, Moyamoya disease

Poster Exhibition

8. Pathophysiology of Obesity and Metabolic Syndrome

PE 08-01 8. Pathophysiology of Obesity and Metabolic Syndrome

The Circadian Regulator Nobiletin Activated by ROR Inhibits Adipocyte Differentiation and Inflammation Pathway in 3T3-L1 Adipocytes

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Background: Obesity is a well-known risk factor for metabolic diseases and is often linked to chronic inflammation in fat tissue. In our previous research, we found that the natural flavonoid Nobiletin (NOB) acts as a circadian clock regulator. NOB binds directly to and activates the ROR receptors in the core circadian oscillator, significantly enhancing metabolic health in obese mice. In this study, we investigated whether the ROR receptors and the circadian oscillator play a role in the anti-obesity mechanism of NOB.

Method: 3T3-L1 preadipocyte cell lines were treated NOB (10 or 20 μ M) and used for histology, RT-qPCR, Western blot, and measuring TNF α level. To monitor circadian rhythms in 3T3-L1, we generated clones with Bmal1:Luciferase reporters. To generate Rora/ γ double knockdown 3T3-L1 cell lines (Ror DKD), we performed a CRISPR system.

Results: In this study, we demonstrate that NOB enhances the oscillation

of core clock genes in differentiated 3T3-L1 adipocytes, including ROR target genes. NOB also reduced lipid accumulation in 3T3-L1 cells, while disrupting the circadian expression of genes related to adipogenic differentiation, including Cebpb, Pparg, Lpl, Scd1, and Fas. Notably, 3T3-L1 Ror DKD cells significantly weakened NOB's effects on circadian gene expressions of core clock genes and adipogenic genes, and lipid accumulation. Additionally, while NOB increased the expression of I κ B α , a target of RORs, to inhibit NF- κ B activation and reduce proinflammatory cytokine expression, Ror DKD cells showed a stronger activation of the NF- κ B pathway. This further suggests that RORs are essential for NOB's effectiveness in adipocytes.

Conclusion: These findings emphasize the important regulatory role of the NOB-ROR axis in controlling the circadian expression of clock and clock-controlled genes in 3T3-L1 adipocytes. This regulation affects adipogenic differentiation, lipid production, and inflammation.

PE 08-02 8. Pathophysiology of Obesity and Metabolic Syndrome

Genome-wide association study for metabolic syndrome reveals APOA5 SNPs with multilayered effects in Koreans

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Background: Genome-wide association studies (GWAS) investigating metabolic syndrome (MetS) have predominantly focused on non-Asian populations, with limited representation from Korean cohorts. Previous GWAS analyses have primarily emphasized the significance of top single nucleotide polymorphisms (SNPs), leaving other SNP signals poorly explained. This study aimed to reveal the interaction between rs2266788 and rs651821, the principal variants of apolipoprotein A5 (APOA5), within the most significant loci identified through GWAS for MetS. We further investigated how these variants collectively influence triglyceride and high-density lipoprotein (HDL)-cholesterol levels, both diagnostic criteria for MetS.

Methods: We conducted a comprehensive analysis using data from the Korean Genome and Epidemiology Study (KoGES) cohort, comprising 58,600 Korean individuals with available biochemical and demographic data relevant to MetS.

Results: Our findings reveal a significant association between the APOA5 SNP rs651821 and MetS and diagnostic plasma lipid levels. Notably, rs2266788 also exhibited significant associations with both triglyceride and HDL-C levels; however, a conditional analysis employing rs651821 unveiled a reversal in the odds ratio for rs2266788. Thus, rs651821 and rs2266788 emerged as independent and opposing signals in the extended GWAS analysis, namely, the multilayered effects. Further gene-environment interaction analyses regarding smoking, alcohol drinking, and physical activity underscored these multilayered effects.

Conclusion: This study unveils the intricate interplay between rs651821 and rs2266788 in MetS susceptibility. Removing the lead SNP's influence reveals an independent protective signal associated with rs2266788, suggesting a multilayered effect between the two SNPs. These findings underscore the need for novel directions in future GWAS research.

PE 08-03 8. Pathophysiology of Obesity and Metabolic Syndrome

Knowledge, Attitude and Practice Towards Cardiovascular Disease Risks Among Private University Students in Shah Alam, Selangor, Malaysia

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Background: Cardiovascular diseases (CVD) are the leading cause of death in Malaysia in 2023 with approximately 1.7 million people in Malaysia living with the three major risk factors, namely diabetes, hypertension, and high blood cholesterol. Good knowledge and attitude will help individuals to be more aware on the risk factors thus taking necessary precaution to maintain good health.

Method: A cross-sectional study involving 379 participants was conducted to determine knowledge, attitude, and practice towards CVD risk factors among students in MSU. Respondents completed an online questionnaire comprises of socio-economic and demographic section, knowledge on cardiovascular disease risks, together with attitude and practice towards prevention of cardiovascular disease.

Results: Majority of the respondents were female (58%), aged between 18 to 25 years old (87.9%), with no history of cardiovascular disease (95%).

The mean score for knowledge, attitude and practice on cardiovascular disease were 0.80 ± 0.17 , 4.05 ± 0.69 and 3.62 ± 0.64 , respectively. There was a significant relationship between socioeconomic characteristics with knowledge on CVD risks ($p < 0.05$) but not on the attitude and practice towards prevention of CVD ($p > 0.05$).

Conclusion: This study revealed that respondents had moderate knowledge and good attitude/practice towards prevention of CVD. A health promotion campaign at the university setting could create awareness on cardiovascular disease risks and ensure necessary precaution can be implemented to reduce the risks thus protecting cardiovascular health of individuals.

Keywords: Cardiovascular disease, knowledge, attitude, practice, risk factors

PE 08-04 8. Pathophysiology of Obesity and Metabolic Syndrome

Long-term high-fructose high-fat diet renders the retina more susceptible to blue light in mice via AGE/RAGE-induced inflammasome activation

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Background: Blue light (BL) has short wavelengths and higher energy, enabling it to penetrate the eyeball and cause retinal photochemical damage by excessive generation of reactive oxygen species. Given the lack of studies about the influence of dietary factors on the susceptibility to BL phototoxicity, this study aimed to investigate the impact of a long-term high-fructose and high-fat (HFHF) diet on the development of retinal damage by BL exposure.

Methods: A total of 24 male ICR mice were randomly assigned to three groups: control, BL exposure (BL), and BL exposure plus HFHF diet (BL + HFHF) groups. Following a duration of 40 weeks adhering to the HFHF diet, the mice were exposed to low-intensity BL for eight weeks, with a cumulative exposure time of 6 h per day.

Results: The results showed that the HFHF diet led to visceral fat accumulation, elevated levels of blood total cholesterol, protein carbonyl group, and fluorescent advanced glycated end products (AGEs) in mice. Immunofluorescence staining (IF) showed that BL caused the loss of

rhodopsin, activation of Müller glial cells, and a significant elevation in the oxidative stress marker 8-hydroxy-2-deoxyguanosine ($p < 0.05$) as compared to the control group. The HFHF diet had a significant impact on the adverse outcomes of BL, resulting in increased permeability of the blood-retinal barrier and elevated levels of the pro-inflammatory IL-1 β and TNF- α , along with the apoptosis-related caspase-3 and inflammasome NLRP3 and caspase-1 proteins ($p < 0.05$). In the HFHF diet group, the deposition of N ϵ -(1-carboxyethyl)-L-lysine and N δ -(5-methyl-4-imidazolone-2-yl)-L-ornithine was observed in retinal tissues together with the activation of the receptor for AGE.

Conclusion: This study proposes that the inflammasome activation triggered by the AGE/RAGE pathway in response to an HFHF diet could potentially worsen BL toxicity and that unhealthy dietary patterns may have detrimental effects on visual health.

Keywords: AGEs, blue light, high-fructose and high-fat diet, oxidative stress, retina

PE 08-05 8. Pathophysiology of Obesity and Metabolic Syndrome

Metabolic and Mitochondrial Pathways Influenced by Estrogen and Testosterone in Transgender Individuals: A Metabolomic and Machine Learning Approach

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Background: Mitochondria are crucial for energy in skeletal muscle. The impact of hormone therapy on mitochondrial function in transgender individuals is not well understood. This study investigates how estrogen and testosterone affect mitochondrial bioenergetics and identifies distinct metabolic signatures. We also explore implications for managing obesity and MetS in transgender people.

Method: We analyzed data from the NIH Common Fund Metabolomics Program and the UK Biobank, focusing on 300 transgender participants (150 on estrogen, 150 on testosterone therapy). High-resolution metabolomic data, including over 1,000 metabolites, were examined to assess bioenergetic pathways like the TCA cycle and fatty acid oxidation. Mitochondrial function metrics, such as density and ATP production, were derived. Clinical metrics included BMI, fasting glucose, lipid profiles, hormone regimens, and serum hormone levels. We used Principal Component Analysis (PCA) and Random Forest for feature ranking, and predictive modeling with Support Vector Machines (SVMs) and Neural Networks to identify metabolomic signatures linked to MetS outcomes, evaluated by AUC, precision, recall, and F1-score.

Results: Estrogen therapy increased mitochondrial density by 20% and ATP production by 15% ($p < 0.01$). Testosterone therapy decreased mitochondrial density by 10% and ATP by 12% ($p < 0.05$). Estrogen boosted TCA cycle metabolites (1.5x-1.7x, $p < 0.01$) and reduced fatty acid oxidation markers (0.6x, $p < 0.05$). Testosterone increased branched-chain amino acids (1.4x, $p < 0.05$) and oxidative stress markers (1.3x, $p < 0.05$). Our SVM model accurately predicted MetS (AUC 0.92, precision-recall AUC 0.89), emphasizing TCA cycle intermediates and mitochondrial respiration as key predictors. Estrogen upregulated oxidative phosphorylation and glycolysis (scores 2.3 and 1.9, $p < 0.01$), while testosterone enhanced amino acid metabolism and ROS detoxification (scores 1.8 and 2.0, $p < 0.01$).

Conclusion: Estrogen therapy improves mitochondrial function, while testosterone reduces it in transgender individuals. Metabolomic analysis reveals unique pathways influenced by each hormone. Improved mitochondrial health is key for managing obesity and MetS, emphasizing the potential for targeted interventions.

PE 08-06 8. Pathophysiology of Obesity and Metabolic Syndrome

Hepatocyte-derived extracellular vesicles mediate endothelial dysfunction in metabolic dysfunction-associated steatotic liver disease

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Background: Metabolic dysfunction-associated steatotic liver disease (MASLD) is an independent risk factor for cardiovascular disease (CVD), although the mechanism of association is still unclear. Extracellular vesicle (EV) is a biological nanoparticle that plays critical roles in intercellular crosstalk. We aimed to investigate the effect of hepatocyte-derived EVs on endothelial cells in MASLD condition.

Methods: Hepatocytes isolated from C57BL6 mice were exposed to palmitic acid (PA). Mice were fed a Gubra-Amylin Nonalcoholic steatohepatitis (GAN) diet for MASLD model. Human umbilical vein endothelial cells (HUVEC) and human aortic endothelial cells (HAEC) were treated with EVs released from hepatocytes.

Results: The amount of EVs derived from PA-treated hepatocytes was greater than the EVs from control hepatocytes. Fluorescence-labeled hepatic EVs uptake were detected in endothelial cells. Treatment of EVs

derived from PA-exposed hepatocytes induced endothelial dysfunction with subsequent upregulation of inflammatory cytokines, adhesion molecules, and oxidative stress markers in HUVEC/HAEC. Small RNA profiling of miRNA isolated from PA-treated hepatic EVs identified 23 upregulated and 4 downregulated miRNAs. miR-30b-5p was identified as a possible candidate cargo and its elevation was confirmed by qPCR in EVs from PA-treated hepatocytes and GAN diet-induced fatty liver. We identified Elov15 as a direct target of miR-30b-5p, a key enzyme in fatty acid elongation. Overexpression of miR-30b-5p inhibited the elongation of polyunsaturated fatty acids (PUFA), and similar results were observed when the expression of Elov15 was knocked down by Elov15 siRNA. Suppression of Elov15 resulted in endothelial dysfunction which was rescued by supplementation of PUFAs.

Conclusion: Our findings suggest a novel role of hepatic EVs that regulate crosstalk between hepatocytes and endothelial cells. This may explain the independent relationship between MASLD and CVD.

PE 08-07 8. Pathophysiology of Obesity and Metabolic Syndrome

Aged-induced nonalcoholic fatty liver disease seems to inversely correlated with iron and vitamin D

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Background: Nonalcoholic fatty liver disease (NAFLD) is the most common chronic liver disease, linked to obesity and diabetes. Excess iron worsens NAFLD by disrupting lipid metabolism via reactive oxygen species and mitochondrial dysfunction. Herein, we found that iron was excessively accumulated in the liver of aged mice, and discovered that vitamin D alleviates this iron overload.

Method: 3- or 18-month-old mice were divided into two groups and fed a standard chow diet containing vitamin D3 (1000 IU/kg) or a standard chow diet enriched with vitamin D3 (20,000 IU/kg) for 4 months (n = 10-12 per group).

Results: Aging is a well-known risk factor for NAFLD. Previously, we demonstrated that vitamin D3 prevents age-induced NAFLD by increasing the level of mitochondrial cristae organizing system (MICOS) 60. To further investigate the precise mechanisms underlying age-induced liver changes, we conducted a differential gene expression (DEG) analysis with vitamin D3-treated aged livers compared to young and old chow diet-

fed mice. Our findings indicate significant inverse changes in metabolic pathways involved in lipid and cholesterol regulation in vitamin D3-treated aged livers compared to controls. Additionally, total OXPHOS proteins were significantly increased in vitamin D3-treated aged livers compared to those from aged livers on a chow diet.

Twenty-two-month-old C57BL6 mice displayed hepatic steatosis, hepatomegaly, elevated blood triglycerides, and free fatty acids. Concomitantly, we observed liver iron accumulation in aged mice by immunostaining using ferritin heavy chain antibodies. Aged livers exhibited increased ferritin-positive cells per area, whereas vitamin D3-treated aged mice showed a reduction of iron accumulation. Notably, vitamin D3 did not affect ferritin heavy chain protein or RNA levels, but it did regulate ferritin light chain transcript levels.

Conclusion: Sufficient intake of vitamin D is expected to play a very effective role in preventing non-alcoholic fatty liver disease (NAFLD). Vitamin D3 may influence hepatic steatosis by modulating metabolic genes and iron accumulation in aging livers.

PE 08-08 8. Pathophysiology of Obesity and Metabolic Syndrome

Serotonin 2C Receptors Expressed by TRH Neurons Regulate Metabolism

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Background: The thyrotropin-releasing hormone (TRH) neurons are neurohormone-expressing neurons that regulate metabolism. Since it was previously shown that TRH neurons express serotonin 2C receptor (Htr2c) that controls many aspects of metabolism, we aimed to identify the metabolic role of Htr2c expressed by TRH neurons.

Methods: We performed experiments to characterize metabolic phenotypes with Trh-ires-cre::Htr2c^{flox/Y} and Htr2c^{flox/Y} mice fed high fat diet. We measured body weight, food intake, energy expenditure, and performed glucose tolerance test and insulin tolerance test. We also recorded the electrical activity of TRH neurons using patch-clamp technique from the Trh-ires-cre::tdTomato reporter mice.

Results: We did not observe any significant difference in body weight, food intake, and energy expenditure, insulin tolerance test between the Trh-

ires-cre::Htr2c^{flox/Y} and Htr2c^{flox/Y} mice. However, fasting glucose level was significantly lower in Trh-ires-cre::Htr2c^{flox/Y} mice compared to Htr2c^{flox/Y} mice. In addition, Trh-ires-cre::Htr2c^{flox/Y} mice showed improved glucose tolerance compared to Htr2c^{flox/Y} mice. We also found that CP809101, an Htr2c agonist, does not affect TRH neurons within the paraventricular nucleus of the hypothalamus (PVH), but inhibits TRH neurons within the dorsomedial nucleus of the hypothalamus (DMH).

Conclusion: We found that Htr2c expressed by TRH neurons regulate fasting glucose levels without affecting body weight, food intake, and energy expenditure. We also provide evidence that the observed phenotypes may not be due to the activity of PVH TRH neurons, but Htr2c may work on DMH TRH neurons to regulate glucose homeostasis. Our findings provide insight how Htr2c expressed by TRH neurons regulate metabolism.

PE 08-09 8. Pathophysiology of Obesity and Metabolic Syndrome

Role of dorsal raphe serotonergic neurons in sodium appetite

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Background: An animal with sodium deficiency develops sodium appetite which drives it to consume more sodium. Although a lot of studies have been performed to understand how sodium depletion may lead to the development of sodium appetite, current understanding on the mechanisms is incomplete. In particular, while the relationship between serotonin receptors and sodium appetite has been suggested for a long time, it is still unclear how serotonin controls sodium appetite in response to sodium depletion. Hence, we targeted serotonergic neurons in the dorsal raphe nucleus (DRN) in brainstem, which releases more than 50% of serotonin in the brain.

Method: We performed immunohistochemistry and patch-clamp experiments to examine the activity DRN serotonergic neurons in several conditions. Blood pressure was measured by a non-invasive system. For some experiments, drugs were given via an intracerebroventricular cannula

or a subcutaneous minipump.

Results: We found that DRN serotonergic neurons were activated by sodium depletion. Drug-induced hypotension had only minimal effects on the activity of serotonergic neurons and no effects on sodium appetite. Notably, angiotensin II (ATII) was sufficient to activate DRN serotonergic neurons and increase sodium appetite in euvoemia. We also found evidence that ATII receptors are necessary to activate DRN serotonergic neurons and induce sodium appetite in sodium depletion.

Conclusion: In this study, we found that DRN serotonergic neurons are activated in response to sodium depletion. We also found that it is not decreased blood pressure but ATII, which was released presumably in response to volume depletion, that activates DRN serotonergic neurons.

PE 08-10 8. Pathophysiology of Obesity and Metabolic Syndrome

Metabolic Function of Leucine-Rich Repeat Transmembrane Neuronal 4 Expressed by Arcuate AgRP Neurons

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Background: It is well known that the agouti-related peptide (AgRP)-expressing neurons of the arcuate nucleus of the hypothalamus regulate energy balance and glucose homeostasis. While it was previously shown that excitatory and inhibitory synaptic input onto the AgRP neurons influence the activity and metabolic function of AgRP neurons, little is known about the role of synaptic adhesion molecules therein. In this study, we focused on a synaptic adhesion molecule, leucine-rich repeat transmembrane neuronal 4 (LRRTM4), which is expressed by post-synaptic part of excitatory synapses to be involved in synapse formation and synaptic transmission.

Methods: We generated conditional knockout mice which lacks LRRTM4 specifically in the AgRP neurons (AgRP^{LRRTM4-KO} mice). We measured

body weight, food intake, and energy metabolism, and tested glucose homeostasis to see physiological functions of LRRTM4 in AgRP neurons. We also measured electrophysiological properties of AgRP^{LRRTM4-KO} neurons.

Results: We confirmed successful deletion of LRRTM4 in the AgRP neurons and found that excitatory postsynaptic current is significantly decreased in AgRP^{LRRTM4-KO} neurons. We found that AgRPLRRTM4-KO mice show improved insulin sensitivity but normal food intake, body weight, and energy metabolism phenotypes.

Conclusion: Our results provide insight how synaptic machinery of hypothalamic AgRP neurons can shape in vivo metabolic function.

PE 08-11 8. Pathophysiology of Obesity and Metabolic Syndrome

Food insecurity during developmental period promotes addictive-like eating by reshaping top-down circuitry

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Background: Food insecurity is condition of limited or uncertain access to adequate food. It is linked to binge eating, obesity, depression, cognitive and behavioral problems, and mental health issues in adolescents and adults. However, the neural mechanism of the effect of developmental feeding history is unknown.

Method: We developed food insecurity disease model development protocol. Furthermore, we investigated if the disease phenotypes persisted after the mice were provided with sufficient food (recovery study). Mice were weaned at P21 and stereotactic surgery for longitudinal recording at P28. The mice were assigned to either the food secure group (FS) or the food insecure group (FI) for the food paradigm. FS mice were given food only during the dark cycle of each day, while FI mice were randomly given food only during the dark cycle. Longitudinal recordings were used by photometry to monitor neural signal changes in response to the food by schedule. Addictive-like eating behaviors are measured by progressive

ratio, binge eating tests, and social versus food experiments.

Results: Food insecurity group (FI) showed increased dopamine release for food as the disease development protocol progressed. The breakpoint of PR and food intake of binge-eating test was increased, which indicate that food insecurity experience could increase motivation for food and addictive eating behaviors. In addition, during the recovery period after the food paradigm, the fat composition and body weight in the FI group were significantly higher than in the FS group.

Conclusion: Our findings suggest that food insecurity leads to increased dopamine release and reinforces motivation for food, contributing to addictive-like eating behaviors in mice. This indicates that developmental feeding history significantly impacts neural mechanisms underlying eating behavior.

PE 08-12 8. Pathophysiology of Obesity and Metabolic Syndrome

The Role of Glucagon-like Peptide 1 Receptor (GLP-1R) Neuron in Central Amygdala on Aversion and Nausea

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Background: Glucagon-like peptide 1 (GLP-1) and its receptor GLP-1R play a crucial role in regulating satiety and food intake. Although their outstanding therapeutic properties, the mechanism of central GLP-1 signaling, including its functions and side-effects, remains poorly known. Here, we aim to test the role of GLP-1R expressing neurons in the central amygdala (CeA), a major emotion center, and their downstream projection.

Methods: We used optogenetics to determine how CeA^{GLP-1R} neurons influence feeding behavior, and calcium imaging to investigate their natural activity. Finally, we used virus neuronal tracing to discover the inputs and outputs of CeA^{GLP-1R} neurons.

Results: Using optogenetics, we demonstrated that the activation of

CeA^{GLP-1R} neurons abolishes food intake in fasted mice. Also, the activation of CeA^{GLP-1R} neurons also attenuated the voracious feeding of the binge-eating disease model (BEM). CeA^{GLP-1R} neurons encode negative-valence, which leads to food aversion. Using calcium imaging, the neuronal activity of CeA^{GLP-1R} increases not only to positive stimuli like food, and but also to negative stimuli, including visceral malaise, bitter liquid, and shock. Finally, CeA^{GLP-1R} neurons project to lateral habenula (LHb), subthalamic nucleus (STN), substantia nigra (SNR), and anterior thalamus (AT).

Conclusion: In summary, these experiments reveal a novel role of GLP-1R in central amygdala on food aversion. Our findings suggest that pharmaceutical targeting, with the exception of CeA^{GLP-1R} signaling, will improve efficacy in treating obesity and diabetes by reducing nausea and anxiety.

PE 08-13 8. Pathophysiology of Obesity and Metabolic Syndrome

Regulation of odor induced appetite by SST Neurons in the Olfactory Tubercle

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Background: At some point, we've all been overtaken by an intense craving for chicken after smelling it. Just like this, olfactory stimuli have a significant impact on food consumption motivation, yet research on this remains limited. The Olfactory Tubercle(OT) is well-known to directly receive olfactory information from the olfactory bulb, piriform cortex and receive dopamine from the Ventral tegmental area and somatostatin(SST) neurons play a key role in olfaction.

Method: To measure neural activity, we used GCaMP virus and Fiber photometry.

To modulate neural activity, we used Chr2 and NpHR viruses with 473nm and 532nm laser respectively.

Results: We discovered that the OT^{SST} neurons were activated by olfactory

food information to a higher degree than visual food information. And the response to the same olfactory cues significantly increased after learning they were associated with food. Activation of OT^{SST} neurons induced a strong motivation for food consumption and increased food intake even in the presence of bitter taste. Inhibition of OT^{SST} neurons reduced food intake and increased access to food.

These data indicate that OT^{SST} neurons receives information from the olfactory system and responds specifically to food odors, playing a crucial role in food intake.

Conclusion: In conclusion, the OT^{SST} neurons play a crucial role in regulating food intake by responding more strongly to olfactory cues than visual cues, thereby significantly increasing motivation and consumption behaviors related to food.

PE 08-14 8. Pathophysiology of Obesity and Metabolic Syndrome

Neural Mechanisms for Atypical Antipsychotics-induced Hyperphagia and Obesity

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Background: Atypical antipsychotics (AAPs), such as risperidone and olanzapine, are widely prescribed for neuropsychiatric disorders like schizophrenia and bipolar disorder. Despite their therapeutic efficacy, AAPs are associated with metabolic side effects, including severe weight gain and obesity. Given the previously reported downregulation of melanocortin-4 receptor (MC4R) by AAPs, this study aimed to investigate the cellular signaling pathway of the inhibitory effect of AAPs on MC4R-expressing neurons within the paraventricular nucleus of the hypothalamus (PVH) (MC4R^{PVH} neurons). Additionally, we examined in vivo effects of an AAPs-containing diet on MC4R^{PVH} neurons.

Methods: We conducted whole-cell patch-clamp recordings on *Mc4r-cre::Ai14* mice to investigate the acute effects of risperidone on MC4R^{PVH} neurons. Subsequently, cell-attached patch-clamp and whole-cell voltage-clamp recordings were performed on *Mc4r-cre::Ai14* mice fed a risperidone diet. For comparative analysis, the same experiments were conducted with olanzapine.

Results: We found that treatments with risperidone inhibited MC4R^{PVH} neurons via a cAMP/PKA-dependent activation of a K_{ATP} channel in both male and female mice. Notably, the *in vivo* effect of risperidone showed sexual heterogeneity; the activity of MC4R^{PVH} neurons was decreased only in female mice fed a risperidone diet. In contrast, while acute application of olanzapine inhibited MC4R^{PVH} neurons in a similar manner to risperidone, consumption of olanzapine diet did not significantly alter the activity of MC4R^{PVH} neurons in both male and female mice.

Conclusion: In this study, we delineated the cellular mechanisms underlying the inhibition of MC4R^{PVH} neurons by AAPs. It is notable that a risperidone diet inhibits MC4R^{PVH} neurons only in female mice, which coincides with the more prominent hyperphagia and obesity effects observed in women. The hypothalamic mechanisms underlying olanzapine-induced hyperphagia require further investigation. This study enhances our understanding of the metabolic syndromes associated with AAPs and supports the development of targeted therapeutic interventions to mitigate adverse outcomes of AAPs use.

PE 08-15 8. Pathophysiology of Obesity and Metabolic Syndrome

Visceral Adipose Dendritic Cells Modulate Obesity-induced Regulatory T Cell Development through IL-33

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Background: Regulatory T cells (Tregs) residing in visceral adipose tissue (VAT) play a pivotal role in regulating tissue inflammation and metabolic dysfunction associated with obesity. However, the specific phenotypic and functional characteristics of Tregs in obese VAT, as well as the regulatory mechanisms shaping them, remain elusive.

Method: Diet-induced obesity was induced in C57BL/6J mice using a high-fat diet. In vivo characterization of Tregs and antigen presenting cells (APCs) in ATs was performed using flow cytometry. In vitro co-culture experiments for Treg differentiation were conducted by seeding sorted primary APCs isolated from ATs of lean and obese mice with naïve CD4+ T cells for 5 days.

Results: This study demonstrates that obesity selectively reduces Tregs in VAT, characterized by restrained proliferation, heightened PD-1 expression, and diminished ST2 expression. Additionally, obese VAT displays distinctive maturation of dendritic cells (DCs), marked by

elevated expressions of MHC-II, CD86, and PD-L1, which are inversely correlated with VAT Tregs. In an in vitro co-culture experiment, only obese VAT DCs, not macrophages or DCs from subcutaneous adipose tissue (SAT) and spleen, result in decreased Treg differentiation and proliferation. Furthermore, Tregs differentiated by obese VAT DCs exhibit distinct characteristics resembling those of Tregs in obese VAT, such as reduced ST2 and IL-10 expression. Mechanistically, obesity lowers IL-33 production in VAT DCs, contributing to the diminished Treg differentiation.

Conclusion: These findings collectively underscore the critical role of VAT DCs in modulating Treg generation and shaping Treg phenotype and function during obesity, potentially contributing to the regulation of VAT Treg populations.

Keywords: obesity, inflammation, adipose tissue dendritic cell (ATDC), regulatory T cell (Treg), adipose tissue macrophage (ATM)

PE 08-16 8. Pathophysiology of Obesity and Metabolic Syndrome

Activation of OlfrX by Induces Thermogenesis in Brown Adipose Tissues

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Background: Olfactory receptors are widely expressed in extra-nasal tissues, where they regulate cell type-specific signal transduction pathways. This study investigated biological functions of Olfactory receptor X (OlfrX) in brown adipose tissue (BAT).

Methods: C3H10T1/2 cell and primary adipocytes from 6-7 male C57BL/6N mice and OlfrX^{-/-} were used to examine biological functions of OlfrX in vitro. OlfrX gene was silenced with siRNA. For in vivo analysis, mice were first orally administered with ligand N (at a dose of 10 mg/kg body weight, dissolved in methyl cellulose), or distilled water (used as the vehicle) daily for 2 weeks. Following the two-week oral administration of ligand N, mice were exposed to acute cold conditions (4°C) for 6 hours. Protein and mRNA expressions were analyzed by Western blotting and quantitative PCR, respectively.

Results: OlfrX expression is confirmed by qPCR and immunoblotting assays in cultured brown adipocytes. Immunocytochemistry showed that OlfrX

protein is expressed in plasma membrane as well as cytosol. Treatment of an OlfrX ligand induced thermogenic gene expressions of Ucp1 and Pgc1α in cultured brown adipocytes but the inductions were abrogated when OlfrX gene was silenced with siRNA. OlfrX did not influence the levels of second messengers such as cAMP, intracellular calcium, and inositol phosphates, however, OlfrX activated the noncanonical β-arrestin-ERK1/2 signaling pathway. Thus, treatment of barbadin, β-arrestin inhibitor, negated the induced ERK1/2 phosphorylation by OlfrX activation. Mice exposed to an acute cold exposure (4 , 6 hrs) led to higher rectal and surface body temperatures, while these effects were abolished in Olfr558 deficient mice. Ligand activation of OlfrX induced UCP1 and PGC-1α expression in BAT of wildtype mice but not in OlfrX deficient mice. OlfrX did not affect the expression of genes involved in UCP1-independent futile cycles.

Conclusion: OlfrX may regulate non-shivering thermogenesis by inducing UCP1 and PGC-1α expression through the β-arrestin-ERK1/2 signaling pathway.

PE 08-17 8. Pathophysiology of Obesity and Metabolic Syndrome

Regulation of Senescence Signaling by Filbertone in Skeletal Muscle Cells

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Background: Muscle aging and obesity are interconnected health issues that significantly impact the quality of life, especially in older adults. As muscle mass and strength decline with age, a condition known as sarcopenia, individuals often experience reduced mobility and an increased risk of falls. Concurrently, obesity exacerbates these problems by adding excess weight, which places additional strain on weakened muscles and joints. The combination of sarcopenia and obesity, sometimes referred to as sarcopenic obesity, leads to a vicious cycle of decreased physical activity and further muscle deterioration. It has been demonstrated that Filbertone, the main flavor compound in hazelnuts, has been shown to prevent hypothalamic inflammation, obesity, neurodegenerative diseases, and muscle lipid accumulation. However, its effect on muscle aging has not been explored.

Method: This study aimed to investigate the impact of filbertone on muscle aging in C2C12 myotubes induced to senescence by doxorubicin or H2O2.

To understand the mechanisms behind filbertone's effects, we performed experiments including western blot analysis, reverse transcription quantitative polymerase chain reaction (qRT-PCR), and senescence-associated β -galactosidase (SA- β -gal) staining.

Results: Filbertone was found to reduce the protein levels of p53 in senescent skeletal muscle cells without affecting the mRNA levels. Additionally, the expression of muscle-related genes such as myogenin and muscle RING-finger protein-1 (MuRF1) was significantly increased in senescent muscle cells treated with filbertone. Moreover, the number of senescent skeletal muscle cells showing β -galactosidase activity was significantly decreased with filbertone treatment.

Conclusion: These findings indicate that filbertone is essential in regulating muscle aging and could be instrumental in developing better strategies for the prevention and treatment of muscle aging.

PE 08-18 8. Pathophysiology of Obesity and Metabolic Syndrome

Long-term Exercise-mediated Changes in Inflammatory Marker and Adipocytokines in Middle Aged Women by UCP2 Gene Polymorphism

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Background: Physical exercise is assumed to benefit the regulation of inflammatory markers and enhance the anti-inflammatory index. This study aimed to compare the markers of metabolic syndrome and the levels of adipocytokines according to the UCP2 gene types at baseline and assess whether genetic variations of UCP2 may affect exercise-mediated changes in metabolic syndrome markers and adipocytokines.

Methods: Forty-two sedentary healthy middle-aged women (52.74 \pm 6.39 years old) participated in this study. Participants were encouraged to train thrice a week for six months, 60 minutes per treadmill walking / running session at 60% VO2R. Genotypes were identified as homozygous in the 3'-UTR of exon-8 (DD), heterozygous (DI), and homozygous in 3'-UTR of exon-8 (II). DD and DI genotypes of the UCP-2 gene were seen in 23(57.1%) and 19(42.9%) subjects, respectively.

Results: The DD genotype body weight, BMI, % body fat, and waist circumference significantly decreased whereas body weight, BMI, and waist circumference in the ID genotype significantly decreased after the six-month exercise program. There were no significant changes of metabolic markers in ID genotypes whereas insulin and HOMA-IR in DD genotype were significantly decreased after the exercise program. In the DD genotype, after 6 months of aerobic training adiponectin was significantly increased and leptin, TNF- α , and IL-6 were significantly decreased. In the ID genotype, TNF- α was significantly decreased after exercise training.

Conclusion: The beneficial actions of physical exercise to suppress the production of inflammatory markers such as TNF- α and enhance the anti-inflammatory index such as adiponectin may depend on the genotype of UCP2.

PE 08-19 8. Pathophysiology of Obesity and Metabolic Syndrome

Zona Incerta GABAergic Circuits Integrated Consummatory Behaviors under Motivational Conflict

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Background: Zona incerta (ZI) is known to regulate survival behaviors such as flight, drinking and food intake. Despite its various functions and extensive connections with many brain regions, the organizational and functional dynamics of ZI GABAergic circuits across different behaviors, and how these circuits contribute to specific behavioral phases are poorly understood.

Method: Using genetic, optical recording and manipulation tools, we monitored activity of ZI GABAergic neurons to specific rewards and their subsequent behavioral outcomes.

Results: We observed that ZI GABAergic neurons are activated at the onset of biting food, responding to various reward consummatory

behaviors. This neural activity specific to certain rewards is disrupted when other motivations are present by need deprivations. Through optogenetic activation, we demonstrated that stimulating ZI GABAergic neurons promoted biting behavior, even towards non-food objects and bitter food. It induced abnormal persistent biting behavior such as biting the water dish despite dehydration and biting the shock-delivering rod, overriding natural responses.

Conclusion: Our findings highlight the complex and critical role of ZI GABAergic neurons in behavior regulation, providing insights into how specific neuronal activities shape decision-making processes under competitive motivational states. This study provides compelling evidence that ZI GABAergic neurons integrate and arbitrate motivational conflicts, influencing consummatory behaviors.

PE 08-20 8. Pathophysiology of Obesity and Metabolic Syndrome

Exploring Network Pharmacology and Molecular Docking of E.tapos Yoghurt to Combat Maternal Obesity

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Background: Maternal obesity, characterized by an elevated body mass index (BMI) during pregnancy, is known to have adverse effects on the offspring. However, a recent study suggests that *Elateriospermum tapos* (E. tapos) yoghurt may hold potential in mitigating excessive weight retention post-pregnancy. Thus, this study aims to employ network pharmacology to explore the pharmacological effects of the bioactive compounds present in E. tapos yoghurt against maternal obesity.

Methods: Initially, a screening process is conducted to identify the bioactive compounds in E. tapos yoghurt, followed by the prediction of potential gene targets for these compounds using Swiss Target Prediction and SuperPred databases. Maternal obesity-associated genes are sourced from the OMIM, DisGeNet, and GeneCards databases. The interaction between the identified compounds and maternal obesity genes is established through protein-protein interaction analysis, gene ontology examination, and KEGG pathway analysis. To validate the results,

molecular docking studies are conducted using AutoDock Tools software.

Results: The findings reveal that out of the 64 compounds analyzed, three meet the screening criteria, resulting in a total of 380 potential gene targets. Among these targets, 240 are shared with maternal obesity-related genes. Further analysis demonstrates the favorable affinity of these active compounds with key targets, linking them to biological processes involving protein phosphorylation, inflammation, as well as pathways related to lipid metabolism, atherosclerosis, and other signaling pathways.

Conclusion: In conclusion, this study provides valuable insights into the potential pharmacological effects of the bioactive compounds found in E. tapos yoghurt against maternal obesity. These findings open avenues for further exploration and potential therapeutic interventions targeting maternal obesity.

PE 08-21 8. Pathophysiology of Obesity and Metabolic Syndrome

CELLULAR QUIESCENCE IMPAIRS ADIPOCYTE PROGENITOR CELLS DIFFERENTIATION; LEADING TO HYPERTROPHIC EXPANSION OF VISCERAL ADIPOSE TISSUE IN OBESE INDIVIDUALS

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Background: Visceral adipose tissue expansion along with adipocyte hypertrophy are negative determinants of obesity related metabolic diseases such as type 2 diabetes mellitus, hypertension, dyslipidemia and atherosclerosis. Pre-adipocytes exist in a state of cellular quiescence which affects their ability to differentiate into mature adipocytes in response to caloric excess leading to a hypertrophic expansion of adipose tissue. Understanding the genes controlling; pre-adipocyte cellular dormancy will aid us to better tackle adipose tissue dysfunction in obesity and dampen the metabolic complications associated with it.

Method: Obese subjects aged 18-60 years undergoing bariatric surgery (BMI \geq 35; n=12) and their age matched controls (BMI, non-diabetic < 25; n=10) were recruited. Visceral adipose tissue was digested and separated into stromal vascular cells and mature adipocytes based on buoyancy. The size of mature adipocytes was measured using microscopy. The pre-adipocytes were isolated from stromal vascular fraction using FACS; RNA extracted and m-RNA sequenced. Reads were aligned using HISAT-2 and

fold change calculated. Results were analyzed statistically by Student's t-test, and correlation analysis with anthropometric measurement.

Results: Percentage of preadipocytes was inversely correlated with BMI (p-value = 0.04) but no significance difference was observed between obese and non-obese (p = 0.1). Mean diameter of mature adipocytes was significantly higher in obese compared to non-obese (p = 0.04). From the differentially expressed genes (DEGs) two were mapped to "cellular quiescence" by Gene Ontology analysis. NR4A1 and TEAD4 were raised in obese with a (log-FC = 2.88 and 2.36) and (p = 0.01 and 0.005).

Conclusion: Though percentage of pre-adipocyte cells are not significantly reduced in obese individuals; due to upregulation of quiescent genes there is reduced visceral adipose tissue hyperplasia and increased hypertrophy leading to metabolic disturbances as seen in obesity.

PE 08-22 8. Pathophysiology of Obesity and Metabolic Syndrome

CD2 biased immune response skews the SAG mediated therapy for a predominant Th1 response in experimental visceral leishmaniasis infection in light of obesity

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Background: Visceral leishmaniasis is a macrophage associated disorder which leads to a profound decrease in the natural immunotherapeutic potential of the infected subjects to combat the disease. Visceral leishmaniasis is a macrophage associated disorder which leads to a profound decrease in the natural immunotherapeutic potential of the infected subjects to combat the disease. We have evaluated the effect of combining CD2 with conventional antimonial (sb) therapy in protection in BALB/c mice infected with either drug sensitive or resistant strain of *Leishmania donovani* with 3×10^7 parasites via-intra-cardiac route. Obesity is the main causal factor for metabolic syndrome and chronic systemic inflammation, which impacts on immune function and increases susceptibility to pathogens. Several reports suggest that obesity can interfere with responses to pathogen-derived signals and impair the development of protective anti-Leishmania immunity.

Methods: Mice were treated with anti CD2 adjunct SAG sub-cutaneously twice a week for 4 weeks. Assessment for measurement of weight, spleen size, anti-Leishmania antibody titer, T cell and anti-leishmanial

macrophage function was carried out day 0, 10, 22 and 34 post treatments.

Results: The combination therapy was shown boosting significant proportion of T cells to express CD25 compared to SAG monotherapy. Although, the level of IFN- γ was not statistically different between combination vs monotherapy (p=0.298) but CD2 treatment even alone significantly influenced IFN- γ production than either SAG treatment (p=0.045) or with CD2 adjunct SAG treatment (p=0.005) in Ld-S strain as well as in Ld-R strain. The influence of CD2 adjunct treatment was also documented in anti-leishmanial functions in macrophages.

Conclusion: Drug resistance is the major impedance for disease control but the encouraging results obtained after infecting mice with resistant strain of the parasite strongly imply that this drug can be effective even in treating resistant cases of Kala-azar. Also diet can also play a major role in the effective recovery of the disease.

PE 08-23 8. Pathophysiology of Obesity and Metabolic Syndrome

Serum Leptin level in women with Polycystic ovarian syndrome and its correlation with Insulin resistance.

huda naaz

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Introduction: Polycystic ovarian syndrome is a common endocrinological disorder, among women of reproductive age with global prevalence up to 5-7%, which is frequently associated with chronic anovulation, hyperandrogenemia, insulin resistance and obesity. Leptin, hormone product of obesity (ob) gene, synthesized exclusively in adipose tissue. Recently Leptin resistance has been reported to have key role in development of obesity also accompanied by insulin resistance (IR), compensatory hyperinsulinemia suggesting the possibility of interaction between insulin and leptin. However, the relationship between Leptin and Insulin resistance in Polycystic ovarian syndrome is still controversial. Keeping in view present study was conducted to evaluate the correlation between serum leptin level, body mass index and insulin level in PCOS in North Indian population.

Method: A case control study was conducted in department of biochemistry and department of obstetrics and gynaecology at VMMC & Safdarjung hospital, New Delhi. 50 cases diagnosed with PCOS satisfying

the Rotterdam criteria were enrolled in the study. 50 Age and sex matched controls were taken excluding patients with any endocrinological disorder or taking hormonal supplementation. Plasma Insulin and Serum Leptin levels were done by commercially available ELISA kit.

Results: The mean leptin level were 27.86 ± 1.33 ng/ml and 12.26 ± 1.13 ng/ml was observed in PCOS patients and controls. Positive correlation was observed in serum leptin level and BMI ($r=0.90$ $p < 0.0001$) Mean serum Insulin level was 12.26 mIU/L and 8.26 mIU/L. Obese women with PCOS have significantly higher level of serum Leptin. Correlation between serum leptin level and fasting insulin was insignificant ($p > 0.05$)

Conclusion: Serum fasting Insulin and Serum Leptin levels could serve as an early biomarkers for PCOS complications hence, early intervention could prevent progression of disease to Diabetes and metabolic syndrome.

Poster Exhibition

9. Therapeutics of Obesity and Metabolic Syndrome

PE 09-01 9. Therapeutics of Obesity and Metabolic Syndrome

Oxidative Stress and Obesity: Role of Peroxiredoxins

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Background: Accumulating evidence indicates that adipocyte oxidative stress plays an important role in the development of obesity and metabolic syndrome. Increased oxidative stress and mitochondrial dysfunction in obese adipocytes contribute to adipokine dysregulation, inflammation, and insulin resistance. Peroxiredoxins are a family of cellular thiol peroxidases scavenging peroxides. The precise role of peroxiredoxin on obesity is worth to discuss further. The objective of this study is to explore the mechanism by which peroxiredoxin in adipocytes on oxidative stress in obesity.

Method: We conducted a systematic review of the literature search in PubMed and Scopus databases using the terms from 2020 to June 2024. The following phrases were included in the process: (1) "obesity" AND "oxidative stress" AND peroxiredoxin"; (2) "metabolic syndrome" AND "oxidative stress" AND "peroxiredoxin"; (3) "obesity" AND "peroxiredoxin"; (4) "peroxiredoxin" AND "oxidative stress. We included articles that had the clear aim of investigating the role of peroxiredoxin on the risk of obesity or its metabolic complications. Additional articles not found in this

search were identified by exploring references in key articles, as well as by individual searches of peroxiredoxin.

Results: The data demonstrated that peroxiredoxin 5 plays an essential role in regulating adipogenesis. Peroxiredoxin 5 overexpression significantly suppressed cytosolic and mitochondrial reactive oxygen species (ROS) generation. In addition, peroxiredoxin 5 regulated the AMP-activated protein kinase pathway and lipogenic gene (sterol regulatory element binding protein-1 and FAS) expression, and thereby inhibited lipid accumulation.

Conclusion: These data suggest that peroxiredoxin 5 may play an essential role in maintaining normal characteristics of adipocytes and that defect in peroxiredoxin 5 alters mitochondrial redox state and function, and adipokine expression in adipocytes, and thus leading to metabolic alteration. Collectively, peroxiredoxin 5 may be a valuable therapeutic target for the management of obesity and obesity-related metabolic diseases.

PE 09-02 9. Therapeutics of Obesity and Metabolic Syndrome

Protective potential of flaxseed lignan in high fat-diet/alloxan-induced diabetes in kidney and heart of female rats

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Background: Flax (*Linum usitatissimum*) seeds are among the richest sources of plant lignans. The lignans are a large group of low molecular weight polyphenols found in plants, particularly seeds, whole grains, and vegetables. Studies report fish oil based lipid emulsions contain high amounts of omega-3 polyunsaturated fatty acids. Hence, we assessed changes produced by the administration of flaxseed lignan secoisolariciresinol diglucoside (FLSD) on biomarkers related to lipid metabolism, cardiac functions and antioxidant systems in kidney of high fat-diet diabetic rats.

Methods: The study was carried out on 64 diabetic female albino rats; a high-fat diet (HFD) and a single dose of alloxan (25 mg/kg) were utilized for experimental model induction. Diabetic rats were received FLSD (50, 100 and 200 mg/kg) intragastrically by gavage per day for 30 days.

Results: Administration of FLSD caused a remarkable recovery of

kidney weight, heart function, and aldosterone level, particularly. The hypolipidemic activity of FLSD was confirmed by the normalization of total cholesterol, triglycerides, and low- and high-density lipoprotein cholesterol in diabetic rats. Inhibitory effects on albuminuria, creatinine, urea nitrogen, and n-acetyl- β -d-glucosaminidase verified FLSD's hepatic protective activity in diabetic rats. Furthermore, FLSD exerted beneficial modulation of creatinine kinase expression in heart, inflammatory factors and oxidative enzymes. Compared with untreated diabetic rats, FLSD decreased the expression of phosphor-AKT and phosphor-GSK-3 β in the kidneys. Proapoptotic, cardiac biomarker and inflammatory markers were significantly improved and showing a great retain to their normal levels specifically in FLSD (200mg/kg)-treated groups.

Conclusion: FLSD has a great protective influence on kidney injury of HFD/alloxan-induced diabetic rats. These findings indicate that FLSD can be considered as a potential candidate for in vivo and clinical studies against various metabolic disease.

PE 09-03 9. Therapeutics of Obesity and Metabolic Syndrome

Study of Multi-electrode Endovascular denervation in patients with type 2 diabetes mellitus (MILESTONE): 6-month analysis from the first-in-human proof-of-concept study

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Background: Chronic elevation of sympathetic activity has been identified to induce insulin resistance and contributes to the development of type 2 diabetes mellitus (T2DM). This study aims to assess safety and glycemic indices at 6 months in the study of endovascular denervation (EDN) procedure, in patients with T2DM.

Method: Using a novel six-electrode catheter system, EDN was conducted on the celiac artery (CA), and aorta between CA and the superior mesenteric artery (SMA). The primary outcomes were evaluated by the safety, HbA1c, homeostasis-model assessment of insulin resistance (HOMA-IR), and fasting plasma glucose (FPG). The antidiabetic medication, lifestyle, physical condition, blood pressure (BP), and plasma biochemistry were also recorded.

Results: A total of 11 T2DM patients were included for analysis. The technical success was 100% and no severe treatment-related adverse events or major complications were observed. Both HbA1c and HOMA-IR significantly reduced at 6 months, from 9.9 ± 1.6 to $8.0 \pm 2.4\%$ ($P = 0.005$),

and from 13.3 (IQR 5.9-46.1) to 6.0 (IQR 3.1-11.9) ($P = 0.016$), respectively. At 1, 3, and 6 months of follow-ups, FPG levels were 10.2 ± 0.8 , 10.1 ± 1.2 , and 9.6 ± 1.7 mmol/L, respectively, compared to 15.4 ± 1.6 mmol/L at baseline ($P = 0.001$, < 0.001 , and < 0.001 , respectively), and 2hPG levels were 11.8 ± 3.0 , 11.4 ± 4.0 , and 11.0 ± 5.9 mmol/L, respectively, compared to 17.9 ± 6.0 mmol/L at baseline ($P = 0.001$, 0.001 , and 0.002 , respectively). OGTT based 3-hour C-peptide release test showed improved beta-cell function (AUC 0.23 (IQR 0.18-0.32) vs. 0.28 (IQR 0.21-0.38) pmol/mL, $P = 0.046$). A reduction of daily insulin injection was also observed (24 (IQR 15.5-47) vs. 19 (IQR 9-27.5) IU, $P = 0.018$) without changes in lifestyle. Improvements of liver function were observed although physical conditions, BP, plasma norepinephrine, angiotensin II, and blood lipids were not changed during follow-ups.

Conclusion: The 6-month analysis from this trial shows that EDN using the novel six-electrode catheter system at the new sites of CA and aorta between CA and SMA elicits a clinically significant improvement in hyperglycemia in patients with T2DM, with good tolerability.

PE 09-04 9. Therapeutics of Obesity and Metabolic Syndrome

Anti-Obesity Effects of Fimasartan on High Fat Diet-Induced Obese Mouse Model

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Background: Obesity is a disease that has an abnormally large amount of fat accumulated in the body, and is caused by the collapse of energy balance due to excessive food intake and decreased activity.

Fimasartan is angiotensin II receptor inhibitor (ARB) for hypertension, and the results of studies on anti-obesity efficacy in obese mouse animal models and its mechanism are unknown. Therefore, this study was conducted to confirm the anti-obesity efficacy and mechanism of Fimasartan in diet induced obese (DIO) model.

Methods: C57BL/6 mice fed a high fat diet for 12 weeks to induce obesity and administered orally once a day for 4 weeks.

Grp78, sXBP1 mRNA expression was assessed by PCR in epididymal fat.

Hepatic fat accumulation was evaluated by H&E staining and Oil Red O staining.

Results: Repeated oral administration of Fimasartan to the DIO animal

model for 4 weeks showed a dose-dependent weight loss ($P < 0.001$). Plasma analysis showed a significant decrease in LDL-CHO levels in all treatment groups.

Hepatic triglyceride contents were significantly decreased in all groups, especially in the Fimasartan 120 mg treatment group.

To identify the mechanism of action (MOA) of Fimasartan, PCR was performed to compare the gene expression of the ER stress marker Grp78 and sXBP1. There was a significant decrease in all treatment groups, especially in Fimasartan 24 mg treatment group. As a result of evaluating hepatic fat accumulation through H&E and Oil red O staining, the most effective fat reduction effect was shown in Fimasartan 120mg treatment group.

Conclusion: Our findings suggest that Fimasartan has an advantage in improving obesity when orally administered in the DIO mouse model, and this anti-obesity effect is thought to be due to a decrease in ER stress in adipocytes.

PE 09-05 9. Therapeutics of Obesity and Metabolic Syndrome

The neuroprotective effect of exercise-induced hormone irisin in ischemic stroke

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Background: Stroke is a leading cause of death and disability worldwide. Obesity is an important risk factor for stroke, while exercise can reduce the incidence and the mortality associated with stroke. However, little is known about the mechanisms underlying the effect of obesity and exercise on the pathogenesis of stroke. Recent studies have highlighted the role of exercise-induced myokines in mediating the beneficial effect of exercise. Among the discovered myokines, irisin has been shown to exert neuroprotective role in brain disorders, such as Alzheimer's disease. In this study, the effect of exercise and exercise-induced myokine irisin was examined in ischemic stroke with obesity.

Method: Mice were fed a high-fat diet or a normal diet for 4 weeks and then exercised for 4 weeks, before subjected to transient middle cerebral artery occlusion (MCAO). FNDC5 knockout (KO) mice and plant-made human recombinant irisin was used to confirm the effect and mechanism of irisin in

Results: The results showed that exercise significantly reduced infarct size and increased survival rate compared to the HFD group. Inflammatory and apoptotic markers induced by HFD was also reversed in exercised group, while exercise increased tight junction factors. In addition, plasma irisin concentration and irisin expression in muscle and brain were all increased by exercise. In mice deficient in FNDC5, the precursor of irisin, MCAO-induced ischemic stroke was exacerbated, with aggravated inflammation and tight junction markers compared to control mice. Administration of recombinant irisin significantly reduced the size of cerebral infarction while increasing the expression of irisin receptor and M2 macrophage factors.

Conclusion: In conclusion, exercise and exercise-induced myokine irisin are suggested to exert neuroprotective effects on ischemic stroke.

PE 09-06 9. Therapeutics of Obesity and Metabolic Syndrome

Biological Importance Of Anthocyanin In Cardiovascular Disease (CVD): Therapeutic Role In Diabetic Cardiomyopathy With Their Molecular Mechanism

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Background: Medicinal plants and their derived plant extracts and active phytochemicals have numerous biological applications in the traditional medicine. Diabetes mellitus (DM) has been associated with cardiovascular disease (CVD). In the modern age, CVD is one of the main biological complications which affect many lives among people with diabetes. Further, diabetic CVD is associated with heart failure, coronary artery disease, ischemic heart disease, stroke, and diabetic cardiomyopathy (DCM). Anthocyanins are the pigments which gives bright colours to the fruits and vegetables. Anthocyanin has been widely studied for its medicinal properties and pharmacological effectiveness in medicine. Anthocyanins have numerous health beneficial potential in medicine, including anti-diabetic, anti-obesity effects and prevent CVD.

Methods: Biological potential of Anthocyanins class phytochemical have been investigated for their effectiveness against diabetic cardiomyopathy (DCM) and associated secondary complications in present work through scientific data analysis of numerous scientific research works. Biological potential of anthocyanin against isoproterenol-induced myocardial infarction has been investigated in the scientific research. Further, in another scientific research work, its effects on alleviated vascular inflammation in endothelial cells have been also described in the

scientific fields. Other pharmacological activities of anthocyanin were also correlated in the present investigation in order to know its health beneficial aspects in medicine.

Results: Present work scientific data signified the biological importance and therapeutic effectiveness of anthocyanin in medicine. In cardiovascular scientific research, anthocyanin has been reported to exert cardioprotective effects against isoproterenol-induced myocardial infarction. However, in another scientific research work, anthocyanin reduced vascular inflammation in endothelial cells which signified its effectiveness against numerous cardiovascular disease complications. Further, some other scientific research work data revealed the biological importance of anthocyanin on dyslipidemia, promote vascular protection, ameliorate atherosclerosis, counteract obesity, and attenuate diabetic cardiomyopathy. Scientific research showed significant role of anthocyanin in modulating diabetic cardiovascular disease by modulating fibrosis, oxidative damage, inflammation, and apoptosis.

Conclusion: Present work signified biological importance of anthocyanin in cardiovascular disease, including diabetic cardiomyopathy.

PE 09-07 9. Therapeutics of Obesity and Metabolic Syndrome

Digital and Community-Based Peer Support Interventions for Cardiovascular and Metabolic Health in Malaysia

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Background: Cardiovascular diseases (CVD) and metabolic syndrome (MetS) are significant health challenges globally, particularly in underserved communities. We present the outcomes of two peer support interventions in low-income Malaysian communities. Study 1 discusses MYCardio-PEER, a digitally-enhanced peer support intervention targeting CVD risk reduction. Study 2 reports on PERSUADE, a community-specific nutrition and lifestyle behaviour program for Malaysian adults with MetS.

Method: MYCardio-PEER was developed using the Integrated Theory of Behaviour Change, incorporating literature review and stakeholder input to create culturally-relevant educational materials and activities. Trained peer leaders facilitated the 8-week program with educational videos and interactive content on heart-healthy behaviours. In contrast, PERSUADE involved 48 peers in a 3-month program focused on nutrition and lifestyle changes for adults with MetS. Statistical analyses assessed changes in

nutrition intake, anthropometry, and metabolic parameters.

Results: MYCardio-PEER successfully created an engaging peer support intervention using digital resources, led by trained community members. Meanwhile, PERSUADE showed significant improvements in nutrition intake and physical activity, as well as slight improvements in anthropometric and metabolic parameters among adults with MetS.

Conclusion: Both interventions highlight the potential of peer support programs in addressing cardiovascular health and MetS in underserved communities. MYCardio-PEER and PERSUADE offer scalable approaches for promoting health behaviour change and improving health outcomes among vulnerable populations. Future research should focus on their long-term impact and scalability in diverse settings.

PE 09-08 9. Therapeutics of Obesity and Metabolic Syndrome

Puerarin modulates lipid metabolism in high-fat-diet-fed mice in association with gut microbiota via regulating SREBP-1/FAS/CD36 signaling pathways

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Background: Adipocyte differentiation, lipogenesis, lipolysis, and energy metabolism are just a few of the metabolic processes that can become dysregulated and exacerbate obesity. Anti-oxidation and anti-inflammatory qualities of puerarin have been shown to have protective effects against obesity, diabetes, and other cardiovascular illnesses, including atherosclerosis. The current study looked at the anti-obesity impact of YLGT in mice given a high-fat diet (HFD) and explored possible mechanisms through controlling the gut microbiota and SREBP-1/FAS/CD36 signaling pathways.

Methods: Adipocyte development in 3T3-L1 cells was examined as a result of PRN treatment in order to assess the anti-obesity potential of PRN in vitro. Mice were divided into three groups in order to assess its potential in vivo. Body weight, white fat mass (WAT), serum triglycerides (TG), total cholesterol (TC), high-density lipoprotein (HDL) cholesterol, glucose, insulin, and leptin, hepatic lipid accumulation, and gene levels related to lipid metabolism in the liver and WAT were all measured nine weeks after the start of the feeding regimen. We also assessed the study on faecal microbiota.

Results: When PRN was administered to 3T3-L1 cells in vitro, the result was a dose-dependent, effective inhibition of the cells' ability to differentiate into adipocytes. An in vivo study showed that SAE supplementation dramatically reduced the increases in body weight, liver weight, WAT mass, blood TG, TC, lipid, glucose, insulin, and leptin levels that were brought on by the HFD. It was discovered that PRN supplementation suppressed the expression of lipid metabolism-related proteins in the liver and WAT, such as SREBP-1, FAS, CD36, and PPAR γ , in addition to downregulating the mRNA levels of transcription factors like Srebp and Pparg. These findings were consistent with the effects of PRN supplementation on liver weight and WAT mass. By suppressing transcription factors essential to adipogenesis and lipogenesis, PRN prevents fat formation in HFD-fed rats, indicating that it may be useful in avoiding obesity. An additional experiment using fecal microbiota transplantation shown that changes in gut microbiota, such as an increase in unclassified Muribaculaceae and a decrease in Colidextribacter, may be a significant factor in the inhibition of obesity by PRN.

Conclusion: In summary, there is great potential for using PRN in the treatment of obesity via modulating lipid metabolism and gut microbiota.

PE 09-09 9. Therapeutics of Obesity and Metabolic Syndrome

The Combination of Semaglutide and Selenium Supplementation Preserves Muscle Mass and Improves Thyroid Function in Obese Patient with Subclinical Hypothyroidism and Psoriasis: Case Report

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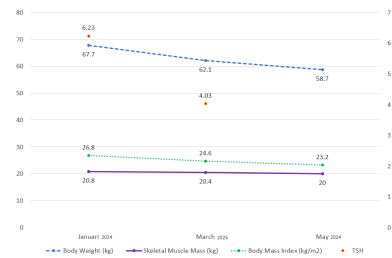
Background: Divergent outcomes have been observed in obesity management using semaglutide. Studies indicate that rapid weight loss following semaglutide injection, can result in loss of muscle and fat mass. Moreover, the relationship between semaglutide and various thyroid problems is still unclear, particularly regarding the development of semaglutide-induced subclinical hypothyroidism. Selenium is a trace mineral that has important biological functions and antioxidant properties, has been demonstrated to enhance thyroid function and maintain muscle mass.

Method: A 52-year-old woman with obesity and psoriasis experienced difficulties in managing her weight and psoriasis symptom. The patient was diagnosed with subclinical hypothyroidism and treated with weekly subcutaneous injection of 1 mg semaglutide, along with daily oral supplementation of 100 g selenium. The patient is instructed to adopt a healthy lifestyle, which involved adherence to the meal prescription and strength training program 2-3 times a week.

Results: After 5 months, decrement of 13% body weight and 4% skeletal muscle mass were observed. Semaglutide injection and selenium supplementation were well-tolerated, with no notable adverse effects.

The serum TSH level returned to normal and psoriasis lesions showed significant improvement after 3 months. Studies have demonstrated that selenium can enhance mitochondrial biogenesis in skeletal muscle and improve thyroid function.

Conclusion: Selenium supplementation has the potential to reduce the adverse effects of semaglutide. The combination of semaglutide injection and selenium supplementation demonstrated a modest decrement of body weight, preservation of muscle mass, enhancement of thyroid function, and alleviation of psoriasis symptoms in obese patient with subclinical hypothyroidism and psoriasis.



PE 09-10 9. Therapeutics of Obesity and Metabolic Syndrome

Targeted Obesity Genes Single Nucleotide Polymorphisms, Diets, Lifestyles, and Obesity Indices: Nutrigenetics as a Predictive Model

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Background: There is a growing connection with nutrigenetics highlighting the influence of genetic factors on how individuals respond to dietary choices and impacting the prevalence of overweight and obesity. The study aims to explore different obesity genetic single nucleotide polymorphisms (SNPs), interact with diet-lifestyle factors, and influence the status of obesity.

Methods: A total of 290 Malaysian adults aged between 18-65 years old were recruited. A pre-tested, validated, structured, and self-administered questionnaire was utilized. Obesity was defined in terms of body mass index (BMI), waist circumference (WC), and body fat percentage (BF%). The Infinium Asian Screening Array-24 v1.0 BeadChip was used to genotype MC4R, INSIG2, FTO, and APOA genes. IBM® SPSS® Statistics v27 and Nutritionist Pro Version 4.0.0 were used for data analysis.

Results: A weak but positively significant correlation was found between dietary calories and BMI ($r = 0.142$, $p=0.038$). A positive significant correlation was revealed between energy ($r_{\text{partial}} = 0.142$, $p=0.038$), protein ($r_{\text{partial}} = 0.154$, $p=0.025$), alcohol ($r_{\text{partial}} = 0.144$, $p=0.037$), and WC. There were significant differences between FTO gene SNPs:

rs11075989 ($p=0.001$), rs9936385 ($p=0.001$), rs8043757 ($p=0.003$), rs62033400 ($p=0.002$), rs7202116 ($p=0.002$), rs11075990 ($p=0.002$), and rs12149832 ($p=0.002$) and WC. The interaction between smoking and INSIG2 rs7566605 was significantly correlated with WC ($r_{\text{partial}} = 0.186$, $p=0.012$). In multivariate analysis, a significant positive association was shown between total daily energy expenditure and WC (adjusted- $\beta=503$, 95%CI= 0.007, 0.021, $p<0.001$). A significant positive association was found between dietary patterns high in carbohydrates, sugar, and fat and BMI, adjusted for gender and marital status (adjusted- $\beta=0.349$, 95%CI= 0.048, 0.650, $p=0.024$). The mean micronutrient index was significantly associated with BF% status ($p=0.027$). Increased dietary iron density index increased the odds of high BF% almost by 5-fold (AOR=4.70, 95%CI=1.07, 20.55, $p=0.040$).

Conclusion: Findings of nutrient-gene interaction highlight the need to implement personalized nutrition and strategies to overcome obesity.

Keywords: Genetics, Metabolomics, Nutrient Density, Nutrition, Obesity, Public Health

PE 09-11 9. Therapeutics of Obesity and Metabolic Syndrome

Cardio Protective Effects of Red Sea Marine Sponge (*Xestospongia Testudinaria*) Extract In Heart Failure Rat

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Background: Heart failure persists as a widespread cardiovascular ailment distinguished by compromised cardiac function and concomitant vascular issues, such as endothelial dysfunction and oxidative stress. In the quest for innovative therapeutic approaches, this study endeavors to elucidate the potential efficacy of *Xestospongia Testudinaria*, a red sea marine sponge renowned for its rich content of bioactive compounds, in ameliorating cardiac dysfunction in rats subjected to experimentally induced heart failure.

Method: Male Wistar rats (200-250g, n=35) were randomly divided into 5 groups: Control, *Xestospongia Testudinaria*, Isoprenaline, Isoprenaline + *Xestospongia Testudinaria*, and Isoprenaline + Digoxin. Heart failure was induced for 14 days by using Isoprenaline (10mg/kg/s.c) daily followed by treatment for 14 days using *Xestospongia Testudinaria* (15mg/kg/o.g) and Digoxin (10/mg/kg/o.g). Control rats were given saline as a vehicle for ISO, *Xestospongia* spp. and Digoxin. Hemodynamic measurements, Electrocardiography (ECG), Cardiac Injury marker NT-proBNP, and histology analysis were assessed.

Results: Systolic blood pressure (SBP) in all ISO groups was significantly increased compared to the control group ($p < 0.05$), and *Xestospongia Testudinaria* treatment managed to reduce the SBP. Besides that, *Xestospongia Testudinaria* treatment also significantly reversed the increase rat's heart rate (HR) in ISO-induced rats. The ECG patterns were also abnormal in ISO-induced rats, which were normalized in *Xestospongia Testudinaria* treated rats. Cardiac injury marker (NT-proBNP) level was remarkably reduced by *Xestospongia Testudinaria* in the ISO group. Cardiac hypertrophy was evident by larger cardiomyocyte size and the fibrosis deposition was remarkable in ISO induced group. Interestingly, *Xestospongia Testudinaria* able to improve those conditions in ISO induced groups.

Conclusion: *Xestospongia Testudinaria* extract treatment was able to improve the hemodynamic functions, ECG readings, reduce NT-proBNP levels and reverse the cardiac structure; hence, highlighting its potential as an alternative treatment for heart failure conditions.

PE 09-12 9. Therapeutics of Obesity and Metabolic Syndrome

Coloring White Adipose Tissue as a Novel Therapeutic to Combat Obesity and its Metabolic Complications

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Background: Obesity is an urgent and worsening problem that is a major risk factor for morbidity and mortality. White adipose tissue (WAT) primarily functions in energy storage by accumulating fat, whereas brown adipose tissue (BAT) expends energy through thermogenesis. The transformation of WAT into BAT, referred to as "browning," has gained attention as a promising therapeutic approach for addressing obesity and its associated metabolic disorders. This review aims to summarize current methods and findings related to WAT browning and its potential benefits in obesity management.

Methods: We conducted a systematic search through Pubmed, Scopus, Cochrane Library, and EBSCO was conducted to find this topic, utilizing relevant MeSH terms. Keywords included "white adipose tissue browning," "brown adipose tissue," "obesity," and "metabolic disorders." The studies were selected based on relevance, and the quality of evidence and then critically appraised.

Results: Initially, 889 studies were identified, out of which 29 scientific papers met the inclusion criteria. Full-text articles were assessed, and six studies were selected for detailed analysis. According to the data analysis

results, browning of WAT increases the body's energy expenditure, which can help in reducing overall body fat and combating obesity; improve insulin sensitivity and reduce the risk of metabolic disorders such as type 2 diabetes; contributes to better regulation of body temperature and energy balance. Recent research focuses on identifying molecular targets and pathways that can induce browning such as cold exposure that can promoting browning through the release of norepinephrine; pharmacological agents like β -adrenergic agonists, thiazolidinediones show promise in promoting browning; and nutritional interventions including capsaicin and resveratrol that have been associated with increased browning activity.

Conclusion: The conversion of WAT to BAT offers a novel and effective strategy to combat obesity and its metabolic complications. Further research is necessary to develop safe and effective interventions for clinical use.

Keywords: white adipose tissue browning, brown adipose tissue, obesity, metabolic disorders

PE 09-13 9. Therapeutics of Obesity and Metabolic Syndrome

Potential Combination of Quercetin and Resveratrol as Obesity Therapy through Increased AMPK α 1 Regulation, Increased Expression of Adiponectine Receptors, and Repairment of Intestinal Microbiota

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Background: Obesity has emerged as a global health concern, including in Indonesia, with its association with dyslipidemia, hypertension, glucose intolerance, heart disease, type II diabetes mellitus, cancer, osteoarthritis, and sleep apnea. The pathogenesis of obesity is intricately linked to disruptions in AMPK α 1 phosphorylation. Additionally, alterations in the composition of intestinal microbiota contribute to the progression of obesity. While contemporary obesity therapies have been developed, they are not without limitations and are associated with various side effects. Therefore, this narrative review aims to explore alternative therapies that can either replace or enhance current therapeutic approaches.

Method: The literature search was conducted using PubMed, Cochrane Library, Science Direct, and Clinicaltrials.gov, utilizing keywords such as "new treatment," "obesity," "flavonoids," "quercetin," and "resveratrol". Our review indicates that the combination of quercetin and resveratrol holds promise in the context of obesity treatment.

Results: This combination can augment the AMPK α 1 pathway, leading to the activation of SIRT1 and the inhibition of macrophage inflammation, thereby suppressing nuclear factor κ B activation and reducing proinflammatory cytokine synthesis. Furthermore, increased expression of adiponectin receptors appears to enhance insulin sensitivity, decrease the expression of lipogenesis-related genes (PPAR γ , ACC1, ACC2, and FAS), and improve glucose uptake. Additionally, quercetin and resveratrol may modulate intestinal microbiota, promoting the proliferation of beneficial bacteria with anti-inflammatory properties and potentially enhancing lipid metabolism while reducing harmful bacteria.

Conclusion: This review underscores the potential of the quercetin and resveratrol combination as a viable candidate for future alternative obesity treatment approaches, offering multiple avenues for therapeutic intervention.

PE 09-14 9. Therapeutics of Obesity and Metabolic Syndrome

Attenuation of COX-2 and PPAR γ Expression by *Pluchea indica* is Associated with Reduced Adiposity and its Related Complications

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Background: Obesity is a chronic, long-term health disease that progressively worsens over time. It is linked to a slew of complications that include ischemic heart disease, type 2 diabetes, an increased risk of stroke, cognitive dysfunctions, kidney problems, bone resorption, and so on. Therefore, it is necessary to search for pharmacological remedies for obesity. Medicinal plants are well utilized for the management of obesity and related complications. Here we made use of *Pluchea indica*, a species of flowering plant from the Asteraceae family. This study focused on demonstrating the effect of methanolic extract of *P. indica* leaf in obesity and related complications in high fat-induced obese mice.

Methods: Swiss albino mice were fed with high fat diet to induced obesity and the obese mice was treated with different doses of *Pluchea indica* leaves extract for eight weeks. Variation in the weight gain patten, food efficiency ratio, food intake behavior, adipocyte morphology, fat mass accumulation, serum cholesterol level, cardiac risk assessment, liver

function, and creatinine levels were recorded. Moreover, IL-6, COX-2, MCP-1, and PPAR γ expression at transcript level were also explored to know the changes in adipocyte specific genes associated with obesity and inflammation.

Results: The findings from our studies showed that the extract significantly reduced ($p < 0.05$) body weight gain and abdominal fat mass buildup, followed by a reduction in the levels of blood cholesterol. Educated adipocyte sizes were also recorded in obese mice under treatment. Cardiac complication risk, hepatic function were altered positively. The extract was able to attenuate the mRNA expression of inflammatory adipokines like IL-6, COX-2, MCP-1, and PPAR γ significantly, which is consistent with the biochemical outcomes.

Conclusion: All these biochemical and gene expression studies validated the potential of *P. indica* leaf to reduce adiposity and its associated factors.

PE 09-15 9. Therapeutics of Obesity and Metabolic Syndrome

Anti-Obesity Effects of Edible Bird Nest in High Fat-Cholesterol Diet-Induced Obese Rabbits via AMPK-Mediated Lipid Metabolism Pathway

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Background: Edible bird nest (EBN) is made from the saliva of swiftlets, and it is regarded as a highly nutritious and health restorative food. Growing evidence suggests that EBN is a potential functional food for managing metabolic disorders, which has initiated the present study to explore into novel therapeutic approach of EBN to improve obesity and its related disorders. Moreover, the role of EBN in preventing obesity has yet to be elucidated, and this study will be the first to report such activity. Therefore, the study aimed to determine the anti-obesity effect of EBN supplementation in high fat-cholesterol diet-induced obese rabbits via regulation of genes related to lipid metabolism mechanism via AMPK activation.

Method: Twenty-five young, male, New Zealand white rabbits aged 8-10 weeks-old with weights approximately 1.6 to 1.7 kg, were randomized into five groups (n=5): group I was the control, group II received high fat-cholesterol diet (HFCD), group III, IV and V received HFCD supplemented with Orlistat, EBN stew extract (SE) and EBN full stew (FS) for 12 weeks. In all groups, body weight, obesity index, visceral organ weights, serum lipid profile, leptin, adiponectin and free fatty acid levels were investigated. Histological evaluation was performed to assess the morphological

changes in white adipose and liver tissues using Haematoxylin and Eosin staining. Additionally, the regulatory effect of EBN on lipid metabolism related genes were determined in adipose and liver tissues.

Results: Supplementation of SE and FS to HFCD-fed rabbits inhibited body weight gain and the mass of white adipose and liver tissues in the experimental rabbits. In addition, SE and FS supplementation attenuated lipid accumulation in adipose and liver tissues as displayed by Haematoxylin and Eosin staining. Serum lipid profile, adiponectin, leptin and free fatty acid concentrations were improved following SE and FS supplementation. The anti-obesity effect of EBN was achieved via regulation of genes involved in lipid metabolism mechanism, reflected with downregulation of ACACa, PLIN2 genes and upregulation of LIPE, LPL, PPARa and FFAR2 genes via AMPK activation.

Conclusion: The present study demonstrated for the first time, the functional properties of EBN as anti-obesity agent and proposed the underlying molecular mechanisms which mediated the effect via AMPK activation that regulate the expression of genes related to lipid metabolism.

PE 09-16 9. Therapeutics of Obesity and Metabolic Syndrome

Effect of Nelumbo nucifera Extracts and Regular Walking on Muscle Strength and Mass in Adults with Relatively Low Muscle Mass: A Randomized Controlled Trial

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Background: Previous in vitro and in vivo studies have confirmed the efficacy of Nelumbo nucifera leaves extracts (NM) in increasing muscle production and reducing muscle breakdown. In particular, NM improved muscle wasting through the regulation of muscle protein metabolism in DEX-induced muscle atrophy mice. However, the effect of oral NM supplementation on human muscle strength and mass is unclear. Therefore, we tested the effects and safety of consumption of NM combined with regular walking for 12 weeks on muscle strength and mass in older adults with relatively low muscle mass.

Methods: A randomized controlled trial was conducted on 80 adults between 19 and 71 years of age. Participants were randomized to receive either a placebo or 2,000 mg NM daily for 12 weeks. The indicator component of NM was Quercetin-3-O-glucuronide 24 to 37 mg/g. At baseline and 12 weeks after treatment, the following parameters of the participants were examined: knee strengths, handgrip strengths, body composition, blood tests, and 24-hour dietary recall. All participants were required to walk for 30–60 min/day for >3 days/week during the trial period. Physical activity was assessed using an exercise log during the study.

Results: Of the 80 participants, 73 completed the trial without reporting adverse effects. NM supplementation over 12 weeks did not increase knee or grip strength compared to the control group. Also, the two groups observed no differences in muscle mass or biomarkers. None of the participants experienced adverse events. The application of NM was well tolerated, and no notable adverse effect was reported in either group.

Primary outcome measure of the two groups

	Control group		Nelutri™ group		Adjusted difference of Control vs Nelutri™ 12 wk	P ¹
	Baseline	12 wk	Baseline	12 wk		
Intention to treat (n=80)						
60 degree's knee extension peak TQ (Right), Nm	90.76±31.16	96.03±28.55	82.28±30.35	86.91±28.97	-0.93 (-9.75, 7.90)	0.835
60 degree's knee extension peak TQ (Left), Nm	88.63±29.77	91.24±28.16	82.58±28.31	84.85±28.14	0.60 (-7.86, 9.06)	0.888
Per protocol (n=73)						
60 degree's knee extension peak TQ (Right), Nm	91.29±30.30	96.99±27.21	84.20±30.58	89.35±28.66	-0.61 (-10.41, 9.19)	0.901
60 degree's knee extension peak TQ (Left), Nm	89.22±30.10	92.04±28.30	85.40±27.99	87.92±27.51	1.03 (-8.39, 10.46)	0.828

Values are mean ± SD or mean (95% CI).
¹ANCOVA with adjustment for age, sex, and the changes from baseline in dietary total caloric intake and physical activity as covariates.

Conclusion: NM supplementation with regular walking did not improve remarkably muscle function compared to regular walking alone in adults with relatively low muscle mass.

PE 09-17 9. Therapeutics of Obesity and Metabolic Syndrome

Differences in Heart Rate, Blood Pressure and Cardiopulmonary Function according to Obesity during Cardiac Rehabilitation Program in Middle-Aged Men who have experienced Coronary Artery Disease

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Background: In Korea, Because of increasing patients with coronary heart disease, the need for a program that manages the heart was required in 1993, but related research is incomplete, and it is still on process. This research aimed to examine the functional difference before and after the cardiac rehabilitation program by dividing the two mid-age male groups who had experienced cardiovascular disease with obesity.

Method: The subjects, middle-aged 30 males who were diagnosed with acute myocardial infarction in 15 control group (NOG) and 15 obese group (OG). For 8 weeks, subjects was comparatively analyzed to effects of the cardiac rehabilitation program for heart rate, blood pressure and cardiopulmonary function according to obesity. Analysis was performed to two-way repeated measure ANOVA analyze the difference between before and after the cardiac rehabilitation program for each subject. And paired t-test was conducted to verify before and after changes.

Results: The results of this study are follows. Rest heart rate, the interaction effect between the group and time was found to be a statistically significant difference(p=.025). As a result of pre-post analysis

within each group was significantly reduced in the NOG(p=.000). Maximum heart rate showed a significant difference according to the time of the main effect test(p=.020). Blood pressure at maximal systolic showed a significant difference according to the time of the main effect test(p=.009). Pre-post analysis within each group were significantly increased in the NOG(p=.037). Maximum oxygen intake showed a significant difference according to the time of the main effect test(p=.000). Pre-post analysis within each group were significantly increased in the NOG(p=.000), OG(p=.005). Rate-pressure product at stage 3 showed a significant difference according to the time of the main effect test(p=.045). Pre-post analysis within each group were significantly decreased in the NOG(p=.023). Rate-pressure product at maximal showed a significant difference according to the time of the main effect test(p=.006). Pre-post analysis within each group were significantly increased in the NOG(p=.049), OG(p=.047).

Conclusion: This study confirm that both groups are effective in cardiac rehabilitation programs and their effects are different. Therefore various cardiac rehabilitation programs have to follow-up studies are required in the future.

PE 09-18 9. Therapeutics of Obesity and Metabolic Syndrome

2 cases clinical experience of intragastric balloon for obese patients

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Background: Obesity, a chronic and recurrent disease, requires a multifaceted approach for effective management. Recent advancements in evidence-based care have expanded treatment modalities beyond conventional methods to include pharmacotherapy, endoscopic interventions, and metabolic surgery. In line with these developments, South Korea included the intragastric balloon procedure in its medical coverage in February 2024. This presentation aims to share our institution's experience with the intragastric balloon procedure.

Methods: Patients were selected based on established criteria for the intragastric balloon procedure. Preoperative evaluations included thorough medical history, and nutritional assessment. Detailed procedural steps of the intragastric balloon insertion were recorded.

Results: Case 1 : A 47-year-old male with initial weight of 118.6kg (BMI 38kg/m²) have been managing only with hypertension medication. He received successful intragastric balloon placement on March 6th, 2024, following a 2kg weight loss through dietary counseling and antiobesity medication. No significant procedural complications noted. Follow-up

on May 17th, 2024 revealed weight reduction to 99.1kg (BMI 31.49kg/m²), achieving total weight loss of 19.5kg (16.44% TWL). Continued antiobesity medication during follow-up.

Case 2: A 40-year-old male with initial weight of 102.4kg (BMI 35kg/m²) have been managing hypertension, type 2 diabetes, hyperlipidemia, non-alcoholic fatty liver disease with multiple medication. He received the intragastric balloon placement on April 18th, 2024 without prior pharmacotherapy. No significant procedural complications noted. Follow-up on June 5th, 2024 revealed weight reduction to 95.4kg (BMI 29.6kg/m²), achieving total weight loss of 7kg (6.8% TWL). Initiated antiobesity medication due to slower weight loss progress.

Conclusion: In the short follow-up period, the procedure was safe, and significant weight loss outcomes was observed over three months. Given the multifaceted nature of obesity, various treatment modalities are necessary. Endoscopic therapies, alongside pharmacological and surgical options, are expected to advance as key pillars in the management of obesity.

PE 09-19 9. Therapeutics of Obesity and Metabolic Syndrome

Beneficial Effects of Limosilactobacillus fermentum-derived Metabolites on Hepatic Energy Metabolism in Streptozotocin and High-Fat Diet-induced Type 2 Diabetic Mice

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Background: Hyperglycemia-induced hepatic dysfunction is a major concern in type 2 diabetes mellitus (T2DM), which can be linked to disturbed energy metabolism, excessive lipid accumulation, inflammation, oxidative stress and cell death. *Limosilactobacillus fermentum* is well known for its potential role as a probiotic with anti-diabetic properties. Recently, numerous studies have reported that the effects of probiotics might stem from their metabolites, which are bioactive compounds produced by probiotics. In this study, we aimed to investigate the effects of *L. fermentum*-derived whole metabolites (LF) on hepatic energy metabolism in T2DM mice. Furthermore, specific metabolite of *L. fermentum* was administered as a single compound (LM) in T2DM mice, in order to identify which substance is particularly responsible for the beneficial effects among numerous metabolites derived from *L. fermentum*.

Method: T2DM was induced by high-fat diet (60% kcal) and streptozotocin (80 mg/kg BW i.p. injection, twice) in male C57BL/6 mice, whereas the mice in the normal control group (NC) were treated with control diet (10% kcal) and vehicle control buffer. After inducing T2DM (fasting blood glucose level ≥ 300 mg/dL), mice were randomly divided into four groups (n = 6-8 per group): diabetic control (DMC), 50 mg/kg BW of whole metabolites derived from *L. fermentum* (LF), 5 mg/kg BW of LM (LLM), and 20 mg/kg BW of LM

(HLM). Fasting blood glucose (FBG) levels and hemoglobin A1c (HbA1c) levels were evaluated. The molecular mechanisms associated with insulin signaling, energy metabolism, inflammation, oxidative stress, and apoptosis were measured by western blot in hepatic tissue.

Results: FBG levels were reduced in LF and HLM group, while HbA1c levels were decreased in all treatment groups compared to those of DMC group. Moreover, increased hepatic lipid accumulation in T2DM mice was normalized by LF and LM administration in a dose-independent manner. At the molecular level, hepatic oxidative stress (catalase, NQO1, SOD2), inflammation (NF- κ B) and apoptosis (p53, Bax, Bcl-2, Bcl-xL) were downregulated by both LF and LM supplementation regardless of dose, which could stem from enhanced insulin signaling (p-IRS, p-Akt) and energy metabolism (SIRT1, PGC1 α) in T2DM mice.

Conclusion: This study demonstrated that LF and LM attenuated hyperglycemia-induced hepatic dysfunction by activating SIRT1/PGC1 α signaling in T2DM mice. Thus, it can be deduced that both whole metabolites (LF) and single metabolite (LM) can exhibit ameliorative effects on T2DM-induced hepatic dysfunction. Taken together, LF and LM might serve as promising therapeutic intervention against T2DM-induced abnormal energy metabolism.

PE 09-20 9. Therapeutics of Obesity and Metabolic Syndrome

Ameliorative Effects of Bioconverted Plant Extract on Renal Inflammation via Regulation of SIRT1/PGC1 α Pathway in High-Fat Diet and Streptozotocin-Induced Type 2 Diabetic Mice

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Background: Diabetic nephropathy is one of the diabetic complications and the leading cause of end-stage renal failure. The persistent hyperglycemic condition causes imbalanced energy metabolism and hyperinflammation in the renal tissue. Recently, bioconverted plant extracts have emerged as a novel therapeutic intervention for metabolic diseases including diabetes due to their enhanced bioavailability of its own metabolites. In this study, we aimed to investigate the effects of plant extract bioconverted by *Limosilactobacillus fermentum* (PBL) on hyperglycemia-induced renal inflammation in type 2 diabetic (T2D) mice.

Methods: T2D was induced by high-fat diet (60% kcal fat) and i.p. injection of streptozotocin (80 mg/kg BW, twice) dissolved in citrate buffer (pH 4.5) in male C57BL/6J mice, whereas normal control mice (NC) were treated with control diet (10% kcal fat) and i.p. injection of citrate buffer (pH 4.5). After inducing diabetes (fasting blood glucose level ≥ 300 mg/dL), diabetic mice were randomly divided into three groups: diabetic control (DMC), 50 mg/kg BW of metabolites of *L. fermentum* (LF), 50 mg/kg BW of plant extract bioconverted by *L. fermentum* (PBL) (n=5~6 per group). Treatment was administered via oral gavage for 15 weeks. Fasting blood glucose (FBG) levels were assessed weekly, whereas hemoglobin A1c (HbA1c) measurements and oral glucose tolerance

test (OGTT) were conducted at the end of the experiment. Histopathological changes in renal tissue were examined using hematoxylin and eosin staining. The molecular mechanisms related to energy metabolism, inflammation and apoptosis were analyzed using western blotting in renal tissue.

Results: Supplementation of PBL as well as LF ameliorated hyperglycemia demonstrated by the levels of FBG and HbA1c and improved glucose tolerance represented by OGTT. Furthermore, administration of PBL as well as LF decreased glomerular area, indicating that PBL and LF could ameliorate T2D-induced abnormal morphological changes in diabetic renal tissue. However, only PBL supplementation showed increases in the renal protein levels of biomarkers associated with energy metabolism (SIRT1, PGC1 α), while attenuating those related to inflammation (NF- κ B, NLRP3, ASC, caspase-1, IL-1 β) and apoptosis (p53, Bax, caspase-8, 9) in T2D mice.

Conclusion: PBL supplementation ameliorated hyperglycemia-induced renal inflammation via SIRT1/PGC1 α pathway in T2D mice. Conclusively, PBL might be a more promising nutraceutical compared to LF in mitigating hyperglycemia-induced renal inflammation in T2D.

PE 09-21 9. Therapeutics of Obesity and Metabolic Syndrome

Human Origin Faecalibacterium prausnitzii Alleviates Symptoms of Obesity and Metabolic Disorders in Mice

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Background: Obesity and related metabolic issues are a growing global health concern. Recently, the discovery of new probiotics with anti-obesity properties has gained interest.

Method: In this study, four Faecalibacterium prausnitzii strains were isolated from healthy human feces and evaluated on a high-fat diet-induced mouse model for 12 weeks.

Results: The F. prausnitzii strains reduced body weight gain, liver and fat weights, and calorie intake while improving lipid and glucose metabolism in the liver and adipose tissue, as evidenced by regulating lipid metabolism-associated gene expression, including ACC1, FAS, SREBP1c, leptin, and adiponectin. Moreover, the F. prausnitzii strains inhibited

low-grade inflammation, restored gut integrity, and ameliorated hepatic function and insulin resistance. Interestingly, the F. prausnitzii strains modulated gut and neural hormone secretion and reduced appetite by affecting the gut-brain axis. Supplementation with F. prausnitzii strains noticeably changed the gut microbiota composition.

Conclusion: In summary, the novel isolated F. prausnitzii strains have therapeutic effects on obesity and associated metabolic disorders through modulation of the gut-brain axis. Additionally, the effectiveness of different strains might not be achieved through identical mechanisms. Therefore, the present findings provide a reliable clue for developing novel therapeutic probiotics against obesity and associated metabolic disorders.

PE 09-22 9. Therapeutics of Obesity and Metabolic Syndrome

Associations between Dietary Patterns and Metabolic Syndrome

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Background: Metabolic syndrome (MetS) is a multifactorial cluster of metabolic disorders related to cardiovascular disease and type 2 diabetes mellitus. Diet and dietary patterns are significant factors in the development and management of MetS.

Methods: The associations between dietary patterns (i.e., high-carbohydrate [HCHO], high-fat [HF], and high-protein [HP] diets) and the prevalence of MetS according to sex in Koreans were examined using data from the Korean National Health and Nutrition Examination Survey, collected between 2018 and 2020. The study included data from 9,069 participants (3,777 men and 5,292 women).

Results: The percentage of participants with MetS was significantly higher in the HCHO diet group than in the normal diet, HF, and HP diet groups, and significantly lower in the HF diet group than in the normal

diet group for both men and women. Women with HCHO diet were positively associated with elevated blood pressure and triglyceride levels based on a comparison with the normal diet group ($p=0.032$ and $p=0.005$, respectively). Men with HF diet were negatively associated with elevated fasting glucose levels based on a comparison with the normal diet group ($p=0.014$). Our findings showed that HCHO intake was strongly associated with a higher risk of MetS, especially elevated blood pressure and triglyceride levels in women, and HF diet was negatively associated with elevated fasting glucose levels in men.

Conclusion: Further prospective studies of the impact of dietary carbohydrate, fat, and protein proportions on metabolic health are needed. The optimal types and proportions of these dietary components as well as the underlying mechanisms through which suboptimal proportions can lead to MetS, should also be investigated.

PE 09-23 9. Therapeutics of Obesity and Metabolic Syndrome

Efficacy and Safety of WCFA19 (Weissella confusa WIKIM51) in Reducing Body Fat in Overweight and Obese Adults

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Background: WCFA19 (Weissella confusa WIKIM51), found during the fermentation of kimchi, is known for its inhibitory effects on body weight and body fat. This study looked at the impact of WCFA19 isolated from dandelion kimchi on weight loss in overweight and obese adults that are otherwise healthy

Method: This study was conducted as a multicenter, double-blind, randomized, placebo-controlled study with 104 overweight and obese subjects. Subjects were randomized evenly into the test group (WCFA19, 500 mg, n = 40) or control group (n = 34) for 12 weeks from 14 June 2021 to 24 December 2021. Effects were based on DEXA to measure changes in body fat mass and percentage

Results: Among the 74 subjects analyzed, WCFA19 oral supplementation for 12 weeks resulted in a significant decrease in body fat mass of 633.38

± 1396.17 g (p = 0.0066) in overweight and obese individuals in the experimental group. The control group showed an increase of 59.10 ± 1120.57 g (p = 0.7604), indicating a statistically significant difference between the two groups. There was also a statistically significant difference (p = 0.0448) in the change in body fat percentage, with a decrease of 0.41 ± 1.22% (p = 0.0424) in the experimental group and an increase of 0.17 ± 1.21% (p = 0.4078) in the control group. No significant adverse events were reported.

Conclusion: Oral supplementation of 500 mg of WCFA19 for 12 weeks is associated with a decrease in body weight, particularly in body fat mass and percentage

Keywords: Lactobacillus fermentum; Weissella confusa WIKIM51; anti-obesity; kimchi; obesity; overweight; probiotics.

PE 09-24 9. Therapeutics of Obesity and Metabolic Syndrome

Selective CYP4A Inhibitor Reveals Potential in Treating Metabolic Dysfunction, Inflammation, and Fibrosis in Metabolic dysfunction-associated fatty liver disease(MAFLD)

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Background: Metabolic dysfunction-associated fatty liver disease (MAFLD) is identified by the presence of fatty liver combined with one or more conditions such as obesity, type II diabetes, or another metabolic anomaly. These varied risk profiles impact the determination of the most effective treatment methods. Type II diabetes (T2DM), a significant diagnosis for MAFLD, is the most common metabolic disorder. Despite the development of numerous drugs for these conditions, many have adverse side effects like hypoglycemia, weight gain, cardiotoxicity, and hepatotoxicity. Therefore, our goal was to discover new potential drugs without these side effects.

Methods: Through in silico screening, a potent CYP4A inhibitor was identified and subsequently tested in both in vivo and in vitro models. The effects of the inhibitor were quantified using fluorescence imaging for Nile Red staining, glucose uptake, and ROS production. Additionally, changes in gluconeogenesis and lipogenesis were analyzed using Western blotting. In vivo models utilized include the High Fat Diet (HFD)

model, db/db mouse model, and ob/ob mouse model.

Results: We found that C1 and C2 reduce ectopic lipid accumulation, aberrant glucose metabolism, endoplasmic reticulum (ER) stress, oxidative stress, and insulin resistance in various in vitro and in vivo models of diabetes. Furthermore, they significantly reduced hepatic inflammation and fibrosis in a mouse model of nonalcoholic steatohepatitis (NASH). Using in vivo models, the effects of drug treatment were evaluated by measuring Food Intake, Glucose Tolerance Testing (GTT), and Insulin Tolerance Testing (ITT).

Conclusion: Based on these results, our study highlights C1 and C2 as promising CYP4A inhibitors with a diverse range of beneficial effects in both diabetes and NASH models, making them valuable candidates for further exploration in addressing metabolic dysfunction-associated fatty liver disease (MAFLD).

PE 09-25 9. Therapeutics of Obesity and Metabolic Syndrome

A Novel CYP4A inhibitors regulate Metabolic dysfunction-associated fatty liver disease (MAFLD)

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Background: Metabolic dysfunction-associated fatty liver disease(MAFLD) contains a range of fatty liver changes from simple steatosis to Steatohepatitis and linked to metabolic syndrome. Recently, patients with type 2 diabetes mellitus(T2DM) has been proposed as a risk factor for the progressive form of MAFLD. Also, hepatic steatosis induced by lipid accumulation, is resulted in the development insulin resistance and T2DM. Recent drugs for hepatic steatosis and T2DM mostly target insulin but, it has lots of side effect like pancreas dysfunction. Therefore, it is essential to develop new therapeutic drugs to directly improve liver injury. In the previous study, Cytochrome P450 4A(CYP4A), known as an enzyme in lipid metabolism, were suggested a target of MAFLD.

Method: For the T2DM animal model, 8-week-old male C57BL/6N mice were fed an NCD or HFD (60% of energy derived from fat, Research Diets Inc, NJ, USA) for 12 weeks. C57BL/KsJ-db/db mice were used as a genetic model of T2DM. For the NASH model, 6-week-old male ob/ob mice were

used and divided into groups; a methionine-choline deficient (MCD) diet (#A02082002B; Research Diets Inc, NJ, USA) to induce NASH and the control group with a standard diet. Each CYP4A inhibitors (5mg/kg/day) were injected intraperitoneally for 2 or 4 weeks.

Results: Targeting CYP4A binding site, drug candidates were found through in silico screening. The drug candidates were selected by CYP4A enzyme activity assay and we investigated their effect on hepatic steatosis and T2DM induced by palmitate and ER stress inducers in HepG2 cells. In addition, in T2DM mouse model, they improved hyperglycemia, hyperinsulinemia and hepatic steatosis as well. Then, it reduced the expression of ER stress and apoptosis markers in liver tissues. Also, they had the rescue effects on the MASH mouse model.

Conclusion: Together, novel CYP4A inhibitors that we discovered are effective for T2DM with MAFLD treatment.

PE 09-26 9. Therapeutics of Obesity and Metabolic Syndrome

Global Trends in the Clinical Development of MASH Treatment

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Background: Metabolic Dysfunction-Associated Steatohepatitis (MASH), previously known as Non-Alcoholic Steatohepatitis (NASH), has emerged as a significant global health concern. As the prevalence of obesity and metabolic syndrome continues to rise worldwide, so does the incidence of MASH. This study aimed to analyze current trends in the clinical development of MASH treatments globally, providing insights into the evolving therapeutic landscape.

Methods: We conducted a comprehensive review of ongoing and completed clinical trials for MASH treatments registered in major international databases, including ClinicalTrials.gov, EU Clinical Trials Register, and Japan's UMIN Clinical Trials Registry, from January 2010 to April 2024. Data were analyzed for trends in therapeutic approaches, geographic distribution, trial phases, and sponsor types. Additionally, we examined publication patterns in peer-reviewed journals to assess the dissemination of trial results.

Results: The analysis revealed a significant increase in MASH-focused clinical trials over the past decade, with a 300% rise in registered studies.

Novel therapeutic approaches, including metabolic modulators, anti-fibrotic agents, and combination therapies, dominated the pipeline. North America and Europe led in trial numbers, accounting for 65% of all studies, but Asia showed the fastest growth rate, with a 450% increase since 2010. Phase II trials were most prevalent (45%), indicating a maturing field approaching later-stage development. Notably, there was a shift towards more industry-sponsored trials, now comprising 70% of all studies compared to 50% in 2010. Publication rates of trial results improved, with 60% of completed trials having published outcomes within two years of completion.

Conclusion: The clinical development landscape for MASH treatments is rapidly evolving, with diverse therapeutic strategies being explored globally. While significant progress has been made, particularly in advancing novel compounds to mid-stage trials, there remains a critical need for effective therapies to address this growing health burden. The increased industry involvement and improved result dissemination suggest a maturing field, potentially leading to new treatment options in the near future.

PE 09-27 9. Therapeutics of Obesity and Metabolic Syndrome

Identification of Potential Bioactive Phytochemicals for the Inhibition of Platelet-Derived Growth Factor Receptor β : Targeting Obesity and Metabolic Syndrome

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Background: Platelet-derived growth factor receptor beta (PDGFR β) belongs to the receptor tyrosine kinase (RTK) protein family and affects glucose metabolism by modulating the function of insulin-responsive tissues. PDGFR- β signaling is crucial for the differentiation of precursor cells into adipocytes. It influences the development and expansion of adipose tissue by modulating the proliferation and differentiation of preadipocytes. Given its involvement in key processes related to obesity and metabolic syndrome, PDGFR- β is being investigated as a potential therapeutic target.

Method: This study aimed to identify potential PDGFR β inhibitors through virtual screening of phy-tochemicals extracted from the IMPPAT database. The initial assessment involved applying the Lipinski rule-of-five to evaluate the physicochemical properties of the molecules. Subsequently, a comprehensive analysis encompassing binding affinity assessment, PAINS filter application, ADMET profiling, and PASS prediction was conducted.

Results: We identified Genostrychnine and Chelidonine exhibited remarkable affinity and specificity in their interactions with the PDGFR β kinase domain. To gain insights into these interactions' temporal evolution and dynamics, all-atom molecular dynamics (MD) simulations and essential dynamics analysis were employed. These computational techniques provided valuable insights into the behavior and stability of the PDGFR β -ligand complexes over time. Based on our findings, we propose that Genostrychnine and Chelidonine merit further investigation through in vivo and in vitro studies to evaluate PDGFR- β signaling to improve insulin sensitivity, reduce inflammation, and promote healthy adipose tissue function.

Conclusion: In conclusion, this study underscores the potential of Genostrychnine and Chelidonine as promising PDGFR β inhibitors. Further experimental investigations are required to validate their efficacy and assess their therapeutic potential for PDGFR β -related diseases, with a particular focus on obesity and metabolic syndrome management.

PE 09-28 9. Therapeutics of Obesity and Metabolic Syndrome

Time restricted feeding prevents the loss of rhythmicity in high fat diet induced obesity

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Background: Obesity is the most common problem in developing countries, which are the risk factors for the pathogenesis of diabetes, hypertension, cancer etc. It can be managed or cured by lifestyle modification. Time Restricted Feeding (TRF) is very important in today's scenario as changing the life pattern may protect from various diseases and improve quality of life.

Methods: Total 15 Wistar rats were included in our study and divided into two groups. Control group and High Fat diet (HFD) group which consist of six rats and nine rats respectively. HFD group was fed fatty diet for two months to developed obesity. These rats were shifted to TRF with HFD for three months, after which they were again put back on ad lib (24 hr feeding). These rats were sacrificed and samples collected. Body weight was measured monthly, with blood glucose, Insulin and lipid profile

estimated after sacrifice.

Results: The body weight of HFD group were significantly increased and TRF with chow diet were significantly decreased as compared to control rats ($p=0.0263$) and ($p=0.0054$) respectively. The level of HDL was reduced in rats fed with HFD whereas total cholesterol, TG a LDL were increased. TRF intervention with HFD diet reduced body weight, blood glucose level, TG and LDL and elevated the level of insulin, total cholesterol and HDL. Per1 and Bmal1 gene were up regulated in HFD group and after TRF intervention had reduced mRNA expression.

Conclusion: TRF is a potential behavioural intervention which is easily adaptable in lifestyle modification. TRF intervention can prevent and treat obesity and metabolic disorders.

PE 09-29 9. Therapeutics of Obesity and Metabolic Syndrome

Anti-atherosclerosis effect of Columbianadin against High Fat Diet induced atherosclerosis in rats via alteration of hyperlipidemia, inflammation and oxidative stress

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Background: Atherosclerosis is a medical condition characterized by the buildup of plaque inside the arteries. It is a progressive disease that typically develops over many years, and it can affect arteries throughout the body. In this study, we scrutinized the anti-atherosclerosis effect of columbianadin against High fat diet (HFD) induced atherosclerosis in rats.

Method: HFD were used for the induction of atherosclerosis in rats for 10 weeks and rats were received the oral administration of columbianadin (5, 10 and 15 mg/kg), respectively. The body weight, liver weight, lipid, antioxidant, cytokines, inflammatory and atherogenic index parameters were estimated. The mRNA expression of vascular cell adhesion molecule 1 (VCAM-1), Monocyte Chemoattractant Protein-1 (MCP-1) and Intercellular adhesion molecule-1 (ICAM1) were estimated.

Results: Columbianadin significantly ($P < 0.001$) reduced the body weight and altered the level of organs such as liver and heart. Columbianadin significantly ($P < 0.001$) altered the level of total cholesterol (TC), high density lipoprotein (HDL), triglyceride (TG), low density lipoprotein (LDL), very low-density lipoprotein (VLDL) and free fatty acids (FFAs),

respectively. Columbianadin significantly ($P < 0.001$) decreased the level of creatine kinase-MB (CK-MB), serum creatine kinase (CK), lactate dehydrogenase (LDH) and aspartate aminotransferase (AST) levels. Columbianadin significantly altered the level of superoxide dismutase (SOD), malonaldehyde (MDA), catalase (CAT), glutathione (GSH), glutathione peroxidase (GPx) and glutathione S-transferase (GST); suppressed the level of tumor necrosis factor- α (TNF- α), interleukin-1 β (IL-1 β) interleukin-6 (IL-6) and interleukin-17 (IL-17); inflammatory parameters like prostaglandin, cyclooxygenase-2 and inducible nitric oxide synthase. Columbianadin also down-regulated the expression of TNF- α , IL-1 β , IL-6, IL-17, ICAM1, VCAM-1 and MCP-1.

Conclusion: Collectively, we can say that Columbianadin exhibited the anti-atherosclerosis effect against HFD induced rats via alteration of hyperlipidemia, inflammation and oxidative stress.

Conclusion: Atherosclerosis, Columbianadin, Inflammation, Hyperlipidemia.

PE 09-30 9. Therapeutics of Obesity and Metabolic Syndrome

Crocetin-Dextrin nano-formulation attenuates obesity-induced cardiac hypertrophy by alteration JAK2/STAT3-associated inflammation and oxidative stress

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Background: Cardiac hypertrophy has emerged as an independent and predictive risk factor for adverse cardiovascular events. Chronic low-grade inflammation and oxidative stress play a crucial role in the expansion obesity induced cardiac hypertrophy. In this experimental study, we fabricate the crocetin-dextrin nano-formulation (CDNF) and scrutinized the protective effect against obesity-induced cardiac hypertrophy by alteration JAK2/STAT3-associated inflammation and oxidative stress.

Methods: Crocetin-Dextrin nano-formulation was prepared the aqueous nano-emulsion of crocetin and dextrin. The primary cardiomyocytes and H9c2 cells were used for the invitro model. Male mice were fed with normal chow or high fat diet for 22 weeks for the induction of obesity and estimated the body weight, water and food intake. Oxidative stress parameters, cytokines, inflammatory and apoptosis parameters were estimated. The mRNA expression of Nppa, Mynh7 and Nppb were also estimated.

Results: Crocetin knockdown in H9c2 cells exacerbated PA-induced inflammatory responses and increased NOX4 expression. Conversely, pretreatment with exogenous crocetin mitigated PA-induced cardiomyocyte hypertrophy, reduced the up-regulation of inflammatory cytokines, and alleviated oxidative stress in both primary cardiomyocytes and H9c2 cells. CD-NF remarkably suppressed the body weight which was boosted in HFD induced obesity rodent. CD-NF altered the level of oxidative stress parameters like SOD, CAT, GSH, GPx; cytokines parameters viz., TNF- α , IL-1 β , IL-6, IL-10, IL-17, IL-18; inflammatory parameters such as COX-2, iNOS, VEGF, NF- κ B, respectively. CD-NF treatment significantly boosted the mRNA expression of Nppb, Myh7 and Nppa. CD-NF treatment also altered the mRNA expression of JAK2 and STAT3.

Conclusion: We can conclude that CD-NF treatment exhibited the protective effect against obesity-induced cardiac hypertrophy by alteration JAK2/STAT3-associated inflammation.

PE 09-31 9. Therapeutics of Obesity and Metabolic Syndrome

ANALYSIS OF FENUGREEK SEED EXTRACTS ON GLYCOSYLATED HAEMOGLOBIN IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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Background: The present study was planned to evaluate the effect of fenugreek seed extract on fasting & post-prandial blood glucose levels along with its effect on serum C-peptide levels & HbA1c levels.

Method: Both male & female participants with age of 25-60 years were recruited for the study. Patients with type-2 diabetes mellitus for <5 years were preferred for the evaluation. Patients were required to be on oral anti-diabetic treatment with no change in the treatment from last one month. those patients were selected who had HbA1c >7.5% & reported to have fasting plasma glucose not exceeding 180 mg/dL. Patient reported with diabetes other than type-2 diabetes mellitus were not included in the study.

Results: fenugreek seed extract caused significant change in blood sugar

levels as compared to Placebo group. The decrease in sugar levels in Placebo group was due to concomitant anti-diabetic therapy. A significant decrease in HbA1c levels was observed as compared to respective baseline value. fenugreek seed extract caused significant reduction in fasting plasma sugar levels, reduction PP plasma sugar levels. fenugreek seed extract -treated group also showed reduction in concomitant anti-diabetic therapy. It was also found to be safe in patients with type-2 diabetes.

Conclusion: fenugreek seed extract when given as "an add on" to concurrent therapy of type-2 diabetes, was synergistic and effective in better management of type-2 diabetic patients, as compared to Placebo group, in which patients were on their routine allopathic diabetic medicine. fenugreek seed extract was safe in treating patients with type-2 diabetes mellitus.

PE 09-32 9. Therapeutics of Obesity and Metabolic Syndrome

Potential Therapeutic Effects of Polysaccharide Derived from Ziziphus jujuba Mill on Nonalcoholic Fatty Liver Disease by in vitro and in vivo Approach

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Background: Non-alcoholic fatty liver disease (NAFLD) is a prevalent global health issue characterized by excessive fat accumulation in the liver, often leads to complications like obesity and diabetes, and in more severe cases, results in hepatic fibrosis, which involves excessive extracellular matrix protein deposition. Jujube (Ziziphus jujuba Mill.), a traditional food with recognized medicinal and nutritional value worldwide, has been found to exhibit a range of health-promoting effects. This study aimed to evaluate the anti-NAFLD effects of jujube derived polysaccharides (JP) using in vitro and in vivo models.

Methods: TGF-β1 (transforming growth factor- β) was used to induce fibrosis in human hepatic stellate cell line LX-2, followed by treatment with JP. Cell viability was assessed using the MTT assay, fibrosis-related gene expression was analyzed by RT-PCR, and protein levels were measured by Western blotting. Five-week-old male C57BL/6 mice were randomly divided into four groups: normal diet (ND), ND with 5% JP (N/JP), high-fat diet with high-fructose drinking water (HFHFD), and HFHFD with 5% JP (H/JP) for 17 weeks. Finally, basic parameters including body weight (B/W) and total energy intake were measured, body composition and liver histology were investigated.

Results: JP significantly attenuated liver fibrosis by decreasing the expression of fibrotic markers such as Tgf-β, Collagen Ia, Pdgfb and Timp1 through regulation of the TGF-β-mediated SMAD2/3/4 pathway in LX2 cells. In the NAFLD mouse model, JP supplementation significantly reduced B/W gain in the N/JP group compared to the ND group, while no significant difference was observed between the HFHFD and H/JP groups. Nevertheless, fat mass and overall adiposity were significantly decreased with JP supplementation compared to the HFHFD group, without affecting lean mass. Hematoxylin and eosin (H&E) staining of liver sections revealed substantial reductions in hepatic steatosis, inflammatory infiltration and liver cell injury in the H/JP group compared to the HFHFD group.

Conclusion: Based on the current data, JP exhibits protective effects against NAFLD in both in vitro and in vivo models by reducing fat accumulation, inflammation, and suppressing fibrosis, suggesting its potential therapeutic value for managing NAFLD. We are conducting tissue RT-PCR and multi-omics analyses, including microbiota profiling, liver RNA sequencing, and metabolite profiling to further elucidate the correlation and mechanisms by which JP exerts its anti-NAFLD effects.

PE 09-33 9. Therapeutics of Obesity and Metabolic Syndrome

UPSPS's Role in Alleviating Obesity and Metabolic Syndrome: Transforming Seaweed Byproducts into Therapeutics

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Background: *Undaria pinnatifida* (UP), a brown seaweed (Phaeophyceae), comprises various parts including a blade (lamina), midrib, sporophyll, and root-like structures. While UP is extensively studied for its nutritional and bioactive properties, its sporophylls, referred to as *Undaria pinnatifida* sporophyll (UPS), are often deemed a byproduct in the seaweed food industry. This study focuses on the upcycling of these byproducts.

Method: In this study, we unraveled UPS-derived Polysaccharide (UPSPS)'s protective mechanism on intestinal barrier inflammation in an intestine-mimicked co-culture model, additionally exploring its impact on the pathophysiology of a diet-induced obese (DIO) model and characterizing UPSPS's structure.

Results: UPSPS alleviated inflammation and enhanced gut permeability in the inflamed co-culture model by decreasing nitric oxide production and pro-inflammatory gene expression. In DIO mice, UPSPS administration resulted in significant reductions in body weight, liver and adipose tissue weight, blood

glucose levels, triglyceride levels, and the number of crown-like structures in adipose tissue. Furthermore, UPSPS ameliorated obesity-induced dysbiosis and increased short-chain fatty acid levels. Structural analysis revealed that the major monosaccharides constituting UPSPS were identified as fucose (29.11%), galactose (27.52%), glucuronic acid (24.82%), mannuronic acid (7.00%), guluronic acid (6.33%), and mannose (2.02%). The polysaccharide has a molar mass of 2,496 Da and features a three-dimensional structure characterized as a long-chain polymer with a helical and layered spatial configuration.

Conclusion: UPSPS shows considerable promise in treating obese-metabolic syndrome, as confirmed through intestine-mimicked co-culture and DIO models. It effectively reduces inflammation, enhances gut permeability, and mitigates obesity-related metabolic disturbances. Additionally, advanced structural characterization techniques have uncovered the complex structure of UPSPS. Consequently, this study highlights the value of upcycling seaweed byproducts and facilitates in-depth application studies for treating metabolic syndrome and obesity-related disorders.

PE 09-34 9. Therapeutics of Obesity and Metabolic Syndrome

Effects of Jeju Purple Jerusalem Artichoke Extracts on Adipocyte Differentiation and Immune Cell Response

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Background: This study investigates the dual role of Jeju purple Jerusalem artichoke extracts (PJAE) on both adipogenesis in 3T3-L1 adipocytes and splenocytes proliferation. Understanding how different compounds affect these processes can provide insights into its potential therapeutic applications.

Methods: Cell viability was assessed with the MTT assay. Anti-adipogenic effects of PJAE were measured using Nile red staining to quantify intracellular lipid accumulation. Additionally, splenocytes were treated with PJAE, and their proliferation was evaluated with the MTT assay in the presence and absence of Concanavalin A (ConA) and Phorbol 12-myristate 13-acetate (PMA)/Ionomycin.

Results: PJAE exhibited no cytotoxic effects on 3T3-L1 cells at concentrations

up to 125 µg/mL and significantly diminished intracellular lipid accumulation in 3T3-L1 adipocytes at concentrations of 62.5 and 125 µg/mL compared to the control. While PJAE alone increased cell proliferation in splenocytes, its co-treatment with ConA or PMA/Ionomycin led to a concentration-dependent decrease in cell proliferation at higher concentrations (500 and 1000 µg/mL).

Conclusion: PJAE exhibited cell type-specific effects as not only significantly reducing lipid accumulation in 3T3-L1 adipocytes without cytotoxicity but also modulating splenocyte proliferation by enhancing proliferation alone while inhibiting proliferation when co-treated with ConA or PMA/Ionomycin. Thus, dual bioactivity of PJAE could be harnessed for the treatment of obesity and related metabolic disorders as well as for the potential role in immune modulation. Future studies are warranted to further elucidate the mechanisms underlying these effects and to explore their potential clinical applications.

PE 09-35 9. Therapeutics of Obesity and Metabolic Syndrome

Maternal high-fat diet during pregnancy and lactation causes impairments in aminergic system and motor functions in rat offspring: protective effect of calcium

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Background: The present study aimed to examine the therapeutic efficacy of calcium (Ca) supplementation against the maternal high fat (HF) diet-induced perturbations in rat offspring's neurochemical and behavioral functions.

Method: To do this, we fed mother rats with HF and control diets from gestation day (GD) 6 to postnatal day (PND) 21 and stopped at weaning. We then supplemented Ca as 0.02% in drinking water to the HF diet-fed dams from GD 6 to PND 21.

Results: Our findings showed increased synaptosomal dopamine, epinephrine, and norepinephrine levels in the cortex, cerebellum, and hippocampus at PND 21, PND 45, and PND 60 age groups of offspring

of HF diet-fed rats. In contrast, the synaptosomal serotonin levels and mitochondrial monoamine oxidase activity (MAO) decreased. Significant deficits were also observed in the open field and exploratory behaviors in the offspring of HF diet-fed rats. However, supplementation of calcium showed reversal effects against HF diet-induced alterations in the aminergic system and behavioral functions in HF diet-fed rats' offspring. The alterations in different brain regions indicate that the HF diet influences the aminergic system in a brain region-specific manner.

Conclusion: Our findings demonstrate that maternal HF diet consumption leads to persistent impairments in the aminergic system in the offspring, which may be associated with behavioral deficits, suggesting the therapeutic efficacy of calcium supplementation against HF diet-induced behavioral disorders.

Poster Exhibition

10. Metabolic and Bariatric Surgery

PE 10-01 10. Metabolic and Bariatric Surgery

Effects of dehydroepiandrosterone administration on metabolic homeostasis and antioxidant status after sleeve gastrectomy in male rats

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Background: Sex hormones dysfunctions bring about pathological changes in different organs of the body. Findings obtained from in vivo and in vitro studies point out those sex steroids hormones have a strong impact on oxidative stress. Sleeve gastrectomy has been used for the surgical treatment of morbid obesity.

The aim of the present study was to determine the effects of dehydroepiandrosterone (DHEA) administration on metabolic homeostasis, oxidative stress parameters in male rats.

Method: Sixty-four male Wistar albino rats were divided into control (n:12), and experimental (n:12) groups and underwent sleeve gastrectomy. Experimental group rats received a single dose of DHEA (100 mg/100 g) in the operation day. Rats were sacrificed on postoperative day 7. Serum DHEA hormones were analysed. The supernatants were used to measure total oxidant status, total antioxidant status, nitric oxide and malondialdehyde levels. All tissue parameters were analysed by spectrophotometric methods.

Oxidative stress index values were calculated.

Results: DHEA stimulating hormone levels in both the control and DHEA group did not significantly change on the 7th postoperative day. Free DHEA levels were significantly higher in DHEA group rats than in control group rats (DHEA vs control). Although total oxidant status levels did not altered by thyroid hormone treatment, total antioxidant status levels significantly decreased. Oxidative stress index values were not statistically different in tissues. Tissue nitric oxide levels were also similar in both groups. Malondialdehyde levels increased in DHEA given rats compared with the control group.

Conclusion: This study showed that total oxidant status levels and oxidative stress index values were similar in both groups. However, DHEA supplementation induced lipid peroxidation by increasing tissue malondialdehyde levels that might deplete tissue antioxidant level.

PE 10-02 10. Metabolic and Bariatric Surgery

Predicting Postoperative Bone Mineral Density Loss in Metabolic and Bariatric Surgery Patients Using Multi-Modal Machine Learning Integrating DXA and Biochemical Markers

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Background: Postoperative Bone Mineral Density (BMD) loss is a major concern for patients after Metabolic and Bariatric Surgery (MBS), increasing their risk of fractures and osteoporosis. Traditional risk assessments fail to account for complex factors leading to BMD loss. This study aims to develop a machine learning model to predict BMD loss by combining DXA imaging data with biochemical markers, offering significant improvement in personalized care.

Methods: We studied 300 patients undergoing metabolic and bariatric surgery, using data from DXA scans and biochemical profiles collected preoperatively and at 3-, 6-, and 12-months post-surgery. DXA measured bone mineral density, T-scores, and bone geometry. Biochemical markers included calcium, vitamin D, parathyroid hormone, and bone turnover indicators. Data were normalized and missing values addressed. A Convolutional Neural Network analyzed DXA data, a Random Forest processed biochemical data, and a stacking ensemble integrated the predictions. Model performance was assessed using Mean Squared Error, R-squared, and Mean Absolute Percentage Error.

Results: The machine learning model showed high accuracy in predicting postoperative bone mineral density (BMD) loss. At 12 months post-surgery, it achieved a Mean Squared Error (MSE) of 1.4%, a Mean Absolute Percentage Error (MAPE) of 6.8%, and an R-squared (R^2) of 0.82. The Convolutional Neural Network (CNN) component effectively detected early bone changes in DXA scans. Key predictors of significant BMD loss included a low baseline T-score (2.9-fold risk increase), high preoperative parathyroid hormone levels (1.7-fold risk increase) and decreased postoperative vitamin D (2.1-fold risk increase). Elevated bone turnover and nutritional deficiencies were also strongly linked to greater BMD loss.

Conclusion: Our machine learning model accurately predicts bone mineral density (BMD) loss in bariatric surgery patients using DXA imaging and biochemical data. This tool enables early identification of high-risk individuals, allowing targeted interventions to prevent BMD loss. It sets a new standard for predictive care in bariatric surgery.

Poster Exhibition

11. Obesity and Metabolic Syndrome in Children and Adolescents

PE 11-01 11. Obesity and Metabolic Syndrome in Children and Adolescents

Performance of Mid-Upper Arm and Wrist Circumferences for Identifying General and Fat Obesity in Children Aged 7-15 Years

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Background: Mid-upper arm circumference (MUAC) and wrist circumference are frequently used as screening tools for obesity in children. Nonetheless, specific cut-offs were required for a certain population. This study aimed to investigate the performance of MUAC and wrist circumference in identifying general and fat obesity in children aged 7-15 years.

Methods: Participants were 1103 children aged 7-15 years (538 boys, 565 girls) from Yogyakarta, Indonesia. Height, weight, and skinfold thickness were measured. Percentage of body fat (%BF) was estimated from skinfold thickness (fat obesity). Body mass index (BMI) was calculated (general obesity). The data were stratified by age (7-9, 10-12, 13-15 years) and gender. Statistical analyses used were one-way ANOVA, Pearson correlation, independent sample t-test, the Receiver Operating Characteristic (ROC) and Area Under the Curve (AUC). The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were evaluated.

Results: The prevalences of general obesity were 20.6% (boys) and 19.6% (girls), while fat obesity were 24.0% (boys) and 16.8% (girls). MUAC and wrist circumference were significantly correlated with BMI and %BF in both boys and girls aged 7-9 and 10-12 years ($r=0.36-0.94$; $p<0.01$). In boys and girls aged 13-15 years, MUAC and wrist circumference were only significantly correlated with %BF ($r=0.19-0.68$; $p<0.01$). Overall, MUAC had a higher AUC than wrist circumference across all age groups and genders for both general (AUC=0.767-0.985) and fat obesity (AUC=0.709-0.990). The younger age groups appear to have higher AUC. Cut-offs were established for both general and fat obesity, stratified by gender and age. MUAC and wrist circumference performed better in detecting fat obesity than general obesity, and in younger than older age groups.

Conclusion: MUAC and wrist circumference were useful in identifying general and fat obesity in children aged 7-15 years. Cut-offs should be used with caution and consideration for age and gender.

Keywords: MUAC, wrist circumference, BMI, %BF, obesity

PE 11-02 11. Obesity and Metabolic Syndrome in Children and Adolescents

Feeding to Soothe, Appetitive Traits and Weight Status of Malaysian Infants in the First 6 Months of Life

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Background: Weight status in early infancy has been found to predict obesity in later life. Appetitive traits emerge early in postnatal life and some of these traits may predispose a child to over-eating. Poor feeding practices may also lead to excessive weight gain in infancy.

Methods: This cross-sectional study aimed to determine the associations between feeding to soothe, appetitive traits and weight status of infants aged 1 – 6 months in Kuala Lumpur and Putrajaya, Malaysia (n=229). Feeding to soothe was assessed using Baby's Basic Needs Questionnaire, and infant's appetitive traits (food responsiveness, enjoyment of food, satiety responsiveness, slowness in eating, general appetite) were assessed using Baby Eating Behaviour Questionnaire. Infant's gestational age, birth weight, current weight and length were obtained from their health records. Weight-for-length z-score (WLZ) and length-for-age z-score (LAZ) were determined using WHO Anthro software.

Results: The prevalence of overweight/obesity (WLZ $\geq +1SD$) among

the infants was 9.2%, with 4.8% had low birth weight (< 2.5 kg) and 0.4% had high birth weight (> 4.0 kg). Less than half (39.7%) of the infants were exclusively breastfed and 14.0% had been introduced to solid food. Higher birth weight ($r=0.182$, $p=0.006$) and general appetite ($r=0.157$, $p=0.017$) were associated with higher WLZ, while higher LAZ was associated with lower WLZ ($r=-0.157$, $p=0.017$). Higher feeding to soothe score was associated with higher general appetite ($r=0.299$, $p<0.001$), but not WLZ in the infants ($p>0.05$). Monthly household income ($B=6.852$, $SE=0.001$, $p=0.012$), birth weight ($B=0.854$, $SE=0.191$, $p<0.001$), LAZ ($B=-0.216$, $SE=0.059$, $p<0.001$), exclusive breastfeeding ($B=-0.297$, $SE=0.132$, $p=0.026$), and general appetite ($B=0.216$, $SE=0.069$, $p=0.002$), were significant predictors of WLZ ($F=3.809$, $p<0.001$) among the infants.

Conclusion: Feeding to soothe may stimulate general appetite of infants, which in turn may lead to higher WLZ in infancy, and thus development of obesity in later life.

PE 11-03 11. Obesity and Metabolic Syndrome in Children and Adolescents

Sociodemographic Characteristics of Mothers Associated with Body Weight Status of Children in Petaling District, Selangor, Malaysia

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Background: Inappropriate complementary feeding practices such as untimely introduction, improper feeding frequency, and low dietary diversity of complementary foods have been widely shown to increase the risk of underweight and stunting among young children. This study aimed to investigate the association between socioeconomic and demographic factors of mothers with complementary feeding practices and body weight status of children in Petaling District, Selangor.

Methods: This was a cross-sectional study involving 141 mothers of children aged 6-24 months recruited through purposive sampling approach. Self-administered questionnaires were distributed among participants comprising of socioeconomic and demographic characteristics of mothers and children, maternal nutritional knowledge, breastfeeding practice, and complementary feeding practice. The height/length and weight of the children were measured to determine BMI-for-age z-score (BAZ) using standardized methodology.

Results: A total of 46.8% male and 53.2% female children, respectively with a mean age of 15.27±6.11 months participated in the study. The

average BAZ was 0.167±0.675 with 75.9% of children in the normal, 15.6% in overweight, and 8.5% in wasted category, respectively. Significant association was found between maternal age ($X^2=9.707$), educational level ($X^2=4.553$), occupational status ($X^2=5.652$), and household income ($X^2=5.177$) with complementary feeding practices, but not on maternal race ($X^2=0.017$) and maternal knowledge ($X^2=0.339$). No significant association was also found between socioeconomic characteristics and complementary feeding practices with the weight status of the children ($p > 0.05$).

Conclusion: Majority of children in this study had normal growth. This study highlights possible factors that were associated with complementary feeding practices and weight status of the children. Other factors should be explored in future to ensure better complementary feeding practices among mothers and optimal growth of the children.

Keywords: Sociodemographic, complementary feeding practices, growth, children

PE 11-04 11. Obesity and Metabolic Syndrome in Children and Adolescents

Direct Parental Involvement in Adolescent Obesity Treatment: A Case Report

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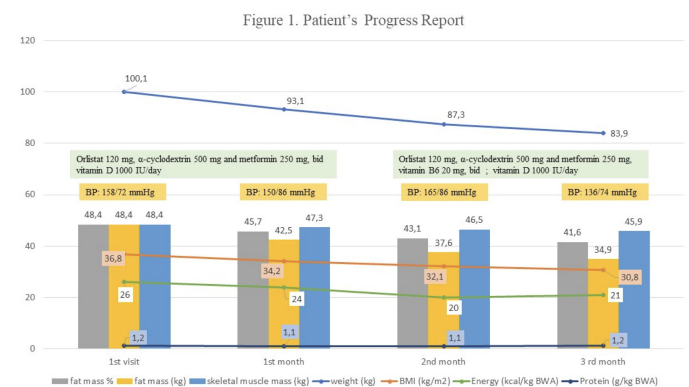
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Background: The management of obesity is to achieve weight loss through diet and exercise, which requires the maintenance of behaviour change. Behaviour change is difficult to sustain unless people have support. The social context most likely to support making healthy behaviour changes is the family.

Methods/Case: A 17-year-old female patient visited nutrition clinic with her father, wanted to lose weight because she got tired quickly, sore legs, and menstruation 1 week late every month. Her eating habits: skipping meals, frequent snacking, eating more ready-to-eat foods, and drinking sugar-sweetened beverages. The patient had no regular exercise because of busy school schedule. The patient lived in a boarding house. The patient was diagnosed with obesity based on the CDC (BMI > 95th percentile) and hypertension. The patient received lifestyle modification therapy and pharmacotherapy. Both parents always accompanied and actively participated in nutrition educational therapy, also gave motivation to the patient. A diet plan could be implemented with help from her aunt and grandmother. After a follow-up period, she had no complaints, had improvement in blood pressure without drug, a loss of weight 16.1 kg (16%) and changed in body composition as detected.

Results/Discussion: Obesity treatment in pediatrics has demonstrated the importance of parents' participation in weight control program. Direct parental involvement, defined as parents' presence requested

at education sessions, enhances the effectiveness of the intervention. Weight loss was achieved by the patient because of family involvement in lifestyle modification therapy.



Conclusion: Direct parental involvement appeared to positively impact lifestyle modification intervention effectiveness.

PE 11-05 11. Obesity and Metabolic Syndrome in Children and Adolescents

Factors Associated with Physical Health Literacy in Japanese Junior High School Students: A Survey Based on Attitudes toward Exercise Habits, Diet, and Physical Measurement

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Background: The concept of hHealth literacy, the understanding and application of health information to make appropriate health decisions, is recognized gaining attention as a critical force that determindeterminant ofes health. Early intervention in health literacy education is important, with and many studies have focusedfocusing on the younger generation. In Japan, the prevalence of obesity is an increasing among number of students in all grades up to high school. tend to be obese. Therefore, the purpose of tThis study aimsis to examine the physical health literacy status of junior high school students and identify further related factors to help them junior high school students develop health habits forin the future.

Methods: The study surveyed subjects were 800 junior high school students in A city B, prefecture IbarakiA, in Japan., using aA self-administered questionnaire survey was conducteddistributed by mail method. The primary outcome measures were five aspects of physical health literacy items (:exercise habits, eating habits, health check-ups, physical measurements, and health knowledge. about health). Secondary outcome measures included current health status, breakfast intakeconsumption, feeling of loneliness, and Information and Communication Technology (ICT) use, sense of well-being. The five primary outcomesendpoints were divided into high and low groups, and comparisons were made using the secondary outcomes endpoints were compared.

Results: A total of 616 respondents wereresponses were obtained received (response rate = 77.0%). Signiant differences ($p < 0.05$) Health literacy in terms of were found exercise habits, eating habitsdiet, and physical measurements based on differed significantly ($p < 0.05$) in terms of current health status, feeling of loneliness, and sense of well-being. FurthermoreIn addition, health literacy regarding the use of in terms of use of health check-ups and health knowledge showed differed significantly difference ($p < 0.05$) not only in terms ofcurrent current health status, but also in terms of breakfast intake consumption and time spent using ICT.

Conclusion: The study shows that the The physical health literacy of junior high school student's perceptions of lifestyle and self-awareness differ based on their health literacy, which is influenced by both their health status and awareness of health behaviors. students suggests that their perceptions of lifestyle and self differ depending not only on their health status but also on their awareness of health behaviors. To Prevent lifestyle-related diseases and obesity, We would likeit is important to clarify the structure of health literacy of among junior high school students and to consider new intervention methods for the prevention of lifestyle-related diseases and obesity in the future.

PE 11-06 11. Obesity and Metabolic Syndrome in Children and Adolescents

Factors Related to Japanese Junior High School Parents' Attitudes toward Children's Lifestyle and Eating Habits Focusing on the Health Literacy of Parents

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Background: The problem of disorganized health awareness and habits among junior high school students has been raised. several studies have shown that parents' habits significantly influence their children's lifestyles. Therefore, this study aims to examine parents' attitudes toward their children'slifestyle habits and related factors focusing on their health literacy, in order to help establish healthy habits for junior high school students in the future.

Methods: The study population consisted of 800 parents of junior high school students in A City, Ibaraki prefecture, Japan. A self-administered questionnaire survey was conducted by mail. The primary outcomes were five child-rearing attitudes: lifestyle, eating habits, reading, career counseling, and study habits. Secondary outcomes included parents' health literacy, ICT use, feeling of loneliness, children's actual lifestyle and eating habits. The five nurturing attitudes were divided into high and low groups, and a comparative study of the secondary assessment outcomes was conducted.

Results: Responses were received from 567 respondents (response rate = 70.9%). The group with high awareness of their children's efforts to develop a regular lifestyle had significantly higher health literacy and health knowledge regarding their parents' dietary habits ($p < 0.05$). The group with high awareness of their children's dietary habits had significantly higher use of health examination results and health knowledge ($p < 0.05$). In addition, the group with high awareness of discussing future career paths had significantly higher scores on all health literacy items ($p < 0.01$).

Conclusion: The results suggest that different concepts of health literacy are associated with different attitudes towards lifestyle and nutrition in middle school children. The findings suggest the need to consider parents' health literacy when addressing the improvement of junior high school students' lifestyle habits and future health concerns.

PE 11-07 11. Obesity and Metabolic Syndrome in Children and Adolescents

Physical Activity and Weight Status of Primary School Children with Learning Difficulties in Selangor, Malaysia

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Background: Children with different conditions of learning disabilities are vulnerable to becoming overweight or obese due to adoption of various lifestyle practices or exposure to behavioral risk factors. Constant engagement in physical activity can provide maintenance of optimal weight status to the children with learning disabilities despite their underlying conditions. Therefore, the aim of this study is to assess the physical activity level of children with learning difficulties and its association with weight status.

Methods: A cross-sectional study was conducted among 360 learning-disabled children who enrolled in Program Pendidikan Khas Integrasi (PPKI). Parents completed a self-administered questionnaire comprised of sociodemographic section, while Physical Activity Questionnaire for Children (PAQ-C) was used for determining physical activity levels. Children' data including weight and height were obtained and further analyzed using WHO AnthroPlus software to determine their growth status.

Results: Most of the children were male (68.3%), of Malay ethnic group

(83.9%) and coming from less than USD1500 income households. Approximately, 52.8% of children with learning disabilities were at a normal weight status, with 11.6% and 35.5% of them being underweight and overweight/obese, respectively. Physical activity was significantly associated with weight status of these learning-disabled children ($r = -0.124$, $p < 0.05$). No other sociodemographic factors were associated with weight status of the children except for income and presence of medical conditions ($p < 0.05$).

Conclusion: Most children with learning disabilities in this study had normal weight and could be due to the influence of moderate physical activity performance. However, other factors such as the family household background, children's dietary pattern and severity of the learning disorders are not to be excluded and should be incorporated in future research among this vulnerable group of children.

Keywords: Learning disabilities, children, weight status, diet quality and physical activity

PE 11-08 11. Obesity and Metabolic Syndrome in Children and Adolescents

The role of sugar-sweetened beverages in a late adolescence patient with obesity and chronic kidney disease: A case report

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Background: Obesity is characterized by abnormal fat accumulation and can lead to chronic health complications. This condition is closely linked to lifestyle factors, including the consumption of sugar-sweetened beverages (SSBs), which is a global trend. Obesity is associated with hypertension, and hypertension has a causal relationship with chronic kidney disease (CKD). This study presents a case of CKD due to obesity and hypertension, observed at the Emergency Department of Semen Padang Hospital.

Methods: We reported on a 21-year-old man admitted to the Emergency Department of Semen Padang Hospital due to weakness and dizziness lasting more than three months. He has a history of obesity, uncontrolled hypertension, and frequent consumption of sugar-sweetened beverages. The patient's BMI is 30.86 kg/m². Laboratory tests revealed elevated serum urea (116 mg/dl), elevated serum creatinine (15.6 mg/dl), and low hemoglobin levels (7.9 g/dl). The patient was scheduled for hemodialysis, transfusion of packed red blood cells, and anti-hypertensive medication.

Results: Based on the Ministry of Health Republic of Indonesia's classification in 2009, this patient is categorized as a late adolescent. Evaluation indicated a connection between sugar-sweetened beverage consumption, obesity, uncontrolled hypertension, and chronic kidney disease. Habitual consumption of SSBs contributes to weight gain, while CKD may be caused by obesity and hypertension, associated with histopathological findings of obesity-related glomerulopathy and glomerular hypertension. Metabolic products from adipose tissue contribute to various pathophysiological processes such as oxidative stress, inflammation, and endothelial dysfunction.

Conclusion: SSBs, obesity and uncontrolled hypertension can cause CKD. Treating this medical condition necessitates using algorithms that involve decisions from multiple disciplines.

Keywords: Obesity, sugar-sweetened beverages, hypertension, chronic kidney disease

PE 11-09 11. Obesity and Metabolic Syndrome in Children and Adolescents

Obesity and Metabolomic Signatures and Among Children in Asian Landscape

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Background: Childhood obesity is a major public health concern worldwide, with rising prevalence rates posing serious health risks. Metabolomics, as an emerging technology, holds significant potential for studying biochemical pathways to childhood obesity. However, studies characterizing metabolomic signatures in pediatric obesity within the Asian region remain limited. This review aims to explore the use of metabolomics in Asian pediatric studies and identify metabolomic signatures associated with childhood obesity.

Methods: Relevant articles were searched through online databases, including PubMed and Web of Science. Google Scholar was also used to find additional grey literature. This review was conducted in compliance with PRISMA guidelines. The search strategy included the following components: population (Asian children aged 4-12 years old with overweight/obesity); intervention (metabolomics approach, either targeted or non-targeted); comparisons (with/without control group); and outcomes (metabolomic signatures related to obesity).

Results: This study reviewed six metabolomics investigations into

childhood obesity conducted in two Asian countries, namely China and South Korea. Metabolomic profiling of pediatric obesity involved analyzing blood and urine samples to comprehensively study metabolic pathways. The findings suggested that amino acid and lipid metabolisms are the most affected pathways in childhood obesity. Alterations in biomarkers of branched-chain amino acids (BCAA), lipids, and several acylcarnitines were linked to childhood overweight and obesity. Additionally, changes in BMI-for-age were positively correlated with higher BCAA concentrations in plasma.

Conclusion: In conclusion, metabolomics enables the identification of valuable biomarkers and metabolic pathways associated with obesity, particularly in amino acid and lipid metabolisms. The findings suggest that alterations in biomarkers such as BCAA, lipids, and acylcarnitine are linked to childhood overweight and obesity. Addressing these issues is crucial because early detection and personalized treatments can prevent the progression of obesity and its associated health complications, thereby improving long-term outcomes for children.

PE 11-10 11. Obesity and Metabolic Syndrome in Children and Adolescents

The triglyceride-glucose index and its relationship to metabolic syndrome in Korean children

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Background: Childhood obesity should be closely monitored and addressed because a significant proportion of obese children and adolescents progress to adulthood with obesity and health problems such as metabolic syndrome (MetS), type 2 diabetes, and cardiovascular disease. We aimed to compare the prognostic values of the triglyceride-glucose (TyG) index and homeostasis assessment model of insulin resistance (HOMA-IR) for predicting MetS.

Methods: The study included 660 children (355 boys and 305 girls) with obesity aged 6 and 11 years. After anthropometric and clinical evaluation, fasting blood samples were collected from the children. Fasting glucose, insulin, triglycerides, resting blood pressure, and high-density lipoprotein cholesterol (HDL-C) were measured. HOMA-IR was calculated using the formula: $\text{fasting glucose (mmol/L)} \times \text{fasting insulin (}\mu\text{U/mL)} / 22.5$. The TyG index was calculated as $\ln [\text{fasting triglycerides (mg/dL)} \times \text{fasting plasma glucose (mg/dL)} / 2]$. The areas under the curve of TyG and HOMA-IR were compared by receiver-operating-characteristic (ROC) analysis in predicting the MetS.

Results: The overall prevalence of MetS was 8.5% ($n=56$) in this pediatric population, with girls having a higher trend than boys (6.8% vs. 10.5%, $p=0.58$). Those with MetS have higher TyG (8.08 vs. 8.84, $p<0.001$) and HOMA-IR (1.86 vs. 4.18, $p<0.001$) than those without MetS. The TyG index has a larger ROC area (AUC = 0.910, 95% confidence interval, CI = 0.866-0.954, $p<0.001$ versus AUC = 0.729, 95% CI = 0.723-0.853, $p<0.001$) than HOMA-IR.

Conclusion: The TyG index was more convenient and effective than HOMA-IR in assessing MetS risk in schoolchildren (overall model quality of TyG = 0.87 versus overall model quality of HOMA-IR = 0.66). The TyG index is a valuable tool for pediatric research and intervention evaluation.

PE 11-11 11. Obesity and Metabolic Syndrome in Children and Adolescents

Individual Variability in Insulin Sensitivity, Visceral fat and Cardiorespiratory Fitness in Response to Exercise in Adolescents with Obesity

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Background: We examined the influence of exercise training on interindividual variability and response rates above the smallest worthwhile change (SWC) after accounting technical error of measurement (TE) in cardiorespiratory fitness (CRF) and health risk factors in adolescent boys and girls with overweight and obesity.

Methods: We included 143 adolescents (12-18 years, BMI>85th percentile) who participated in randomized exercise trials (3-6 months) at UPMC Children's Hospital of Pittsburgh and had complete baseline and post-intervention data for insulin sensitivity by the hyperinsulinemic euglycemic clamp, visceral fat by magnetic resonance imaging, and peak oxygen uptake during maximal treadmill test (59 aerobic, 58 resistance, and 26 combined aerobic and resistance exercise). Each individual's observed response was compared with the SWC after adjusting for TE and categorized as a 'possible' change (greater than SWC) or 'likely' change

(greater than the SWC and beyond the 90th percentile or TE).

Results: In response to 3 to 6 months of aerobic and/or resistance exercise, approximately half to two-thirds of boys and girls in all exercise groups had an improvement in insulin sensitivity that would indicate a 'likely/possible' improvement. For visceral fat, most groups had over 80% of participants having a 'likely/possible' improvement in response to exercise. For peak oxygen uptake, most groups had over 75% of participants having a 'likely/possible' improvement in response to exercise.

Conclusion: Substantial variability in response to standardized exercise was observed for change in insulin sensitivity, and to a lesser degree, visceral fat and CRF after accounting for measurement error in adolescents with overweight and obesity.

PE 11-12 11. Obesity and Metabolic Syndrome in Children and Adolescents

Associations between Skeletal Muscle Lipid, Muscular Strength and Insulin Sensitivity in Adolescents with Obesity

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Background: We examined the associations between skeletal muscle lipid, muscular fitness and insulin sensitivity in adolescent boys and girls with obesity.

Methods and Materials: We included 181 healthy adolescents (77 boys and 104 girls, 12-18 years, BMI>95th percentile). Measurements included insulin sensitivity assessed by a 3-hour hyperinsulinemic-euglycemic clamp, total and intermuscular adipose tissue (AT) and skeletal muscle (SM) mass quantified by whole-body magnetic resonance imaging, and mid-thigh skeletal muscle density evaluated by computed tomography. Muscular strength index was calculated as the sum of the 1-RM scores for the chest and leg press expressed per kg of body weight.

Results: In both boys and girls, insulin sensitivity was inversely associated

with total intermuscular AT mass (boys: $r = -0.59$, girls: $r = -0.36$), mid-thigh intermuscular AT area (boys: $r = -0.41$, girls: $r = -0.31$), and low-density muscle area (boys: $r = -0.30$, girls: $r = -0.33$), and these associations remained significant after accounting for race, Tanner stage and muscular strength index. By contrast, insulin sensitivity was not associated with muscular strength index with and without adjustment for race and Tanner stage. After accounting for race, Tanner stage and total adiposity (%), intermuscular AT mass remained significantly associated with insulin sensitivity, explaining 35% and 14% of the variance in insulin sensitivity in boys and girls, respectively.

Conclusion: Independent of total fat, race and sex, skeletal muscle quality is an important determinant of insulin sensitivity in adolescents with obesity.

PE 11-13 11. Obesity and Metabolic Syndrome in Children and Adolescents

Differential Effects of Exercise on Changes in Body Composition and Insulin Sensitivity in Adolescents with Metabolically Healthy versus Metabolically Unhealthy Obesity

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Background: We examined the effects of exercise training on changes in total and regional body fat, and skeletal muscle (SM) in adolescents with metabolically healthy (MHO) versus unhealthy obesity (MUO).

Methods: This is a secondary analysis of our previously published randomized trials of aerobic, resistance, and combined exercise training. We included 70 black and 60 white adolescents (BMI >85th percentile, 12-18 years) who had complete baseline and post-intervention data for total fat and SM quantified by whole-body magnetic resonance imaging, and insulin sensitivity measured by 3-hr hyperinsulinemic euglycemic clamp. Adolescents with glucose disposal (R_d) greater than 13.8 mg/kg·FFM/min were classified as MHO, whereas those with R_d < 13.8 mg/kg·FFM/min were classified as MUO as reported by us previously (Lee and Arslanian, J Adolesc Health. 2019 Mar;64(3):327-332).

Results: In blacks, despite no weight loss, both MHO and MUO groups had significant reductions in visceral fat, intermuscular fat and liver fat, and increases in SM mass following exercise interventions after

accounting for sex, baseline value and exercise modality. In Blacks with MUO, there were significant reductions ($P<0.05$) in total fat, abdominal subcutaneous fat and waist circumference (WC) and increases in mid-thigh SM density, which were not seen in black MHO group. In whites, BMI, waist circumference, and all body fat measures (total, visceral and abdominal subcutaneous fat, and ectopic fat in the liver and muscle) decreased significantly after exercise interventions in the MUO group only. Further, total SM mass and SM density increased significantly in whites, both MUO and MHO groups, and the increases in SM mass and reductions in visceral fat were significantly greater ($P<0.05$) in the MUO versus MHO group. In both races, significant improvements in insulin sensitivity were observed in the MUO group only.

Conclusion: Although MHO adolescents displayed benefits in response to exercise interventions, the beneficial effects of regular exercise on body composition and insulin sensitivity were more pronounced in adolescents with MUO compared to MHO in both races.

PE 11-14 11. Obesity and Metabolic Syndrome in Children and Adolescents

BMI changes before and after two years of COVID-19 lockdown: a retrospective longitudinal study in single elementary school

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Background: This study aimed to investigate changes in Body Mass Index (BMI) before and after the COVID-19 lockdown by grade and sex, as well as the recovery of BMI after the lockdown.

Methods: We retrospectively reviewed the height, weight, and BMI of students from a single elementary school from 2019 to 2023, excluding 2020 due to the COVID-19 lockdown. We conducted both longitudinal and cross-sectional studies to examine changes in BMI according to grade and BMI status before and after the lockdown.

Results: A cross-sectional study of the entire student body indicated that BMI SDS in 2021, a year after the COVID-19 lockdown, significantly increased compared with BMI SDS in 2019, a year before the lockdown ($p=0.009$). However, longitudinal studies for each grade showed different

results. In 2019, first-grade students experienced a significant decrease in BMI SDS after the lockdown ($p=0.003$). In contrast, students in other grades showed a significant increase in BMI SDS during the lockdown, with third-grade students in 2019 showing the most significant increase ($p=0.027$). The increased BMI SDS was more frequently observed in the normal and overweight groups compared to the obese group before the lockdown.

Conclusion: Our longitudinal study indicates that not all children and adolescents experienced increased BMI SDS due to the COVID-19 lockdown. We found that changes in BMI varied depending on obesity status and grade before the lockdown. Therefore, different approaches to controlling and preventing obesity-related metabolic diseases may be required depending on the affected age group and obesity status post-COVID-19.

PE 11-15 11. Obesity and Metabolic Syndrome in Children and Adolescents

Associations between sedentary behaviors, dietary factors and sugar-sweetened beverage consumption among Korean adolescents: A path analysis

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Background: The escalating prevalence of obesity among adolescents presents a significant global health concern, with sugar-sweetened beverage (SSB) consumption closely linked to this issue. Factors associated with SSB overconsumption among adolescents such as dietary habits, sedentary lifestyle, and other health risk behaviors have previously identified. This study aimed to identify modifiable key factors affecting overconsumption of SSB among adolescents and investigate their interconnections through path analysis.

Methods: This cross-sectional study utilized data from the 2022 Korea Youth Risk Behavior Web-based Survey with 49,548 participants. Data on the frequency of SSB consumption, socio-demographic characteristics, eating habits, sedentary behaviors and other health-related factors were collected using self-reported questionnaire. Path analysis was used to develop a model of SSB over-consumption among adolescents and to estimate direct and indirect effects of modifiable factors.

Results: Male students, current alcohol drinkers, those consuming more fast foods and late-night snacks, and those with increased smartphone usage were more likely to overconsume SSB. Correlation analysis revealed positive relationships between SSB consumption and the frequency

of watching Mukbang and cooking broadcasts ($r=0.085$), smartphone usage time ($r=0.122$), leisure sitting time ($r=0.074$), fast-food consumption ($r=0.301$), and nighttime eating ($r=0.257$), whereas self-perceived health status showed a negative correlation ($r=-0.058$). Direct path coefficients indicated that leisure sitting time ($\beta = 0.045$), negative self-perceived health level ($\beta = -0.039$), fast food consumption ($\beta = 0.239$), and nighttime eating ($\beta = 0.181$) were associated with higher SSB consumption among participants. Leisure sitting time was indirectly and positively associated with SSB consumption, mediated by Mukbang watching, smartphone use, fast-food intake, and nighttime eating. Self-perceived health status was negatively associated with SSB consumption, mediated by fast food intake and nighttime eating.

Conclusion: The frequency of SSB consumption among Korean adolescents was significantly associated with unhealthy eating habits and longer leisure sitting time. Increased fast food intake, nighttime eating, Mukbang watching, smartphone use, and negative self-perceived health status directly affected SSB consumption and acted as mediators in these relationships. Appropriate school health intervention policies to regulate screen time and ultimately promote healthy eating habits are needed.

PE 11-16 11. Obesity and Metabolic Syndrome in Children and Adolescents

Difference of Living Variables According to Body Mass Index of Korean High School Students

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Background: Child and adolescent obesity is increasing worldwide, including Korea, and its importance is being emphasized. Therefore, identifying predictive factors of adolescent obesity is important for preventing obesity and necessary for developing intervention programs.

Methods: The purpose of this study was to investigate the differences in physical activity and eating habits according to the body mass index of high school students using the 2020 National Health and Nutrition Survey. Data were analyzed using independent t-test, one-way ANOVA of the SPSS WIN 21.0 program.

Results: The results of this study showed that physical activity ($p = 0.78$), physical activity classification ($p = 0.50$), lunch frequency ($p = 0.65$), dinner frequency ($p = 0.19$). There was a difference only in the number of breakfasts ($p = 0.04$).

Conclusion: These results suggest that the importance of breakfast should be emphasized and breakfast should be prepared at home, considering that the meaning of breakfast is an important variable in high school students' obesity.

PE 11-17 11. Obesity and Metabolic Syndrome in Children and Adolescents

Factors Influencing Obesity in Korean High School Students

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²College of Nursing, Dongwon Institute of Science and Technology, Korea

³College of Nursing, Dongwon Institute of Science and Technology, Korea

Background: This study was a second analysis study of descriptive research to identify the factors affecting obesity in Korean high school students based on the online survey data of youth health behavior in 2023.

Methods: If the value of the data selected as the main concept of the study in the entire primitive data is missing, the data are analyzed and analyzed using the remaining 3,501 data. Data analysis method was descriptive statistics, correlation analysis and multiple regression analysis using SPSS WIN 20.0 program.

Results: As a result of this study, obesity of Korean high school students was statistically correlated gender($p < .001$), grade($p = .003$), age($p = .002$), smoking($p = .033$), diet($p = .002$), physical activity($p < .001$), subjective body

image($p < .001$). Factors affecting obesity in Korean high school students are as follows. Gender($\beta = -.247$), physical activity($\beta = .024$), subjective body image($\beta = .795$) variables explained 62.7% of obesity in Korean high school students.

Conclusion: Therefore, in order to prevent obesity in Korean high school students, the development and application of nursing intervention program that can improve the perception of high school students based on physical activity so as to increase physical activity more positively for female students and positively improve subjective body image need.

PE 11-18 11. Obesity and Metabolic Syndrome in Children and Adolescents

Hyperaldosteronism Against the Background of Obesity

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Background: Obesity has become a global epidemic, contributing to the increased prevalence of comorbid conditions, including hyperaldosteronism. This case report presents a 14-year-old female patient with obesity and hyperaldosteronism, highlighting the significance of comprehensive diagnosis and interdisciplinary treatment.

Methods: Laboratory tests revealed elevated aldosterone levels with normal renin levels, suggesting obesity-induced hyperaldosteronism. Imaging studies showed adrenal hypertrophy, further complicating the diagnostic process.

Results: The patient initially received symptomatic treatment for hypertension, emphasizing the need for targeted therapeutic strategies aimed at reducing activity of the renin-angiotensin-aldosterone system (RAAS) and body mass.

Conclusion: This case underscores the importance of early detection and management of hyperaldosteronism in the context of obesity among children and adolescents. Future research should focus on understanding the genetic and molecular mechanisms underlying hyperaldosteronism in obesity and evaluating long-term outcomes of different therapeutic approaches to improve patient care and prevent complications.

PE 11-19 11. Obesity and Metabolic Syndrome in Children and Adolescents

Obesity and the metabolic syndrome in children and adolescents

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Background: Both the frequency and severity of childhood obesity are sharply rising. In a sizable, multiracial, multiethnic cohort of children and adolescents, we looked at the impact of different degrees of obesity on the prevalence of the metabolic syndrome and its relationship to insulin resistance, C-reactive protein, and adiponectin levels.

Methods: Twenty children and adolescents were not obese, 31 were overweight, and 439 were obese when we gave them a routine glucose-tolerance test. Adiponectin levels, C-reactive protein, blood pressure, and plasma lipid levels were all measured at baseline. Blood pressure, high-density lipoprotein cholesterol, and triglyceride levels were corrected for age and gender. We used conversion to a z score to standardise the values for age and sex because the body-mass index changes with age.

Results: As obesity got worse, so did the prevalence of the metabolic syndrome, which in very obese children reached 50%. In overweight

and obese subjects, the odds of developing the metabolic syndrome increased with each half-unit increase in body-mass index (converted to a z score) and with each unit increase in insulin resistance as determined by the homeostatic model (odds ratio, 1.12; 95 percent confidence interval, 1.07 to 1.18 for each additional unit of insulin resistance). After adjusting for race or ethnic group and degree of obesity, the prevalence of the metabolic syndrome rose considerably with increasing insulin resistance (P for trend, <0.001). Adiponectin and C-reactive protein levels rose.

Conclusion: Obese children and adolescents have a high incidence of the metabolic syndrome, and this prevalence rises as obesity gets worse. These children already exhibit biomarkers of an increased risk of unfavourable cardiovascular outcomes.

PE 11-20 11. Obesity and Metabolic Syndrome in Children and Adolescents

The Impact of Lifestyle Choices on Chronic Kidney Disease and its Complications in Young Adults: A Case Report and Literature Review

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Background: Chronic Kidney Disease (CKD) poses a significant global health challenge, influenced by multiple risk factors including obesity, abdominal/ central obesity, and hypertension. These conditions are often linked to poor lifestyle choices, such as high intake of sugary foods, sugar-sweetened beverages, deep-fried, and fried foods, along with lack of physical activity. Such risk factors impact both elderly and young populations, increasing the prevalence of CKD and related complications like pneumonia. Pneumonia, a common cause of morbidity and mortality in CKD patients, significantly raises the risk of hospitalization and death compared to the general population.

Case Illustration: A 26-year-old female presented to the Emergency Department with severe shortness of breath for 3 days, worsening over the past 6 hours. She had a 2-week history of productive cough and intermittent fever, along with hemoptysis for 3 days. Diagnosed with CKD and hypertension 1.5 months earlier, she was undergoing bi-weekly hemodialysis. Her diet was high in sugar and fried foods, and she led a sedentary lifestyle. Physical examination revealed a blood pressure of 230/120 mmHg, heart rate of 130 bpm, respiratory rate of 34/min, temperature of 38.5°C, and peripheral oxygen saturation of 84-85%. She exhibited central obesity and edema. Pulmonary examination revealed bilateral rales. Laboratory results indicated low hemoglobin (7.5 g/dl), leukocytosis (18,500), elevated serum urea (229.9 mg/dl), and serum creatinine (11.1 mg/dl). Chest X-ray showed bilateral infiltrates. She was

treated with hemodialysis, blood transfusion, and antihypertensive medication. After 3 days in the High Care Unit (HCU), she was transferred to the general ward and fully recovered after 7 days.

Discussion: The patient's obesity and poor lifestyle choices significantly contributed to the development of CKD and hypertension. These conditions predisposed her to severe pneumonia, a common complication in CKD patients due to their compromised immune function. The interplay between obesity, hypertension, and CKD exacerbates the patient's vulnerability to infections and complicates CKD management. Metabolic products from adipose tissue contribute to various pathophysiological processes, including oxidative stress, inflammation, and endothelial dysfunction.

Conclusion: This case underscores the importance of addressing lifestyle factors in young adults to prevent CKD and its complications. Early intervention and lifestyle modifications are crucial in managing obesity, hypertension, and CKD, thereby reducing the risk of severe infections like pneumonia and improving patient outcomes.

Keywords: Abdominal obesity, chronic kidney disease, hypertension, lifestyle, obesity, pneumonia

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DPP4i, dipeptidyl peptidase 4 inhibitor; FDC, fixed-dose combination; SGLT2i, sodium-glucose co-transporter-2 inhibitor; T2D, type 2 diabetes.

KR-14571 | Exp. 2025-09 (Prep. 2023-09)

Reference 1. IQVIA Data SGLT2 and DPP4 MAT May 2023 2. SIDAPVIA (Dapagliflozin 10mg/ Sitagliptin 100mg) Prescribing Information. [Approved on Jun 30, 2023]

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Met, Metformin; Gemi, Gemigliptin; Dapa, Dapagliflozin; HbA1c, Glycated hemoglobin.

^{††} Change in HbA1c from baseline at week 24

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Zemidapa[®] Tab. (Gemigliptin/Dapagliflozin) 50/10 mg (Full product information can be confirmed in the QR code to the right position)

■ **Therapeutic Indication** Zemidapa[®] is indicated as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes mellitus. ■ **Dosage and Administration** The recommended dose is one tablet once daily, in patients who need 50 mg of gemigliptin and 10 mg of dapagliflozin. (Special population) 1) Renal impairment: The efficacy and safety of Zemidapa[®] is dependent on renal function, and renal function should be evaluated prior to initiation of Zemidapa[®] and periodically thereafter. For patients with eGFR₄₅ mL/min/1.73m², no dose adjustment is required. For patients with eGFR < 45 mL/min/1.73m², Zemidapa[®] is not recommended. 2) Hepatic impairment: No dose adjustment is required for patient with mild or moderate hepatic impairment. The safety and efficacy of Zemidapa[®] in patients with severe hepatic impairment have not yet been established. ■ **Contraindication** Zemidapa[®] is contraindicated in patients with/for, 1) hypersensitivity to the active substances or to any of the excipients or a history of serious hypersensitivity reactions, i.e., angioedema or anaphylaxis, to another dipeptidyl peptidase-4 (DPP-4) inhibitor or sodium glucose cotransporter (SGLT) 2 inhibitor, 2) type 1 diabetes or diabetic ketoacidosis, 3) rare hereditary problems of galactose intolerance, total lactase deficiency or glucose-galactose malabsorption, and 4) hemodialysis. ■ **Precaution** 1) Gemigliptin: patient taking with medicinal products known to cause hypoglycemia, patient with cardiac impairment, patient with severe hepatic impairment, patient with acute pancreatitis, 2) Dapagliflozin: patient with volume depletion and impaired renal function. ■ **Safety Profile** The most common adverse events reported in ≥ 10% in patients treated with Gemigliptin once daily, in add-on combination of Metformin and Dapagliflozin in a 24 weeks study (Regardless of Investigator Assessment of Causality): Lipase increased, Chronic gastritis, Dizziness, Urinary tract infection, Cough, Diabetic nephropathy, Gastritis, Gingivitis, Large intestine polyp, Urticaria, Dyspepsia. ■ **Manufacturer** LG Chem.

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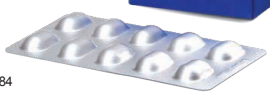


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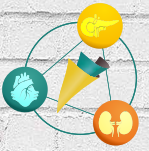
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[주성분] 프라바스타틴 나트륨 **[효능·효과]** 1. 원발성고지혈증: 고콜레스테롤혈증(IIa형), 고콜레스테롤혈증과 고트리글리세라이드혈증의 복합형(IIb형) 2. 고콜레스테롤혈증 또는 복합성고콜레스테롤혈증을 갖고 있는 환자 중 다음의 고위험군 환자에서 심근경색의 초발, 관상동맥심질환성 사망의 위험성 감소 3. 심근경색 또는 불안정성 협심증의 병력이 있는 환자에서 심근경색, 심혈관계관류술의 필요성, 허혈성 뇌졸중, 일과성 허혈발작 질환의 위험성 감소 **[용법·용량]** 치료를 시작하기 전에, 환자는 저콜레스테롤 식이를 시작해야 하고, 치료 중에도 이를 지속하여야 한다. 통상의 개시용량은 10 mg, 20 mg 혹은 40 mg 단일 용량으로 1일 1회이다. 환자의 반응에 따라 최대 40 mg까지 증량할 수 있다. **[사용상의 주의사항]** 1. 다음 환자에는 투여하지 않는다. 1) 이 약에 과민증 또는 그 병력이 있는 환자 2) 활성 간질환 또는 원인이 밝혀지지 않는 트랜스아미나제의 지속적인 상승이 있는 환자 3) 임부 또는 임신하고 있을 가능성이 있는 부인, 수유부 4) 소아 5) 중증의 간·신부전 환자 6) 근병증 환자 7) 담즙울체 환자 8) HDL 콜레스테롤 상승이 동반된 hyperalphalipoproteinaemia에 의한 고콜레스테롤혈증 환자 9) 이 약은 유당을 함유하고 있으므로, 갈락토스 불내성(galactose intolerance), Lapp 유당분해효소결핍증(Laplactase deficiency) 또는 포도당-갈락토스 흡수장애(glucose-galactose malabsorption) 등의 유전적인 문제가 있는 환자 2. 이상반응 1) 과민증: 발진, 아나필락시스, 혈소판감소, 백혈구 감소, 용혈성 빈혈, 항핵항체(ANA) 양성, 혈액침강속도 증가, 혈관염, 루푸스양증후군, 광과민증, 혈압감하, 혈관부종, 피부근염, 소양증. 2) 소화기계: 설사, 구역, 구토, 변비, 복통, 위부불쾌감, 구내염, 가슴쓰림, 복부팽만감, 식욕부진. 3) 간장: 간기능 이상. 4) 신장: BUN, 혈청 크레아티닌치의 상승. 5) 골격근: 횡문근 용해증, 관절염, 관절통, 근육병변. 6) 정신신경계: 두통, 어지러움, 불면, 말초신경병증, 우울증, 권태감, 피로, 수면장애, 인지장애. 7) 기타: 요산상승, 혈뇨, 부종, 탈모, 빗기부전 **[제조원]** inno.N **[개정년월일]** 2023년 3월 1일 ※ 본 정보는 요약된 일부의 정보입니다. 따라서 최신 변경된 허가사항이나, 보다 자세한 내용은 한국다이이찌산코 홈페이지(www.daiichisankyo.co.kr)의 제품 설명서나 의약품안전나라(nedrug.mfds.go.kr)를 참고하시기 바랍니다.



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For **the Broad** Range of **T2D** Patients Consider **Jardiance[®] 1-3** with Broad CRM Benefits.

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MACE^{1*}

14%
vs. Placebo

HR 0.86
(95.02% CI 0.74, 0.99, P=0.04)

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Death¹

38%
vs. Placebo

HR 0.62
(95% CI 0.49, 0.77, P<0.001)

HbA1c^{2**}

1.35%
vs. Baseline

Kidney Disease
Progression
or CV Death³

36%
vs. Placebo

HR 0.64
(95% CI 0.54, 0.77)

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※ For chronic heart failure, chronic kidney disease indication is only for Jardiance[®] 10 mg.

※ Jardiance[®] is not approved in Korea for reducing cardiovascular death or major cardiovascular disease risk for type 2 diabetes patients.

*Pooled empagliflozin group (empagliflozin 10 mg and 25 mg) **Change from baseline in HbA1c at week 24 in empagliflozin 10 mg q.d.

3P-MACE, 3-point major adverse cardiovascular event; CI, confidence interval; CRM, cardio-renal metabolic; CV, cardiovascular; HbA1c, glycated hemoglobin; HR, hazard ratio; T2D, type 2 diabetes; q.d., once daily.

References 1. Zinman B, et al. *N Engl J Med*. 2015;373(22):2117-2128 and supplementary data. 2. Hadjadj S, et al. *Diabetes Care*. 2016;39:1718-1728. 3. Herrington WG, et al. *N Engl J Med*. 2023;388(2):117-127.

Product Information ※ For more detailed information, please check the product information via the QR code.

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Jardiance[®] 25mg



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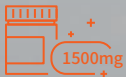
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- ✓ 심혈관 위험군
- ✓ 말초 신경염환자
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*Spence JD. Nutrients. 2019 Mar 17;11(3):647.



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SGLT2i Inhibitor
for Blood Sugar Control
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SGLT2 Inhibitor

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- Lowered risk of renal composite variables.
- Recommended for the treatment of type 2 diabetes patients with SGLT2 inhibitors according to the guidelines of the American Diabetes Association and the Korean Diabetes Association.

FORXIDAPA

Active Ingredient and Dosage: Dapagliflozin Propanediol Hydrate 12.3mg (equivalent to Dapagliflozin 10mg)

Appearance: Yellow, biconvex diamond-shaped film-coated tablets

Indications and Effects: Type 2 Diabetes: This medication is administered as an adjunct to dietary and exercise therapy to improve blood sugar control in patients with type 2 diabetes. - Monotherapy - Combination therapy

Precautions for Use: This medication does not significantly affect the ability to drive or operate machinery. Patients should be aware of the risk of hypoglycemia when using this medication in combination with sulfonylureas or insulin.

Package Units: 30 tablets/bottle, 100 tablets/bottle

Storage: Store in a tightly closed container at room temperature (1-30°C)

Shelf Life: 24 months from the date of manufacture.

FORXIDAPA-M

Active Ingredients and Dosage: Dapagliflozin Propanediol Hydrate 12.3mg (equivalent to Dapagliflozin 10mg), Metformin Hydrochloride 1000mg

Appearance: Yellow, biconvex, oval-shaped sustained-release film-coated tablets

Indications and Effects: This medication is administered as an adjunct to dietary and exercise therapy to improve blood sugar control in adult patients with type 2 diabetes for whom the combination of dapagliflozin and metformin is appropriate.

Precautions for Use: Studies on whether this medication or dapagliflozin affects the ability to drive or operate machinery have not been conducted. It is expected that dapagliflozin or metformin will have little to no impact on the ability to drive or operate machinery in patients. However, considering that dizziness has been reported in dapagliflozin clinical trials, this should be taken into account.

Package Units: 30 tablets/bottle, 100 tablets/bottle

Storage: Store in a tightly closed container at room temperature (1-30°C)

Shelf Life: 24 months from the date of manufacture.

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[Anagliptin]

가드메트[®]정
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혈당변동성 조절을 위한
2중(아침, 저녁) 안정 장치
가드렛[®], 가드메트[®]

가드렛[®]정(아나글립틴)

[원료약품 및 분량] 1정 중 아나글립틴(별규) 100.0mg **[효능·효과]** 이 약은 제2형 당뇨병 환자의 혈당조절을 향상시키기 위해 식사요법 및 운동요법의 보조제로 투여한다. 1. 이 약은 단독요법으로 투여한다. 2. 이 약은 메트포르민 단독요법으로 충분한 혈당조절을 할 수 없는 경우 병용요법으로 투여한다. **[용법·용량]** 이 약은 단독요법 또는 병용요법 시 1일 2회 아침저녁으로 100mg을 투여한다. 식사와 관계없이 투여할 수 있다. -신장에 환자, 중증의 신장에 환자 또는 말기 신장에 환자: 1일 1회 100mg 투여 권장. **[사용상의 주의사항]** 1 다음 환자에는 투여하지 말 것 1) 이 약의 주성분 또는 다른 성분에 과민증 있는 환자 2) 당뇨병성 케톤산증, 당뇨병성 혼수 또는 전혼수, 제1형 당뇨병 환자 3) 중증감염증, 수술전후, 중증의 외상이 있는 환자 **[저장방법]** 기밀용기, 실온보관 **[포장단위]** 60정 PTPPack **[제조 및 판매원]** (주)JW총외제약 **[판매원]** (주)JW신약, (주)유디스코퍼메이션

가드메트[®]정(아나글립틴, 메트포르민)

[원료약품 및 분량] 가드메트 100/500mg 1정 중 아나글립틴(별규) 100.0mg 메트포르민염산염(KP) 500.0mg 가드메트 100/850mg 1정 중 아나글립틴(별규) 100.0mg 메트포르민염산염(KP) 850.0mg 가드메트 100/1000mg 1정 중 아나글립틴(별규) 100.0mg 메트포르민염산염(KP) 1000.0mg **[성상]** 100/500mg 연한 노란색의 장방형 필름코팅정제 100/850mg 노란색 장방형 필름코팅정제 100/1000mg 진한 노란색의 장방형 필름코팅정제 **[효능·효과]** 이 약은 아나글립틴과 메트포르민의 병용투여가 적절한 성인 제2형 당뇨병 환자의 혈당조절을 향상시키기 위해 식사요법 및 운동요법의 보조제로 메트포르민 단독요법으로 충분한 혈당조절을 할 수 없는 환자 및 아나글립틴과 메트포르민 병용요법을 대체하는 경우 투여한다. **[용법·용량]** 1일 2회 아침저녁으로 식사와 관계없이 투여한다. **[중요·용량]** 1일 2회 복용하고, 용량 증가가 서서히 진행되어야 한다. 각 성분의 1일 최대 권장용량인 아나글립틴 200mg과 메트포르민 2000mg을 넘지 않는 범위 내에서 유효성과 내약성에 따라 조절한다. 이 약은 통째로 삼켜야 한다. **[사용상의 주의사항]** -경고: 메트포르민염산염은 1) 드물게 심한 우산신증을 일으킬 수 있다. 2) 인슐린, 살인소스계 약물 등 다른 당뇨병용제와 병용투여하는 경우, 드물게 중증의 저혈당을 일으킬 수 있으므로 주의한다. -금기: 심혈관계 허혈(속), 급성심근경색과 패혈증과 같은 상태로부터 아끼릴 수 있는 신장 질환이나 신기능부전 환자, 골밀성 상부전 환자, 방사선 요오드 조절물질을 정맥내 투여하는 경사를 받는 환자, 이 약의 주성분에 과민반응 병력이 있는 환자, 제1형 당뇨병, 혼수, 당뇨병성 케톤산증 병력 환자, 중증감염증 또는 중증 외상성 전신장애 환자, 임부 또는 임신하고 있을 가능성이 있는 부인, 수유부 -이상반응: 메트포르민과 병용 투여 시, 3% 이상 빈도로 보고된 이상반응은 인두염(11.96%), 소화불량(7.8%), 설사(7.61%), 두통(5.43%), 저혈당증(3.26%), 메트포르민의 치료한 경우 가장 흔하게 보고되는 이상반응(5.9%)은 위장관계 증상에, 설사, 오심, 구두)이며, 메트포르민의 투여량이 높을수록 더 빈번하게 나타난다. **[저장방법]** 기밀용기, 실온(1~30°C) 보관 **[포장단위]** 30정 PTPPack **[제조 및 판매원]** (주)JW총외제약 **[판매원]** (주)JW신약, (주)유디스코퍼메이션

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