

Symposium 1

Precision Medicine for Obesity and Diabetes

Chairpersons

Leonie Kaye Heilbronn

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Speakers

Jean-Pierre Després

VITAM – Research Centre on Sustainable Health, Canada

Yoon Jung Park

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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.