Diabetes, Metabolic Syndrome and Obesity

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EDITORIAL

Metabolic Disorders and Complications

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Metabolic disorders are complex abnormalities that involve impaired glucose and lipid metabolism, linked to complications such as kidney disease, cardiovascular disease, foot ulcers, retinopathy, and neuropathy.[1] The majority of morbidity and early death in diabetes are caused by chronic complications, such as diabetes-associated non-alcoholic fatty liver disease (NAFLD), cardiovascular, renal, and ocular diseases.[2] Indeed, a vast proportion of some of the leading causes of death have metabolic disorders associated with diabetes, metabolic syndrome and diabetes as major underlying contributors.

Insulin resistance, hypertension, dyslipidemia, and abdominal obesity are all part of the metabolic syndrome, a concept introduced by Grundy et al in 2001,[3–5] replacing Reaven's Syndrome X introduced in 1988,[6] to describe a constellation of factors that together identify a person at increased risk of cardiovascular disease. Obesity, particularly abdominal obesity, is associated with increased release of physiologically active adipokines. Adipokines and cytokines may reduce insulin sensitivity in tissues, causing inflammation and the development of chronic problems. Leptin and adiponectin have been identified as possible markers of obesity-related problems.[7] The adipokine revolution, essentially beginning in the 1990s with the discovery of leptin[8] and adiponectin,[9,10] has resulted in a shift of our scientific understanding of obesity where adipose tissue, containing over 600 adipokines,[11] is now viewed as an active endocrine order and obesity is viewed as a disease.[12]

First described by Thomas Addison in 1836,[13] up to 38% of adults worldwide suffer from what has previously been known as non-alcoholic fatty liver disease (NAFLD), now the primary cause of chronic liver disease.[14] In recognition of the metabolic basis of the hepatic damage in this condition, it was first suggested that the term NAFLD be changed to "metabolic dysfunction-associated fatty liver disease" (MAFLD) for adults.[15] In 2023, the term "metabolic dysfunction-associated steatotic liver disease (MASLD) was adopted; the name chosen to replace non-alcoholic steatohepatitis was metabolic dysfunction-associated steatohepatitis (MASH).[16,17] A number of "parallel hits" contribute to the systemic low-grade inflammation and hepatic inflammation in MASLD or MASH, including intestinal dysbiosis, proinflammatory diets, insulin resistance, and lipotoxicity.[17]

Metabolic alterations are not only associated with increased risk of diabetes and cardiovascular disease but are also related to the risk of cancer. According to a population cohort study that followed 1.3 million Koreans, it was reported that high fasting blood sugar (more than 140 mg/dL) increased the risk of all cancers by 29% for men and 23% for women, respectively.[18] A recent meta-analysis of eight observational studies found that lean patients with MASLD had a greater risk of hepatocellular carcinoma, pancreatic and colorectal cancers than non-lean MASLD patients.[19] Liver-driven systemic low-grade inflammation promotes the development of cardiovascular inflammation/atherosclerosis, chronic kidney disease, and cancer in a variety of organs, including the colon, stomach, and pancreas.[17]

Though knowledge is incremental, as with adipokines, it is sometimes revolutionary resulting in complete paradigm shifts in how we see health conditions and their importance. The last half of a century, from Syndrome X and the Metabolic Syndrome to Adipokines, to obesity and type 2 diabetes as diseases rather than just metabolic conditions, and to cancer as a consequence of metabolic disorders, has witnessed such both incremental and revolutionary changes in our understanding of metabolic disorders and their complications. Given the role that metabolic disorders play in many chronic diseases, particularly diabetes, cardiovascular disease, cancer and premature death, this has been much needed

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knowledge. We look forward to what the coming year and the years ahead bring in furthering our understanding of these topics. We look forward to what the research coming to Diabetes, Metabolic Syndrome and Obesity will reveal.

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Data sharing is not applicable to this article as no data were created or analyzed in this study.

Author Contributions

JWS – Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review and editing. DAM – Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review and editing. All authors gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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References

1. Cheang WS. Editorial for the special issue "bioactive compounds of natural products on metabolic disorders and complications". *Curr Issues Mol Biol*. 2023;45(7):5706–5707. doi:10.3390/cimb45070359
2. Menini S, Iacobini C, Vitale M, Pugliese G. The inflammasome in chronic complications of diabetes and related metabolic disorders. *Cells*. 2020;9(8). doi:10.3390/cells9081812
3. Cleeman JI. Executive summary of the third report of the national cholesterol education program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (Adult Treatment Panel III). *JAMA*. 2001;285(19):2486–2497. doi:10.1001/jama.285.19.2486
4. Grundy SM. Metabolic syndrome: part I. *Endocrinol Metab Clin North Am*. 2004;33(2):ix–xi. doi:10.1016/j.ecl.2004.03.018
5. Grundy SM, Brewer HB Jr, Cleeman JI, Smith SC Jr, Lenfant C. Definition of metabolic syndrome: report of the National Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. *Circulation*. 2004;109(3):433–438. doi:10.1161/01.Cir.0000111245.75752.C6
6. Reaven GM. Banting lecture 1988. Role of insulin resistance in human disease. *Diabetes*. 1988;37(12):1595–1607. doi:10.2337/diab.37.12.1595
7. Zorena K, Jachimowicz-Duda O, Ślęzak D, Robakowska M, Mrugacz M. Adipokines and obesity. potential link to metabolic disorders and chronic complications. *Int J Mol Sci*. 2020;21(10). doi:10.3390/ijms21103570
8. Zhang Y, Proenca R, Maffei M, Barone M, Leopold L, Friedman JM. Positional cloning of the mouse obese gene and its human homologue. *Nature*. 1994;372(6505):425–432. doi:10.1038/372425a0
9. Scherer PE, Williams S, Fogliano M, Baldini G, Lodish HF. A novel serum protein similar to C1q, produced exclusively in adipocytes. *J Biol Chem*. 1995;270(45):26746–26749. doi:10.1074/jbc.270.45.26746
10. Hu E, Liang P, Spiegelman BM. AdipoQ is a novel adipose-specific gene dysregulated in obesity. *J Biol Chem*. 1996;271(18):10697–10703. doi:10.1074/jbc.271.18.10697
11. Kirichenko TV, Markina YV, Bogatyreva AI, Tolstik TV, Varaeva YR, Starodubova AV. The role of adipokines in inflammatory mechanisms of obesity. *Int J Mol Sci*. 2022;23(23). doi:10.3390/ijms232314982
12. Conway B, Rene A. Obesity as a disease: no lightweight matter. *Obes Rev*. 2004;5(3):145–151. doi:10.1111/j.1467-789X.2004.00144.x
13. Addison T. Observations on fatty degeneration of the liver. *Guys Hosp Rep*. 1836;1:485.
14. Wong VW, Ekstedt M, Wong GL, Hagström H. Changing epidemiology, global trends and implications for outcomes of NAFLD. *J Hepatol*. 2023;79(3):842–852. doi:10.1016/j.jhep.2023.04.036
15. Eslam M, Newsome PN, Sarin SK, et al. A new definition for metabolic dysfunction-associated fatty liver disease: an international expert consensus statement. *J Hepatol*. 2020;73(1):202–209. doi:10.1016/j.jhep.2020.03.039
16. Rinella ME, Lazarus JV, Ratziu V, et al. A multisociety Delphi consensus statement on new fatty liver disease nomenclature. *J Hepatol*. 2023;79(6):1542–1556. doi:10.1016/j.jhep.2023.06.003
17. Targher G, Byrne CD, Tilg H. MASLD: a systemic metabolic disorder with cardiovascular and malignant complications. *Gut*. 2024;73(4):691–702. doi:10.1136/gutjnl-2023-330595
18. Jee SH, Ohrr H, Sull JW, Yun JE, Ji M, Samet JM. Fasting serum glucose level and cancer risk in Korean men and women. *JAMA*. 2005;293(2):194–202. doi:10.1001/jama.293.2.194
19. Souza M, Diaz I, Barchetta I, Mantovani A. Gastrointestinal cancers in lean individuals with non-alcoholic fatty liver disease: a systematic review and meta-analysis. *Liver Int*. 2024;44(1):6–14. doi:10.1111/liv.15763