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Introduction to the Obesity, Metabolic Syndrome and CVD Compendium

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Obesity is a major threat to cardiovascular health worldwide. While early studies focused on body mass index (BMI) as a generalized measure of obesity and its relation to cardiovascular disease (CVD), studies within the last decade have turned to identifying select markers of adipose tissue physiology and metabolic dysfunction to clarify the impact of obesity on CVD. In this *Circulation Research* compendium, we feature contributions from leading scientists in the fields of diabetes and obesity to update investigators and clinicians on how our understanding of the connection between obesity and CVD has evolved and the current state of the field.

The articles in this Compendium Series cover the spectrum of research, from epidemiology of populations and clinical trials in patients to molecular mechanisms in animal model systems.

Després and colleagues¹ open the series with an overview of the clinical epidemiology of obesity, focusing specifically on the role of “regional” fat (e.g. visceral and hepatic fat) in the pathogenesis of CVD in obese individuals. Next, in their contribution on basic mechanisms of diabetic heart disease, Ritchie and Abel² review the current understanding of underlying factors and pathways contributing to the pathogenesis of diabetic cardiovascular disease. This is complemented by Goodarzi’s and Rotter’s³ review of the growing insights from genetic epidemiologic studies of obesity and diabetes, and particularly the role of human genetic variation in type 2 diabetes risk and CVD.

The link between metabolic inflammation and CVD pathogenesis has received much attention in the last decade. In a series of reviews, this Compendium highlights the present paradigms and emerging hypotheses of the roles that immune cells play in metabolic homeostasis and the pathogenesis of cardiometabolic diseases. Wu and Ballantyne⁴ detail the intricate interplay of metabolic Inflammation and insulin resistance in obesity, while Schmidt and colleagues⁵ provide a comprehensive overview of the eclectic cast of immune cells that orchestrates innate immune activation in obesity and metabolic perturbations. Complementing these contributions, Fisher and colleagues⁶ review how insights from single cell RNA-sequencing are expanding our understanding of the heterogeneity and complex interactions of immune cells in adipose tissue in health and disease.

New insights into human adipose and heart physiology continue to emerge from the integration of “omics” and imaging technologies in translational and clinical research. Chen and Gerszten⁷ address how metabolomics and proteomics are being harnessed to define the landscape of molecular alterations in diabetes and to improve diagnostic and therapeutic strategies. Peterson and Gropler⁸ review the state-of-the-art in metabolic and molecular imaging of diabetic cardiomyopathy. Finally, Heffron and colleagues⁹ detail how treatment approaches in obesity, such as bariatric surgery, impact metabolic risk factors and cardiovascular disease.

The compilation of reviews in this Compendium reflects the collective work of leading investigators in the areas of diabetes and cardiometabolic diseases. Together, they build a comprehensive overview of how obesity and metabolic physiology contribute to CVD and the emerging opportunities for improved detection, intervention and potentially, prevention of cardiometabolic diseases. Although it is not possible to cover every aspect of a field as large and complex as Obesity, Metabolic Syndrome and CVD, we hope that this compendium will help the readers to keep abreast of recent developments and future directions in this rapidly evolving field.

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