

The Intersection of Diabetes and Cardiovascular Disease

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In the past few years, there have been extraordinary developments in the intimate interplay between diabetes and cardiovascular disease. From the early stages of insulin resistance and prediabetes to advanced cardiac complications from diabetes, clinicians are now able to tailor therapy for patients with a focus beyond their A1c levels.

In this issue of the *Methodist DeBakey Cardiovascular Journal*, we delve into the intricate relationship of diabetes and the heart. Although there are many topics that deserve attention, those chosen for this issue cover the spectrum from prevention and evaluation to management of diabetes in the setting of cardiovascular disease. As we care for patients with diabetes-related cardiovascular disease, this issue will serve as a guide to the current literature and recommendations and will challenge the traditional paradigm by which we manage both disease processes.

In the first article, Drs. Shruti Agashe and Steven Petak tackle the debilitating complication of cardiac autonomic neuropathy (CAN) in patients with diabetes. Because of its complex pathophysiology, CAN is often under recognized; however, its subtle but persistent manifestation negatively affects patient morbidity, mortality, and quality of life. The authors present a comprehensive review of CAN including epidemiology, pathophysiology, diagnosis, and current treatment options and encourage early detection and diagnosis to prevent progression and minimize patient suffering.

The second article by Drs. Patricia Mejia Osuna, Dale Hamilton, and coauthors focuses on stage-based management of patients with type 2 diabetes and heart failure. In this complicated setting, treatment options must be well thought out to provide the best risk-to-benefit ratio and preserve or even improve future cardiac function. This review provides an in-depth discussion of the effects of traditional antihyperglycemic therapies versus newer agents that offer improved cardiovascular outcomes, such as incretin therapies and sodium-glucose cotransporter-2 (SGLT-2) inhibitors. In addition, a therapeutic guide of the drugs with the most efficacy and benefit is outlined for each stage of heart failure.

Coronary artery disease is the leading cause of morbidity and mortality in patients with diabetes, but not all patients with diabetes have similar high risk for cardiac events. More than a third of asymptomatic patients do not have evidence of

coronary atherosclerosis and have a very low annual cardiac event rate. Early identification of patients with subclinical coronary atherosclerosis and/or significant obstructive coronary artery disease with silent myocardial infarction can guide therapeutic decision making to help prevent future devastating cardiovascular events. Drs. Maan Malahfji and John Mahmarian address the role of imaging techniques such as coronary artery calcium scoring, computed tomography coronary angiography, exercise treadmill testing, and stress imaging for stratifying cardiovascular risk and optimizing therapy in asymptomatic patients with diabetes.

The pharmacopeia for diabetes management has grown rapidly in recent years, making for a more complex treatment algorithm. The emergence of several new therapeutic classes with different mechanisms of action resulted in a series of cardiovascular outcomes trials that, in turn, are prompting changes in therapeutic guidelines for patients with type 2 diabetes. In their review, Drs. Mohammed Qureshi, Richard Robbins, and colleagues summarize the risks and benefits of the most common traditional and new classes of drugs with a perspective on cardiovascular outcomes and their impact on diabetes care guidelines. With this knowledge, the clinician can be better informed to choose the drug therapy that optimizes outcomes for patients with type 2 diabetes.

Next, Drs. Ahmad Yehya and Archana Sadhu review the two new novel therapeutic drug classes of glucagon-like peptide-1 receptor agonists and SGLT-2 inhibitors in greater detail. Clinical trials of drugs in both classes that set out to determine cardiovascular safety have exceeded expectations and shown cardiovascular benefits in patients with type 2 diabetes. In fact, they have challenged traditional treatment algorithms of A1c reduction and are changing the paradigm of type 2 diabetes management to focus on reducing cardiovascular risk. The authors describe the mechanism of action, side effects, and benefits of these drugs and review data from each of their cardiovascular outcome trials. Since the cardiovascular benefits cannot be explained by glucose control alone, these drugs demonstrate our need for further knowledge in the complex relationship between glucose metabolism and cardiovascular physiology.

The final article by Drs. Ashkan Zand, Karim Ibrahim, and Bhargavi Patham focuses on the early pathophysiological state

of type 2 diabetes (i.e., insulin resistance, or prediabetes). Given the astounding 33.9% of the U.S. population with prediabetes and its demonstrated link to coronary artery disease and diastolic heart failure, this group deserves attention to prevent progression. The authors review prominent clinical trials focused on diabetes prevention with lifestyle intervention and address medical interventions with weight-loss promoting pharmacological agents as well as bariatric surgery. All of these interventions can be effective in preventing the progression of prediabetes to type 2 diabetes and reducing cardiovascular complications in this large at-risk population.

This issue alone cannot cover all of the potential topics in the area of diabetes and cardiovascular disease. However, these reviews provide up-to-date and clinically pertinent information on some of the most common clinical scenarios encountered in patients with type 2 diabetes. We hope you find them valuable in your daily practice and that they provoke ongoing thought in the intricate relationship between diabetes and cardiovascular disease.

For further discussion and CME opportunities, we invite you to visit the journal's website at <http://journal.houstonmethodist.org>, where you can log in and use the "Dialogue with Authors" link to have an open Q&A with the authors of this issue.