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## Diabetes Mellitus and Heart Failure



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Considering current trial results, patients with diabetes and heart failure may benefit most from glucose-lowering therapies with sodium glucose cotransporter 2 (SGLT2) inhibition, according to a review paper to appear in the American Journal of Cardiology.

The beneficial effects of such therapies may be due to "the elimination of glucose via the kidney, with net reduction of energetic substrate availability following SGLT2 inhibition, among other possible mechanisms," write study authors Michael Lehrke, MD, and Nikolaus Marx, MD, PhD, both from the Department of Internal Medicine I at University Hospital Aachen, Aachen, Germany.

Epidemiologic and clinical data from the past two decades have shown that the prevalence of heart failure in diabetes is very high, and the prognosis for patients with heart failure is worse in those with diabetes than in those without diabetes. Experimental data suggest that various mechanisms contribute to the impairment in systolic and diastolic function in patients with diabetes, and there is an increased recognition that these patients develop heart failure independent of the presence of coronary artery disease or its associated risk factors.

Imaging studies have revealed left ventricular concentric remodelling as a relevant characteristic of diabetic myocardium, which may be associated with impaired myocardial energetics and reduced systolic strain. Hypertrophy of the diabetic heart is the consequence of myocardial triglyceride deposition and/or increased extracellular volume as an indicator for collagen deposition and fibrosis, with the increased extracellular volume being predictive for mortality and heart failure in this population. Other studies have found direct association among myocardial tissue perfusion, oxygen supply, energetic substrate availability, and myocardial function in patients with diabetes, suggesting microcirculatory damage as a contributing cause for diabetic cardiomyopathy.

With regard to energetic substrate availability, this can also be reduced with lifestyle intervention, which beneficially affects myocardial function in obese patients with and without diabetes, according to the authors. Moreover, limited evidence suggests beneficial effects with metformin, which reduces energetic substrate availability by decreasing endogenous glucose production, on heart failure in patients with diabetes. In contrast, the authors note, no improvement in heart failure, or potential detrimental effects, have been reported for glucose-lowering strategies that directly or indirectly increase the availability of insulin.

"These considerations should be addressed in future study designs to optimise heart failure therapy in patients with diabetes," Drs. Lehrke and Marx write.

Current guidelines from the European, as well as the American, cardiology societies do not recommend specific therapeutic approaches for heart failure in patients with diabetes compared with subjects without diabetes. Meanwhile, the optimal treatment strategy in patients with diabetes and heart failure remains controversial and only some glucose-lowering medications have specifically been studied in patients with heart failure, the authors say.

Source: [American Journal of Cardiology](#)

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