Heart Failure Omics: Cardiac Metabolism and Beyond

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Heart failure (HF) is a major public health problem and while HF and its related risk factors portend poor prognosis, there is marked heterogeneity in development of, and survival from, HF. As such there is a need for more personalized approaches to risk models, prevention and therapies for HF. Advances in molecular profiling technologies have facilitated identification of potentially clinically relevant in parallel with highlighting potential novel molecular mechanisms of disease. Given the central role of metabolism to the normal and failing heart, metabolomic profiling holds great promise for such a personalized approach. Our laboratory studies genetic and metabolic biomarkers and pathways in cardiometabolic diseases including obesity and HF. Our work has elucidated the role of dysregulated mitochondrial branched chain amino acid (BCAA) metabolism and related circulating biomarkers in obesity, functional impairment in HF and in HF with reduced ejection fraction. We have also identified circulating metabolites reflecting impaired mitochondrial fatty acid oxidation in HF with reduced and preserved ejection fraction. Finally, we have expanded our work in the molecular epidemiology of HF most recently with identification of protein biomarkers and pathways for HFpEF and post-heart transplant outcomes.