

Cardiorenal syndrome type 1: Pathophysiological crosstalk leading to combined heart and kidney dysfunction in the setting of acutely decompensated heart failure

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Cardiorenal syndrome (CRS) type 1 is characterized as the development of acute kidney injury (AKI) and dysfunction in the patient with acute cardiac illness, most commonly acute decompensated heart failure (ADHF). There is evidence in the literature supporting multiple pathophysiological mechanisms operating simultaneously and sequentially to result in the clinical syndrome characterized by a rise in serum creatinine, oliguria, diuretic resistance, and in many cases, worsening of ADHF symptoms. The milieu of chronic kidney disease has associated factors including obesity, cachexia, hypertension, diabetes, proteinuria, uremic solute retention, anemia, and repeated subclinical AKI events all work to escalate individual risk of CRS in the setting of ADHF. All of these conditions have been linked to cardiac and renal fibrosis. In the hospitalized patient, hemodynamic changes leading to venous renal congestion, neurohormonal activation, hypothalamic-pituitary stress reaction, inflammation and immune cell signalling, systemic endotoxemic exposure from the gut, superimposed infection, and iatrogenesis all contribute to CRS type 1. The final common pathway of bidirectional organ injury appears to be cellular, tissue, and systemic oxidative stress which exacerbate organ function. This review will explore in the detail the pathophysiological pathways that put a patient at risk and then effectuate the vicious cycle now recognized as CRS type 1.

Biography

Peter A. McCullough, M.D., M.P.H., F.A.C.C., F.A.C.P., F.C.C.P., F.A.H.A.

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After receiving a bachelor's degree from Baylor University, Dr. McCullough completed his medical degree as an Alpha Omega Alpha graduate from the University of Texas Southwestern Medical School in Dallas. He went on to complete his internal medicine residency at the University of Washington in Seattle, cardiology fellowship at William Beaumont Hospital, and master's degree in public health at the University of Michigan.

As the Chief Academic and Scientific Officer of the St. John Providence Health System, Dr. McCullough oversees graduate medical education, corporate medical staff services, and research. He is an internationally recognized authority on the role of chronic kidney disease as a cardiovascular risk state with over 800 published, scientific communications including the "Interface between Renal Disease and Cardiovascular Illness" in Braunwald's Heart Disease Textbook. Dr. McCullough is the current Chair of the National Kidney Foundation's Kidney Early Evaluation Program, the nation's largest community screening effort for chronic diseases. He is the co-editor of Reviews in Cardiovascular Medicine and serves on the editorial boards of multiple specialty journals. He has led numerous clinical trial steering, data safety monitoring, and events committees and has testified before the U.S. Food and Drug Administration and the Congressional Oversight Panel. Outside of professional life, Dr. McCullough is a dedicated athlete and has completed marathons across North America, Europe, and Asia.

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