

Treating Mitochondrial Dysfunction in Heart Failure

This technology targets the root cause of heart failure by employing nicotinamide riboside (NR) to protect mitochondrial function and reduce inflammation, and normalizing MRPP2 levels to improve mitochondrial DNA processing, offering a potential avenue to reverse the course of heart failure.

What is the Problem?

Heart failure is a significant health issue with high morbidity and mortality rates worldwide. Mitochondrial dysfunction, characterized by decreased mitochondrial biogenesis and impaired mitochondrial DNA (mtDNA) processing, is a critical mediator in the progression of heart failure. This dysfunction initiates a vicious cycle of inflammation, further impairing mitochondrial function and leading to the activation of circulating immune cells and increased production of inflammatory cytokines, such as Interleukin 6 (IL6). The current therapeutic options for heart failure are often insufficient in addressing this underlying mitochondrial dysfunction.

What is the Solution?

The presented research proposes an innovative approach to heart failure treatment, focusing on improving mitochondrial function. This is achieved by using a NAD precursor, nicotinamide riboside (NR), which has been shown to protect mitochondrial function and reduce inflammatory cytokine production in peripheral blood mononucleated cells (PBMC) both in vitro and in vivo in heart failure patients. Additionally, the research identifies the malfunction of endonuclease P, specifically the downregulation of one subunit, MRPP2, as a primary cause of inadequate mtDNA transcript processing in failing hearts. Normalizing MRPP2 levels in mouse failing hearts has shown to improve mitochondrial function and reverse the course of heart failure.

What is the Competitive Advantage?

The competitive advantage of this research lies in its potential to transform the treatment paradigm for heart failure by focusing on improving mitochondrial function. This approach, combined with the use of a novel therapeutic agent, nicotinamide riboside (NR), offers a promising avenue to not only manage but potentially reverse the course of heart failure. As the incidence of heart failure continues to increase globally, this innovative treatment strategy could significantly improve patient outcomes and quality of life.

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