Novel Biomarker and Therapeutic Target for Cardiomyopathy and Congestive Heart Failure

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Technology description

Summary

Currently, methods for detecting early myocardial dysfunction include the use of cardiac derived biomarkers (b-type natriuretic peptide, pre-pro-B type natriuretic, and cardiac troponins I and T) and systemically derived markers (C-reactive protein). These rely on the release of proteins into the bloodstream after irreversible cardiac muscle death and an inflammatory response. Although myocardial biopsies may offer unique insights on cardiac disease and failure in select patients, these require complicated invasive procedures that prove to be high risk to the patient/individual. Also, non-invasive imaging modalities are playing an important emerging role in early detection of physical changes to the heart (velocity and displacement as well as strain and strain rate for deformation of muscle) and molecular imaging events in the heart (labeling of metabolites, angiogenic regulators, neuroreceptors, and remodeling factors). However, these molecular events are based on inactive byproducts, which are released to the bloodstream, found in the heart as a result of cardiac muscle death, inflammation, and/or late-onset diseases processes, and are not necessarily specific to cardiac muscle cells. Better diagnostic biomarkers are needed.

Description

Researchers at UC San Diego have developed a novel biomarker that is predictive of congestive heart failure. Using novel multi-scale computational model and genetic mouse models they have shown that phosphorylation of ventricular myosin light chain 2 (MLC2v) controls early dynamics of muscle contraction activation and the known critical twisting motion (torsion) of the heart during contractionin vivo. Their results uncover early mechanisms by which MLC2v and myosin can dictate activation of heart muscle contraction as well as contribute to decreased heart torsion, the latter of which is gaining attention as an early clinical functional marker of heart disease in children and adults. The inventors have identified two phosphorylation sites on the cardiac muscle specific gene.

Advantages

The invention provides a therapeutic target for cardiomyopathy and congestive heart failure, methods for predicting or diagnosing a heart disease or a defect in cardiac muscle contractility in an individual, and methods for screening for a composition that can treat, ameliorate, prevent, or reverse a heart disease or a congestive heart failure in an individual.

Institution

University of California, San Diego