BIOMECHANICAL MECHANISMS OF HEART FAILURE

Martyn Nash

The University of Auckland, New Zealand
martyn.nash@auckland.ac.nz

Keywords: Cardiac mechanics, Heart failure modelling, Microstructural remodelling

Summary: Diagnosis and treatment of heart failure is hampered by a lack of knowledge of the underlying pathophysiological mechanisms on an individualised basis. Tissue-specific biomechanical factors, such as diastolic myocardial stiffness and stress, are known to have important influences on heart function, but these factors cannot be measured directly. Mathematical modelling provides a rational basis for identifying these biomarkers by integrating the rich variety of physiological data that are now available in the laboratory and clinical settings. This presentation will discuss how image-based, individualised biomechanical models of the heart can be used to characterise the relative roles of anatomical, microstructural and functional remodelling in heart failure. Data from pre-clinical and clinical studies will be presented to demonstrate this approach. In the clinic, patient-specific mathematical models of this kind have the potential to more specifically stratify the different forms of heart pathology, and thus to help inform and monitor patient therapy.