

Role of nuclear imaging in risk stratification and treatment of heart failure patients

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Heart failure is a growing epidemic in developed countries. It is associated with high morbidity and mortality, and incurs significant economic health burden. In the last few decades, new medical therapies including stem cell-based therapeutic approaches, surgical techniques and novel devices have been introduced to improve the long-term outcome of heart failure patients. To derive maximal clinical benefit requires individualized therapy for each patient. As such, accurate assessment of the underlying heart failure etiology, quantification of left ventricular dimensions and function, and assessment of underlying valvular heart disease are paramount to patient care. In this regard, multimodality cardiac imaging provides essential information for accurate assessment of heart failure patients. Among the different imaging techniques, nuclear imaging may provide the most comprehensive information. Nuclear imaging permits differentiation between an ischemic versus non-ischemic etiology. Left ventricular volumes and function are also important prognostic parameters, and are essential measures prior to initiation of further heart failure therapies such as implantable cardioverter defibrillator (ICD) or cardiac resynchronization therapy. These parameters can be evaluated with gated single-photon emission computed tomography (SPECT) and positron emission tomography (PET). In addition, SPECT and PET constitute the first choice technique for assessment of ischemia and viability. The new hybrid imaging techniques such as SPECT/PET computed tomography scanners can integrate information on coronary anatomy with ischemia and viability testing. Finally, the assessment of myocardial innervation with ^{123}I -MIBG-SPECT imaging or ^{11}C -metahydroxyephedrine-PET provides crucial prognostic information and may help to identify those patients who will benefit from an ICD.