

Myocardial Perfusion Scintigraphy: Advancing from SPECT to PET Imaging

Conventional scintigraphic myocardial perfusion imaging with single photon emission tomography (SPECT) and also more recently with positron emission tomography (PET) has emerged as an important diagnostic modality to identify the presence of flow-limiting coronary artery disease (CAD) process, that carries important prognostic information. By assessing the relative myocardial distribution of the radiotracer uptake during treadmill exercise or pharmacologic-vasodilation and during rest, the presence of flow-limiting coronary artery lesions can be determined. Relative reductions in regional radiotracer uptake during stress, identify myocardial regions that are subtended to advanced-obstructive epicardial artery lesions, while territories with the highest radiotracer uptake are commonly considered to be supplied by normal epicardial arteries or early stages of non-obstructive CAD. While the conventional visual and semiquantitative evaluation of cardiac SPECT or PET perfusion images adds to the identification of advanced and clinically manifest CAD, the concurrent ability of PET to assess regional myocardial blood flow (MBF) in quantitative estimates in *ml/g/min* enables the non-invasive detection of functional and/or structural alterations of early developing CAD. MBF estimates at rest and during pharmacologically-induced hyperemia, therefore, allow the non-invasive assessment of coronary circulatory function as early functional precursor of the CAD process. Notably, the assessment of coronary circulatory dysfunction also entails important predictive information for the development and progression of CAD and its atherothrombotic sequelae. Improvement or even normalization of coronary vasomotor function due to lifestyle-modification, effects of HMG-CoA reductase inhibitors, or ACE-inhibition can be reliably monitored by PET measurements of MBFs. Whether an improvement in coronary circulatory dysfunction, as monitored with PET, also mediates a reduced risk of developing future cardiovascular events remains to be established.