INTRODUCTION: Positron emission tomography (PET) is the gold standard for non-invasive assessment of myocardial viability and allows accurate detection of coronary artery disease by assessment of myocardial perfusion. Magnetic resonance imaging (MRI) provides high resolution anatomical images that allow accurate evaluation of ventricular structure and function together with detection of myocardial infarction. OBJECTIVE: Potential hybrid PET/MR tomography may potentially facilitate the combination of information from these imaging modalities in cardiology. Furthermore, the combination of anatomical MRI images with the high sensitivity of PET for detecting molecular targets may extent the application of these modalities to the characterization of atherosclerotic plaques and to the evaluation of angiogenetic or stem cell therapies, for example. DISCUSSION: This article reviews studies using MRI and PET in parallel to compare their performance in cardiac applications together with the potential benefits and applications provided by hybrid PET/MRI systems.