



CT and MRI Cardiac Imaging

Cardiac imaging using computed tomography (CT) and magnetic resonance imaging (MRI) has advanced rapidly in the past decades. Faster technology and advances in computer ability have allowed detailed three-dimensional views of the beating heart.

Non-contrast cardiac CT is used to quantify coronary artery calcification. The technology used is Electronic Beam Cardiac Tomography (EBCT) or multi-detector computer tomography (MDCT). MDCT gives more of a three-dimensional view. The detection of coronary artery calcium is diagnostic of atherosclerosis. There is not a 1-to-1 relationship with the amount of calcium measured and the extent of the obstruction of the involved coronary artery. For this reason, a treadmill stress test may be done to discover whether the plaque is obstructive enough to cause exertional ischemia. If the stress test is very positive, coronary artery angiogram may be the next procedure.

Non-invasive coronary CT angiography (CTA) involves intravenous administration of iodinated contrast during a prolonged breath hold and permits a diagnosis of significant (greater than 50% diameter) obstructive coronary artery disease (CAD). Sensitivity and specificity for detection of CAD are comparable to conventional x-ray coronary angiography. CTA permits viewing the artery obstruction without the risks associated with invasive angiogram.

Cardiac CT is also used to evaluate congenital heart disease. Nuclear/CT hybrid devices are evolving to include high-speed multi-detector computer tomography (MDCT with PET) and single-photo emission computer tomography (SPECT) detector systems. Positron Emission Tomography (PET) scans create images based on physiology or organ function. Dual imaging allows one piece of equipment to determine perfusion, function, and metabolism (PET-SPECT) in coronary calcification and CT angiography.

Cardiovascular magnetic resonance (CMR) is used for the diagnosis and management of many cardiovascular diseases. Magnetic resonance angiography (MRA) is performed with a 3D coverage of the vessel during a short breath hold. Often an intravenous gadolinium-based contrast agent is used. Myocardial perfusion CMR can be done to assess regional and global function, perfusion, viability and coronary angiography. CMR is used in identification and management of non-ischemic cardiomyopathies.

CMR is also used in assessing pericardial disease, valvular heart disease, and congenital heart disease

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