



## Multimodality Cardiac Imaging

The two cases described here demonstrate the use of combined multiple modalities to evaluate the heart and to arrive at a diagnosis.

For a long time, cardiac imaging was the domain of the cardiologist using echocardiography or catheter angiography, with some contribution from the nuclear medicine physician. With the advent of cardiac CT and cardiac MRI over the last two decades, radiologists have now also started evaluating the heart.

One of the first rules for radiologists now is to look at the heart (Fig. 1) on every cross-sectional imaging study, whether CT or MRI or PET/CT. The second rule is to utilize to the maximum the modalities available to get to a diagnosis (Fig. 2).

Routine CT of the chest allows us to look for coronary calcium, mitral and aortic valvular calcification and chamber dilatation as well as signs of pulmonary edema. Cardiac CT is now the gold standard for ruling out coronary artery disease in low and intermediate risk patients. Cardiac MRI is the gold standard for viability imaging and cardiomyopathies. Cardiac PET/CT gives additional information in infiltrative cardiomyopathies, while whole body PET/CT allows us to pick up pathology in other parts of the body that may give a clue to the diagnosis.

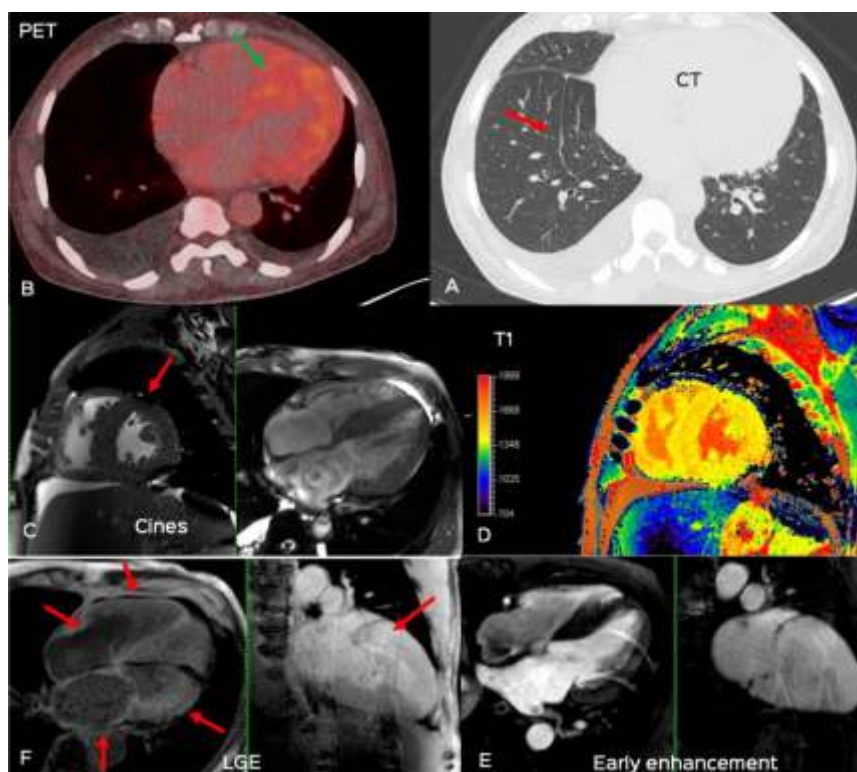


Fig 1 (A-F): 59-years old with fever. The lung window CT scan (A) shows septal thickening (arrow) and bilateral effusions, suggesting pulmonary edema. The PET/CT (B) shows thickening of the myocardium with increased uptake (green arrow), suggesting a myocardial pathology. There is also biatrial dilatation, suggesting a likely restrictive cardiomyopathy. The cine MRIs (C) show thickening (arrow) of the myocardium. The T1 image (D) shows increased T1 values (arrow). The early gadolinium (Gd) enhancement images (E) show deranged contrast kinetics, while the LGE (late Gd enhancement) images show diffuse enhancement (arrows) of the walls of all 4 chambers of the heart. These findings are characteristic of amyloidosis. (A video of the case is also available at <https://www.mricardiac.com/case44>)

*At a glance:*

- ◆ It is necessary for radiologists to look at the heart on all cross-sectional imaging studies through the chest
- ◆ Routine CT chest gives us preventive and diagnostic information about the heart
- ◆ Cardiac CT, cardiac MRI and PET/CT have specific roles to play in the diagnosis and staging of cardiac diseases.

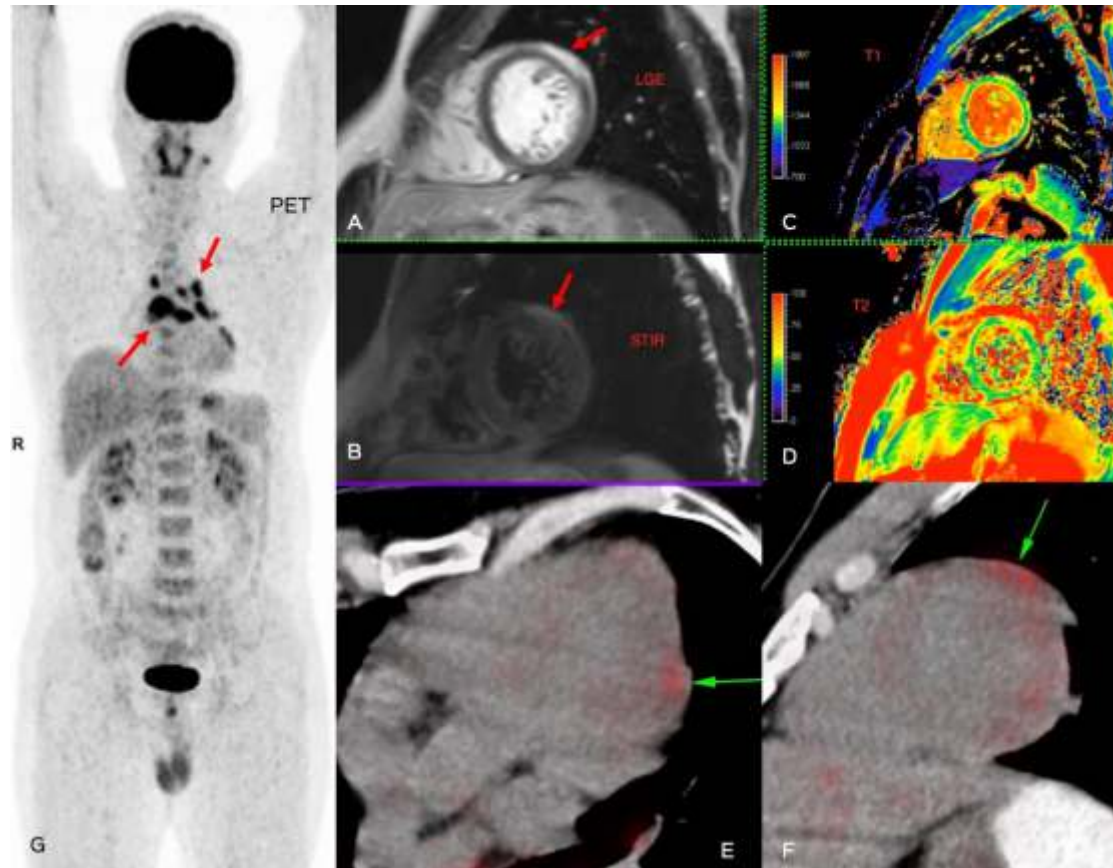


Fig 2 (A-G): 36-years old with monomorphic ventricular tachycardia. The short axis LGE image (A) shows abnormal mid-myocardial and epicardial enhancement in the basal anterolateral segment (arrow) with edema (arrow) on the STIR (B) image and raised T1 and T2 values (C,D). This is suggestive of a granulomatous cardiomyopathy (there were also lymph nodes on the axial images). The cardiac PET/CT (4-chamber – E and short axis – F) shows uptake (arrows) corresponding to the MRI lesions, suggesting active inflammation. The whole body PET (G) shows the typical “panda” distribution of the mediastinal and hilar nodes. All these findings are highly suggestive of sarcoidosis.

(A video of the case is also available at <https://www.mricardiac.com/case49>)

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