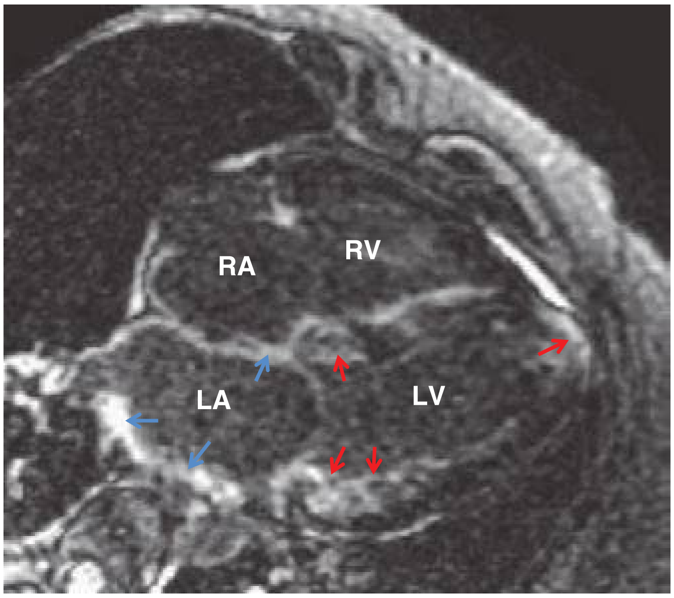

FIGURE 270e-27 A case of cardiac amyloidosis. Note on this late gadolinium enhancement image that there were multiple foci of gadolinium accumulation in the left ventricle (LV) myocardium (*red arrows*), as well as the left atrial (LA) walls (*blue arrows*). The LV walls were markedly increased in thickness, and both atria were dilated, consistent with a restrictive cardiac morphology. The blood pool signal was diminished after contrast injection, which was consistent with high burden of amyloid disease in other organs that causes gadolinium concentration in the blood to rapidly go down. RA, right atrium; RV, right ventricle.

or history of myocardial infarction. Thus, the appropriate classification for any given patient is not always clear, and it often requires the complementary information of coronary angiography and noninvasive imaging. Stress radionuclide imaging and echocardiography can be helpful in delineating the extent and severity of inducible myocardial ischemia and viability. Multiparametric CMR can be quite helpful in the differential diagnosis of heart failure etiologies. Apart from quantifying left and right ventricular volumes and function, CMR can provide information about myocardial ischemia and scar. The pattern of LGE helps differentiate infarction (typically starting in the subendocardium and involving a coronary territory) from other forms of infiltrative or inflammatory cardiomyopathies (typically involving the mid- or subepicardial layers without following a coronary distribution) **(Fig. 270e-27)**. In addition, it can assess the presence of myocardial edema (e.g., myocarditis) and quantify myocardial iron deposition that can potentially lead to cardiac toxicity. Infiltrative cardiomyopathy such as amyloidosis typically has a restrictive cardiomyopathy pattern (bilateral atrial enlargement and biventricular increased wall thickness). CMR of patients with cardiac amyloidosis often also demonstrates a characteristic pattern of diffuse endocardial infiltration of the left ventricle and the atria (Fig. 270e-27). Hypertrophic cardiomyopathy has variable degree of increased ventricular thickness, and often is seen to have outflow obstruction and intense LGE in regions with marked hypertrophy **(Fig. 270e-28)**. CMR also can quantify myocardial iron content in patients at risk of iron-overload cardiomyopathy **(Video 270e-7)**.

PET metabolic imaging has a complementary role in the evaluation of inflammatory cardiomyopathies, especially sarcoidosis. In patients with suspected cardiac sarcoidosis, the presence of focal and/or diffuse glucose uptake can help identify areas of active sarcoidosis. In addition, for patients undergoing immunosuppressive therapy, PET is frequently used to monitor therapeutic response **(Fig. 270e-29)**. In patients with ischemic cardiomyopathy, radionuclide imaging in general and PET in particular are frequently used to quantify the presence and extent of myocardial ischemia and viability to assist with clinical decision making related to myocardial revascularization (Fig. 270e-26).

ASSESSING CARDIAC FUNCTION IN PATIENTS UNDERGOING CANCER TREATMENT

Therapies used to treat cancer can adversely affect the cardiovascular system. As the efficacy of cancer treatment and survival improve, many patients are presenting with late adverse consequences from chemotherapy and/or radiation therapy on cardiovascular function. Thus, the morbidity and mortality from late cardiovascular complications threaten to offset the early gains in cancer survival, especially among children and young adults. Early recognition and treatment of cardiomyocyte injury are critical for successful application of preventative therapies, but difficult because the adverse effects on cardiac function are a relatively late manifestation after exposure to anticancer therapy.

The accepted standard for clinical diagnosis of cardiotoxicity is defined as a >5% reduction in LVEF to <55% with symptoms of heart failure, or a >10% drop in LVEF to <55% in patients who are asymptomatic. Thus, noninvasive imaging plays a major role in diagnosing and monitoring for cardiac toxicity in patients undergoing cancer treatment. Radionuclide angiography has been the technique of choice

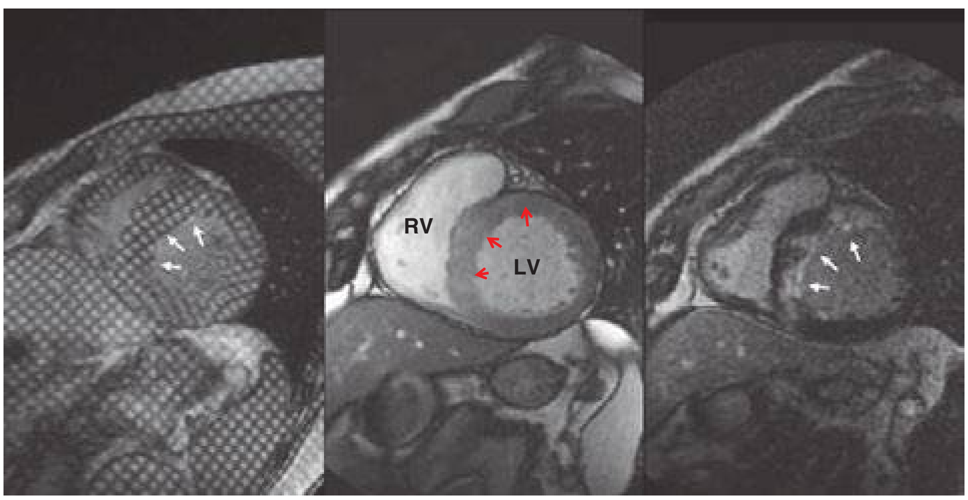

FIGURE 270e-28 This figure demonstrates three pulse sequence techniques by cardiac magnetic resonance that are often used to assess patients with hypertrophic cardiomyopathy, all displayed in the mid short-axis scan plane. The *center panel* demonstrates that the left ventricle (LV) was markedly thickened in its wall thickness especially in the LV septum (*red arrows*). This finding was matched by marked regions of late gadolinium enhancement (LGE), which was consistent with fibrosis in these segments (*right panel, white arrows*). The *left panel* was cine myocardial tagging in the same slice plane. Myocardial tagging is used to assess the normal intramyocardial strain by assessing distortion of the myocardial grids during systole. In this case, despite normal-appearing systolic radial wall thickening, the myocardial strain as assessed by the distortion of grids was markedly reduced (*left panel, white arrows*). This finding is consistent with substantial myofibril disarray in the anterior and anteroseptal segments in this patient. RV, right ventricle.