Large myocardial infarction (MI) in the left ventricle (LV) leads not only to expansion of the necrotic infarct zone, but also to compensatory remodeling throughout the remainder of the LV. This is shown in the Figure (left), which was acquired from a 73-year-old man who presented with NYHA class II congestive heart failure 7 years after an anterior MI. Cardiac MRI, as described in the legend, revealed a thin-walled pseudoaneurysm of the apical anterior wall and severe systolic dysfunction in the rest of the myocardium. These findings were confirmed at surgery (pseudoaneurysm repair and 2 coronary artery bypass grafts).

The genetic mechanisms underlying LV remodeling as a result of a large MI can be identified by studying transgenic and knockout mice. However, studies of chronic MI in genetically manipulated mice have been impeded by the technical challenges of inducing myocardial infarction in small animals (<35 g) and assessing cardiac structure and function at such rapid heart rates (>500 bpm). To address these problems, 6 C57BL/6N mice (28 to 30 g) were anesthetized with pentobarbital and intubated for a reperfused 2-hour occlusion of the major left anterior descending coronary artery. Four weeks later, each mouse was anesthetized, and cardiac MRI was performed. As shown the Figure (right) and in the accompanying cine images (found at www.circulationaha.org), the LV remodeling and aneurysm formation characteristic of clinical heart failure after MI can be replicated with a high degree of fidelity in mice using these techniques. Thus, the combination of cardiac MRI and murine models of chronic MI should prove valuable in elucidating the role of specific genes in the pathophysiology of LV remodeling after MI.

Varian Inova 4.7T MR scanner using a Helmholtz coil. An ECG-triggered, 2D cine FLASH pulse sequence with an echo time of 3.9 ms and a flip angle of 20 degrees was used to obtain 12 phases per cardiac cycle at a final resolution of 100×100×1000 μm³. Cine imaging consisted of a long-axis scout and a series of 7 contiguous, 1-mm-thick, short-axis slices spanning the heart from apex to base. These long-axis images (also shown in the accompanying cine images, which can be found Online at www.circulationaha.org) demonstrate that reperfused MI in the mouse heart induces an LV remodeling process that bears remarkable similarity to that observed in humans after MI.

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Cine images of the Figure can be found Online at http://www.circulationaha.org

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Circulation encourages readers to submit cardiovascular images to the Circulation Editorial Office, St Luke’s Episcopal Hospital/Texas Heart Institute, 6720 Bertner Ave, MCI-267, Houston, TX 77030.

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