

# Imaging Helps Guide Heart Failure Treatments

*Assessments of left ventricular size and systolic function can demonstrate myocardial viability.*

BY ROBERT FINN  
San Francisco Bureau

SAN FRANCISCO — Studies show that about 70% of patients with heart failure also have coronary artery disease, and the decision about whether to intervene surgically or medically is a complex one, Patrick T. O’Gara, M.D., said at a cardiovascular imaging conference sponsored by the American College of Cardiology.

Imaging can assist in making the decision, said Dr. O’Gara of Harvard Medical School (Boston). “Imaging should provide detection of the disease that we suspect and should characterize it further,” he said. “It should also provide us with an assessment of long-term prognosis and the risks that our patients face for adverse events in the intermediate term. It should then clarify the way for the treatment options that are available to us, [and] we should rely on imaging to assess the response to therapy when it is otherwise not

clear to us from a clinical perspective.”

Cardiac imaging is useful only to the extent that it provides information not readily available by more conventional means, such as a history, a physical exam, an ECG, or a chest x-ray.

Of the data that cardiac imaging can provide, assessments of left ventricular size and systolic function are the most important. This information allows the clinician to separate patients whose heart failure arises from systolic function from patients whose heart failure arises from valvular, pericardial, or intramyocardial causes.

The issue of viability is particularly salient, Dr. O’Gara said. A metaanalysis of studies involving 3,088 patients with comorbid heart failure and coronary artery disease indicated that patients with viable but hibernating myocardium have a significantly lower mortality rate after revascularization than do patients with nonviable myocardium (*J. Am. Coll. Cardiol.* 2002;39:1151-8).

## CMR Addresses the Subtleties Of Heart Failure Diagnoses

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SAN FRANCISCO — Cardiac magnetic resonance with late gadolinium enhancement is the imaging technique of choice when the goal is tissue characterization and infarct detection in heart failure, Christopher M. Kramer, M.D., said at a cardiovascular imaging conference sponsored by the American College of Cardiology.

While echocardiography—especially 3-D echocardiography—has its advantages, CMR provides outstanding image quality, excellent quantification, and tissue characterization, said Dr. Kramer of the University of Virginia, in Charlottesville.

Gadolinium contrast is easy to use and safe with CMR. The technique also offers the ability to assess intramural function. But CMR devices are not portable, are quite expensive, and are not readily available. Physicians need extensive training in the use of CMR and the technique is suitable for patients with implanted metallic devices such as pacemakers and implantable cardioverter defibrillators. Furthermore, assessment of diastolic function is not routine with CMR.

Echocardiography does have a number of advantages. The devices are portable, relatively inexpensive, and readily available. Generations of cardiologists have established its validity and all cardiologists become proficient in the use of echo during their training. Contrast can be added to echocardiography, and the assessment of diastolic function has become routine.

But echocardiography is subject to variable image quality and poor windows. Results tend to be qualitative, and quanti-

tation can be difficult. Newer 3-D echocardiographic techniques address some of these issues, but these devices are not widely available.

Gadolinium-enhanced CMR has proved to be especially useful in determining whether cardiomyopathy is ischemic or nonischemic. In one study of 90 patients (63 with dilated cardiomyopathy and 27 with coronary artery disease) and 15 controls, none of the controls showed any hyperenhancement. All the patients with coronary artery disease showed hyperenhancement. And among the patients with dilated cardiomyopathy, 59% had no hyperenhancement, 13% had hyperenhancement consistent with coronary artery disease, and 28% had mid-wall hyperenhancement (*Circulation* 2003;108:54-9).

Enhanced CMR is also useful as a marker of late-stage myocarditis. In a study of 32 patients with myocarditis, investigators noted enhancement in 28 (88%) of them, with the lateral free wall the most common site. Twenty-one of the patients had biopsy in the area of enhancement, and active myocarditis was detected in 19. Of the other 11 patients, only 1 had active disease (*Circulation* 2004;109:1250-8).

Other studies have shown the value of enhanced CMR in hypertrophic cardiomyopathy, amyloidosis, sarcoidosis, and Chagas disease.

Dr. Kramer concluded that echocardiography is fine in several circumstances, especially for diastolic function and when “quick and easy” is adequate. CMR, on the other hand, is best for regional systolic function, for differential diagnosis and tissue characterization, and whenever quantitation is needed and 3-D echo is unavailable. ■

On the other hand, patients with viable myocardium appear to have a much higher mortality rate with medical therapy than do those with nonviable myocardium.

This metaanalysis has come under a good deal of criticism, Dr. O’Gara acknowledged. Some of the included studies were observational, nonrandomized, and unblinded. They had varying patient-selection criteria, varying methodologies, and varying definitions of viability. Nevertheless, he said, the message that emerges is that the demonstration of viability seems to be important.

Most clinicians would say that patients need to have viability in at least 25%-30% of the myocardial mass to be good candidates for revascularization, but this has never been evaluated prospectively.

Other studies have shown that the survival advantages of coronary artery bypass grafting (CABG) are greatest for those patients with the most extensive coronary disease, the greatest degree of left ventricular systolic dysfunction, and the greatest degree of ischemia.

The 2001 heart failure guidelines from the American College of Cardiology and the American Heart Association say that either angiography or noninvasive assessments of ischemia and viability is appropriate for a patient with both coronary disease and left ventricular systolic dysfunction, usually defined by a left ventricular ejection fraction of 35% or less.

The 2005 guidelines, released within days of Dr. O’Gara’s talk, say that coronary angiography should be performed on heart failure patients with angina or ischemia unless they are not candidates for revascularization of any kind (class I recommendation). Coronary angiography is reasonable for patients with chest pain that may or may not be of cardiac origin or those who have known or suspected coronary artery disease without angina, unless the patient is not eligible for revascularization of any kind (class IIa recommendation).

Separate CABG guidelines from the same organizations state that there is good evidence that left main stenosis or

two- or three-vessel disease in the left anterior descending artery are indications for CABG. There is somewhat less evidence in favor of CABG for “significantly viable noncontracting revascularizable myocardium.” The problem is that the term “significantly viable” is not defined precisely.

“The heart failure panel looked at it differently, and they warned us that coronary revascularization of patients who have heart failure and coronary disease but do not have a history of angina has never been demonstrated to be useful,” Dr. O’Gara said. This statement is unchanged in the 2005 guidelines.

In practice, most clinicians would consider it mandatory to search for coronary artery disease in patients with heart failure and a left ventricular ejection fraction of less than 40%. Either angiography or noninvasive assessment of ischemia and viability would be appropriate.

“Some would prefer coronary angiography to settle the issue as to whether or not appropriate targets are available for revascularization, if the patient is shown to have demonstrable ischemia,” he said. “You need to have the targets and you need to have the conduits before you can move ahead with revascularization.”

Beyond that, the clinician must ask a series of questions to determine whether the patient is a good candidate for revascularization. Among the considerations are the patient’s general health status, whether he or she will have adequate support at home during the recovery period, whether the patient has a history of angina, and the experience level of the surgeon and the hospital.

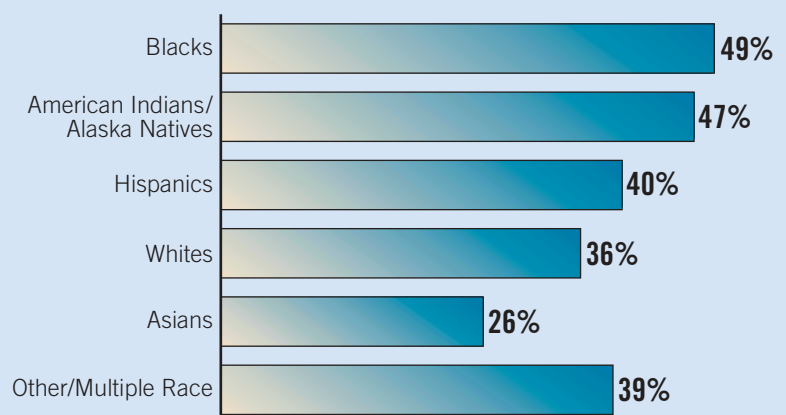
“These are not the kind of patients who should be operated on by low-volume operators in low-volume institutions,” he said.

He offered no strong recommendations on which specific imaging tests would be best, except to say that in practice clinicians should rely on the modality that has the greatest degree of reproducibility and accuracy in the local community.

Finally, he recommended counseling the patient and the family on the basis of widely available risk calculators. ■

### DATA WATCH

#### Racial/Ethnic Groups Reporting Multiple Risk Factors for Heart Disease, Stroke



Note: Based on a study of adults who reported having two or more of the following: high blood pressure, high cholesterol, diabetes, obesity, current smoking, or physical inactivity in 2003. Source: Centers for Disease Control and Prevention