Quantitative SPECT Aids Cardiac Risk Assessment

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SAN FRANCISCO — Quantitative nuclear cardiology allows for highly sensitive, specific, and reproducible estimates of a patient's risk, and assists in the decision of who should be sent for revascularization, Daniel S. Berman, M.D., said at a cardiovascular imaging conference sponsored by the American College of Cardiology.

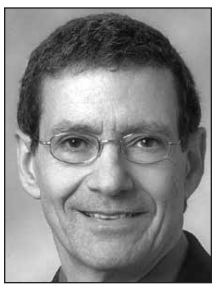
When quantitative techniques are used with single photon emission computed tomography (SPECT), the results are operator independent, said Dr. Berman of Cedars-Sinai Medical Center, Los Angeles. A quantitative SPECT assessment of myocardial perfusion and function reduces the reliance on expert observers, standardizes results from center to center, facilitates serial assessments, and ultimately improves patient outcomes.

The technology produces reliable assessments of many important parameters of cardiac function (see box below), and numerous studies have shown how these parameters relate to cardiac risk.

For example, pooled data from more than 17,000 patients show that those with a normal stress myocardial perfusion SPECT had only a 0.6% chance of suffering cardiac death or a nonfatal MI over a mean follow-up of 27 months. This low rate of cardiac events is impressive because these were patients with known or suspected coronary artery disease.

This study included patients who were under either exercise or pharmacologic stress. According to another study, a normal stress myocardial perfusion SPECT has less prognostic value if the patient fails to reach at least 70% of the predicted maximal heart rate (PMHR) during exercise. Among more than 5,000 patients, the cardiac event rate for patients who failed to reach 70% PMHR was more than three times that of those who reached 70%-100% PMHR. Patients who are unable to reach 70% PMHR during exercise need to undergo myocardial perfusion SPECT with pharmacologic stress, Dr. Berman said.

The presence of diabetes is another factor that modifies a patient's risk after myocardial perfusion SPECT. For any given summed stress score (SSS)—an estimate of the overall size and severity of a perfusion defect during stress—nondiabetics have the lowest level of risk, insulin-dependent diabetics have the highest level of risk, and non–insulin-dependent diabetics have an intermediate risk. SSS alone isn't enough, however. The summed difference score, which subtracts the summed rest score from the SSS, is a more reliable measure.



Quantitative SPECT assessment of myocardial perfusion and function reduces reliance on expert observers.

DR. BERMAN

Better still is to normalize these scores based on the maximum possible score. This yields measures of percent myocardium perfused that are independent of the specific SPECT system employed. When applied to the summed difference score, the percent myocardium perfused is a measure of ischemia.

This measure of ischemia is important in deciding whether to refer patients to revascularization or to treat them with medical therapy. Studies have shown that patients with extensive ischemia have a much lower risk of cardiac death with revascularization than with medical therapy. ■

Measurements Possible With Quantitative Cardiac Perfusion SPECT

Percent hypoperfusion.
Percent reversibility.
Lung-to-heart ratio.
Transient ischemic dilatation.
Left ventricular mass.
Left ventricular ejection fraction.
End diastolic volume.
End systolic volume.
Wall motion.
Wall thickening.
Peak filling rate.

Source: Dr. Berman

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