Stress Single Photon Emission Computed Tomography in Patients With Normal Electrocardiograms

To the Editor:

On the basis of data collected from a large cohort of patients undergoing stress single photon emission computed tomography (SPECT), Hachamovitch et al recently concluded in Circulation that, “Stress SPECT yields incremental prognostic value and enhanced risk stratification in patients with normal resting ECGs in a cost-effective manner.” This summary conclusion is not fully representative of the study, and because it may significantly impact patient management, it warrants further discussion and clarification.

The study did indeed retrospectively identify a group of patients who may gain additional prognostic benefit from SPECT versus exercise treadmill test (ETT) alone. For the majority of patients, however, the addition of stress SPECT to ETT was of no proven clinical value, and was cost-ineffective. In our view, therefore, the study as performed confirmed what these and other investigators have previously concluded, that nuclear imaging adds little prognostic value over ETT at an acceptable cost for the majority of patients with normal resting ECGs.

By retrospective data analysis, SPECT imaging was felt to be able to reclassify intermediate and high-risk patients in a cost-effective manner. The authors therefore concluded that the use of stress SPECT as a second test after a positive ETT might be of benefit because low-risk stress SPECT findings in these patients could help avoid unnecessary cardiac catheterizations. The cost-analysis of the study, however, was not conducted to reflect such a 2-tiered, sequential approach. Adding a stress SPECT to ETT adds up the costs of 2 separate stress tests, and may also add a day of hospitalization and/or loss from work for some patients. Furthermore, it would have to be shown that a negative stress SPECT in patients who were determined to have intermediate or high risk after clinical evaluation and ETT is sufficiently reliable and powerful to eliminate the need for cardiac catheterization in clinical practice. In the study by Hachamovitch et al, there is no suggestion as to how the data influenced management decisions, and more importantly, patient outcomes.

The study by Hachamovitch et al provides important information about the prognosis of different subgroups of patients with normal resting ECGs who undergo stress myocardial perfusion SPECT. It does prove that for low-risk patients, the addition of SPECT is not cost-effective. In non–low-risk groups, a negative SPECT result identifies patients who have relatively low rates of subsequent “hard events.” Only a prospective study that utilizes a sequential ETT and exercise-SPECT approach, and one that analyzes the totality of costs involved including the costs of 2 separate stress tests, the costs of cardiac catheterization, and the cost of subsequent intervention would provide a definitive answer about the cost-effectiveness of the addition of SPECT to ETT in these intermediate and high-risk patients with normal resting ECGs. It would also be important to understand how the addition of SPECT to ETT would influence clinical management and patient outcomes.

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Response

We thank the Drs Anderson and Littman for their comments regarding our publication. They share a misconception held by many regarding the use of single photon emission computed tomography (SPECT) in patients with normal resting electrocardiograms, which is that SPECT is neither useful nor cost-effective in these patients. The primary conclusion of our study was that 50% or more of these patients will derive prognostic clinical value from SPECT in a cost-effective manner.

We agree that the summary conclusion in the abstract is not fully representative of the results of the paper because it does not include the phrase “when applied to an appropriate patient population, those with intermediate to high post-exercise tolerance test (ETT) risk.” Drs Anderson and Littman also state that “for the majority of patients, however, stress SPECT compared with ETT was of no proven additional clinical value, and was cost-ineffective.” We disagree with this statement and presented several analyses in our article demonstrating that SPECT added incremental information beyond that provided by clinical, historical, and exercise treadmill test (ETT) information, both in the overall patient cohort as well as in a number of relevant patient subgroups (Figures 2, 3, 4, and 6). An important conclusion of our article, as previously shown by both our group and others, is that cost-effectiveness is achieved only when the use of SPECT is limited to appropriate patient populations; that is, patients at intermediate to high prescan likelihood of coronary artery disease (CAD). In both our study and previous studies, SPECT was found to yield clinical value and be cost-effective when used in appropriate populations, and these costs were significantly lower than those associated with testing in unselected patients.

Drs Anderson and Littman also claim that our study was not conducted in a manner that could assess the potential cost implications of strategies we examined. As stated in the Methods section, the costs we considered were solely those of the addition of a SPECT study. Alternative approaches could have included the cost of ETT before SPECT, including downstream procedures (eg, catheterization, revascularization), hospitalizations, etc. Sensitivity analyses could also have been applied. Our goal, however, was to use an approach that would optimize comparisons with previous studies, such as those cited by Drs Anderson and Littman. We believe that our approach closely reflects the cost difference between strategies with and without SPECT.

We agree with Drs Anderson and Littman that the addition of post-test resource utilization would have enhanced our study. These results are as follows. Patients with normal SPECT were referred to catheterization at considerably lower rates than patients with abnormal studies, even in the setting of a high likelihood of CAD (2%, 4%, and 8% for patients with low, intermediate, and high likelihood of CAD, respectively). Within each likelihood category, the referral rates for catheterization increased appropriately as a function of the extent and severity of ischemia (catheterization rates for mild, moderate, and severely abnormal scans were 7%, 13%, and 41% for low likelihood patients, 17%, 25%, and 58% for intermediate likelihood patients, and 21%, 47%, and 70% for high likelihood patients).

We also agree with Drs Anderson and Littman that a prospective study directly comparing clinical strategies with and without SPECT would be informative, although we do not agree that it would be definitive. A study whose goal is the assessment of cost
is inherently aiming at a “moving target,” and the results of all cost-analyses are dependent on the assumptions that are made at the onset.

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