

Pharmacologic Stress Testing

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Pharmacologic stress testing plays an important role in the diagnosis of patients with known or suspected coronary artery disease. In many busy nuclear cardiology laboratories, 30 to 40% of all nuclear stress tests are pharmacologic.¹ This makes it particularly important for clinicians to understand the indications, complications, and optimal way to perform pharmacologic stress testing. Thus, the comprehensive review by Patel et al² is timely and valuable. By following these guidelines, our patients can receive the best care and experience the fewest side effects.

Although patients seem to understand the reasoning behind an exercise stress test, the pharmacologic stress test can be confusing. A frequent question is why the patient is undergoing a pharmacologic stress test instead of an exercise stress test. It is important to note that an exercise treadmill test is generally considered inadequate when patients cannot reach 85% of their predicted maximum heart rate, cannot reach a workload of 5 METS, or cannot exercise for at least 3 minutes. If the patient is unable to exercise to these levels, then pharmacologic stress serves them much better.

Other important reasons to perform pharmacologic stress testing include conditions such as aortic stenosis, left bundle branch block, a paced rhythm, recent myocardial infarction, and severe arterial hypertension.^{3,4} Because of the varying reasons, the decision to perform one stress modality over another is often not made until the patient is interviewed and examined on the day of the stress imaging procedure. The possibility of either stress test needs to be made clear to both the referring clinicians and to the patients so that there is no surprise when an exercise treadmill test is converted to a pharmacologic stress test or vice versa.

Another important concern is whether pharmacologic stress testing is as diagnostically useful as exercise treadmill testing. Pharmacologic stress testing in conjunction with nuclear imaging is just as effective at risk-stratifying patients as is exercise stress testing. Although a treadmill stress test in patients without contraindications is preferred, the sensitivity and specificity of pharmacologic stress testing in conjunction with nuclear imaging is equivalent to an exercise stress nuclear study in the diagnosis of coronary artery disease.⁵



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However, this does not mean that the post-test probability of disease is the same in patients with a normal pharmacologic stress study as those with a normal exercise stress study. Patients requiring pharmacologic stress often have a greater number of comorbid conditions. While the accuracy of nuclear scanning is similar for both groups of patients, those that require pharmacologic stress testing have a slightly worse prognosis. Thus, it is not surprising to note that patients with a normal pharmacologic stress nuclear scan have a hard cardiac event rate of about 1 to 2% per year, compared with an event rate of 1% or less per year in patients with a normal exercise stress nuclear scan.⁶ Nevertheless, newer prognostic scoring systems may enable clinicians to risk-stratify patients undergoing pharmacologic stress testing into a very low risk category with an annual hard event rate of less than 1%.⁷

Finally, another frequent question patients have in regards to pharmacologic stress testing is its safety and side effects. A recent multi-center international trial found that the rate of cardiac death in patients undergoing dipyridamole stress testing was nearly identical with that of patients undergoing exercise stress testing (1 death out of 10,000 stress tests).⁸ Other pharmacologic agents have similarly low, hard cardiac event rates.⁹⁻¹¹ Although the incidence of side effects is relatively high, these tend to be minor and short-lived.¹²

Pharmacologic stress testing is a timely and important topic which will only increase as the baby boomer generation ages. This, along with the rapid increase in imaging technology, makes the present a good time for new physicians to learn about and older physicians to update their knowledge on pharmacologic methods of stress testing.

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