

Preparing Patients for Stress Testing

ABORTED TESTS AND REDUCED SENSITIVITY

Although dynamic exercise is the preferred method of stress for myocardial perfusion imaging (MPI) in the majority of patients, not all patients are able to reach the necessary duration of exercise or the target heart rate. The inability to exercise adequately for testing can be apparent in patients who have documented disabilities or injuries. For some patients, however, it may be unclear how much exercise can be performed.

The need to abort exercise stress tests due to submaximal exercise levels is a common cause of disruptions in the nuclear cardiology laboratory. Aborted exercise stress tests can pose problems for both the laboratories and the patients involved. The laboratory suffers the loss of scheduled time and a wasted dose of radiotracer, while the patient may be forced to reschedule and return on another day, which can be difficult for those who have limited mobility or time constraints.

Also, submaximal exercise may reduce test sensitivity,¹ which can result in an incorrect diagnosis. Negative results in patients with submaximal exercise levels may be false negatives, requiring the need for a repeated stress test or even a more invasive diagnostic procedure, such as cardiac catheterization.

PREPARE ALL PATIENTS

To greatly reduce the chance of aborted exercise stress tests, all patients—even those scheduled for exercise—should be prepared as though they could undergo a pharmacologic stress test.² Therefore, if a patient is unable to exercise adequately, a pharmacologic stress test can be conducted immediately, averting the need for another dose of radiopharmaceutical tracer and the rescheduling of camera, technologist, and patient time.

To greatly reduce the chance of aborted exercise stress tests, all patients—even those scheduled for exercise—should be prepared as though they could undergo a pharmacologic stress test.²

WHEN SCHEDULING A PATIENT FOR ANY STRESS TEST:

- Review the patient's medications with his or her physician and have the patient stop using those that may interfere with pharmacologic stress testing (see the table for examples).
- Review patient history for any symptoms or underlying conditions that may influence the patient's ability to complete the test.
- Ensure that the patient abstains from all foods or medications that contain caffeine or theophylline for at least 24 hours before the test because these substances can interfere with vasodilator stress. Give the patient a list of products to avoid, and call special attention to the fact that soft drinks labeled "caffeine-free" and decaffeinated coffee must also be avoided (see the table for examples).
- Tell the patient to abstain from all food and drink for 3 to 6 hours prior to the test.
- Remind the patient to dress appropriately for exercise, with comfortable clothes and appropriate shoes.
- Tell the patient not to apply creams, lotions, or powders to the chest area on the day of the test.

EXERCISE ABILITY

Certain patient populations may be less likely to be able to exercise adequately for a stress test and may be candidates for pharmacologic stress. Approximately 40% of women referred for stress MPI are candidates for pharmacologic stress.³ Women who are not able to perform a minimum of 5 metabolic equivalents of exercise should be considered candidates for pharmacologic stress.³

Women are less likely to be able to achieve an adequate heart rate during exercise stress testing compared with men of the same age.⁴ Women generally present with coronary artery disease 10 years later in life than men,⁵ which also may affect their ability to achieve maximum heart rate compared with men. Women are also more likely to have smaller coronary vessels than men.⁶ Small blood vessel size may be one of the reasons for a lower specificity and sensitivity of exercise testing in women.⁴

Obese patients and those who have diabetes have a higher likelihood of a submaximal exercise test.⁷ African American women have a higher prevalence of obesity than other patient groups.⁸ This can make it especially difficult for these patients to perform adequate exercise stress tests.

CONCLUSION

If a patient's ability to exercise adequately for stress testing is in question, exercise should be attempted first. If the duration or heart-rate response is inadequate, the radioisotope should not be injected and pharmacologic stress can be considered.⁹ Imaging results with pharmacologic stress are similar to those with maximal exercise.¹⁰

Because aborted exercise stress tests can be costly and inconvenient for patients and laboratory staff alike, efforts should be made to increase efficiency by minimizing aborted tests. Frequently, a patient's ability to exercise is overestimated and an adequate exercise endpoint cannot be reached.² One important way to avoid canceling tests for patients who prove unable to exercise adequately is to have all patients prepared as though they could undergo a pharmacologic stress test.² This way, if a patient is unable to exercise adequately, a pharmacologic stress test can be considered at the same visit, if necessary, and the need to reschedule the appointment can be avoided.

For interactive *Tech Tips* and more, visit pharmstresstech.com.

References

1. Iskandrian AS, Heo J, Kong B, Lyons E. Effect of exercise level on the ability of thallium-201 tomographic imaging in detecting coronary artery disease: analysis of 461 patients. *J Am Coll Cardiol*. 1989;14:1477-86.
2. Wackers FJTh, Bruni W, Zaret BL. Patient preparation. In: Wackers FJTh, Bruni W, Zaret BL. *Nuclear Cardiology: The Basics. How to Set Up and Maintain a Laboratory*. Totowa, NJ: Humana Press; 2004:35-41.
3. Mieres JH, Shaw LJ, Hendel RC, et al. A report of the American Society of Nuclear Cardiology Task Force on Women and Heart Disease (Writing Group on Perfusion Imaging in Women). *J Nucl Cardiol*. 2003;10:95-101.
4. Isaac D, Walling A. Clinical evaluation of women with ischemic heart disease: diagnosis and noninvasive testing. *Can J Cardiol*. 2001;17(suppl D):38D-48D.
5. Lerner DJ, Kannel WB. Patterns of coronary heart disease morbidity and mortality in the sexes: a 26-year follow-up of the Framingham population. *Am Heart J*. 1986;111:383-90.
6. Cerqueira MD. Diagnostic testing strategies for coronary artery disease: special issues related to gender. *Am J Cardiol*. 1995;75:52D-60D.
7. Consensus development conference on the diagnosis of coronary heart disease in people with diabetes: 10-11 February 1998, Miami, Fla. American Diabetes Association. *Diabetes Care*. 1998;21:1551-1559.
8. American Heart Association. *Heart Disease and Stroke Statistics—2007 Update*. Dallas, TX: American Heart Association; 2007.
9. Cerqueira MD. Pharmacologic stress versus maximal-exercise stress for perfusion imaging: which, when, and why? *J Nucl Cardiol*. 1996;3:510-514.
10. Nishimura S, Mahmarian JJ, Boyce TM, Verani MS. Equivalence between adenosine and exercise thallium-201 myocardial tomography: a multicenter, prospective, crossover trial. *J Am Coll Cardiol*. 1992;20:265-275.

Examples of Products That Should Be Avoided for at Least 24 Hours Before Vasodilator Stress Testing*†

Food and Drinks Containing Caffeine

- Chocolate and cocoa products
 - Including candies, cakes, brownies, pudding, chocolate milk, hot cocoa, etc
- Coffee and tea
 - Including brewed, instant, iced, and decaffeinated
- Soda pop
 - Including those labeled “caffeine-free”
- Diet supplement bars

Over-the-Counter Drugs Containing Caffeine

- Anacin®
- NoDoz®
- Excedrin®
- Vivarin®

Prescription Drugs Containing Caffeine

- Cafergot® (all forms)
- Fiorinal®
- Synalgos®-DC
- Esgic® (all forms)
- Norgesic™
- Wigraine® (all forms)
- Fioricet®
- Norgesic™ Forte

Common Drugs Containing Theophylline

- Aerolate®
- Slo-bid™
- Theo-Dur®
- Constant-T®
- Slo-Phyllin®
- Theolair™
- Elixophylline®
- T-Phyl®
- Theo-Organidin®
- Primatene® (tablets)
- Tedral® SA
- Theo-Sav®
- Quibron® (all forms)
- Theo-24®
- Theostat®
- Respbid®
- Theoclear®
- Theo-X™

*Individual pharmacologic stress agents may require additional or alternative pretest product avoidance. Please see individual package inserts for complete information on potential product interactions.

†None of the above are registered trademarks of Astellas Pharma US, Inc.

Provided as an educational service by **Astellas Pharma US, Inc.**
COMMITTED TO CARDIOLOGY®