

Stress Testing: Review Questions

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QUESTIONS

Choose the single best answer for each question.

- Which of the following patients has class I indications for a regular stress test?**
 - A 40-year-old man with sharp chest pain of a few minutes' duration at rest who has a normal baseline electrocardiogram (ECG)
 - A 60-year-old man who smokes cigarettes and has hypertension, hypercholesterolemia, dull substernal chest discomfort for 15 minutes, and a normal resting ECG
 - A 52-year-old woman with preexcitation syndrome
 - A 42-year-old man with chest tightness and mild dyspnea who had a rotational atherectomy of the right coronary artery 9 months previously
 - A 58-year-old woman with no risk factors who has sharp chest pain but is not taking any medication
- Which of the following ECG leads is most useful for interpreting stress ECGs?**
 - Lead II
 - Lead III
 - Lead V₂
 - Lead V₅
 - Lead aV_R
- Which of the following is considered most diagnostic of obstructive coronary heart disease on stress ECG?**
 - An upsloping ST segment of 1 mm in lead II in a 62-year-old man with a heart rate of 143 bpm
 - A downsloping ST segment in V₂, V₃, and V₄ in three consecutive beats
 - A horizontal ST in a V_R of 0.5 mm with T-wave inversion
 - Symmetrical T-wave inversion in precordial leads
- A 60-year-old man presents to the emergency department with substernal chest discomfort lasting for approximately 15 to 20 minutes. The patient is known to have diabetes mellitus and is taking insulin. He claims he is not hypertensive; however, he is taking verapamil at 240 mg/day. His total cholesterol level 3 months prior to presentation was 249 mg/dL, and he has smoked one pack of cigarettes per day for the past 45 years. His ECG shows left ventricular hypertrophy with repolarization changes. He is admitted with a preliminary diagnosis of unstable angina and to rule out a myocardial infarction. On the basis of serial enzyme levels and lack of ECG progression, a stress test is planned. Which of the following is appropriate for this patient?**
 - He should be given a regular ECG stress test to evaluate the possibility of coronary heart disease
 - He should be given an adenosine Cardiolute (technetium Tc 99m sestamibi) study and stress testing to rule in underlying coronary heart disease
 - He can be discharged if an ECG stress test is performed the following week
 - He should be given coronary arteriography immediately
- False-negative results for stress echocardiography are attributable to all of the following EXCEPT:**
 - Inadequate stress testing
 - Mild coronary artery disease
 - Poor image quality
 - Poor electron transfer
 - Antianginal therapy

(turn page for answers)

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EXPLANATION OF ANSWERS

- 1. (A) A 40-year-old man with sharp chest pain of a few minutes' duration at rest who has a normal baseline ECG.** The diagnostic use of stress testing is best achieved in patients with intermediate risks of coronary heart disease on the basis of their chest pain characteristics, age, sex, and associated major risk factors. Patients with high probability of coronary heart disease who are having symptoms should not have a stress test. The false-positive rate is high in women receiving nonthallium stress tests. Therefore, in women with a low clinical probability of coronary artery disease, diagnostic testing should be avoided because of the false-positive results.
- 2. (D) Lead V₅.** Lead V₅ is the most informative lead. In V₅, the positive electrode is placed at the left fifth intercostal space (ICS) in the midclavicular line. The negative electrode in V₅ is either on the manubrium sternum (M)—the bipolar lead is then called CM₅—or on the right fifth ICS midclavicular line (C)—the bipolar lead is then called CC₅. Diagnostic ST-segment changes in CC₅ are very specific, whereas changes in CM₅ are very sensitive. Lead II has high false-positive results.
- 3. (B) A downsloping ST segment in V₂, V₃, and V₄ in three consecutive beats.** PQ junction is taken as base line or isoelectric. With exercise, the J-point depression is a normal event. The precordial and inferior leads are important; however, lead V₅ is most informative (*see* Explanation of Answers to Question 2). ST-segment depression of 1 mm or more is considered abnormal if it is either horizontal or downsloping in any lead in more than three consecutive beats. If the ST segment is upsloping, the part of ST depression after 60 to 80 ms of J point of more than 1 mm is also considered abnormal. Because lead II is known to have high false-positive results, the first answer choice (an upsloping ST segment of 1 mm in lead II in a 62-year-old man with a heart rate of 143 bpm) is not most diagnostic of exercise-induced ischemia. T-wave changes are influenced by body

position and hyperventilation and therefore are not useful for diagnosis. ST-segment elevation in leads without abnormal Q waves is consistent with injury and is diagnostic of underlying coronary heart disease with a high degree of specificity. Thus, ST-segment elevation also can localize the myocardial wall with ischemia and, consequently, the coronary artery that is blocked (which is usually a proximal lesion or spasm). However, when ST increases occur in the presence of abnormal Q waves, these results signify dyskinetic movement of the left ventricular wall at the area of old scar (usually in a patient with low ejection fraction) and are associated with a worse prognosis than for a patient who has a scar and does not have ST elevation.

- 4. (B) He should be given an adenosine Cardiolute (technetium Tc 99m sestamibi) study and stress testing to rule in underlying coronary heart disease.** Stress testing with the addition of a radioactive nuclide test is a more acceptable testing modality, especially because the patient's resting ECG is already abnormal. In a patient with left ventricular hypertrophy by ECG, stress echocardiography may be more diagnostic. Any patient who can perform a treadmill test should do so, rather than a pharmacologic test, regardless of whether nuclear imaging is used. False-positive test results are seen commonly in patients receiving digitalis or in patients with left ventricular hypertrophy, preexcitation syndromes, left bundle branch block, or pacemaker rhythms.
- 5. (D) Poor electron transfer.** The level at which the patient is exercised during stress echocardiography, like most other modalities, is essential for accurate and usable results. At least 85% of the age-predicted maximum heart rate is required for reasonable accuracy, and the inability to reach this maximum heart rate is a primary indication for pharmacologic (dobutamine) testing.

Adapted from Zaks JM, Khan F: Stress testing. Hospital Physician Cardiology Board Review Manual 1998:4(6).

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CARDIOLOGY

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