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ACSM Certified Exercise Physiologist

ACSM 020-222

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Topic Break Down

Topic	No. of Questions
Topic 1, Health and Fitness Assessment	50
Topic 2, Exercise Prescription and Implementation	15
Topic 3, Risk Management and Professional Responsibilities	50
Total	115

QUESTION NO: 1

What is the best test to help determine ejection fraction at rest and during exercise?

A. Angiography.

B. Thallium stress test.

C. Single-proton emission computer tomography.

D. MUGA (blood pool imagery) study.

ANSWER: D

Explanation:

MUGA (blood pool imagery) study is the best test because gated radionuclide ventriculography is designed to measure ventricular volumes and calculate left-ventricular ejection fraction reproducibly. In this procedure, red blood cells are tagged with a radiotracer, and a gamma camera records changes in ventricular blood-pool counts over many ECG-gated cardiac cycles. The difference between end-diastolic and end-systolic counts permits calculation of ejection fraction. Importantly for this question, the acquisition can be performed both at baseline and during exercise, allowing direct assessment of how left-ventricular systolic performance changes with exertion. This use is valuable when evaluating exercise-induced ventricular dysfunction or following ventricular function serially, because the technique has historically provided highly reproducible ejection-fraction measurements. Modern practice may also use echocardiography or cardiac MRI in appropriate settings, but radionuclide blood-pool imaging is the classic exercise-testing modality specifically suited to comparing ejection fraction at rest and exercise. The American Society of Nuclear Cardiology describes equilibrium radionuclide angiography as a method for assessing ventricular function, including left-ventricular ejection fraction; further procedural detail is available from NCBI Bookshelf and patient-focused information is available from the Cleveland Clinic.

QUESTION NO: 2

Which statements are appropriate regarding exercise programming for an older adult with osteoporosis and no current fracture or exercise-related pain?

A. Include weight-bearing aerobic activity as tolerated.

B. Include progressive resistance training with controlled technique.

C. Include balance activities to help reduce fall risk.

D. Routinely prescribe loaded end-range trunk flexion exercises.

E. Avoid all resistance exercise because it increases fracture risk.

ANSWER: A B C

Explanation:

Weight-bearing aerobic activity and progressive resistance exercise are appropriate because both can provide mechanical loading that supports musculoskeletal health. Exercises that challenge balance are also appropriate because reducing fall risk is an important goal for individuals with osteoporosis. Resistance training should use controlled technique and individualized progression. In contrast, loaded end-range spinal flexion can increase vertebral compression forces and should not be routinely prescribed, particularly for individuals with vertebral osteoporosis or a history of vertebral fracture. ACSM guidance for older adults emphasizes multicomponent programming that includes aerobic, resistance, flexibility, and neuromotor activity. See the ACSM Physical Activity Guidelines and the Bone Health and Osteoporosis Foundation's exercise guidance.

QUESTION NO: 3

What is the most appropriate action in assisting a person suffering from a seizure?

A. Hold the person down so that he or she does not hurt himself or herself.

B. Do not restrain the person; stay with them and ensure the surrounding area is safe.

C. Place a wedge in the person's mouth so that he or she does not swallow the tongue.

D. Ignore the person, and allow the seizure to pass.

ANSWER: B

Explanation:

The appropriate response is to protect the person from injury without restraining their movements. Stay calm, remain with the person, guide them away from immediate hazards if this can be done safely, and cushion the head with something soft if they are on the ground. Loosen tight clothing around the neck, note the time the seizure begins, and observe breathing and responsiveness as the seizure ends. After convulsive movements stop, place the person on their side in a recovery position if they are breathing, so the airway remains clear, and stay with them until they are fully alert. Activate emergency medical services when a seizure lasts 5 minutes or longer, seizures occur repeatedly without recovery, breathing is impaired, injury occurs, the person is pregnant or has diabetes, the seizure happens in water, or it is a first known seizure. This approach reflects standard seizure first-aid guidance and prioritizes safety, airway monitoring, and appropriate escalation of care. See the CDC seizure first-aid guidance and the Epilepsy Foundation first-aid resources.

QUESTION NO: 4

During calibration of a treadmill, the belt length was found to be 5.5 m. It took 1 minute and 40 seconds for the belt to travel 20 revolutions. What is the treadmill speed?

A. 4 m/min.

B. 66 m/min.

C. 79 m/min.

D. 110 m/min.

ANSWER: B

Explanation:

66 m/min. is correct. Treadmill belt speed is determined by calculating the total linear distance traveled by the belt and dividing that distance by the elapsed time. Each complete revolution corresponds to one belt length, so 20 revolutions of a 5.5 m belt represent 110 m of travel (20 × 5.5 m). The recorded duration of 1 minute and 40 seconds equals 100 seconds, or 1.6667 minutes. Therefore, belt speed is 110 m ÷ 1.6667 min, which equals 66 m/min. This approach is appropriate for treadmill calibration because the moving belt, rather than an individual's walking or running stride, determines the actual speed presented to the exerciser. Verifying belt speed helps ensure that the treadmill's displayed setting produces the intended external workload, which is important for valid exercise-test results, accurate estimation of exercise intensity, and safe exercise prescription. ACSM guidance emphasizes proper equipment preparation and calibration as part of quality exercise testing practice. General SI measurement principles also support expressing a measured rate as distance divided by time. See ACSM's Guidelines for Exercise Testing and Prescription and NIST's SI Units guidance.

QUESTION NO: 5

Which observations during a supervised exercise session warrant stopping activity and assessing the client further?

A. New chest discomfort

B. Pallor with near-syncope

C. Sudden confusion or loss of coordination

D. Expected local muscle fatigue near the end of a set

E. A request for a planned water break

ANSWER: A B C

Explanation:

New chest discomfort, signs of poor perfusion, and sudden neurologic symptoms warrant immediate cessation of exercise and further assessment. Pallor, cyanosis, ataxia, confusion, or near-syncope can indicate inadequate perfusion or another serious acute problem. New chest discomfort may reflect myocardial ischemia or another urgent condition. Mild expected muscle fatigue alone does not necessarily require emergency action, but the exercise professional should modify or end activity when technique or safety is compromised. See ACSM's Guidelines for Exercise Testing and Prescription.

QUESTION NO: 6

Chronic soreness and fatigue are symptoms of

A. Hyperglycemia.

B. Strain.

C. Overuse injury.

D. Hypoglyeemia.

ANSWER: C

Explanation:

Chronic soreness and fatigue are symptoms of an overuse injury. Overuse injuries develop when repeated exercise or sport-specific loading exceeds the body's capacity to recover and adapt. Rather than resulting from one identifiable traumatic event, they typically emerge gradually as cumulative stress affects muscles, tendons, bones, or other tissues. Persistent soreness that does not resolve with usual recovery, along with unusual fatigue or declining ability to tolerate normal training, should prompt an exercise professional to reduce or modify the aggravating activity and assess contributing factors such as abrupt increases in training volume, intensity, frequency, inadequate rest, biomechanics, equipment, and nutrition. Early recognition is important because continued repetitive loading can turn a mild tissue irritation into a more significant injury and prolong recovery. ACSM guidance emphasizes appropriate progression and recovery as central components of safe exercise programming, particularly when clients report persistent symptoms. For additional context on the effects of excessive training load and inadequate recovery, see the ACSM consensus statement on overtraining at Medicine & Science in Sports & Exercise and ACSM's exercise guidance at ACSM Physical Activity Guidelines resources.

QUESTION NO: 7

The clinical exercise physiologist shares a responsibility to

A. Implement measures to stop disease.

B. Make patients look healthy.

C. Implement preventive measures to reduce the risk of medical emergencies.

D. Develop a plan to reduce the physical demands of exercise testing.

ANSWER: C

Explanation:

Implement preventive measures to reduce the risk of medical emergencies is correct because ensuring safety is a core shared responsibility of the clinical exercise physiologist when conducting exercise testing, prescribing exercise, and supervising activity in clinical populations. This role includes applying appropriate preparticipation screening procedures,

identifying symptoms or clinical findings that require medical evaluation, selecting suitable testing protocols, monitoring physiologic and subjective responses during activity, and following established test termination and emergency-response procedures. Prevention also requires maintaining an environment with appropriate emergency policies, equipment, communication processes, and trained personnel. These measures help reduce the likelihood of adverse events and support prompt, coordinated action should an emergency occur. The responsibility is shared with the supervising physician or other qualified health care providers, facility leadership, and the broader clinical team; however, the clinical exercise physiologist has a direct professional duty to recognize risks within the exercise setting and implement applicable safeguards. This safety-focused scope is particularly important because clinical exercise physiologists work with individuals who may have cardiovascular, pulmonary, metabolic, orthopedic, neurologic, or other chronic conditions. ACSM identifies safe assessment, exercise programming, monitoring, and emergency preparedness as essential elements of professional exercise practice. See ACSM's Clinical Exercise Physiologist certification overview and its Guidelines for Exercise Testing and Prescription.

QUESTION NO: 8

Which actions are appropriate when an exercise physiologist is supervising a client with treated hypertension who is beginning resistance training?

A. Use controlled breathing throughout each repetition.

B. Begin with moderate loads and progress gradually.

C. Encourage breath holding during the sticking point.

D. Monitor blood pressure response when clinically indicated.

E. Use maximal lifts as the initial training load.

ANSWER: A B D

Explanation:

Using controlled breathing and avoiding a Valsalva maneuver, beginning with moderate loads, and monitoring blood pressure response are appropriate. Breath holding during lifting can produce marked transient elevations in blood pressure. Initial resistance exercise should emphasize proper technique, a manageable load, and gradual progression. Blood pressure should be monitored as clinically indicated, particularly when hypertension is not well controlled or medication changes are recent. Exercise should be deferred and medical follow-up obtained when resting blood pressure is severely elevated. See ACSM's Guidelines for Exercise Testing and Prescription and the American Heart Association guidance on physical activity and blood pressure.

QUESTION NO: 9

A 70-kg client pedals a mechanically braked cycle ergometer at 50 $rev \cdot min^{-1}$ against a resistance of 2.0 kg. The flywheel distance is 6 $m \cdot rev^{-1}$. Using the ACSM leg-cycle equation, what is the estimated oxygen uptake?

A. 16.4 $mL \cdot kg^{-1} \cdot min^{-1}$

B. 22.4 $mL \cdot kg^{-1} \cdot min^{-1}$

C. 30.1 $mL \cdot kg^{-1} \cdot min^{-1}$

D. 37.9 $mL \cdot kg^{-1} \cdot min^{-1}$

ANSWER: B

Explanation:

22.4 $mL \cdot kg^{-1} \cdot min^{-1}$ is correct. Work rate is 2.0 kg × 6 $m \cdot rev^{-1}$ × 50 $rev \cdot min^{-1}$ = 600 $kg \cdot m \cdot min^{-1}$. Using the ACSM leg-cycle equation, VO_2 = 7 + (1.8 × work rate/body mass), gives 7 + (1.8 × 600/70) = 22.4 $mL \cdot kg^{-1} \cdot min^{-1}$. The 7 $mL \cdot kg^{-1} \cdot min^{-1}$

component accounts for resting and unloaded cycling oxygen cost. See ACSM's Guidelines for Exercise Testing and Prescription.

QUESTION NO: 10

Which findings are commonly associated with hypoglycemia during or shortly after exercise?

A. Diaphoresis

B. Shakiness

C. Confusion

D. Warm, dry skin

E. Progressive thirst and polyuria

ANSWER: A B C

Explanation:

Diaphoresis, shakiness, and confusion are common manifestations of hypoglycemia. Adrenergic symptoms may include sweating, tremor, palpitations, and hunger, while neuroglycopenic symptoms may include confusion, visual changes, and altered behavior. If a conscious client can swallow safely, exercise should be stopped and fast-acting carbohydrate should be provided according to the individual's diabetes plan. The American Diabetes Association provides guidance on recognition and treatment of low blood glucose.

QUESTION NO: 11

A client with stable exertional angina has been medically cleared for supervised exercise. Which practices are appropriate when planning the aerobic exercise session?

A. Use an extended warm-up and cool-down.

B. Monitor symptoms and perceived exertion during exercise.

C. Initially prescribe exercise below the known anginal threshold.

D. Encourage the client to continue through mild angina to improve tolerance.

E. Use only age-predicted maximal heart rate to set intensity.

ANSWER: A B C

Explanation:

Appropriate practices include using an extended warm-up and cool-down, monitoring symptoms and perceived exertion along with heart rate, and initially maintaining exercise intensity below the ischemic or anginal threshold identified during clinical evaluation. When an ischemic threshold is known, exercise intensity is commonly prescribed at least 10 beats·min^{-1} below the heart rate at which angina or ischemic ECG changes occurred. A gradual warm-up can reduce abrupt increases in myocardial oxygen demand. Exercise should be stopped if angina occurs, and the facility's established emergency procedures should be followed if symptoms do not resolve promptly with rest or according to the participant's medical plan. ACSM discusses exercise programming considerations for cardiovascular disease in Guidelines for Exercise Testing and Prescription.