Advanced Exercise Science Proficiency

Exercise Science · Answer Key · 12 Questions

1. Which specific protein filament is primarily responsible for the 'power stroke' during the sliding filament theory of muscle contraction?

A) Tropomyosin
B) Troponin
C) Myosin
D) Actin

2. In the context of cardiac output, which hormone is the primary catecholamine released by the adrenal medulla to increase heart rate during acute exercise?

A) Epinephrine
B) Cortisol
C) Aldosterone
D) Glucagon

3. The 'Bohr Effect' describes the shift of the oxygen-hemoglobin dissociation curve to the right, which is primarily caused by which factor during intense exercise?

A) Increased pH
B) Decreased PCO2
C) Decreased body temperature
D) Increased hydrogen ion concentration

4. Which muscle fiber type is characterized by high mitochondrial density, high capillary density, and a high concentration of myoglobin?

A) Type IIx
B) Type I
C) Type IIa
D) Type IIb

5. What is the primary function of the Golgi tendon organ (GTO) in the human musculoskeletal system?

A) Detecting muscle length
B) Detecting muscle tension
C) Initiating the stretch reflex
D) Inhibiting antagonist muscles

6. During steady-state aerobic exercise, which metabolic pathway provides the majority of ATP for muscle contraction?

A) Phosphagen system
B) Anaerobic glycolysis
C) Beta-oxidation
D) Oxidative phosphorylation

7. Which anatomical plane divides the body into superior and inferior segments?

A) Sagittal
B) Frontal
C) Transverse
D) Coronal

8. What is the rate-limiting enzyme in the process of glycolysis?

A) Hexokinase
B) Phosphofructokinase
C) Pyruvate kinase
D) Lactate dehydrogenase

9. Which sensory receptor is specifically sensitive to rapid changes in muscle length and contributes to the monosynaptic stretch reflex?

A) Pacinian corpuscle
B) Muscle spindle
C) Meissner corpuscle
D) Free nerve ending

10. In the Frank-Starling mechanism, an increase in end-diastolic volume leads to an increase in stroke volume primarily due to what change?

A) Increased myocardial contractility
B) Increased venous return and sarcomere stretch
C) Decreased afterload
D) Reduced peripheral resistance

11. Which mineral is essential for the binding of troponin to tropomyosin to allow for actin-myosin cross-bridge formation?

A) Magnesium
B) Sodium
C) Calcium
D) Potassium

12. What is the term for the maximal amount of oxygen that can be consumed per minute during exhaustive physical activity?

A) Ventilatory threshold

B) VO2 max

C) Oxygen deficit

D) EPOC