Advanced Human Physiology in Sports Medicine

Sports Medicine · Answer Key · 12 Questions

1. Which specific zone of the articular cartilage is characterized by the highest concentration of proteoglycans and the lowest concentration of collagen?

A) Superficial zone
B) Middle zone
C) Deep zone
D) Calcified zone

2. What is the primary physiological mechanism that causes 'delayed onset muscle soreness' (DOMS) after strenuous eccentric exercise?

A) Lactic acid accumulation in muscle fibers
B) Microscopic damage to sarcomeres and subsequent inflammatory response
C) Depletion of muscle glycogen stores
D) Inadequate ATP production in the mitochondria

3. In the context of tendon histology, which cell type is primarily responsible for the synthesis and maintenance of the extracellular matrix?

A) Osteoblasts
B) Tenocytes
C) Chondrocytes
D) Myofibroblasts

4. Which physiological adaptation is primarily responsible for the increased maximal oxygen uptake (VO2 max) observed in elite endurance athletes?

A) Increased lung vital capacity
B) Increased stroke volume
C) Decreased hemoglobin concentration
D) Reduced capillary density

5. The 'Female Athlete Triad' is clinically defined by the interrelationship of which three specific medical conditions?

A) Osteoporosis, amenorrhea, and disordered eating
B) Anemia, hypertension, and fatigue
C) Scoliosis, asthma, and depression
D) Hypoglycemia, syncope, and dehydration

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6. During a maximal effort sprint, which fuel source provides the majority of ATP energy within the first 10 seconds of activity?

A) Blood glucose
B) Muscle glycogen
C) Creatine phosphate
D) Free fatty acids

7. Which anatomical structure is the primary restraint to anterior translation of the tibia on the femur?

A) Posterior cruciate ligament
B) Anterior cruciate ligament
C) Medial collateral ligament
D) Lateral meniscus

8. What is the term for the physiological state where a muscle remains in a state of sustained contraction due to rapid, successive neural impulses?

A) Tetanus
B) Isotonic contraction
C) Hypertrophy
D) Atrophy

9. Which hormone is predominantly responsible for the stimulation of erythropoiesis in response to hypoxic stress encountered during high-altitude training?

A) Cortisol
B) Erythropoietin
C) Insulin-like growth factor 1
D) Thyroxine

10. In cardiac physiology, what is the 'Frank-Starling mechanism' as it relates to athletic performance?

A) The regulation of blood pressure by the carotid sinus
B) The increase in stroke volume due to increased end-diastolic ventricular stretch
C) The decrease in heart rate due to vagal tone increase
D) The strengthening of heart valves through exercise

11. Which type of collagen is the most abundant component found in the healthy, mature human tendon?

A) Type I
B) Type II
C) Type III
D) Type IV

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12. What physiological process describes the reduction in muscle force production capacity following prolonged exposure to high ambient temperatures during exercise?

A) Thermal muscle fatigue
B) Metabolic alkalosis
C) Hyperthermic cardiovascular drift
D) Peripheral nervous system inhibition

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