Name: _____ **Date:** _____

How Does Cellular Respiration Power Performance? 12th Grade Physiology Quiz

Bioenergetic stoichiometry, the sliding filament theory, and lactate threshold dynamics — essential concepts for analyzing human athletic potential.

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1. During a high-intensity cycling interval above the functional threshold power (FTP), what is the primary cause of muscular fatigue in the quadriceps as acidosis increases?

A. Depletion of subcutaneous adipose tissue
B. Interruption of calcium ion binding to troponin due to H+ accumulation
C. Excessive intake of atmospheric nitrogen
D. The conversion of glucose into pyruvate via the Krebs Cycle

2. The Frank-Starling Mechanism explains how an increase in left ventricular end-diastolic volume leads to a more forceful cardiac contraction.

A. True
B. False

3. The specific training adaptation characterized by an increase in the number and size of mitochondria within Type I muscle fibers is known as ___.

A. Mitochondrial biogenesis
B. Sarcoplasmic hypertrophy
C. The Bohr Effect
D. Myofibrillar splitting

4. Which enzyme acts as the 'rate-limiting' step during the fast glycolytic pathway, inhibiting energy production if pH drops significantly?

A. Creatine Kinase
B. Lactate Dehydrogenase
C. Phosphofructokinase (PFK)
D. Adenylate Cyclase

5. During the 'Oxygen Deficit' phase at the onset of exercise, the body primarily relies on ___ to meet energy demands before reaching a steady state.

A. Beta-oxidation of lipids
B. The aerobic TCA cycle
C. Phosphagen and fast glycolytic systems
D. Gluconeogenesis in the liver

6. Excess Post-exercise Oxygen Consumption (EPOC) remains elevated longer after a low-intensity walk than after a high-intensity interval session.

A. True

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B. False

7. An elite marathoner likely displays a 'right shift' in their Lactate Threshold curve. What does this indicate about their physiological profile?

A. They reach fatigue earlier in the race
B. They have a higher percentage of Type IIx fibers
C. They can maintain higher speeds without significant blood lactate accumulation
D. Their body prefers protein as a primary fuel source

8. The physiological phenomenon where hemoglobin's affinity for oxygen decreases in the presence of high CO_2 and low pH is called the ___.

A. Bohr Effect
B. Haldane Effect
C. Q10 Effect
D. Size Principle

9. Hypertrophy of the left ventricle is a common chronic adaptation in endurance athletes, resulting in increased stroke volume.

A. True
B. False

10. Which of the following describes the 'Size Principle' of motor unit recruitment during a progressively heavy lift?

A. Large motor units are recruited first to save energy
B. Smaller, fatigue-resistant units are recruited before larger, high-force units
C. Motor units are recruited in a random order based on hormone levels
D. The size of the muscle determines the speed of the nerve impulse