

NCSF ACPT Section II: Exercise Physiology Practice Exam (Sample)

Study Guide



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SAMPLE

Questions

- 1. What adaptive responses occur in the vascular system as a result of endurance training?**
 - A. Decreased blood vessel diameter**
 - B. Increased blood vessel diameter and improved blood flow**
 - C. Reduced capillary density**
 - D. Lower overall blood volume**
- 2. What happens to insulin sensitivity with regular aerobic exercise?**
 - A. It worsens**
 - B. It remains unchanged**
 - C. It improves**
 - D. It fluctuates wildly**
- 3. What effect does regular exercise have on muscular endurance?**
 - A. It decreases muscular endurance**
 - B. It has no effect on endurance**
 - C. It enhances muscular endurance**
 - D. It only benefits aerobic performance**
- 4. What exercise would be most beneficial for promoting strength gains in the legs?**
 - A. Walking lunge (12RM)**
 - B. Overhead squat (15RM)**
 - C. Vertical jump (1RM)**
 - D. Leg press (6RM)**
- 5. What is the primary physiological reason for muscle soreness after intense exercise?**
 - A. Lactic acid accumulation**
 - B. Micro-tears in muscle fibers leading to inflammation**
 - C. Excessive hydration**
 - D. Increased muscle temperature**

- 6. Which type of muscle fiber is largest in diameter and has the greatest potential for increases in size?**
- A. Type I**
 - B. Type IIa**
 - C. Type IIb**
 - D. Slow twitch**
- 7. How does regular exercise impact oxidative stress levels during workouts?**
- A. It increases oxidative stress**
 - B. It has no effect**
 - C. It reduces oxidative stress**
 - D. It fixes systemic inflammation**
- 8. How do antioxidants benefit individuals engaging in exercise?**
- A. Enhance muscle growth**
 - B. Mitigate oxidative stress**
 - C. Boost energy expenditure**
 - D. Increase body fat**
- 9. What is the primary source of energy for short-duration, high-intensity activities?**
- A. Fats**
 - B. Aerobic glycolysis**
 - C. Phosphocreatine (PCr) and anaerobic glycolysis**
 - D. Glycogen**
- 10. What is the primary energy source utilized during high-intensity exercise?**
- A. Fat oxidation**
 - B. Aerobic metabolism**
 - C. Anaerobic glycolysis**
 - D. Creatine phosphate**

Answers

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1. B
2. C
3. C
4. D
5. B
6. C
7. C
8. B
9. C
10. C

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Explanations

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1. What adaptive responses occur in the vascular system as a result of endurance training?

A. Decreased blood vessel diameter

B. Increased blood vessel diameter and improved blood flow

C. Reduced capillary density

D. Lower overall blood volume

Endurance training leads to significant adaptations in the vascular system, primarily characterized by increased blood vessel diameter and improved blood flow. This response occurs due to the enhanced ability of the body to generate new blood vessels, a process known as angiogenesis. As individuals engage in regular endurance activities, their cardiovascular system adapts by enlarging existing blood vessels and forming new capillaries, which facilitates more efficient oxygen and nutrient delivery to working muscles. Larger blood vessels can accommodate greater volumes of blood with each heartbeat, thereby allowing for improved circulation during prolonged physical activity. This adaptation also helps to lower the workload on the heart, as a more efficient vascular system means that the heart does not need to pump as hard to deliver the same amount of oxygenated blood to the tissues. Furthermore, improved blood flow enhances a person's ability to sustain prolonged exercise, ultimately benefiting endurance performance. The other options indicate changes that do not typically occur with endurance training. For instance, a decreased blood vessel diameter would not support improved blood flow, nor would a reduction in capillary density, which could impede oxygen delivery and overall muscle function. Lastly, lower overall blood volume would negatively impact the circulatory system's ability to function effectively during sustained efforts. Thus, the correct answer highlights the beneficial adaptations

2. What happens to insulin sensitivity with regular aerobic exercise?

A. It worsens

B. It remains unchanged

C. It improves

D. It fluctuates wildly

Regular aerobic exercise leads to improvements in insulin sensitivity, which means that the body becomes more effective at using insulin to transport glucose from the bloodstream into the cells. During aerobic exercise, muscle contractions help to facilitate glucose uptake irrespective of insulin signaling. Over time, consistent aerobic activity enhances the muscle's ability to respond to insulin, contributing to better blood sugar management. When engaging in regular aerobic exercise, physiological adaptations occur, such as increased glucose transporter (GLUT4) translocation to the cell membranes of muscle tissue and enhanced metabolic pathways that utilize glucose. These changes not only assist in lowering blood glucose levels post-exercise but also contribute to improved overall metabolic health. Improved insulin sensitivity reduces the risk of developing insulin resistance and type 2 diabetes, highlighting the significant benefits of incorporating aerobic exercise into a regular fitness routine.

3. What effect does regular exercise have on muscular endurance?

- A. It decreases muscular endurance**
- B. It has no effect on endurance**
- C. It enhances muscular endurance**
- D. It only benefits aerobic performance**

Regular exercise is known to significantly enhance muscular endurance. This improvement occurs as the body adapts to the physical demands placed on it during training. When individuals engage in exercise, especially resistance and strength training, muscle fibers undergo physiological changes. These include increased capillary density, improved metabolic support, and a better capacity for energy production through aerobic pathways. As a person consistently participates in exercise, the muscles become more adept at performing repeated contractions over an extended period. Regular training leads to adaptations that allow muscles to sustain performance while resisting fatigue. This is crucial for various activities, ranging from sports to daily tasks, where prolonged exertion is required. The enhancements seen with regular exercise contribute not only to improvements in overall endurance but also to better performance in specific activities requiring sustained muscle engagement. Therefore, the assertion that regular exercise enhances muscular endurance is well-supported by research in exercise physiology.

4. What exercise would be most beneficial for promoting strength gains in the legs?

- A. Walking lunge (12RM)**
- B. Overhead squat (15RM)**
- C. Vertical jump (1RM)**
- D. Leg press (6RM)**

The leg press at a 6-repetition maximum (6RM) is particularly effective for promoting strength gains in the legs due to several key factors. First, this exercise allows for an emphasized focus on the major muscle groups in the lower body, including the quadriceps, hamstrings, and glutes, by providing a stable and controlled environment for lifting heavier weights. The lower repetition range combined with a high load encourages maximal muscle recruitment and strength adaptation. Additionally, when performing leg press variations, individuals can safely handle heavier weights compared to other exercises, which often involves bodyweight or lighter loads. This capability is significant for stimulating muscle hypertrophy and strength since high-intensity training is critical for developing maximal strength. In contrast, the other exercises present different benefits but may not provide the same degree of strength-specific adaptations. The walking lunge, while beneficial for functional strength and balance, typically involves lighter loads and is more focused on endurance and stability. The overhead squat, although effective for improving mobility and strength endurance, might not allow for maximal strength development compared to the higher-load leg press. The vertical jump primarily targets explosive power and plyometric ability rather than focusing on strength gains across the full range of motion or duration required for the development of maximal leg strength.

5. What is the primary physiological reason for muscle soreness after intense exercise?

A. Lactic acid accumulation

B. Micro-tears in muscle fibers leading to inflammation

C. Excessive hydration

D. Increased muscle temperature

The primary physiological reason for muscle soreness after intense exercise is micro-tears in muscle fibers leading to inflammation. When muscles are subjected to intense activity, particularly when performing eccentric movements (where muscles lengthen under tension), small tears can occur in the muscle fibers. This process is a normal and necessary response to exercise, as it helps to stimulate muscle repair and growth. As these micro-tears occur, they trigger an inflammatory response. The body sends various biochemical signals to the injured area, which leads to increased blood flow and the activation of the immune system to help repair the damage. This repair process contributes to the sensation of muscle soreness known as delayed onset muscle soreness (DOMS), which typically peaks 24 to 72 hours after exercise. Contrarily, lactic acid accumulation can occur during intense exercise and may lead to temporary muscle fatigue, but it is not the primary cause of soreness after the fact, as lactic acid is generally cleared from the muscles relatively quickly after exercise. Excessive hydration does not contribute to muscle soreness and, in fact, proper hydration is important for muscle function and recovery. Similarly, while increased muscle temperature occurs during exercise, this is a normal physiological response, and does not directly relate to post-exercise muscle soreness.

6. Which type of muscle fiber is largest in diameter and has the greatest potential for increases in size?

A. Type I

B. Type IIa

C. Type IIb

D. Slow twitch

The largest muscle fiber type in terms of diameter, with the greatest potential for increases in size, is Type IIb fibers. These fibers are also known as fast-twitch fibers, and they are characterized by their ability to generate rapid and powerful contractions. Their larger diameter allows for a greater cross-sectional area, which is directly linked to the potential for muscle growth or hypertrophy. Type IIb fibers contain a higher concentration of myofibrils, which are the contractile elements of muscle cells, along with a greater amount of glycogen, supporting fast and explosive movements. As these fibers are engaged in high-intensity, short-duration activities like sprinting or lifting heavy weights, they respond well to resistance training, leading to significant increases in size and strength. In contrast, Type I fibers (slow-twitch) are smaller in diameter and are more endurance-oriented, which means they are more efficient at using oxygen but have a much lower potential for growth. Type IIa fibers, often referred to as intermediate fibers, can also grow but do not reach the same hypertrophic potential as Type IIb fibers due to their mixed characteristics and adaptation to both endurance and strength activities. Slow-twitch fibers, associated with endurance tasks, also do not contribute significantly to

7. How does regular exercise impact oxidative stress levels during workouts?

- A. It increases oxidative stress
- B. It has no effect
- C. It reduces oxidative stress**
- D. It fixes systemic inflammation

Regular exercise plays a significant role in reducing oxidative stress levels, particularly during workouts. When individuals engage in physical activity, their bodies experience an increase in oxygen consumption and metabolic rate, which can initially lead to an increase in the production of reactive oxygen species (ROS). However, with consistent exercise, the body adapts. This adaptation includes improvements in mitochondrial function and an increase in the antioxidant defense systems. The enhanced antioxidant capacity helps to combat oxidative stress by neutralizing the excess ROS that may be generated during intense or prolonged activity. Furthermore, regular physical activity stimulates the production of endogenous antioxidants, such as glutathione, which further aids in reducing oxidative damage. Additionally, while intense and prolonged exercise may temporarily increase oxidative stress, regular training leads to overall improved resilience, allowing the body to manage oxidative stress more effectively over time. Thus, the fitness benefits of regular exercise extend beyond just physical conditioning; they also include significant biochemical adaptations that lead to reduced oxidative stress levels during workouts.

8. How do antioxidants benefit individuals engaging in exercise?

- A. Enhance muscle growth
- B. Mitigate oxidative stress**
- C. Boost energy expenditure
- D. Increase body fat

Antioxidants play a significant role in the health and performance of individuals who engage in exercise by mitigating oxidative stress. During physical activity, especially intense or prolonged exercise, the body generates free radicals, which are unstable molecules that can cause cellular damage. This process, known as oxidative stress, can lead to fatigue and a longer recovery time, ultimately hindering performance and overall health. Antioxidants help neutralize these free radicals, reducing their potential harmful effects on cells and tissues. This neutralization can contribute to improved recovery following exercise, enhanced immune function, and a lower risk of injuries associated with oxidative damage. By combating oxidative stress, antioxidants allow for better performance during workouts and quicker recovery between training sessions, making them crucial for athletes and fitness enthusiasts alike. The other options—enhancing muscle growth, boosting energy expenditure, and increasing body fat—do not accurately reflect the primary function of antioxidants in the context of exercise and athletic performance.

9. What is the primary source of energy for short-duration, high-intensity activities?

A. Fats

B. Aerobic glycolysis

C. Phosphocreatine (PCr) and anaerobic glycolysis

D. Glycogen

The primary source of energy for short-duration, high-intensity activities is phosphocreatine (PCr) and anaerobic glycolysis. During these types of activities, such as sprinting or heavy weightlifting, the body relies heavily on immediate energy systems that can provide ATP (adenosine triphosphate) quickly, without the need for oxygen. Phosphocreatine serves as a rapidly available energy reserve in muscles. It donates a phosphate group to ADP to regenerate ATP, allowing for sustained muscular contraction during high-intensity efforts lasting about 10 seconds. Once the phosphocreatine stores are depleted, the body shifts to anaerobic glycolysis, which breaks down glucose without the need for oxygen. This process is also capable of producing ATP quickly, although it produces lactic acid as a byproduct, which can lead to fatigue. In contrast, fats and aerobic glycolysis are utilized primarily during longer-duration, lower-intensity activities where the body can efficiently process oxygen and relies on sustained energy production. Glycogen is stored glucose that can be utilized during both aerobic and anaerobic activities, but in the context of immediate short, high-intensity efforts, it is the pathways of phosphocreatine and anaerobic glycolysis

10. What is the primary energy source utilized during high-intensity exercise?

A. Fat oxidation

B. Aerobic metabolism

C. Anaerobic glycolysis

D. Creatine phosphate

During high-intensity exercise, the primary energy source comes from anaerobic glycolysis. This metabolic process occurs in the absence of sufficient oxygen and is crucial for activities that require quick bursts of energy, such as sprinting or heavy lifting. Anaerobic glycolysis breaks down glucose or glycogen into pyruvate, resulting in the production of ATP (adenosine triphosphate), which is the immediate energy currency utilized by muscles during such intense efforts. The nature of high-intensity exercise creates a demand for rapid energy production, which anaerobic glycolysis provides because it can generate ATP much more quickly than aerobic processes. However, it is important to note that this pathway results in the accumulation of lactic acid, which can lead to muscle fatigue if high-intensity efforts continue for extended periods. In contrast, fat oxidation and aerobic metabolism are more efficient for energy production but occur at lower intensities where there is sufficient oxygen to support those processes. Creatine phosphate, while critical for immediate energy supply, primarily supports the first few seconds of high-intensity activity before the body transitions to anaerobic glycolysis for sustained efforts. Therefore, during prolonged high-intensity activities, anaerobic glycolysis remains the key source of energy.