DISCUSSION

A. Objective Questions

1. During prolonged exercise, the preferred energy source for skeletal muscle is:

a. Plasma glucose

b. Plasma fatty acids

c. Muscle triglycerides

d. Muscle glycogen

2. In athletes, physical fitness is more closely correlated with

a. Maximal oxygen uptake than with resting oxygen uptake

b. Maximal pulse rate than with resting pulse rate

c. Maximal minute ventilation than with maximal cardiac output

d. Blood oxygen saturation than with blood lactate level during strenuous exercise

e. Resting vagal tone than with resting sympathetic tone to the heart

3. The muscle fibers adapted to endurance running

a. Are classified as slow rather than fast.

b. Have a relatively high myoglobin content.

c. Are red rather than white

d. Have a relatively high mitochondria content.

e. Are classified as anaerobic rather than aerobic.

4. The oxygen consumed per minute

a. Is greater than the carbon dioxide produced per minute during long distance running.

b. In the resting adult is nearer 100 than 150 ml.

c. During intense mental activity can rise to twice the resting level.

d. During brisk walking is nearer five times than twice the resting level.

e. In an Olympic athlete can rise to 50 litters.

5. The increase in blood flow to muscle in an exercising limb is related to a rise in

a. Local PCO2

b. Local H concentration

c. Local muscle temperature

d. Arterial pressure

e. Vasodilator nerve activity

6. During muscular training

a. Neural control factors improve performance before there is evidence of skeletal muscle hypertrophy.

b. Repeated stretching of skeletal muscle fibers leads to their hypertrophy.

c. There is a gradual decrease in the size of the heart in diastole.

d. There is a gradual increase in the O2 extraction rate from blood perfusing exercising skeletal muscle.

e. The increase in skeletal muscle blood flow for a given work load decreases.

7. Blood lactic acid is

a. Normally undetectable in resting subjects

b. A product of anaerobic metabolism

c. Increased by a 100-metre dash

d. Not increased during steady state running in a marathon race

e. Raised to about 5–10 moles/liter during maximal exercise

8. Isotonic (dynamic) exercise differs from isometric (static) exercise in that there is less

a. Increase in systolic arterial pressure.

b. ncrease in diastolic arterial pressure.

c. Assistance to the circulation by the muscle pump

d. Use of slow-twitch muscle fibers

e. Reliance on anaerobic glycolysis

9. Electrocardiological danger signs during incremental treadmill exercise include

a. A heart rate equal to the maximal predicted for the person's age.

b. An R-R interval of about 500 milliseconds.

c. R waves with an amplitude greater than one milliVolts.

d. Ventricular tachycardia

e. ST depression of one millimetre

10. Exercising in a hot chamber may induce

a. Fainting due to a decreased total peripheral resistance

b. Heat stroke when core temperature rises above 40° C.

c. A rise in alveolar PCO2

d. A decrease in the osmolality of extracellular fluid

e. Heat adaptation if performed daily for several weeks

That part of the body containing the viscera, ie the kidneys, liver, stomach, and intestines; separated from the thorax by the diaphragm.

Answers

1. (b) plasma fatty acid

2.

   A. True

   B. False

   C. False

   D. False

   E. True

3.

   A. True

   B. True

   C. True

   D. True

   E. False

4.

   A. True

   B. False

   C. False

   D. True

   E. False

5.

   A. True

   B. True

C. True

D. False

E. False

6.

A. True

B. True

C. False

D. True

E. True

7.

A. False

B. True

C. True

D. False

E. False

8.

A. False

B. True

C. False

D. False

E. True

9.

A. False

B. False

C. False

D. True

E. False

10.

A. True

B. True

C. False

D. False

E. True

B. Question and Descriptive Answers

1. What is the name of the neurotransmitter in the process of muscular contraction?

Muscle contraction begins when the nervous system generates a signal. The signal, an impulse called an action potential, travels through a type of nerve cell called a motor neuron. The chemical message, a neurotransmitter called acetylcholine, binds to receptors on the outside of the muscle fiber.

2. What steps are involved in neuromuscular transmission?

Steps in neuromuscular transmission: 1) nerve action potential. 2) calcium entry into the presynaptic terminus. 3) release of Ach quanta. 4) diffusion of Ach across cleft. 5) combination of Ach with post-synaptic receptors and Ach breakdown via esterase. 6)

opening of Na+/K+ channels (cation channels).

3. **During a muscular contraction, the myosin filaments pull the actin filaments closer together. This brings what closer together?**

   During muscle contraction, each sarcomere shortens, bringing the Z discs closer together. Muscle contraction thus results from an interaction between the actin and myosin filaments that generates their movement relative to one another.

4. **What is covering the binding site for the myosin head to attach on the actin filament?**

   The protein tropomyosin winds around the thin filaments and covers the myosin binding sites. At regular intervals along the tropomyosin cable sit troponin molecules. The myosin head attaches to the binding site on the actin filament. In addition, it binds ATP, acting as an enzyme to transfer energy from ATP.

5. **What energy system is used in a 100m sprint?**

   Crowder et al. (1992) estimates that during sprint events approximately 95% of energy production comes via the anaerobic system (85% phosphate, 10% lactic acid), and only 5% from aerobic oxygen. Thus, the 100m sprint is an anaerobic event relying heavily on energy supply from the ATP-PC system

6. **What energy system is used in a marathon?**

   Aerobically the body can create energy for running through the

use of glucose and fats in the presence of oxygen. This is known as aerobic glycolysis. The aerobic energy system is primarily used in distance running. Typically running events such as the 10km to ultra-marathon events are run aerobically.

7. Write about Major three system of energy?

a. Anaerobic – Phosphocreatine (PCr) System (ATP; triphosphate, as in three phosphates)

The first phase is called the ATP- CPr (Adenosine Triphosphate)- (Phosphocreatine) system. ATP is stored in all cells, particularly muscles. It is the only system that doesn't require a blood supply and has no by products. As a result, the ATP-PCr system can provide a lot of energy quickly but only for immediate and short (10s) maximum intensity efforts.

b. Glycolytic or Lactic Acid System

The next major phase is called the Lactic (LA) system. After the 20 seconds of the ATP-PCr system, the body requires another ingredient– muscle glycogen (glucose) to be added to continue. his system breaks down carbohydrate, a fuel in limited supply in the body, to produce medium amounts of power for medium amounts of time. The body's stores around 500 grams worth of carbohydrate in the tissues of the liver and muscles in the form of glycogen.The energy is produced without oxygen using carbohydrate > sugar > glucose > glycogen > ATP.

Its by-product, lactic acid, comes from the breakdown of the glucose released from the muscles. Most cyclists have heard

of lactate or lactic acid. Lactate is not a waste product but is actually an important part of anaerobic and aerobic metabolism.

c. Aerobic System

The third system is the Oxidative phase. By using oxygen to fuel the breakdown of carbohydrates first, free fatty acids second and if the exercise continues long enough - protein. Whereas, the previous systems have related to higher intensity work (or power) the aerobic system is more for moderate or low intensity work, but of longer duration. It is only able to produce a relatively small amount of energy, so cannot produce enough energy for any sprinting, but can produce power for extended periods of time.

8. What covers the myosin binding site on actin?

There are two main proteins that regulate actin and myosin interactions: tropomyosin and troponin. Tropomyosin is a long strand that loops around the actin chains in the thin filament. By covering the myosin-binding sites of the actin molecules, tropomyosin prevents muscle contraction.

9. What does an exercise physiologist do?

Exercise physiologists analyze their patients' fitness in order to help them improve their health or maintain good health. They help patients with heart disease and other chronic conditions, like diabetes or pulmonary (lung) disease, to regain their health.

A sports physiologist is a type of exercise physiologist that works

strictly with athletes in order to progress or maintain overall health, fitness, performance and endurance.

10. What is ergonomics?

The study of people's efficiency in their working environment.

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