

Physiology essay

[Science](#), [Biology](#)



Muscles are responsible for all conscious and unconscious movement. It is how we move and react to an environment. There are three types of muscles in the body include the skeletal muscle, smooth muscle, and the cardiac muscle. Whether you are running, walking, breathing, eating, sleeping, or typing it all involves some sort of muscle action. Muscle cells that shape, form, and outline the whole human skeleton is called a muscle fibers. There are two types of muscle fibers: Type I (slow-twitching fibers) and Type II (fast-twitching fibers).

“ The slow muscles are more efficient at using oxygen to generate more fuel (known as ATP) for continuous, extended muscle contractions over a long time. They fire more slowly than fast twitch fibers and can go for a long time before they fatigue. ” (Quiin, 2013) The slow-twitching fibers utilizes an oxidation energy system, or ability to require more oxygen in creating fuel for the muscles, that allows long distance runners to finish a marathon as long as they can. In contrast, Type I muscle fiber is built more for endurance.

“ Fast twitch fibers use anaerobic metabolism to create fuel, they are much better at generating short bursts of strength or speed than slow muscles. However, they fatigue more quickly. Fast twitch fibers generally produce the same amount of force per contraction as slow muscles, but they get their name because they are able to fire more rapidly. ” (Quiin, 2013) Fast-twitching muscles generate energy from the anaerobic energy system, allowing ‘ explosive’ movements for short amount of time before fatigue.

Conclusively, Type II fibers are more for a sprinter or agility movements in periods of two or three minutes. To break it down more, there are two types

of Type II muscle fibers: Type IIa and Type IIb. Type IIa have both characteristics Type I and Type II fiber that consume both anaerobic and aerobic energy systems. And type IIb is more like fast-twitching fibers with its anaerobic energy requirements. When it comes to training certain muscles fiber types, everybody is more differently built with one muscle fiber than the other.

Some are more of a 300-meter sprinter; others are able to run endlessly. Training for a marathon requires a lot of long distance running; training for a 400 meter shuttle sprint will require more short distance runs. No matter what the case is, the only way to improve performance is to keep working on that area; in return builds endurance for that muscle group. In relation to the previous paragraph, muscles require energy to perform. Depending on the muscle fiber type determines which energy system is used.

Adenosine triphosphate, or ATP, is energy that make muscle contraction possible. The energy systems consist of the ATP-PCr system, glycolysis system, and the oxidative system. The ATP-PCr system utilizes stored ATP for quick, ‘ explosive’ movements such as releasing a powerful swing with a baseball bat. The glycolysis system “ provides energy for activities of slightly longer duration and lower intensity like strength training. ” (Hefferman, 2012) And the oxidative system is used for physical activities that perform for a longer period of time, requiring more oxygen.

The first two energy systems are anaerobic, while the third one is aerobic. What all of these systems have in common is they must consume glucose. Glucose is a form of fuel that comes from the foods we eat. Glucose store in the muscles and liver is called glycogen. When the body and muscles need

energy, the glycogen goes through glycolysis; in which is broken down to, once again, glucose. Performing an exercise requires the fuel for the contracting muscles. How does the muscle contract? Reason to contract muscle can be with and without conscious.

On a segment or bundle of muscles are controlled by a neuron in the nervous system. The neuron is made up a cell body (soma), axon, and dendrites. The neuron is referred to as an excitable tissue that transmits signals into nerve impulses. “ A nerve impulse is an electrical signal that travels along an axon. There is an electrical difference between the inside of the axon and its surroundings, like a tiny battery. When the nerve is activated, there is a sudden change in the voltage across the wall of the axon, caused by the movement of ions in and out of the neuron.” (What are nerve impulses)

From contracting muscles to maintaining normal cellular functions, the body requires fuel for energy. Fuel, or calories, is what our body does to metabolize energy. To obtain this fuel, we consume food. Foods we eat made up nutrients and fuel substrates consisting of fat, protein, carbohydrates. Carbohydrates, when broken down, create glucose that is for energy or stored, turns into glycogen, when not in immediate use. Fat is broken down to triglycerides to be used for metabolic energy, and stored as fat when not in immediate use.

Protein breaks down into a form of amino acids when used for energy. Carbohydrates and fat are mainly used for all metabolic needs to generate ATP; protein, in a form of amino acids, goes through lipogenesis for cellular energy needs. In event where all fat and carbohydrates are depleted, protein

is a last resort for ATP. If you ever noticed on a nutrition label printed on a bag or box of food, sometimes you can see the amount of calories per gram that each substrate has.

Carbohydrates and protein stores about four calories per gram, whereas fat contains nine calories per gram; this is one advantage of consuming fat than carbohydrates. Another advantage is fat (triglycerides) can be stored as fat, while carbohydrates require water to form into glycogen for store; this results into water retention (water weight). Disadvantage of fat would be converting into energy (glucose), whereas carbohydrates (glucose) are already broken down and ready to be utilized. This is a reason why marathon runners 'carb load' days prior the event.

Injunction to the first paragraph, the heart is made up of the cardiac muscle. One of the most essential parts of the cardiovascular system, the heart pumps the blood throughout the body transporting oxygen and nutrients to cells. The heart is a very complex organ that consists of " four cavities, or open spaces, inside the heart that fill with blood. Two of these cavities are called atria. The other two are called ventricles. The two atria form the curved top of the heart. The ventricles meet at the bottom of the heart to form a pointed base which points toward the left side of your chest.

The left ventricle contracts most forcefully, so you can best feel your heart pumping on the left side of your chest. " (Unysis) So, the heart pushes the red, oxygen-rich blood from the lungs through the left side of the heart to the rest of the body. As the blood pumps, it delivers the oxygen and flows back to the heart and through the lungs to drop off carbon dioxide and pick up oxygen. To prevent back flow, heart's internal structures comprises of

valves that open and close with every pump of blood. Another essential part of the cardiovascular is blood.

Blood is a fluid containing red blood cells, plasma, antibodies, hormones, enzymes, and nutrients. The purpose of blood consist of transporting oxygen to cells of the body, carry out waste such as carbon dioxide, maintain normal body temperature, and regulate pH levels and hormones. Blood travels through series of vessels. These include arteries (rich-oxygen blood leaving the heart to cells), veins (poor-oxygen blood leaving from the cells through the heart and to the lungs), and capillaries (blood vessel that connects between the veins and arteries). Blood is the life source to sustain life and maintain cellular functions.