

Muscular system: muscle metabolism



**ASSIGN
BUSTER**

Muscular System: Muscle Metabolism 1. List the three roles of ATP in muscle contraction: 1. _Energize the power stroke of the myosin cross bridge. 2. _Disconnecting the myosin head from the binding site on actin at the conclusion of a power stroke. 3. _Energizing the calcium ion pump. 2. The potential energy in ATP is released when the terminal high-energy bond is broken by a process called hydrolysis. Write the end products of this process: $\text{ATP} (+ \text{H}_2\text{O}) \rightarrow \text{ADP}$ 3. Rebuilding ADP into ATP with a new source of energy is carried out by a process called dehydration synthesis.

Write the equation for this process: $\text{ADP} + \text{P}_i \rightarrow \text{ATP} (+ \text{H}_2\text{O})$ 4. List the three processes used to synthesize additional ATP when ATP supplies are low: 1. Hydrolysis of creatine phosphate 2. Glycolysis 3. The Krebs cycle and oxidative phosphorylation 5. An immediate source of energy is creatine phosphate (CP), but the supplies are limited and rapidly depleted. One molecule of CP produces one ATP. 6. Glucose is a major source of energy for synthesizing ATP. List the two sources of glucose: 1. Glucose enters the muscle cell directly from the blood. . Glucose is produced by hydrolysis of glycogen stored in the muscle cell. 7. Glycolysis is the process that breaks down glucose. Name two products of the breakdown of glucose: 1. Two ATP molecules 2. Pyruvic acid If oxygen is not available, pyruvic acid is converted to lactic acid, which is the end product of anaerobic respiration. 8. If oxygen is available, the process is known as ___aerobic_ respiration. Name two sources of oxygen: 1. Oxygen enters the muscle cell directly from the blood. 2. Oxygen is stored in myoglobin, an oxygen-binding protein.

The aerobic pathway consists of glycolysis + krebs cycle + oxidative phosphorylation. The net result of one glucose molecule is 36 ATP. 9. The

process of restoring depleted energy reserves after exercise is called

repaying the oxygen debt. Name four processes that occur during this time:

1. Lactic acid is converted back to pyruvic acid, which enters the Krebs cycle, producing ATP. 2. This ATP is used to rephosphorylate creatine into creatine phosphate. 3. Glycogen is synthesized from glucose molecules. 4. Additional oxygen re-builds to myoglobin. 0. Put the following characteristics under the correct fiber type in the table below:

Krebs cycle and oxidative

phosphorylation uses glycolysis fatigue rapidly high endurance few

capillaries many capillaries much myoglobin little myoglobin long-distance

runners sprinter Krebs cycle and oxidative phosphorylation uses glycolysis

fatigue rapidly high endurance few capillaries many capillaries much

myoglobin little myoglobin long-distance runner sprinter light in color, large

diameter red in color, small diameter Red Slow-Twitch Fibers | White Fast-

Twitch Fibers | | Krebs cycle and oxidative phosphorylation | Uses glycolysis |

| Many capillaries | Little myoglobin | | Red in color, small diameter | Few

capillaries | | High endurance | Light in color, large diameter | | Long-distance

runner | Fatigue rapidly | | Much myoglobin | Sprinter |

BATS NEED A LOT OF SLEEP BECAUSE THEIR HIGH WAKING METABOLISM

PRODUCES