

- g. Step 7: Sarcoplasmic reticulum recaptures Ca^{2+}
 - i. Ca^{2+} is pumped (active transport) back to the SR and the muscle is “relaxed”.
 - h. Step 8: Active sites covered, no cross-bridge interaction
 - i. A new molecule of ATP shows up and binds with the myosin head causing the head to release from actin – the cross bridge breaks down.
 - i. Step 9: Contraction ends
 - j. Step 10: Relaxation occurs, passive return to resting length
- III. Energy Source
- a. ATP is produced by CELLULAR RESPIRATION which occurs in the mitochondria
- IV. Slow- & Fast-Twitch Fibers
- a. Two types of fibers based on speed of contraction
 - i. Slow-twitch or type I fibers
 - ii. Fast-twitch or type II fibers
 - b. The eye lids use type II, a muscle in your calf (soleus) would use mostly type I
 - c. Characteristics of Type I & II
 - i. Type I have a lot of blood vessels and many mitochondria, with a lot of myoglobin.
 - 1. Myoglobin is similar to the blood protein hemoglobin and brings plenty of oxygen to the muscle.
 - 2. These fibers are also called red fibers (dark meat).
 - ii. Type II have fewer of the above and can run off glycogen w/o a lot of O_2 present.
 - 1. These fibers are also called white fibers (white meat)
- V. Origin and Insertion
- a. **Origin** = the immovable end of the muscle
 - b. **Insertion** = the movable end of the muscle
- VI. What is rigor mortis?
- a. A muscle becomes rigid after death because the tissue loses its ability to produce ATP.
 - b. ends after about 48 hr. as the muscle proteins that make the cross bridges start to rot.
 - c. important in forensic medicine for determining the time of death.
- VII. What is tetanus?
- a. Tetanus causes cholinesterase to not break down the acetylcholine in the synapse.
 - b. This results in a person's muscles contracting and NOT relaxing!!
 - i. A tetanus shot must be administered shortly after exposure to the bacteria.
 - ii. Once you develop tetanus, there is NO cure.
- VIII. Other Vocab
- a. **All-or-None Response** - Fibers do NOT contract partially, they either do or they don't
 - b. **Motor Unit** - The muscle fiber + the motor neuron
 - c. **Recruitment** - more and more fibers contract as the INTENSITY of the stimulus increases
 - d. **Muscle Tone** - Sustained contraction of individual fibers, even when muscle is at rest
 - e. **Hypertrophy** - muscles enlarge (working out or certain disorders)
 - f. **Atrophy** - muscles become small and weak due to lack of use
 - g. **Muscle Fatigue** - muscle loses ability to contract after prolonged exercise OR strain
 - h. **Muscle Cramp** - a sustained involuntary contraction
 - i. **Oxygen Debt**
 - i. oxygen is used to create ATP
 - ii. not have enough oxygen **causes Lactic Acid** to accumulate in the muscles
 - 1. Causes soreness