

Skeletal muscle contraction and relaxation (a synopsis)

The functional unit of skeletal muscle fiber contraction is a _____.

The theory that explains skeletal muscle contraction is called the _____
_____ theory.

1. Excitation of the muscle cell membrane

- a. AP arrives at end of axon on **somatic motor neuron**.
- b. _____ channels open on the **synaptic terminals** of the **presynaptic cell**.
- c. _____ is released from **synaptic terminals** into _____ junction.
- d. _____ binds to _____ on the _____
_____ portion of the muscle cell membrane (**sarcolemma**).
- e. These protein receptors are also acetylcholine-gated _____ channels.
- f. Opening these channels causes a _____ polarizing **graded potential** and **excitation** of the **sarcolemma**.
- g. If threshold is reached, AP begins on **sarcolemma** and travels deep into the muscle fiber via _____.
- h. AP arrives at _____.

2. Contraction

- a. AP causes _____ to be released from **SR**.
- b. **Calcium** binds to **sarcomere** at a small protein fiber called _____
(on/off switch).
- c. With calcium bound to **troponin**, the barricade protein (_____), which prevents **crossbridge** formation, is lowered.
- d. _____ heads (hands) can now contact _____ active sites
(handles). When the heads and active sites are bound to one another, it is called a _____.
- e. To initiate the **powerstroke**, _____ must fall off of the _____ head. Myosin heads now pivot for the first **powerstroke**. At the end of the **powerstroke**, _____ falls off of the **myosin head** to prepare for the next cycle.

- f. **Crossbridge** detachment: _____ heads must release the _____ **active sites** and reset for another **powerstroke**. This requires _____.
- g. For a **sarcomere** to shorten, this attach-powerstroke-detach cycle must happen many times. This repetitive process is called _____.

3. Relaxation

- a. In order for muscle fiber to relax, AP on _____ must end, or **acetylcholine** would continue to be released.
- b. **Acetylcholine** that was already in the **neuromuscular junction** must be destroyed, or the muscle receptors would continue to detect it. The enzyme _____ destroys acetylcholine at the **neuromuscular junction**.
- c. No acetylcholine means no **depolarizing graded potential** on the muscle cell and therefore no _____ follows on sarcolemma.
- d. No AP on sarcolemma means that _____ will not be released from **SR**.
- e. **Calcium** present in **sarcomere** must be removed for the _____ barricade proteins to go back up. This is accomplished by pumping **calcium** back into the **SR**, and requires _____.
- f. Now _____ **thin myofilaments** slip back in place and sarcomere lengthens.