

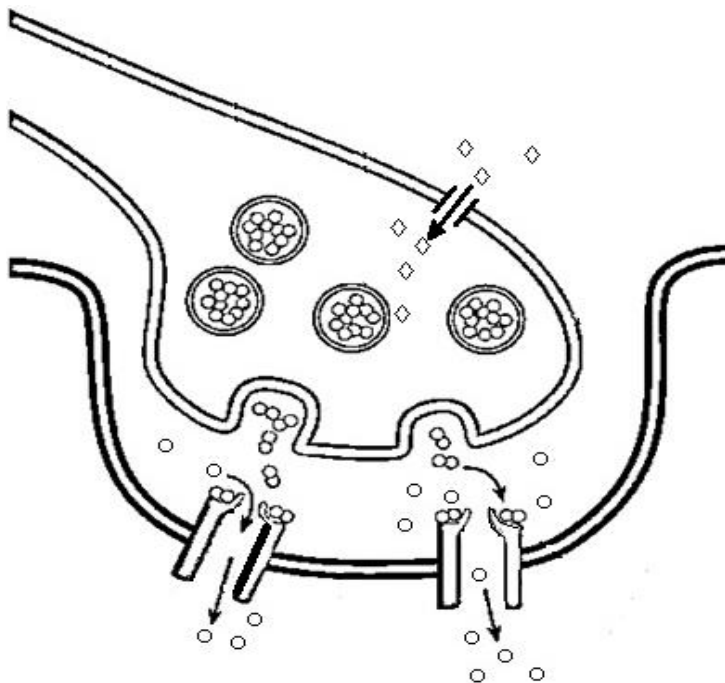
Nerve Supply and Muscle Contraction Honors Anatomy

Match the part or structure of the neuromuscular junction with its description and/or function.

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| <p>_____ 1. Calcium ions</p> <p>_____ 2. Chemical-gated sodium ion channel</p> <p>_____ 3. Neurotransmitter</p> <p>_____ 4. Post-synaptic membrane</p> <p>_____ 5. Pre-synaptic membrane</p> <p>_____ 6. Sodium ions</p> <p>_____ 7. Synaptic cleft</p> <p>_____ 8. Synaptic vesicles</p> <p>_____ 9. Voltage-gated calcium ion channels</p> | <p>a. Ion that diffuses across the post-synaptic membrane causing the creation of an action potential (nerve impulse).</p> <p>b. Structures that contain neurotransmitter.</p> <p>c. Ion channel that opens in response to a neurotransmitter only allowing sodium ions to pass through.</p> <p>d. The sarcolemma of a muscle fiber.</p> <p>e. The gap between the pre-synaptic membrane and the post-synaptic membrane.</p> <p>f. Ion channel that opens in response to an electrical impulse only allowing calcium ions to pass through.</p> <p>g. A chemical messenger, such as acetylcholine.</p> <p>h. The axon terminal of a motor neuron.</p> <p>i. Ion that diffuses into the axon terminal that causes synaptic vesicles to fuse to the pre-synaptic membrane</p> |
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10. A _____ is a type of neuron that stimulates skeletal muscle fibers.
11. _____ are long, cylindrical contractile cells that are a bundle of myofibrils.
12. The synapse or connection between a motor neuron and a muscle fiber is called the _____.
13. A _____ contains a motor neuron and all of the muscle fibers that it innervates (connects to and stimulates).

Using different colors and the list below, color and label the parts of the neuromuscular junction.



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|---|---|---|
| <p>○ Axon terminal (Pre-synaptic membrane)</p> <p>○ Calcium ions</p> <p>○ Chemical-gated sodium ion channel</p> <p>○ Motor Neuron</p> | <p>○ Muscle fiber</p> <p>○ Neurotransmitter (Acetylcholine)</p> <p>○ Sarcolemma (Post-synaptic membrane)</p> <p>○ Sodium ions</p> | <p>○ Synaptic cleft</p> <p>○ Synaptic vesicles</p> <p>○ Voltage-gated calcium ion channel</p> |
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Match the structures or parts of a muscle contraction to their description and/or function.

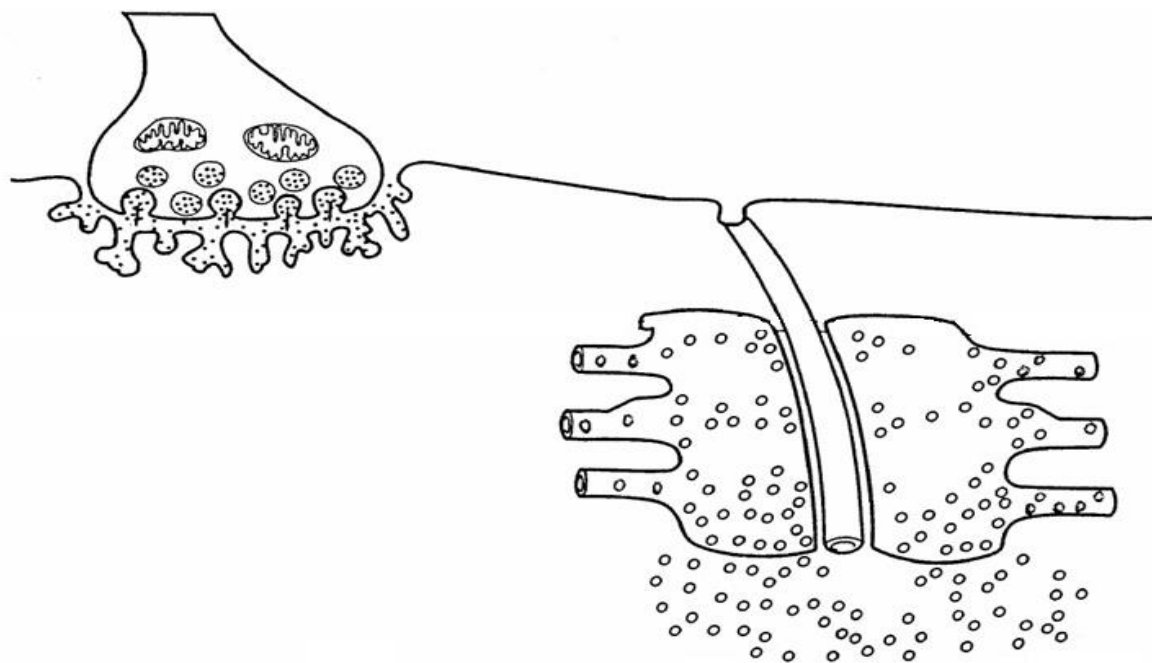
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|----------|------------------------|----|--|
| _____ 1. | Active binding site | a. | Part of actin that contains the active binding site. |
| _____ 2. | ATP | b. | invagination (inward extension) of the sarcolemma that transmits the action potential from the sarcolemma to the sarcoplasmic reticulum. |
| _____ 3. | Calcium ions | c. | Energy molecule that causes the detachment of the myosin head from the active binding site of G-actin. |
| _____ 4. | G-actin | d. | Part of actin that covers the active binding site of G-actin. |
| _____ 5. | Myosin head | e. | Ion stored in the sarcoplasmic reticulum that binds to troponin. |
| _____ 6. | Sarcoplasmic reticulum | f. | The part of a myosin myofilament that forms a cross-bridge with the active site of G-actin. |
| _____ 7. | Tropomyosin | g. | Structure that stores and releases calcium into the sarcomere. |
| _____ 8. | Troponin | h. | Part of actin that is bound to calcium and tropomyosin. |
| _____ 9. | T-tubules | i. | The part of G-actin that forms a cross-bridge with the myosin head. |

Complete the paragraph about the contraction of skeletal muscle.

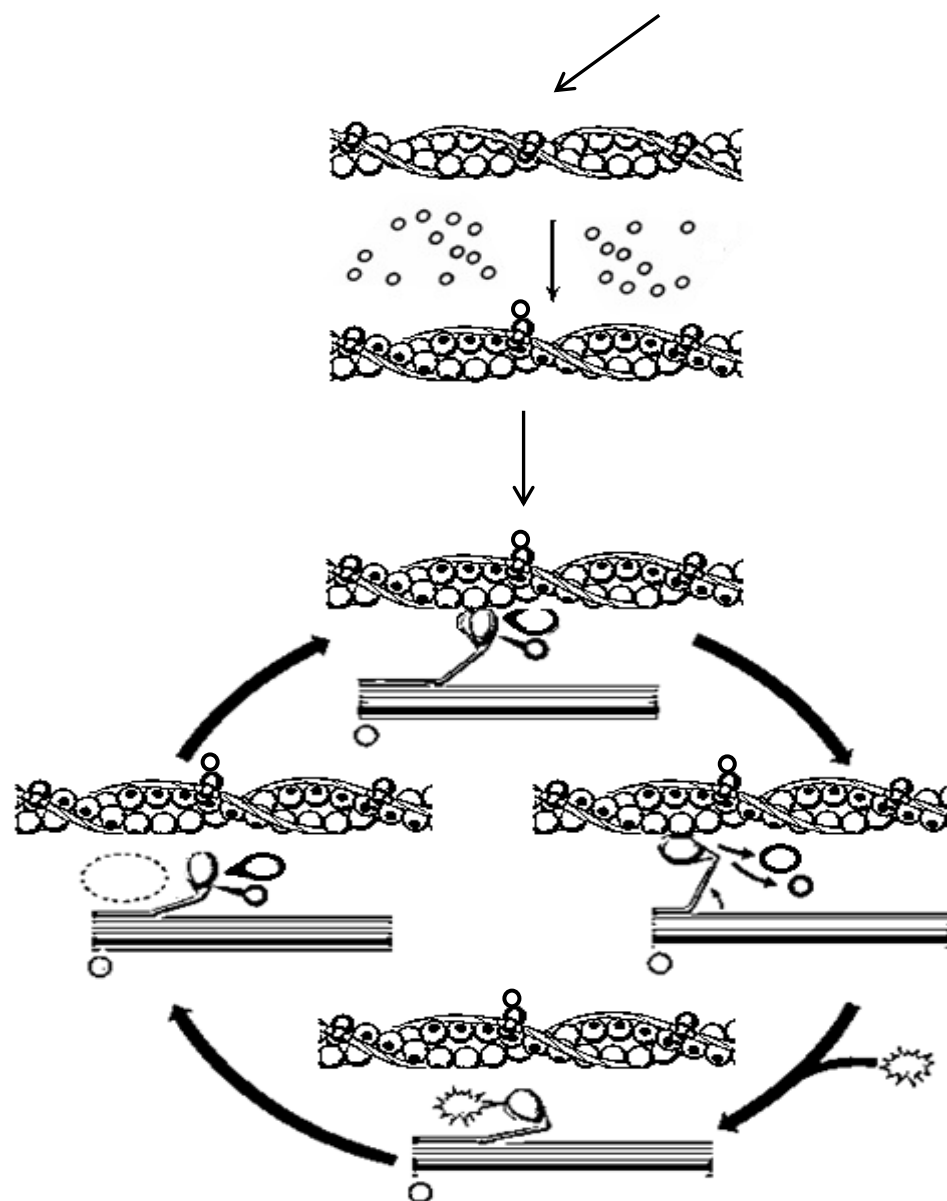
The 1 _____ is where a motor neuron synapses with a muscle fiber. The contraction of a skeletal muscle begins when an action potential travels down the axon of a 2 _____ to its axon terminal. At the axon terminal, the action potential stimulates the opening of _____ - _____ 3 _____ . The opening of these ion channels allows 4 ions to diffuse across the axon terminal membrane. Calcium ions bind to 5 _____, filled with 6 , causing them to fuse to the pre-synaptic membrane. Fusion to the pre-synaptic membrane causes the synaptic vesicles to release acetylcholine into the 7 _____. Once in the synaptic cleft, acetylcholine binds to a _____ - _____ 8 _____, causing it to open and allowing 9 ions to diffuse across the post-synaptic membrane, or the 10 . Diffusion of sodium ions across the sarcolemma creates another action potential. The newly formed action potential travels down the 11 _____ via the sarcolemma and into an invagination called the 12 _____. Once inside the transverse tubule, the action potential is passed to the 13 _____, which serves as a storage site for 14 ions. The action potential causes _____ - _____ 15 _____, located on the membrane of the sarcoplasmic reticulum, to open allowing 16 ions to diffuse out of the sarcoplasmic reticulum and into the 17 , and eventually to each individual contractile unit of a muscle called a 18 . The sarcomere is composed of two myofilaments. The thin myofilament is called 19 and the thick myofilament is called 20 . The actin myofilament has three parts, 21 , 22 , and 23 . The first part, called 24 , binds to calcium and to tropomyosin. The second part, tropomyosin, covers the _____ 25 _____ of 26 - _____, which is the third part. The myosin myofilament is composed of two parts, the rod and the 27 _____, whose function is to bind to the active binding site of G-actin. Once calcium diffuses into the sarcomere it binds to 28 . The binding of calcium to troponin, causes troponin to pull on 29 , thus exposing the active binding site of 30 - _____. Exposure of the active binding site allows the 31 _____ of myosin to bind to actin creating a 32 - _____. Attached to the myosin head are two molecules called 33 (abbreviated) and 34 , which keeps the myosin head in an upward high-energy configuration. When ADP and phosphate are released from the myosin head, the myosin head bends and pulls on actin. This is called the 35 _____. Once the head is bent, it must detach from the active binding site and return to an upward high-energy configuration. Detachment of the myosin head occurs when the high-energy molecule, 36 (abbreviated) binds to the myosin head. To return the myosin head to an upward high-energy configuration state, ATP must be split into ADP and phosphate by a process called 37 _____. Once the myosin head has returned to an upward high-energy configuration, it can perform another 38 - _____ with the G-actin. The interacting movements between myosin and actin is known as the _____ 39 _____.

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39. _____

Using different colors and the list below, color and label the different parts of a muscle contraction.



- Acetylcholine
- Active binding site
- ADP
- ATP
- Calcium ions
- G-actin
- Myosin head
- Neuromuscular junction
- Phosphate
- Sarcolemma
- Sarcoplasmic reticulum
- Synaptic vesicles
- Tropomyosin
- Troponin
- T-tubules



1. Also on the diagram to the right, label the following:

- ATP hydrolysis
- Cross-bridge
- Detachment (of myosin head)
- Reconfiguration (of myosin head)
- Working stroke