

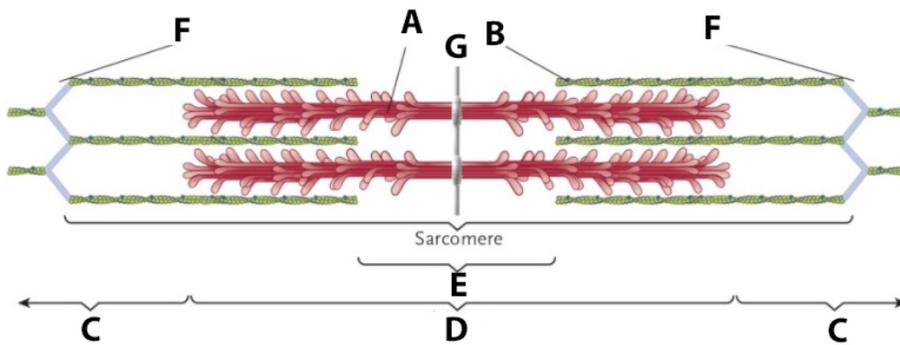
Neuromuscular Junction and Muscle Contraction

Read Chapter 14.4

Fill in the blanks (*Note: the contents in this chapter are in a slightly different order compared to the video, these questions are aligned with the video, starting with the neuromuscular junction and then muscle contraction)

1. The motor plan to initiate a motor movement originates in the _____ cortex.
2. Motor neurons (are/ are not) _____ myelinated.
3. The bundles of contractile proteins inside of muscle cells are called _____.
4. The sarcoplasmic reticulum contains _____, which is important for muscle contraction.
5. Invaginations of the muscle cell membrane that lie close to the sarcoplasmic reticulum are called _____, and this is where the muscle cell _____ occurs.
6. A motor unit is (one or many) _____ neuron(s) and (one or many) _____ muscle fibres.
7. The neuromuscular junction is composed of the _____ of the axon terminal and the _____ of the muscle cell.
8. The neurotransmitter that causes skeletal muscle contraction is _____.
9. In the synaptic end bulb, the action potential causes _____-gated ion channels to open and this causes _____ ions to move (in or out) _____, causing the release of ACh.
10. Put the following events in the correct order:
 - a. Calcium moves into the synaptic end bulb _____
 - b. Exocytosis of acetylcholine _____
 - c. Action potential in the muscle cell membrane _____
 - d. Action potential in the neuron _____
 - e. End plate potential in the motor end plate _____
11. Sodium channels on the sarcolemma are _____-gated ion channels.
12. End plate potentials are (graded or action) _____ potentials.
13. In the neuromuscular junction, acetylcholine is broken down by an enzyme called _____

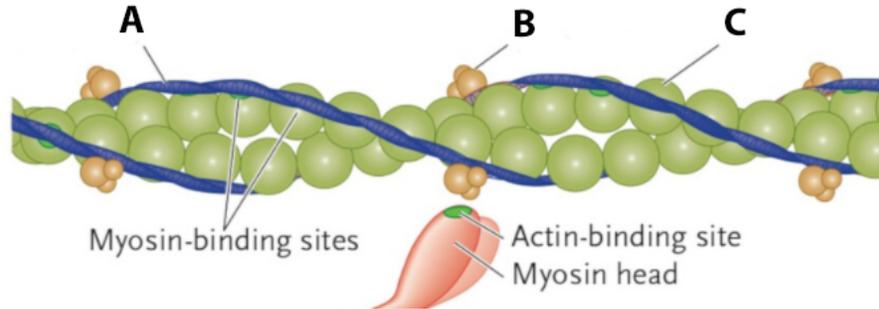
14. Skeletal muscle fibers are (striated or smooth) _____ because there are overlapping regions of thick and thin filaments that make up the myofibrils.
15. Thick filaments are composed of _____
16. Thin filaments are composed of the contractile protein _____, as well as 2 regulatory proteins _____ and _____.
17. A single contractile unit between the Z discs is called a _____.
18. Label the sarcomere: **I band, A band, M line, H zone, Z disc, thick filament, thin filament.**



- A _____ B _____
- C _____ D _____
- E _____ F _____
- G _____

19. Calcium binds to _____ that causes a conformational change that causes it to pull _____ off of the myosin binding sites.
20. During contraction, state if the following regions of the sarcomere shorten or not:
- A band _____
 - H zone _____
 - I band _____

21. Label the proteins in the thin filament: **Actin, Troponin, tropomyosin.**



A _____

B _____

C _____

22. When the last phosphate breaks off of ATP, that process is called _____

23. When muscles are relaxed and myosin is not bound to actin, ATP (is or is not) _____ bound to myosin.

24. When ATP hydrolyzes and both the ADP and the P are still bound to the myosin, this causes the myosin to _____

25. Myosin will have the power stroke when _____

26. For relaxation to occur _____

27. Name 2 reasons why ATP is needed for muscle contraction:

a. _____

b. _____

28. Calcium moves back into the sarcoplasmic reticulum by a process called _____

29. Muscles can lift heavier objects by _____

30. In a _____ contraction, the muscle shortens.

31. In a _____ contraction, the muscle length stays the same.

32. In a _____ contraction, the muscle lengthens.