**Muscle Cell Stimulation and Contraction**

Figure 6-3 is a diagrammatic representation of a small portion of a *relaxed* muscle cell. Use different colors to color the coding circles and corresponding structures on Figure 6-3. Then bracket and label an A band, an I band, and a sarcomere. Draw arrows (5) to show what would happen when the muscle contracts.

- Myosin
- Actin filaments
- Z disc

Looking at your diagram of a contracted sarcomere- which region of the sarcomere shortens during contraction-the dark band, the light band, or both? (1) _________________________________

**Complete the following statements relating to the neuromuscular junction. Insert the correct answers in the numbered answer blanks.**

A motor neuron and all of the skeletal muscle cells it stimulates is called a (2) ________________. The axon of each motor neuron has numerous endings called (3) ________________. The actual gap between an axonal ending and the muscle cell is called a (4) ________________. Within the axonal endings are many small vesicles containing a neurotransmitter substance called (5) ________________. When the (6) ________________ reaches the ends of the axon, the neurotransmitter is released, and it diffuses to the muscle cell membrane to combine with receptors there. Binding of the neurotransmitters with muscle membrane receptors causes the membrane to become permeable to sodium, resulting in the influx of sodium ions and (7) ________________ of the membrane. Then contraction of the muscle cell occurs.
Figure 6-4 shows the components of a neuromuscular junction.

Identify the parts by coloring the coding circles and the corresponding structures in the diagram.

- Mitochondrion
- Synaptic vesicles
- T tubule
- Sarcomere
- Synaptic cleft

Figure 6-4

Number the following statements in their proper sequence to describe the contraction mechanism in a skeletal muscle cell. The first step has already been identified as number 1.

1. Acetylcholine is released into the neuromuscular junction by the axonal terminal.
2. The action potential, carried deep into the cell, causes the sarcoplasmic reticulum to release calcium ions.
3. The muscle cell relaxes and lengthens.
4. Acetylcholine diffuses across the neuromuscular junction and binds to receptors on the sarcolemma.
5. The calcium ion concentration at the myofilaments increases; the myofilaments slide past one another, and the cell shortens.
6. Depolarization occurs, and the action potential is generated.
7. As calcium is actively reabsorbed into the sarcoplasmic reticulum, its concentration at the myofilaments decreases.
Muscle Cell Stimulation and Contraction: KEY (26)

1. The light band; as the sarcomere contracts, the amount of overlap between the actin and myosin (the A band) increases
2. Motor unit
3. Axonal terminals
4. Synaptic cleft
5. Acetylcholine
6. Nerve impulse (action potential)
7. Depolarization
8. 1
9. 4
10. 7
11. 2
12. 5
13. 3
14. 6