Module 12: Muscular System — Study Questions

Functions of the Muscular System

1. What are the major functions of the muscular system?
2. How do muscles help maintain body temperature?
3. How does the muscular system contribute to posture?
4. Why is it important that muscles work in pairs?

Skeletal Muscle Structure

1. Describe the hierarchical organization of a skeletal muscle from largest to smallest component.
2. What is a muscle fiber, and how is it different from a typical cell?
3. What is a myofibril?
4. What is a sarcomere, and why is it considered the functional unit of muscle contraction?
5. What are the thick and thin filaments in a sarcomere made of?
6. What is the significance of the Z-lines in a sarcomere?
7. What is the relationship between the A-band and I-band during muscle contraction?
8. Name and describe the three connective tissue layers that organize skeletal muscle.

Sliding Filament Theory

1. Describe the sliding filament theory of muscle contraction.
2. During contraction, do the thick and thin filaments shorten or do they slide past each other?

3. What is the cross-bridge cycle? Describe its main steps.

4. What role does ATP play in muscle contraction?

5. Why is calcium essential for muscle contraction?

6. What are the functions of troponin and tropomyosin?

7. What happens when calcium is removed from the muscle cell after contraction?

Neuromuscular Junction

1. What is a neuromuscular junction?

2. What neurotransmitter is released at the neuromuscular junction?

3. How does an action potential in a motor neuron lead to muscle contraction?

4. What is excitation-contraction coupling?

5. What would happen if acetylcholine were not broken down after being released?

Muscle Mechanics

1. What is a motor unit?

2. How does the nervous system control the strength of muscle contraction?

3. What is the difference between a muscle twitch and tetanus?

4. What is summation in muscle contraction?

5. What is the difference between isotonic and isometric contractions?

6. What causes muscle fatigue, and how can it be reduced?

Muscle Fiber Types

1. What are the differences between slow-twitch (Type I) and fast-twitch (Type II) muscle fibers?
2. Which type of muscle fiber is more resistant to fatigue, and why?
3. What types of activities are best suited for each fiber type?
4. Can training change the proportion of muscle fiber types in your body?