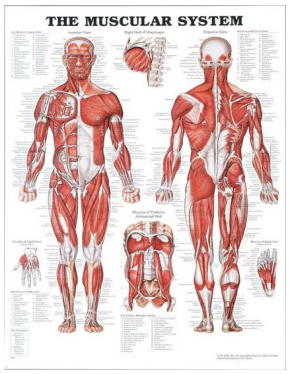


http://www.eicsd.k12.ny.us/schools/EMS/sjf/spring2006/Kelly-Rickard/Muscular-System.jpg

Unit 6
Muscular System

Mrs. Michaelsen
Chetek High School

Composition of Skeletal Muscle

A. Skeletal muscle is an composed of several tissue types.
   1. muscle tissue
   2. tissue
   3. vessels
   4. tissues

A.

B.

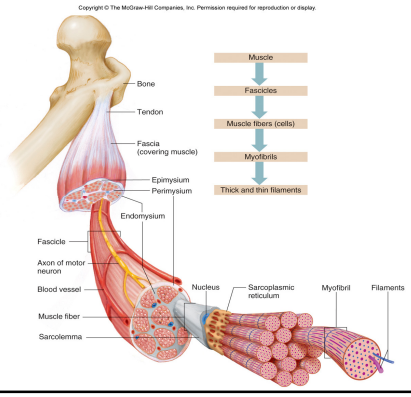
C. Aid in

D. Regulation of

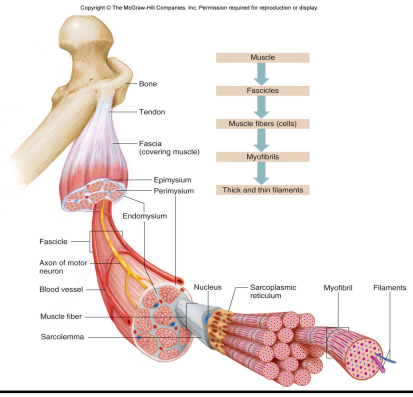
8.2 Structure of Skeletal Muscle

A. Fascia
   1. Connective tissue coverings around
   2. Surround each muscle and separates them from adjacent muscles.
   3. Some intertwine with the
   4. Some form sheets called

8.2 Structure of Skeletal Muscle



8.2 Structure of Skeletal Muscle



8.2 Structure of Skeletal Muscle

B. Fascicles

1.
2. Contain
3. Connective tissue encloses and separates all

    a. Allows independent

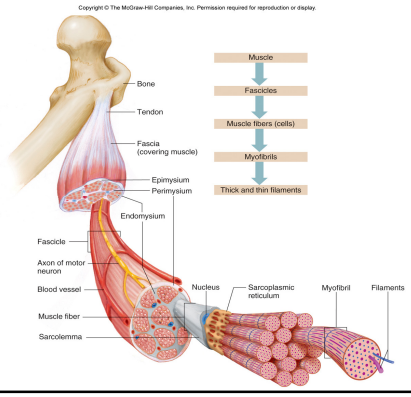
8.2 Structure of Skeletal Muscle

C. Skeletal Muscle Fibers

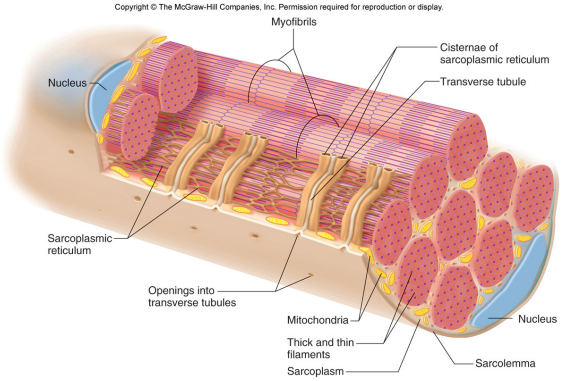
1. Individual muscle
2. Often extend the length
3. Cell membrane is called the
4. Cytoplasm is called the
    a. Contains many
5. Contains

    a. This connects to the membrane of the muscle fiber

8.2 Structure of Skeletal Muscle



8.2 Structure of Skeletal Muscle



8.2 Structure of Skeletal Muscle

D. Myofibrils

1. Long thin components of

   a. Thick ( ) filaments
      i. A myosin molecule consists of two twisted

      ii. Many myosin molecules together form a

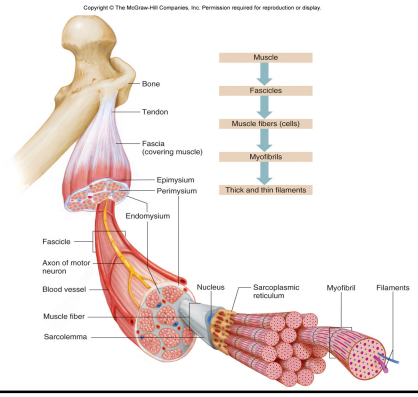
8.2 Structure of Skeletal Muscle

b. Thin ( ) filaments
   i. An actin molecule is a

   ii. Many actin molecules twist into a helix forming an

   iii. The proteins

8.2 Structure of Skeletal Muscle



8.2 Structure of Skeletal Muscle

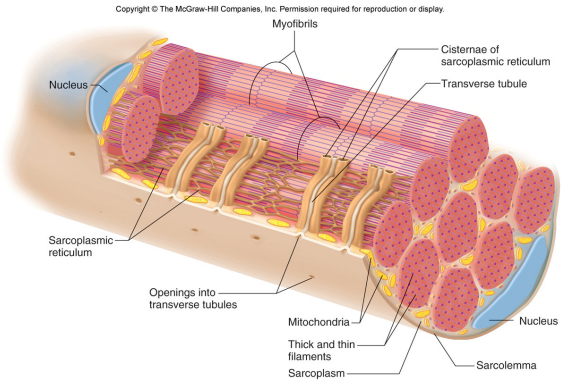
c. Organization of filaments leads to

i.

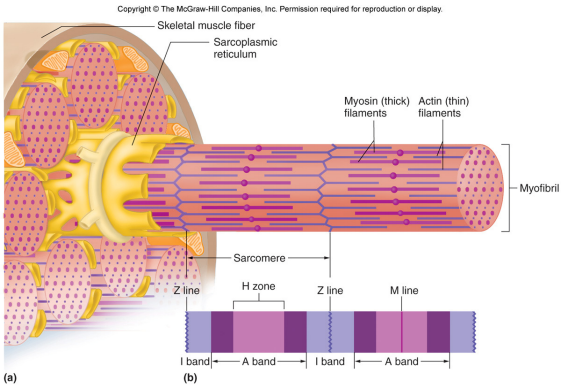
ii. contain overlapping actin and myosin filament regions along with a central

iii. The portion of a myofibril from Z line to Z line is called a

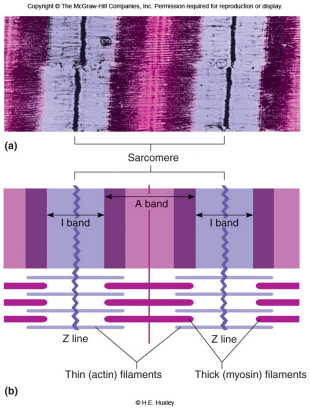
8.2 Structure of Skeletal Muscle



8.2 Structure of Skeletal Muscle



8.2 Structure of Skeletal Muscle



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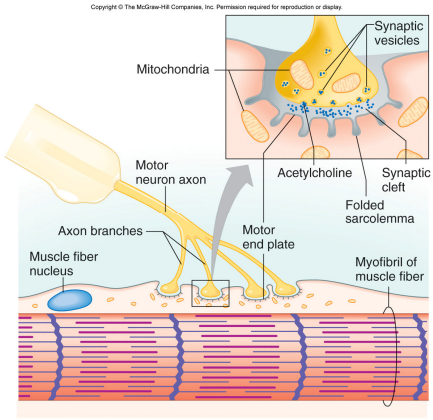


8.2 Structure of Skeletal Muscle

E. Neuromuscular Junction

1. Every skeletal muscle fibers is connected to a

2. The connection point is called the

   a. Muscle fiber is folded here to form a

3. Cytoplasm of neuron rich in

4. Allows impulse to travel from neuron across

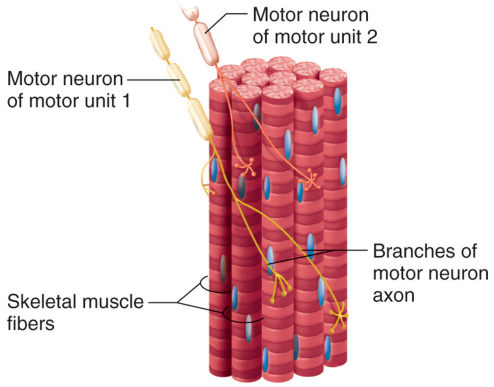
8.2 Structure of Skeletal Muscle

F. Motor Units

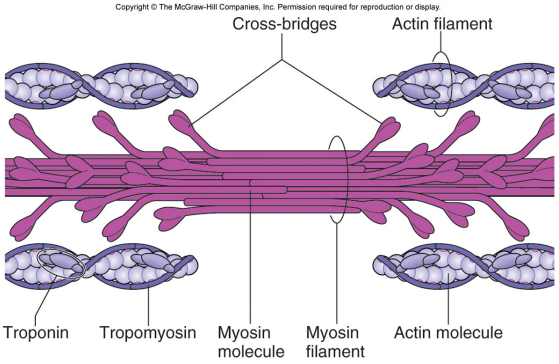
1. Each muscle fiber has one neuromuscular junction, but motor neurons are

2. All of the muscle fibers connected to one motor neuron is called a

8.2 Structure of Skeletal Muscle



8.3 Skeletal Muscle Contraction

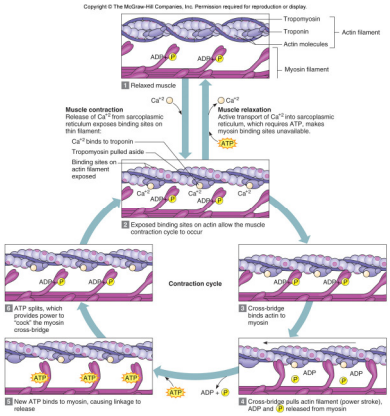


8.3 Skeletal Muscle Contraction

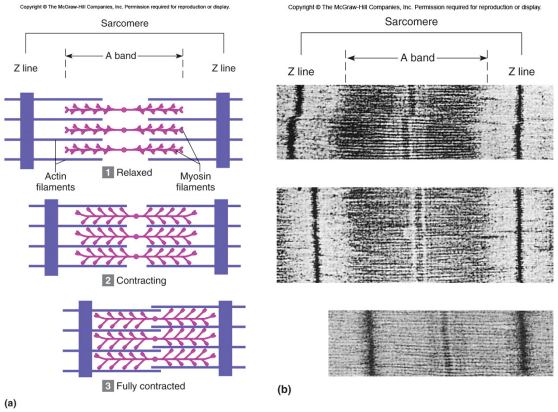
A. The process of skeletal muscle contraction involves the

1. This process is known as the sliding filament model because

8.3 Skeletal Muscle Contraction



8.3 Skeletal Muscle Contraction



8.3 Skeletal Muscle Contraction

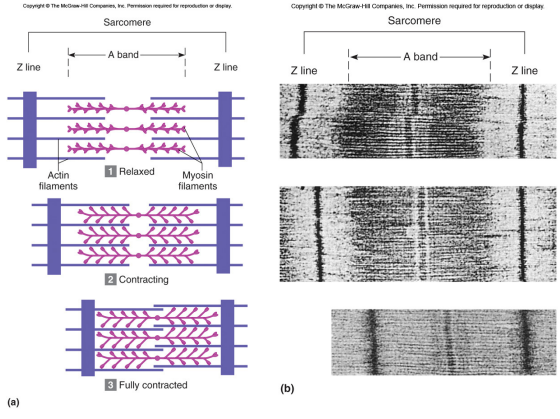
2. When a cocked cross bridge binds to
3. A new ATP then binds to the cross bridge causing it to
4. This new ATP is then broken down and the cross bridge is
5. This continuous pulling shortens the

8.3 Skeletal Muscle Contraction

B. The Sliding Filament Model

1. The cross bridges of the myosin filaments are in a
   a. An enzyme called
   b. This releases energy that puts the cross bridges into a

8.3 Skeletal Muscle Contraction



8.3 Skeletal Muscle Contraction

C. The Muscle at Rest

1. At rest, the binding sites of actin filaments are blocked by the proteins

    a. This is only undone when the muscle is

8.3 Skeletal Muscle Contraction

3. A muscle impulse passes across the entire membrane of the muscle fiber and also travels through the

4. The sarcoplasmic reticulum contains a high concentration of

8.3 Skeletal Muscle Contraction

D. Stimulus for Contraction

1. Skeletal muscles are stimulated to contract when the neurotransmitter

2. Acetylcholine

8.3 Skeletal Muscle Contraction

5. Calcium ions diffuse from the sarcoplasmic reticulum into the

6. When calcium is bound to troponin, the troponin and tropomyosin

8.3 Skeletal Muscle Contraction

7. This allows the myosin cross bridges to

8. Contraction continues as long as there is

8.3 Skeletal Muscle Contraction

2. Calcium ions are

   a. This causes the troponin and tropomyosin to shift back and
   b. A muscle cramp is caused by the lack of

8.3 Skeletal Muscle Contraction

E. Muscle Relaxation
   1. Requires two events which occur when the

      a. Acetylcholine is rapidly decomposed by the enzyme
      b. This ends the muscle impulse and returns normal

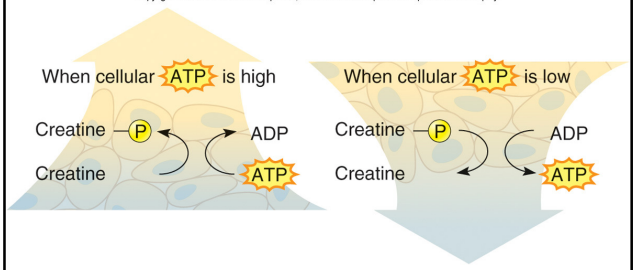
8.3 Skeletal Muscle Contraction

F. Energy for Contraction
   1. Muscle contractions require ATP, however muscle fibers only have enough ATP to

   2. ATP must be

   3. The cycling of phosphate between creatine and creatine phosphate allows the muscles to

8.3 Skeletal Muscle Contraction



8.3 Skeletal Muscle Contraction

b. The muscles rely on cellular respiration (the breakdown of

i. The oxygen that is necessary for cellular respiration comes from two places.

i. The blood –

ii. The muscle tissue –

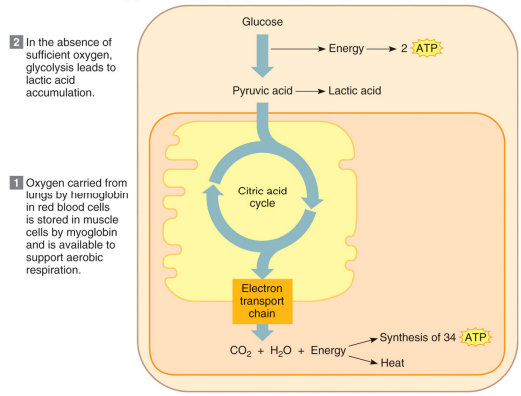
8.3 Skeletal Muscle Contraction

G. Oxygen Supply

1. The supply of creatine phosphate in the muscle fibers can be

a. When this happens, the muscles again need to get a source of

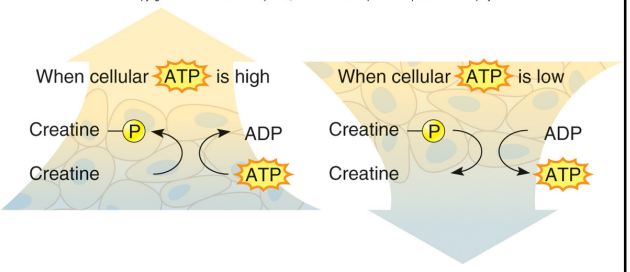
8.3 Skeletal Muscle Contraction



8.3 Skeletal Muscle Contraction

2. Oxygen Debt
   a. During

8.3 Skeletal Muscle Contraction



8.3 Skeletal Muscle Contraction

i. This forces the muscles to rely on

ii. In a low oxygen level environment, the

iii. Lactic acid requires oxygen to be converted back into glucose so the production of lactic acid creates an

8.3 Skeletal Muscle Contraction

H. Muscle Fatigue
   1. After a long period of
      a. Fatigue results in the inability
   2. The reason muscles are unable to contract is that lactic acid changes the

8.3 Skeletal Muscle Contraction

I. Heat Production

1. Less than half the energy released in cellular respiration is available for metabolic processes,

2. Muscle tissue is a major source of heat for the body because