

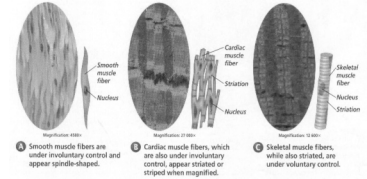
## The Muscular System Section 36-2

- What do skeletal muscles do?
- How do muscles work?



## Function of Skeletal Muscles

- Produce movement
  - Muscle pulls tendons to move the skeleton
- Maintain posture and body position
  - Continuous muscle contraction
- Support soft tissue
  - Support weight of visceral organs
- Maintain body temperature
  - Energy from contraction is converted to heat

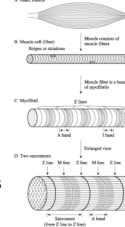


## Anatomy of a Skeletal Muscle

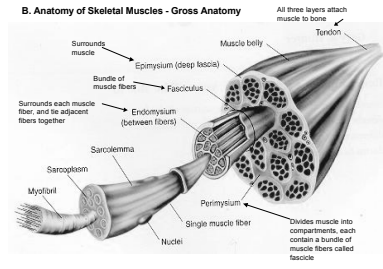
- Muscle contractions require energy
  - Blood vessels deliver oxygen and nutrients to produce ATP
- Muscle contractions are under stimulation from the CNS
  - Voluntary control
  - Axons connect to individual muscle fibers

## Muscle Structure

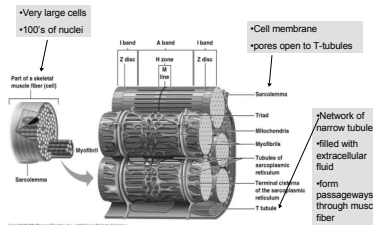
- Muscle fibers made of myofibrils
- Myofibrils made of filaments
- Filaments can be **THICK** or thin... **MYOSIN** vs. actin
- Arranged in sarcomeres



## B. Anatomy of Skeletal Muscles - Gross Anatomy

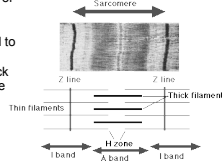


## "Microanatomy" of Skeletal Muscles



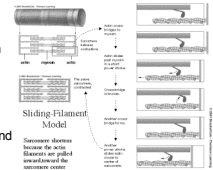
## Sarcomere

- Smallest functional unit of muscle fiber
- Each myofibril contains 10,000 sarcomeres end to end
- Interaction between thick and thin filaments cause contraction
- Banded appearance

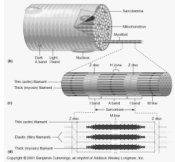


## Sliding Filament Theory

- Contraction happens when thin filaments slide over thick filaments
- Thick filament forms a cross-bridge with the thin filament
- Cross-bridge changes shape and pulls thick filament, sliding toward center of sarcomere
- Cross-bridge detaches and cycle is repeated
- Requires ATP



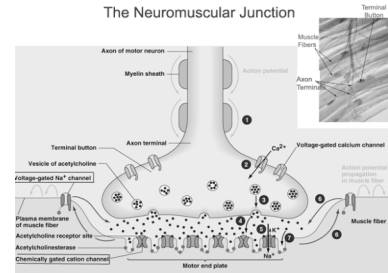
## Muscle Contraction Animation



<http://www.vetmed.wsu.edu/van308/muscleanimation.htm>

## Neuromuscular Junction

- Getting the signal to contract...
- Requires synapse between motor neuron and muscle (fiber) cell
- Neurotransmitter is Acetylcholine (Ach)
- Triggers release of  $Ca^{+2}$  into the fiber
- Muscle contracts (sliding filament theory)
- Contraction continues until cleanup by AchE and calcium pumped out



## Consider These Questions...

- How would severing a tendon affect the ability of the muscle to move a body part?
- Why does skeletal muscle appear striated?
- How would a drug that interferes with cross-bridge formation affect muscle contraction?
- What would you expect to happen to a resting skeletal muscle if it suddenly became very permeable to calcium ions?
- Predict what would happen if the motor end plate did not contain acetylcholinesterase.