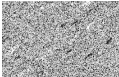
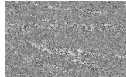


- Composed of single cell type
 - Exerts force by contracting (shortening)

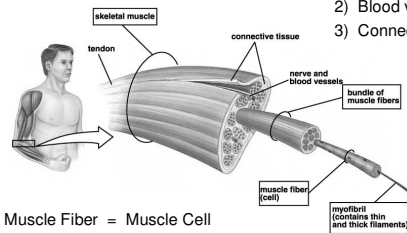
- 1) Produce movement
- 2) Maintain posture
- 3) Support soft tissue (e.g. abdominal wall)
- 4) Guard entrance / exit (e.g. lips / anus)
- 5) Maintain body temperature (e.g. shivering)

			
	Skeletal Muscle	Cardiac Muscle	Smooth Muscle
Appearance	Striated	Striated	Not Striated
Function	Skeletal Movement	Pump Blood	Move Substances Through Hollow Tubes
# of Nuclei / Cell	Many	One	One
Contraction Speed	Slow to Fast	Intermediate	Slow
Control	Voluntary	Involuntary	Involuntary

1) Skeletal Muscle:

- Human Body = > 700 unique skeletal muscles
- Muscle structure and function are closely linked:
 - Tendon: Attach muscle to skeleton (Connective Tissue)
 - Whole muscle consists of:

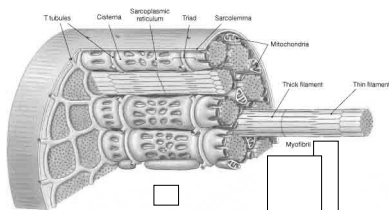
- 1) Muscle Fiber Bundles
- 2) Blood vessels/Nerves
- 3) Connective Tissue Wrap



Muscle Fiber = Muscle Cell

(Figure 39.2)

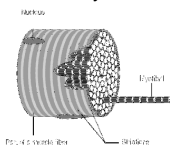
Microanatomy of Muscle:



Each Muscle Fiber Contains:

- T-tubules: Network of passageways through fiber (conduct APs)
- Sarcoplasmic Reticulum: Specialized endoplasmic reticulum
 - Contain calcium ions (Ca^{++})
- Myofibrils: Cylindrical structures containing contractile fibers

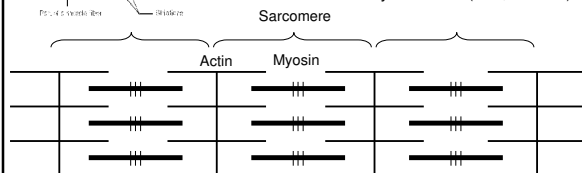
Microanatomy of Muscle:



Myofibril contractile fibers (protein):

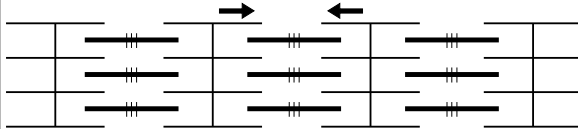
- 1) Actin (Thin filament)
- 2) Myosin (Thick filament)

Sarcomere: Repeating units of myofilaments (~ 10,000 / cell)



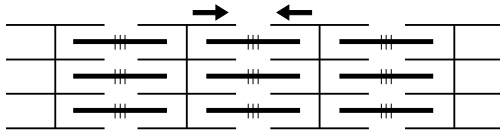
Microanatomy of Muscle:

Interactions between the thick and thin filaments of sarcomeres are responsible for muscle contraction



Microanatomy of Muscle:

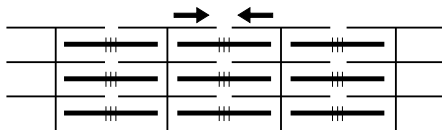
Interactions between the thick and thin filaments of sarcomeres are responsible for muscle contraction



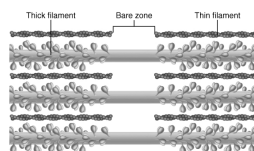
Microanatomy of Muscle:

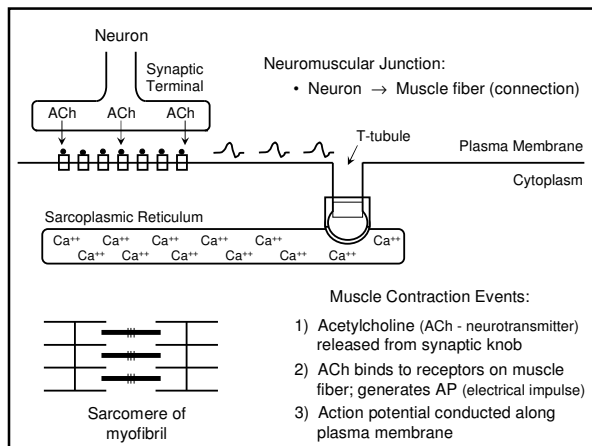
Sliding Filament Theory

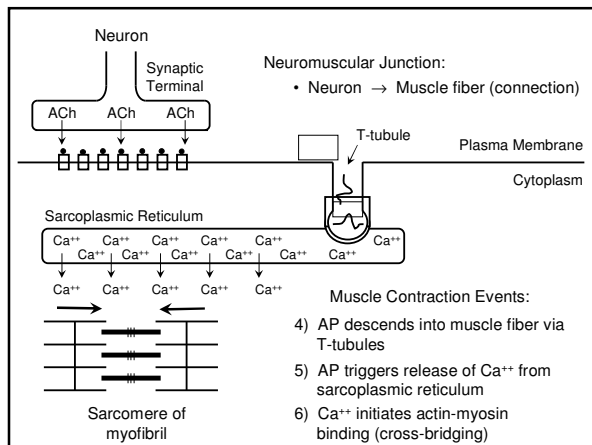
Interactions between the thick and thin filaments of sarcomeres are responsible for muscle contraction

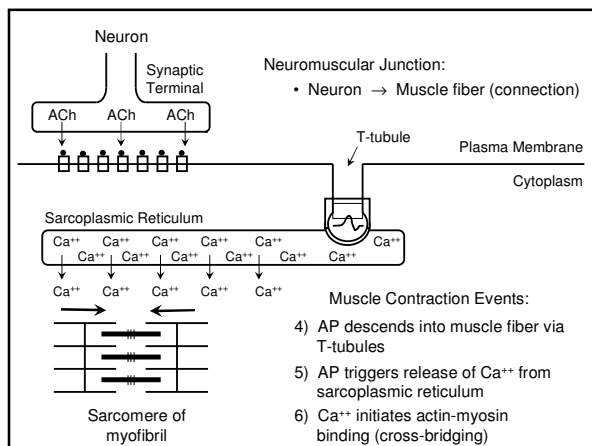


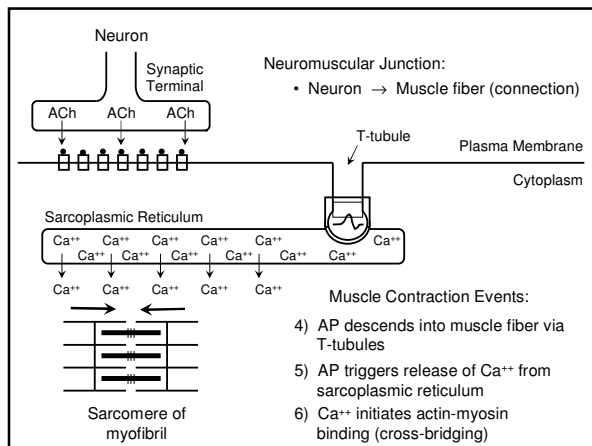
Requires ATP
(600 trillion / second / cell)

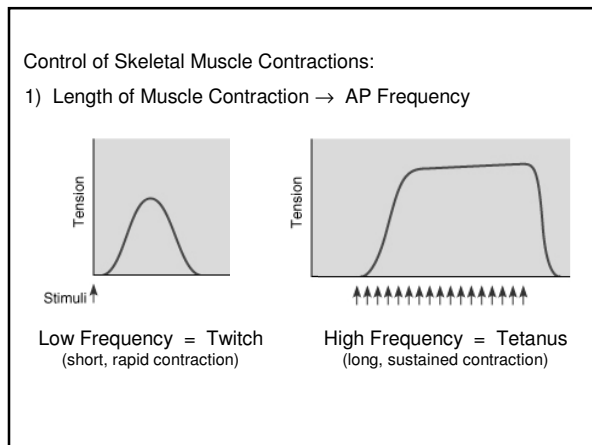


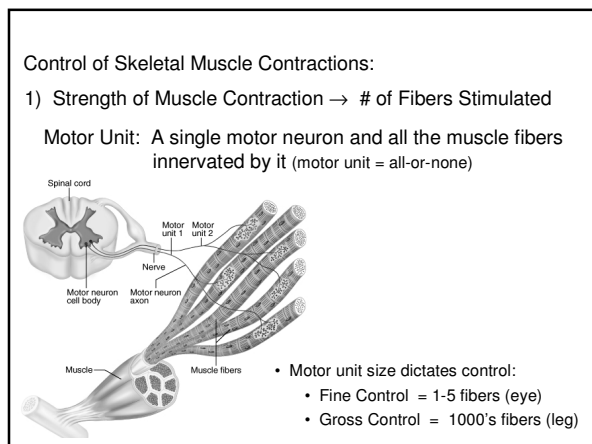










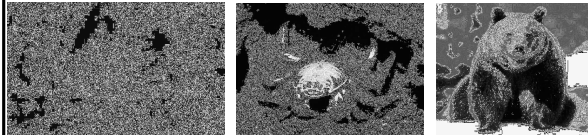


Skeletal System:

- Supporting framework for the body

Types of Animal Skeletons:

- 1) Hydrostatic Skeleton (e.g. earthworm, mollusk)
 - Fluid-filled compartments provides support
- 2) Exoskeleton (e.g. insects, crustaceans)
 - Rigid, external skeleton supporting body
- 3) Endoskeleton (e.g. humans)
 - Rigid, internal skeleton supporting body

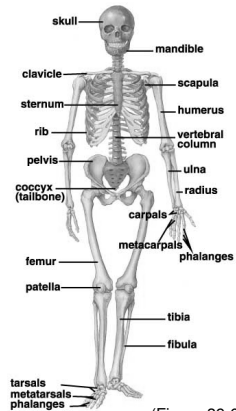


Human Skeleton = 206 bones

- Axial skeleton
 - Skull, vertebral column, rib cage
- Appendicular Skeleton
 - Extremities

Functions:

- 1) Supports body / protects organs
- 2) Locomotion
- 3) Blood cell production (red bone marrow)
- 4) Storage site
 - Calcium and Phosphorus
 - Energy (yellow bone marrow)
- 5) Sensory transduction (e.g. inner ear)

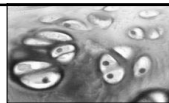


(Figure 39.6)

Skeletal Tissue Types:

1) Cartilage (connective tissue)

- Provides flexible support / connections:
 - a) Forms skeleton (early development)
 - b) Covers end of bones (joints)
 - c) Forms nose / ears
 - d) Connects ribs to sternum
 - e) Forms shock-absorbing pads (e.g. intervertebral discs)
- Consists of living cells (chondrocytes) in protein matrix



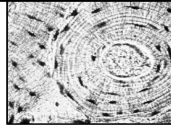
↑
Secrete collagen fibers

- No direct blood supply

Skeletal Tissue Types:

2) Bone (connective tissue)

- Provides strong, rigid framework
- Consists of:
 - a) Collagen fibers (hardened with calcium phosphate deposits)
 - b) Osteoblasts (build bone)
 - c) Osteocytes (mature bone cells)
 - d) Osteoclasts (dissolve bone)
- Bone is constantly remodeled (5 - 10% each year)



Types of Bones:

1) Compact bone

- Hard, outer shell
- Site of muscle attachment

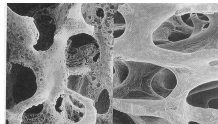
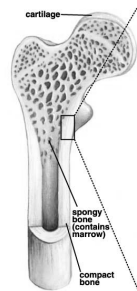
2) Spongy bone

- Interior latticework (porous)
- Contains bone marrow

- Bone density reaches peak at age 35

• Osteoporosis ("porous bone")

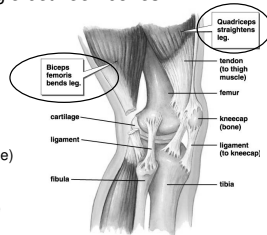
- Predominates in women (8x)
- Treatment:
 - Exercise; Ca++ supplements
 - Hormone replacement therapy



Body Movement:

Joint = Point at which two bones meet

- Ligament = Fibrous connective tissue attaching bones
- Antagonistic muscles drive movement:
 - Flexion = Decrease angle between bones
 - Extension = increase angle between bones



Types of Joints:

1) Hinge joint:

- 2 - dimensional movement (e.g. knee)

1) Ball-and-socket joint:

- 3 - dimensional movement (e.g. hip)
