Muscle Anatomy
• **Skeletal**
  - Unbranched; striated; multinucleate; looooong

• **Smooth**
  - Unbranched; unstriated; uninucleate

• **Cardiac**
  - Branched; striated; intercalated discs
Characteristics of muscle

- **Contractile**: it shortens
- **Excitable**: receives & responds to electrical signals
- **Extensible**: stretches
- **Elastic**: Returns to original length after extending
Functions of skeletal muscle

- Movement
- Maintain posture & body position
- Stabilize joints, support visceral organs (*rotator cuff*)
- Maintain body temperature (*shivering*)
- Guard entrances & exits (*esophageal & anal sphincter*)
Arrangement: tubes within tubes

- **Epimysium:** surrounds whole muscle; collagen
- **Perimysium:** surrounds fascicles; collagen + elastin
- **Endomysium:** surrounds muscle fibers; collagen + elastin
Tubes within tubes
Myoblasts form muscle fibers (cells)
Skeletal muscle cells have the usual cell structures

BUT they have different names

- **Sarcolemma**: plasma membrane
- **Sarcoplasm**: cytoplasm

Unique to skeletal muscle cells

- **Transverse tubules**: conduct signal ($Ca^{2+}$ ions) to contract
- **Sarcoplasmic reticulum**: SER; fuse and form terminal cisternae, which house ($Ca^{2+}$ ions)
Muscle cells & Sarcomeres

• **Sarcomere** = smallest contractile unit of muscle
• ~10k arranged end to end form 1 myofibril
Myofibrils

- Contractile portions of muscle cells
- Consist of interdigitating **thick** and **thin** protein filaments
- **Thick** = myosin; **thin** = actin
**Thin filaments**

- **Actin (F) strand** made of actin subunits (G)
- **Tropomyosin** strands (barbed wire)
- **Troponin** molecules consist of 3 subunits
  - TnI: binds to actin
  - TnT: bonds to tropomyosin
  - TnC: binds Ca$^{2+}$
Thick filaments

- Composed of **myosin** (approximately 500)
- All arranged with **tails** pointing towards Midline (M)
- **Head** = two globular protein subunits that bind to **actin**