Muscle Histology

- motion = reaction of multicellular organisms to changes => mediated by muscle cells
- conversion of chemical into mechanical energy by => contractile apparatus
- actin and myosin = contractile apparatus => myofilaments arranged parallel to direction of contraction
- specialization = an excitable cell membrane => propagates the stimuli

Smooth Muscle Characteristics

- spindle shaped cells of variable size
  => largest = uterus during pregnancy
  smallest = small arterioles
- centrally placed nucleus
  => chromatin granular, 2-5 nucleoli
- innervations = autonomic nervous system
- visceral/ involuntary muscle
- undifferentiated mesenchyme
- multunit = functionally independent, single nerve terminal, no spontaneous contraction
- visceral = GAP junctions, spontaneous contraction

Smooth Muscle Location

- walls of hollow organs
- tunica media => artery, veins
- ciliary muscle
- iris muscle
Skeletal Muscle Characteristics

- striated
- attach to tendons $\Rightarrow$ apply force to bones/joints
- voluntary = somatic nerve
  involuntary = reflex
- multinuclear, peripheral nuclei
  $\Rightarrow$ centronuclear myopathy
- slow twitch (type I) = more mitochondria, myoglobin
  $\Rightarrow$ marathon runners
- fast twitch = contraction short but powerful, lactic acid
  $\Rightarrow$ weightlifters/sprinters

Skeletal Muscle Organization

Epimysium = CT, ensheaths entire muscle
Perimysium = CT, enclosing muscle fibers into fascicles
Fascicle = bundle of 10-100 muscle fibers
Endomysium = CT, ensheaths muscle fiber
Muscle fiber

Muscle Contraction: Neuromuscular Junction

Axon

Muscle cell

Mechanical work

\[ \text{AcOH} + \text{ACH} \rightarrow \text{ATP} \]
Types of Contraction

- **Isometric**
  - force generation
  - no change in muscle length

- **Isotonic**
  - force generation
  - muscle shortens
  - constant load

Cardiac Muscle Characteristics

- striated
- propel blood
- many mitochondria
- myogenic contraction
- Pacemaker cells
  - rhythmic impulses
- CNS = sends signals to speed up/slow down only
- intercalated disk
  - synchronized contraction
- Purkinje fibers = conduct electrical stimulus

Myocardial Infarction

- heart necrosis
- result of long-term conditions
- coronary arteries thickened by cholesterol => narrowing lumen
- plaque rupture = blood clot
- luminal occlusion = blocking flow of blood
- unsure what causes plaque rupture
- risk factors: diabetes, smoking, inactivity, cholesterol