

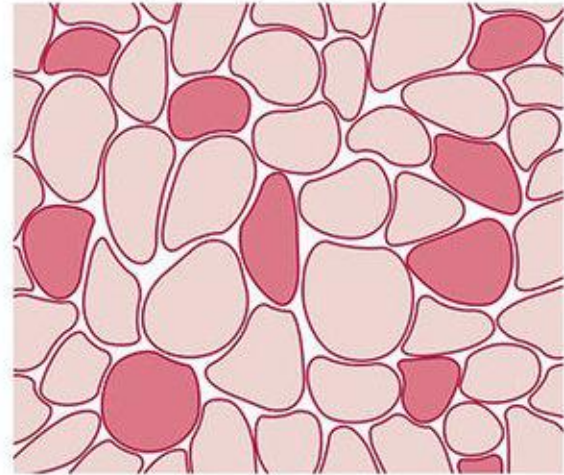
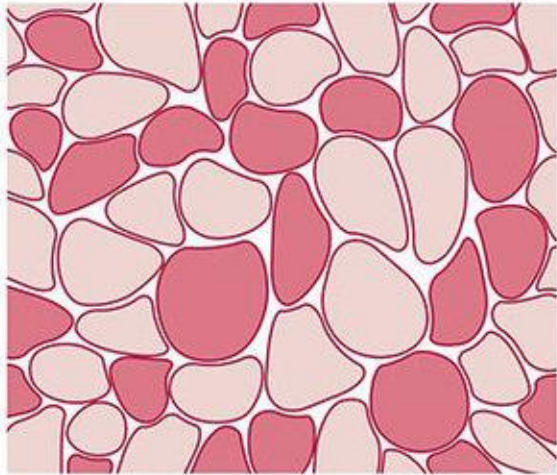
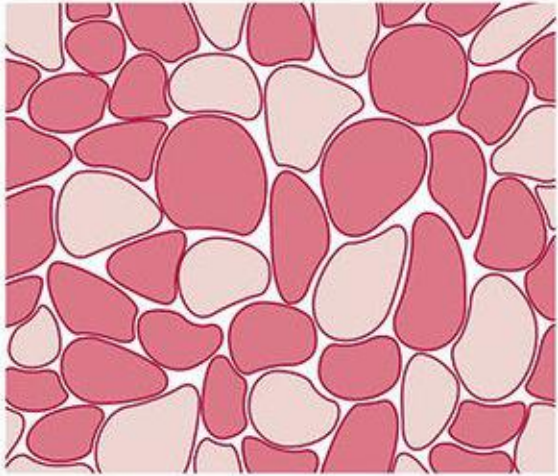
Biology

sarcomere



Classification of skeletal muscle fibers

- Type I or slow, red oxidative fibers:
- Type IIa or fast, intermediate oxidative-glycolytic fibers:
- Type IIb or fast, white glycolytic fibers:

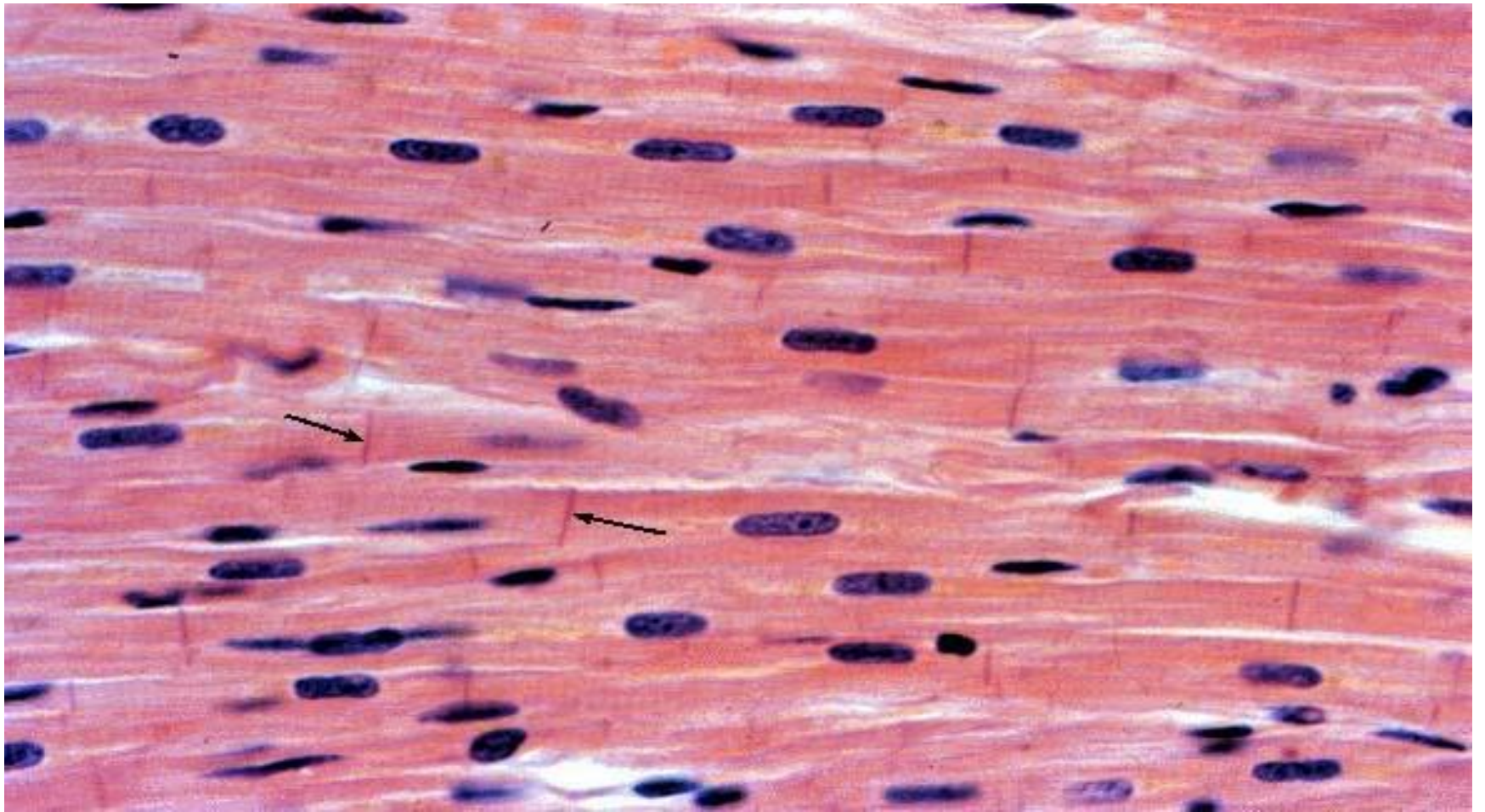


Atypical Striated Muscle

- cremaster muscle (near the spermatic cord).
- esophageal striated muscle, external urethral sphincter, external anal sphincter.

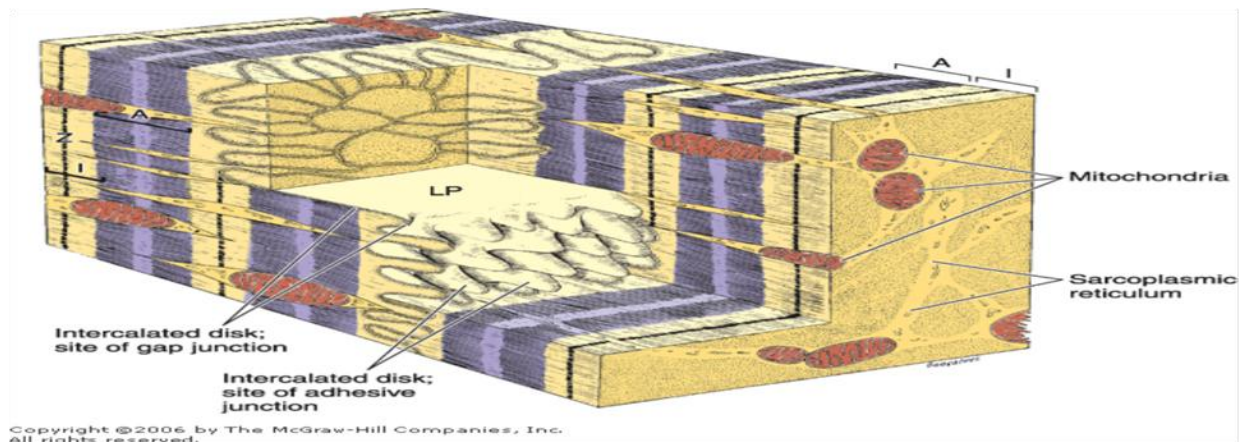
CARDIAC MUSCLE

- The muscle **fibers branch** (bifurcate) and are arranged in series to form an anastomosing network.
- Each myocyte has one or two **central nuclei** (unlike the many peripheral nuclei of syncytia of skeletal muscle fibers).
- The fibers have more sarcoplasm.
- The mitochondria are larger and better developed.
- **All the fibers are Type I** (red fibers, with abundant myoglobin).
- **Glycogen** may also present.
- The myocytes have specialized areas of contact - the **intercalated disks**.
- **Contractions are rhythmic, spontaneous and involuntary.**

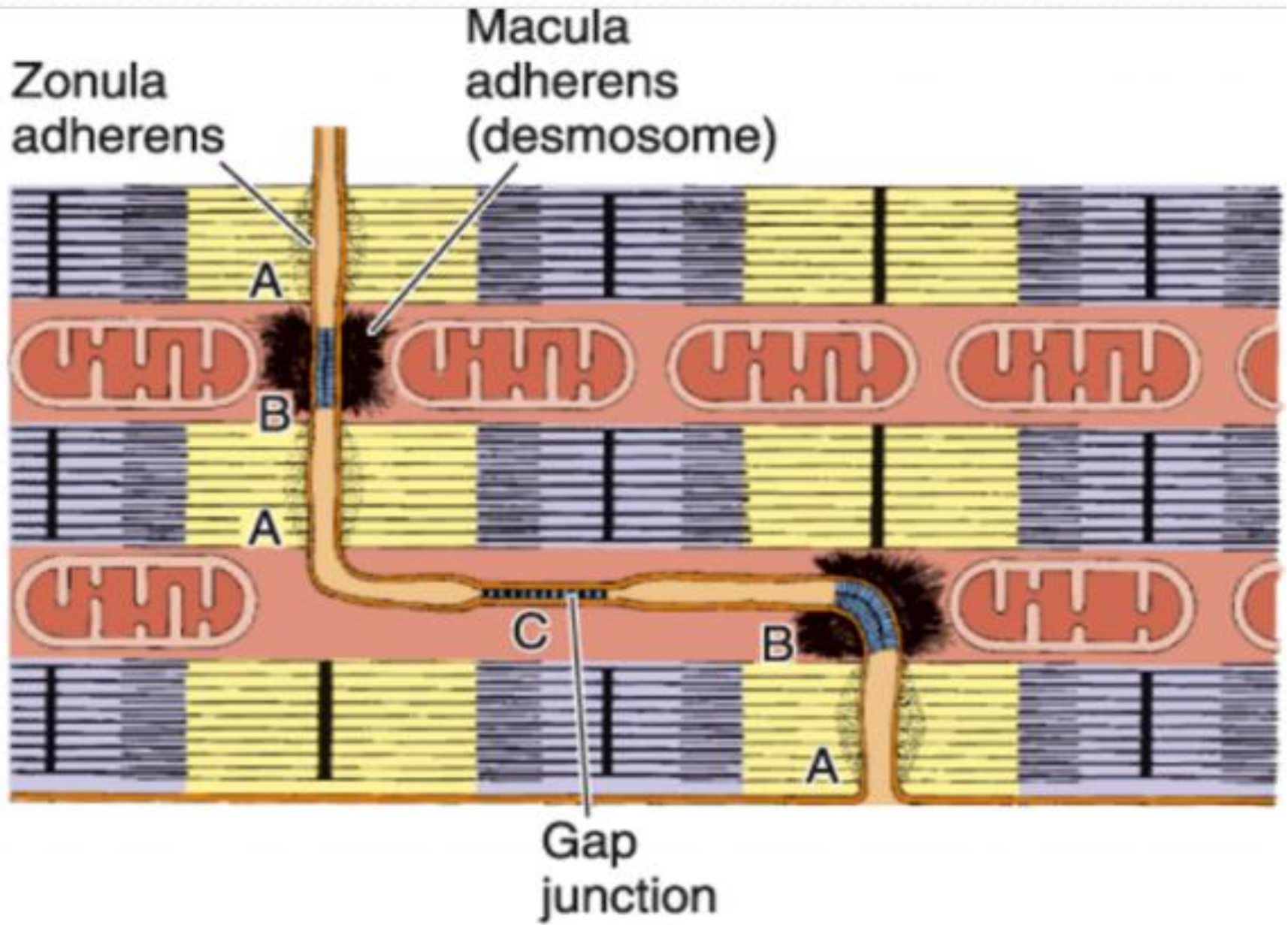


Cardiac muscle cells

- The **T tubule system** and **sarcoplasmic reticulum** are not as regularly arranged in the cardiac myocytes.
- **Diads end near Z disc**
- sarcomere
- Lipofuscin pigment granules (aging pigment)



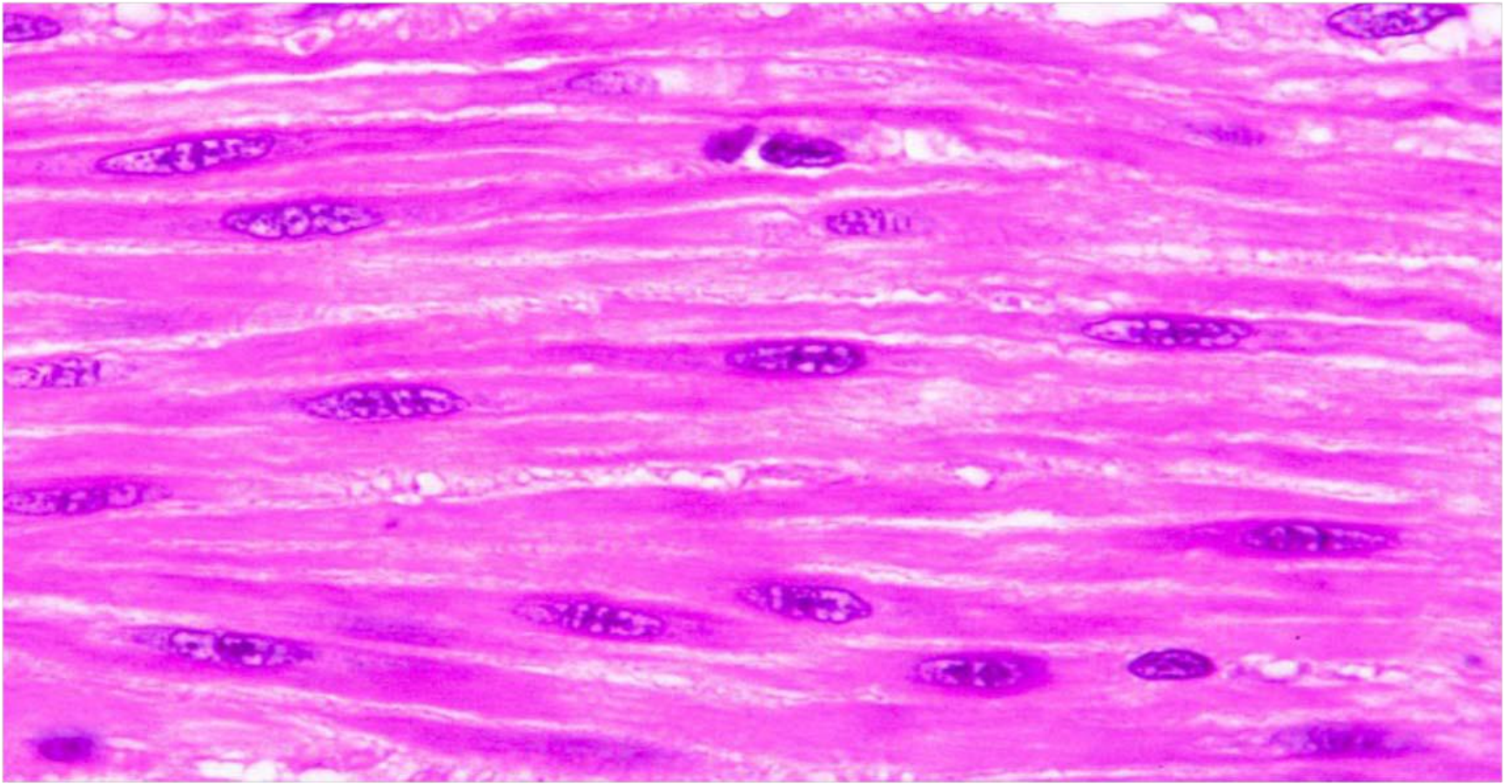
Intercalated disks



SMOOTH MUSCLE

**innervated by the autonomic nervous
system**

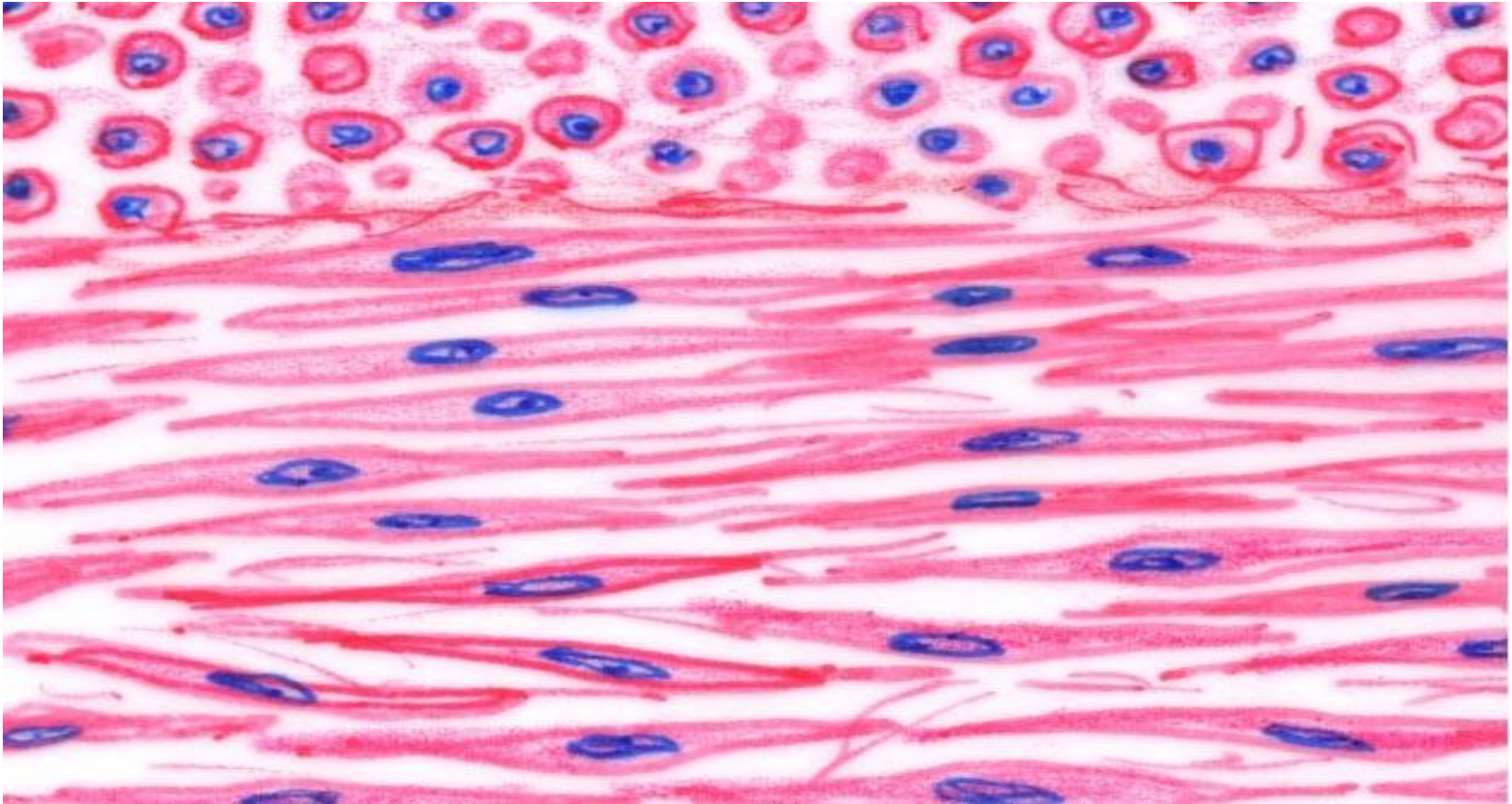
involuntary muscle



Location of smooth muscle

- Smooth muscle is found in the **walls of the hollow internal organs**
- **walls of blood vessels** (vascular smooth muscle, especially in arterial vessels).
- Smooth muscle is found in the **dermis of the skin** (arrector pili).
- Smooth muscle is found in the eye (**iris diaphragm**, controlling the amount of light reaching the retina).

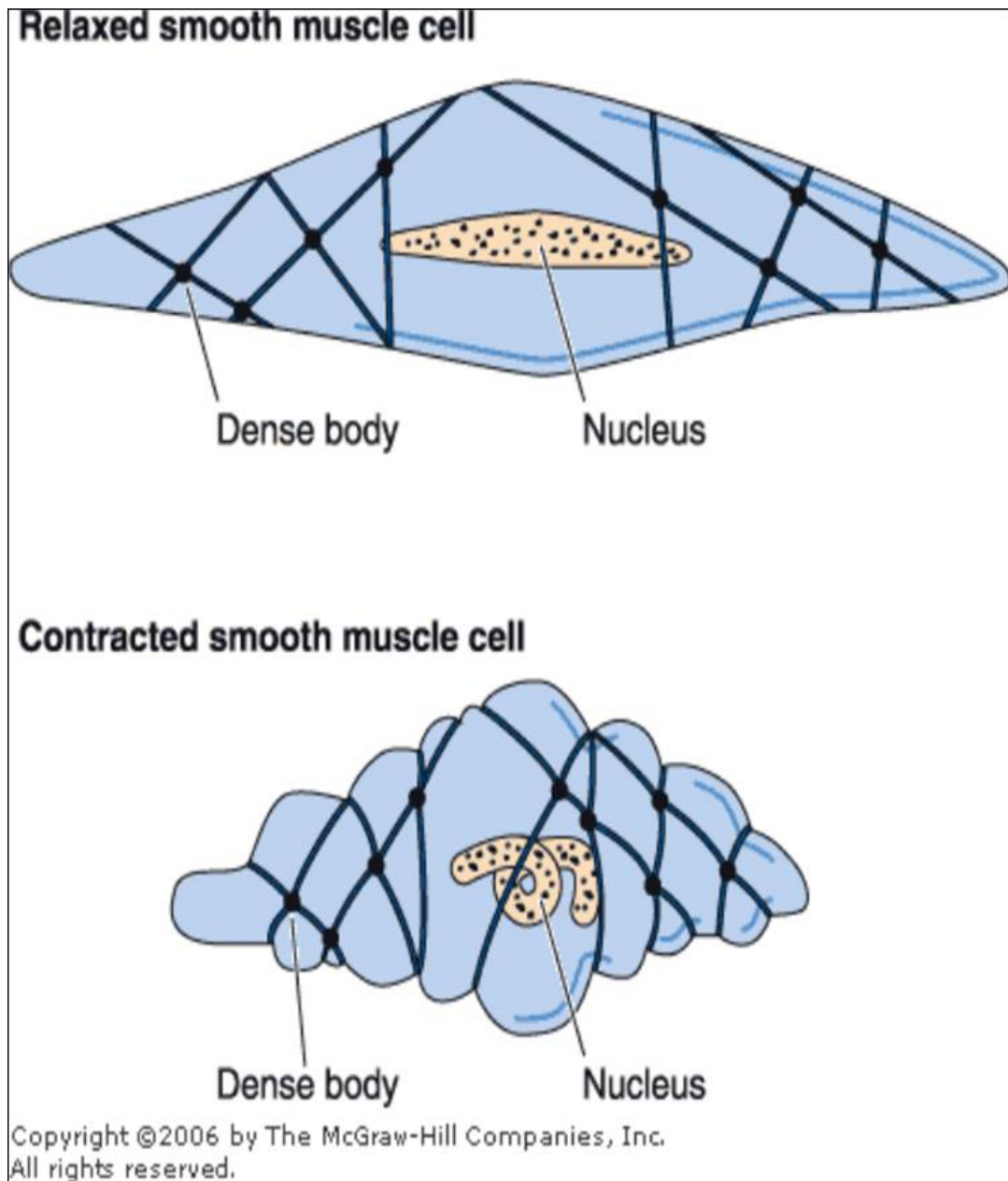
Structure of smooth muscle fibers



Smooth muscle sheath

- **Sheath (proteoglycan, reticular, collagen & elastic fibers)**
- **Myofilaments:**
 - 1. thin myofilaments (actin)** which are the most common type
 - 2. thick myofilaments (myosin)** which are less common
 - 3. intermediate filaments (desmin)** These may be grouped as "dense bodies" and are also found in contact with the sarcolemma (attachment plaques of thin and intermediate filaments that are functionally similar to Z disc of skeletal and cardiac muscles).

No T- tubule
sacculles
caveolae.



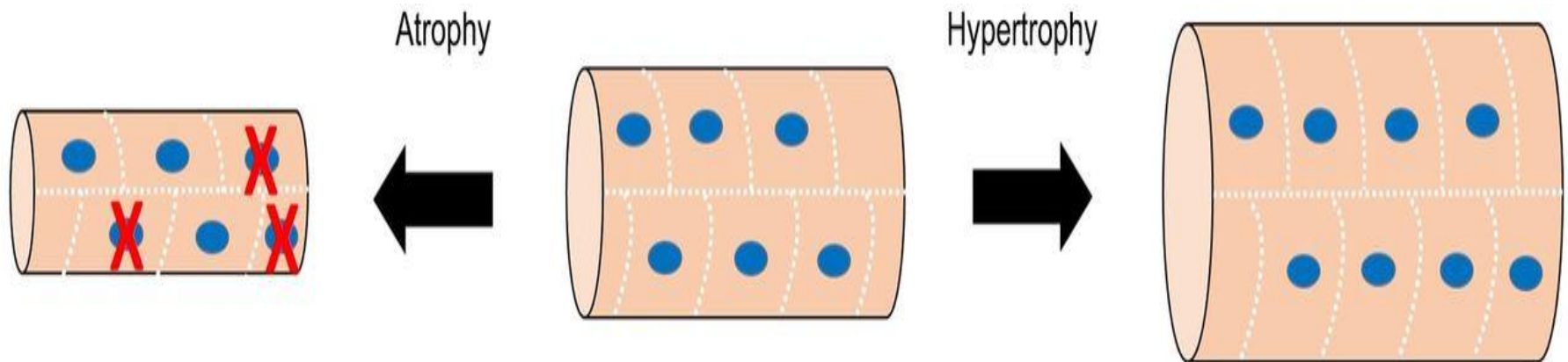
Origin of smooth muscle

- **Mesoderm**
- **From mesenchyme as connective tissue cells**
- **myoepithelial cells**
- part of the esophagus, anal sphincter, tarsi of eyelids

Repair and regeneration after injury

Skeletal muscle

- hypertrophy of use
- disuse myopathy or atrophy

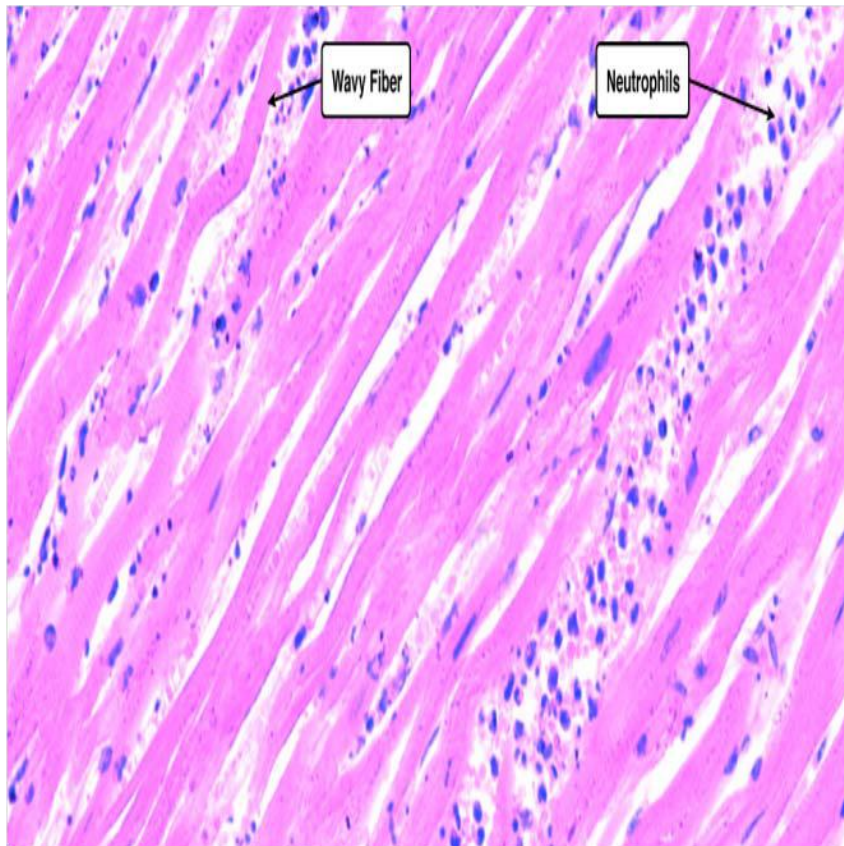


- Loss of myonuclei (apoptosis)
- Myofibre CSA ↓
- Myofibrillar proteins ↓

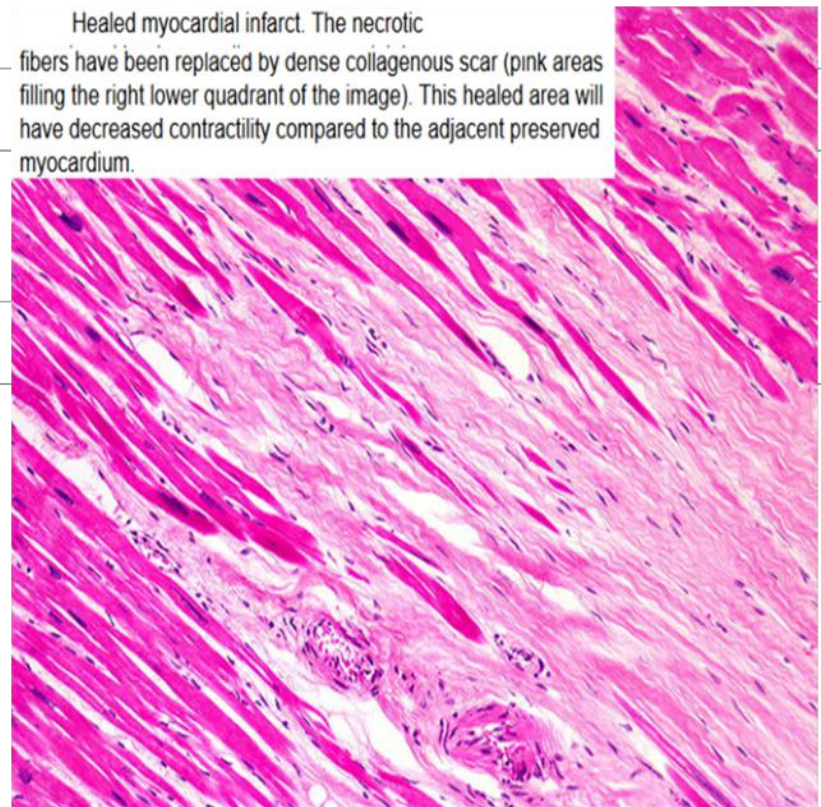
- Addition of myonuclei
- Myofibre CSA ↑
- Myofibrillar proteins ↑

Regeneration of cardiac muscle

Acute Myocardial Infarction



Healed myocardial infarction





Regeneration of Smooth muscle

hyperplasia and hypertrophy

Thank you &
Good luck