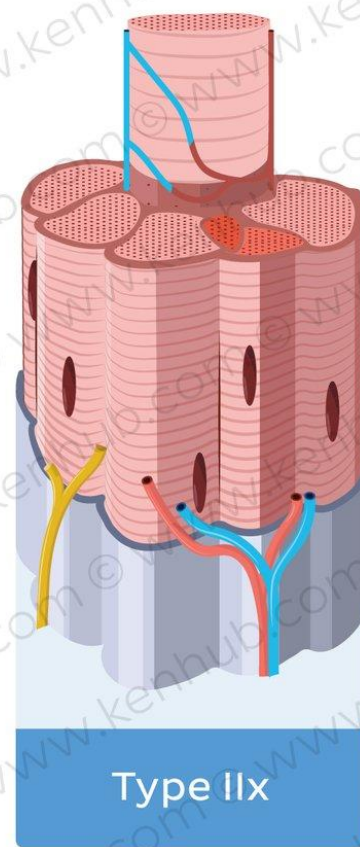
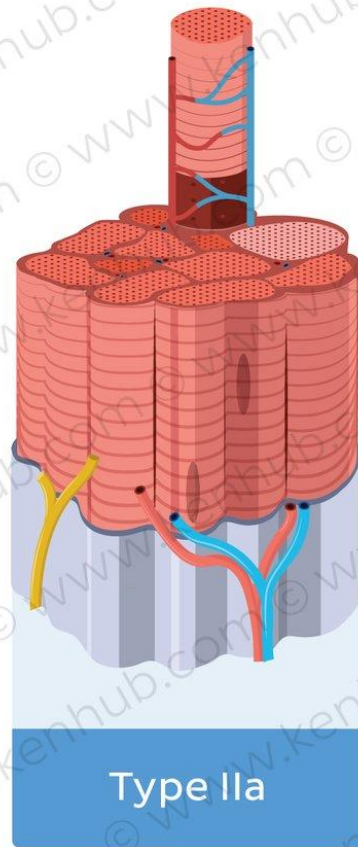
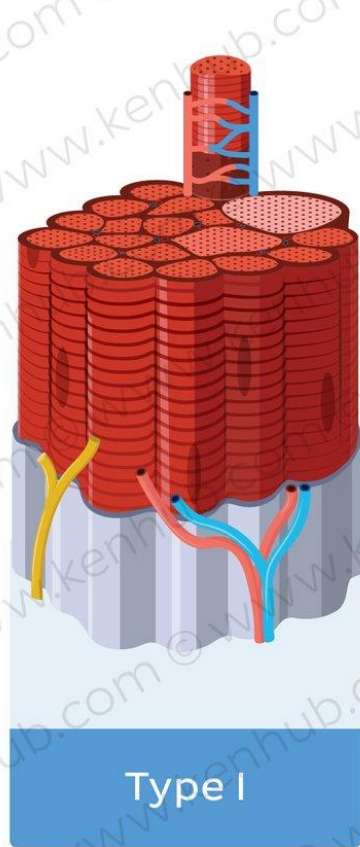


Medical Biology

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:**

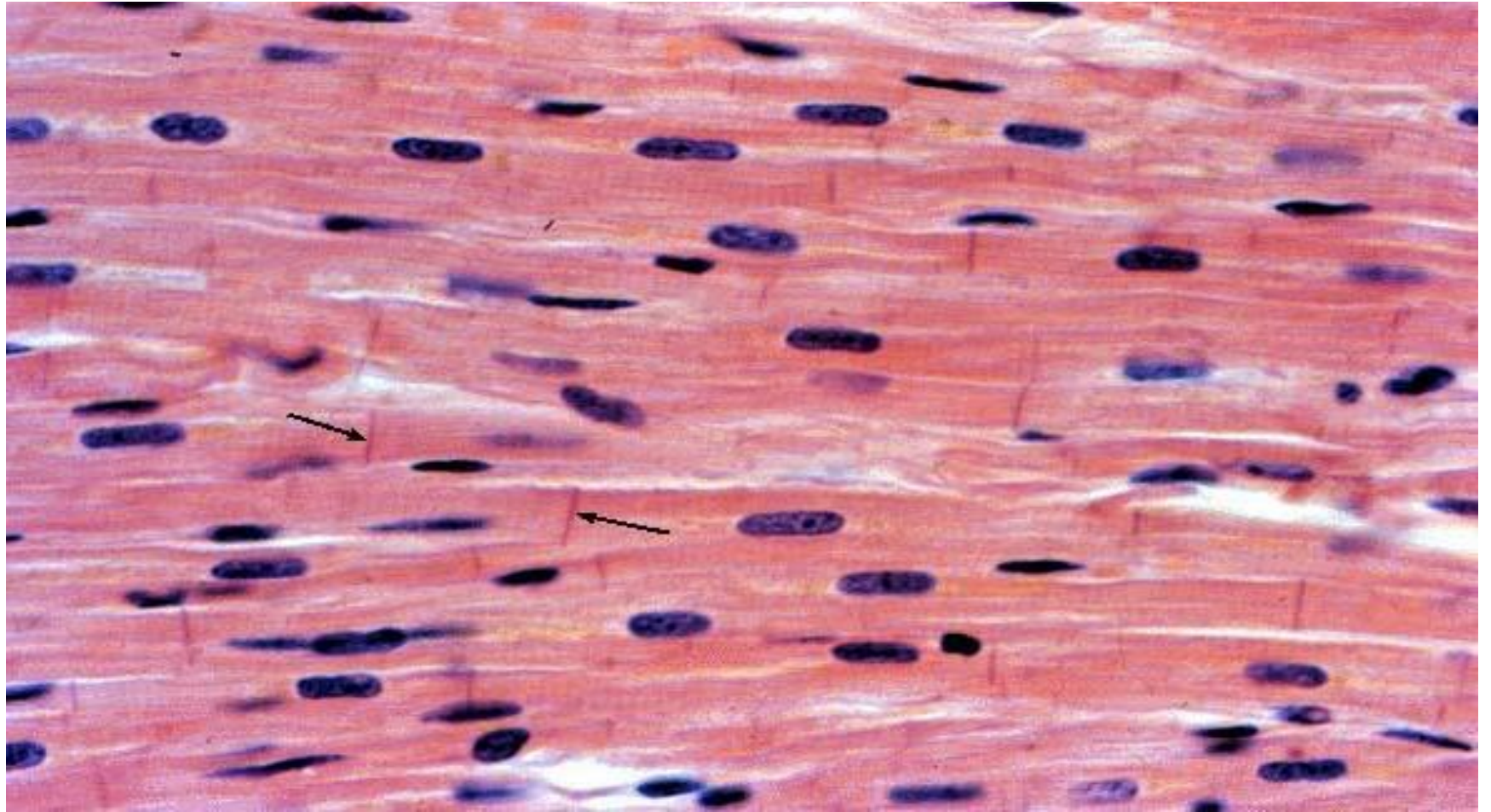


Atypical Striated Muscle

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

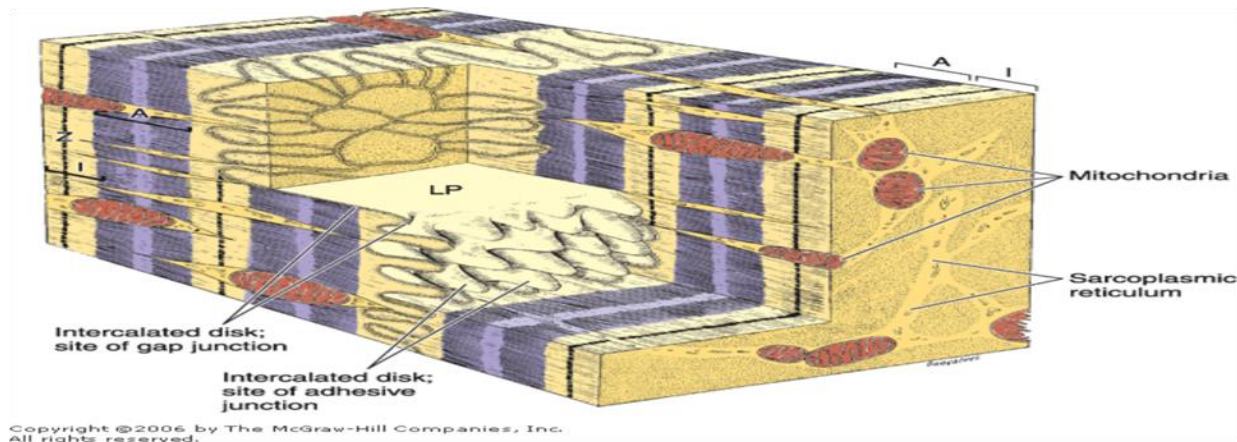
CARDIAC MUSCLE

- 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.**

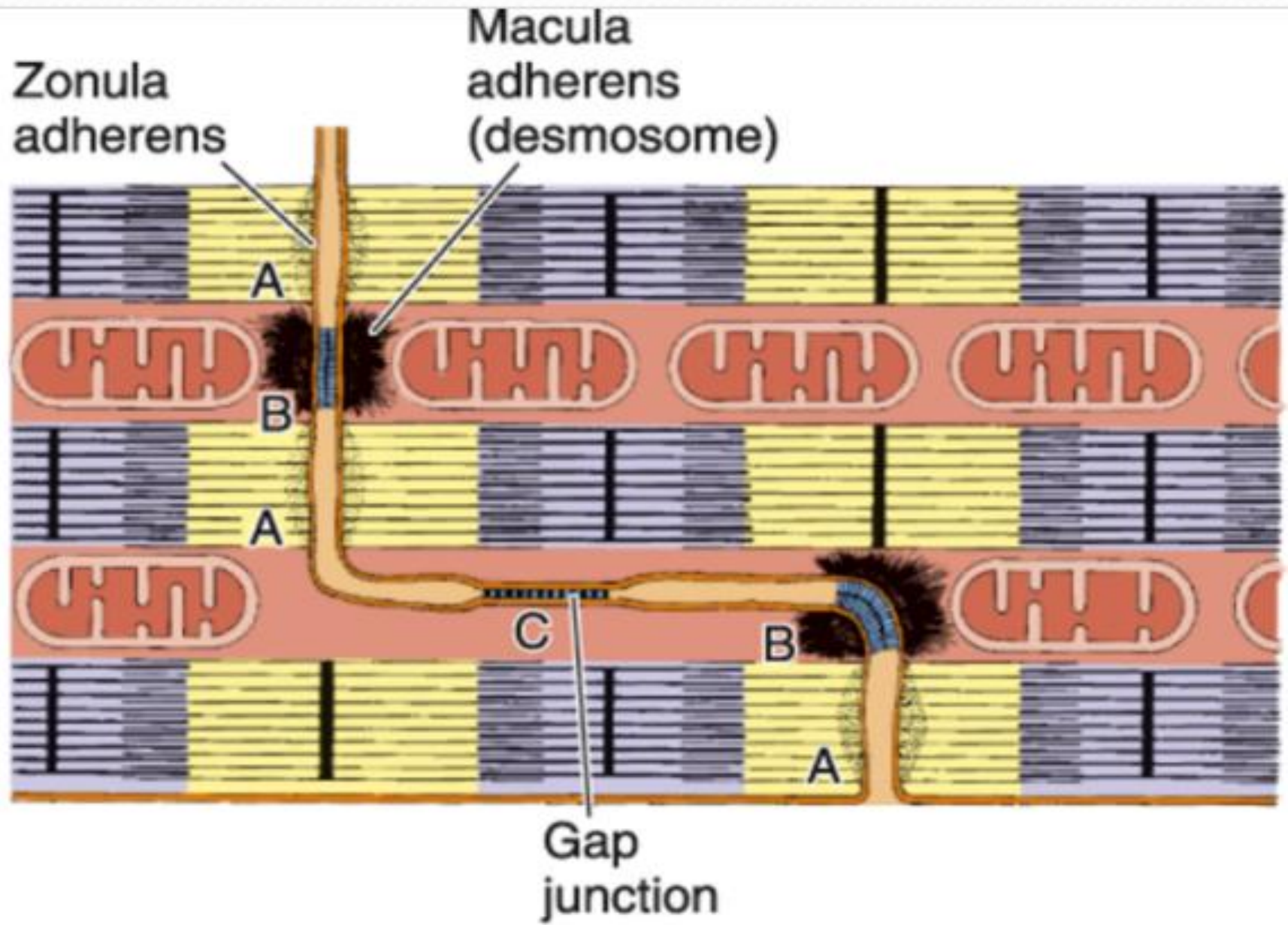


Cardiac muscle cells

- 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)



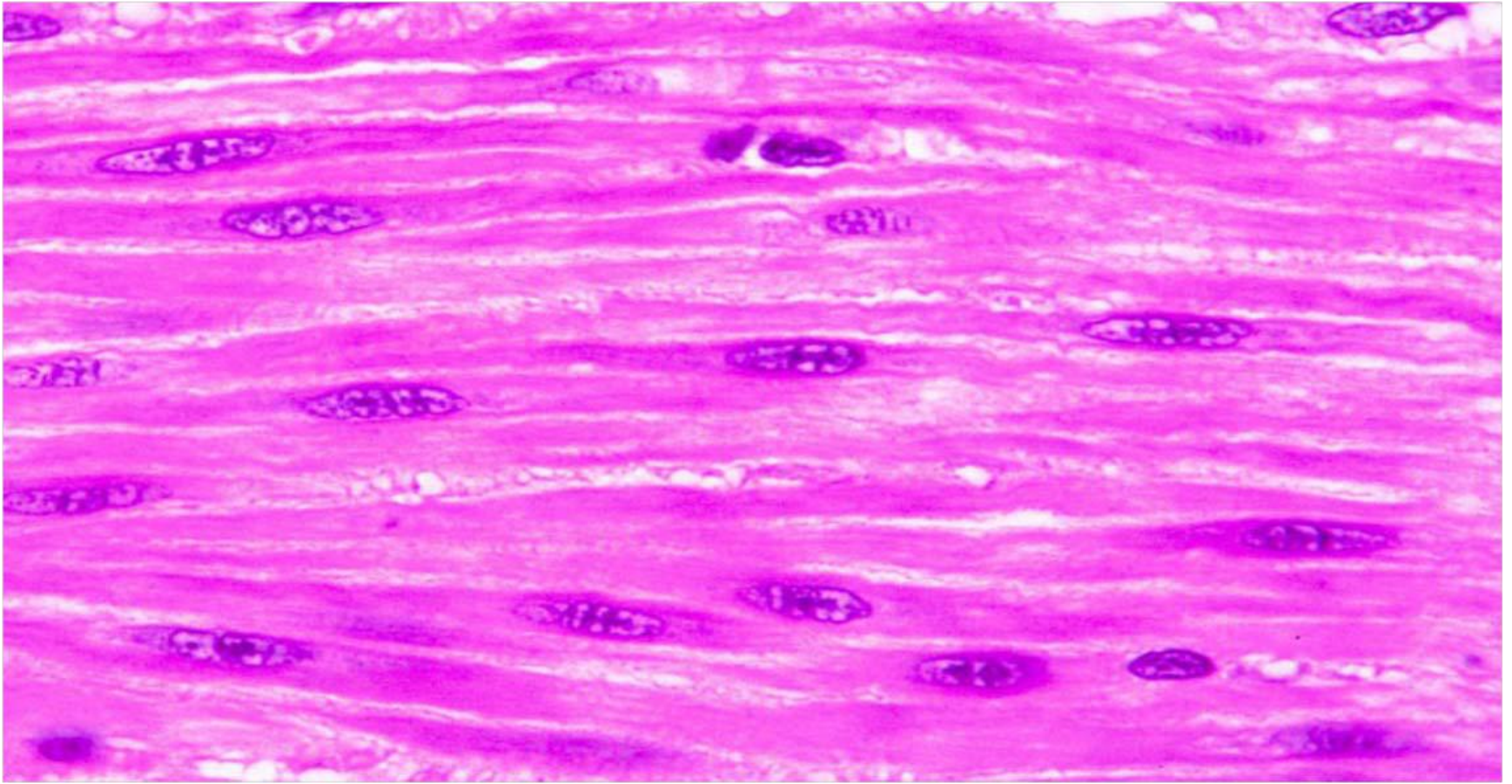
Intercalated disks



SMOOTH MUSCLE

**innervated by the autonomic nervous
system**

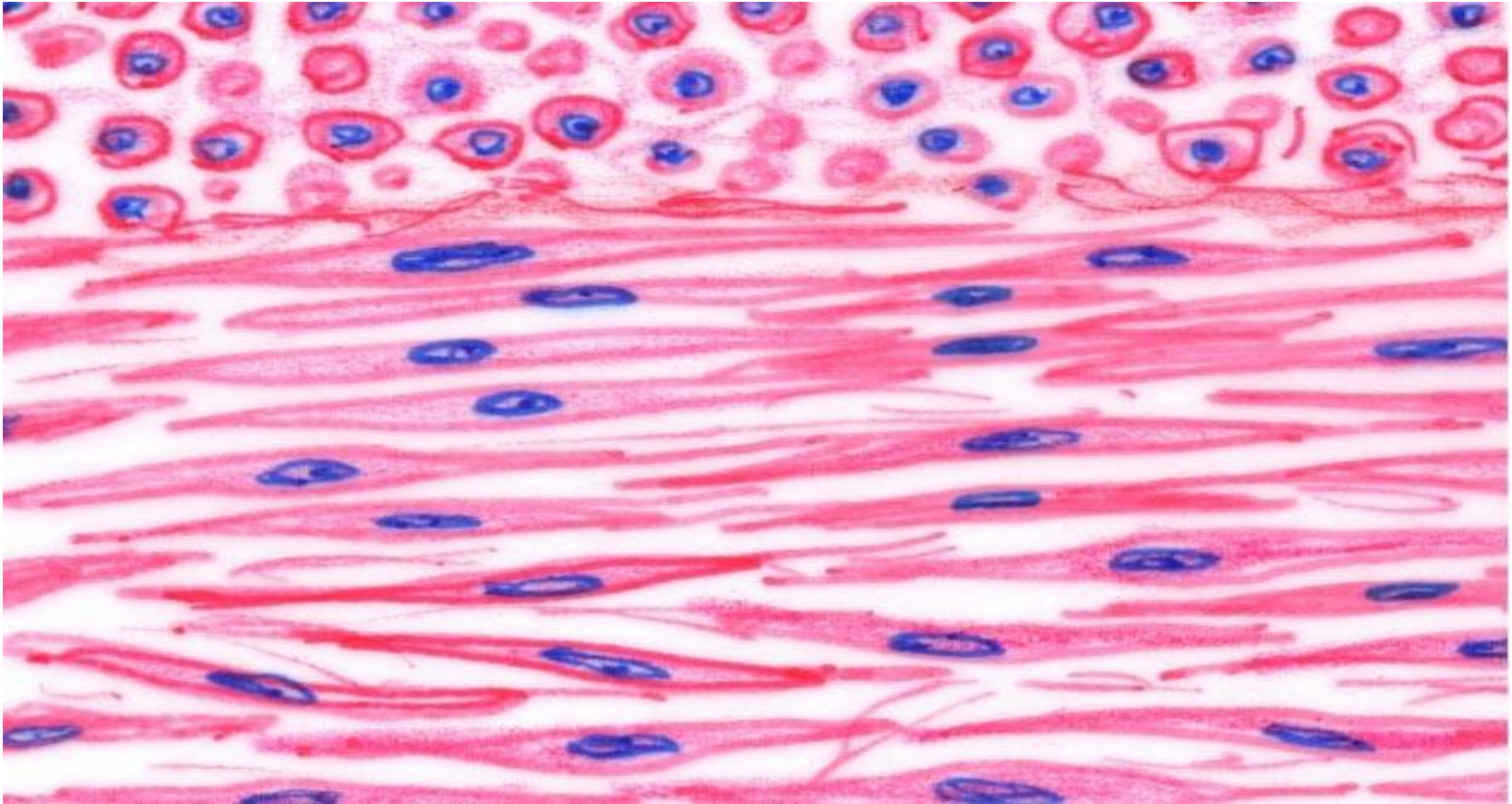
involuntary muscle



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

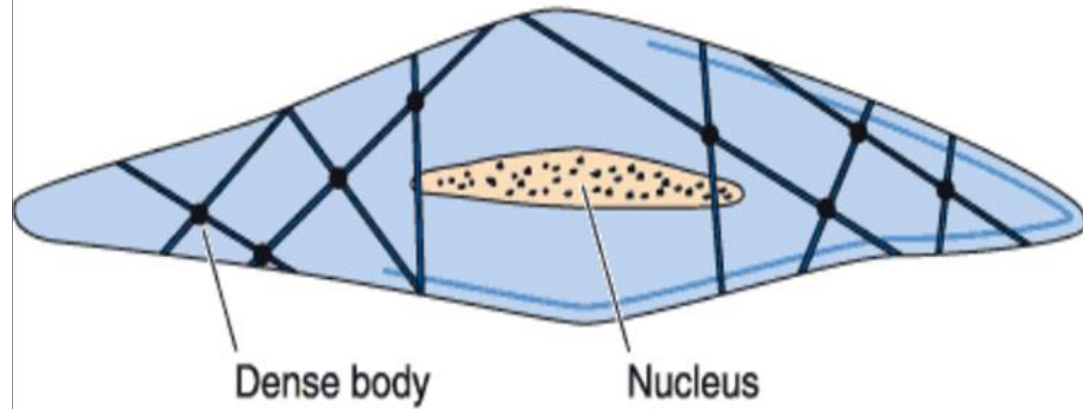


Smooth muscle sheath

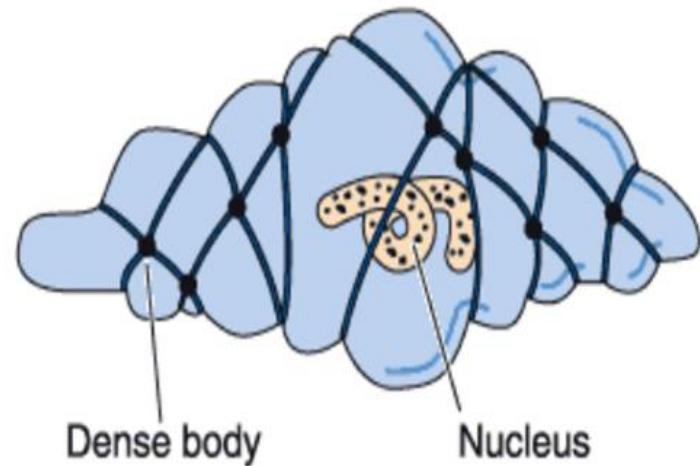
- **Sheath (proteoglycan,reticular, collagen & elastic fibers)**
- **Myofilaments:**
 - 1.thin myofilaments (actin)** which are the most common type
 - 2.thick myofilaments (myosin)** which are less common
 - 3.intermediate filaments (desmin)** These may be • grouped as "dense bodies" and are also found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

No T- tubule
sacculles
caveolae.

Relaxed smooth muscle cell



Contracted smooth muscle cell



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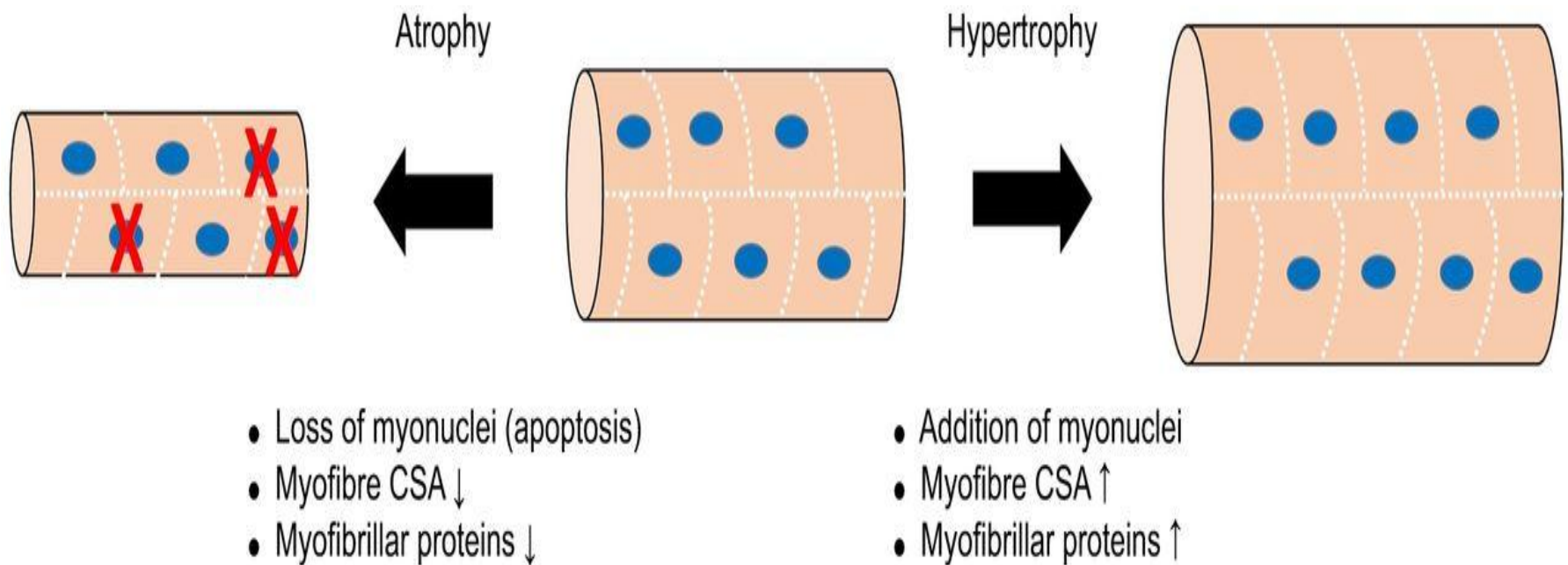
Origin of smooth muscle

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

Repair and regeneration after injury

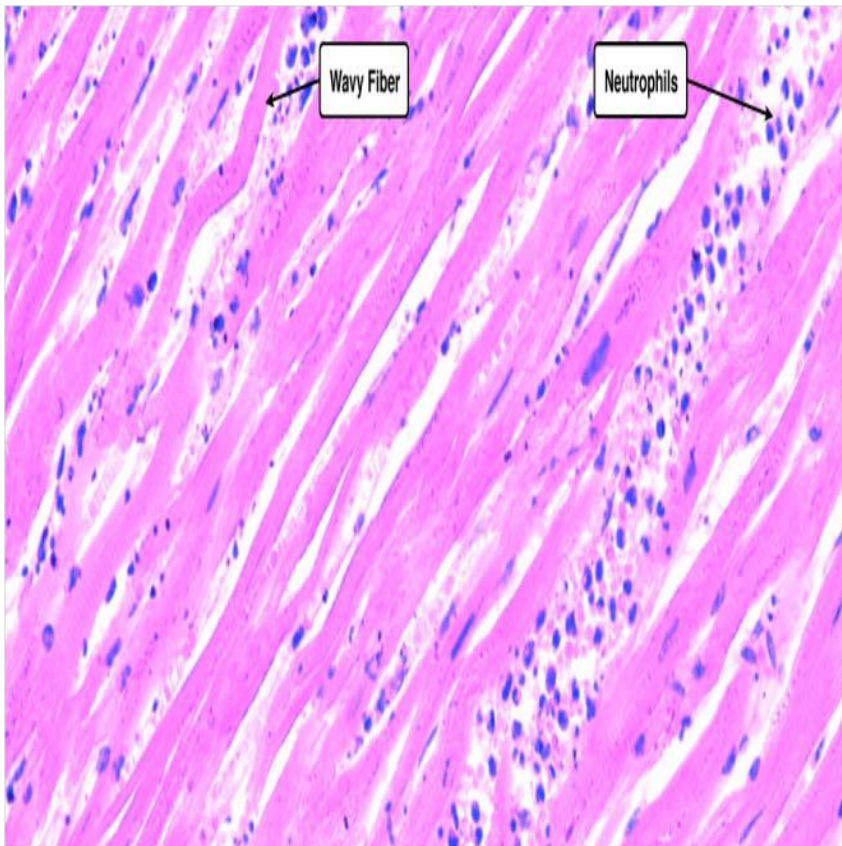
Skeletal muscle

- hypertrophy of use
- disuse myopathy or atrophy

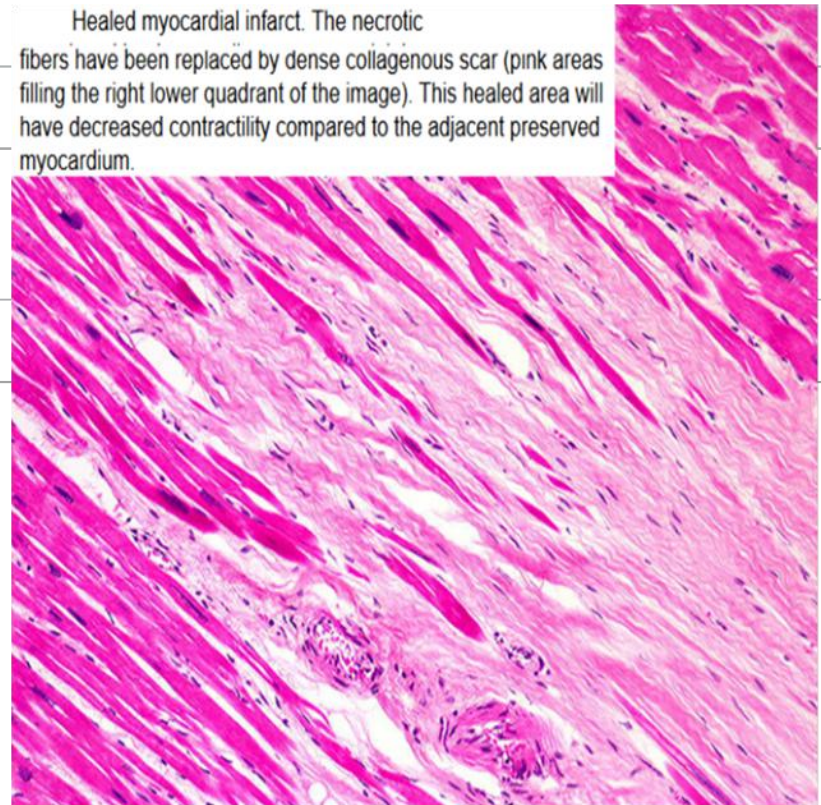


Regeneration of cardiac muscle

Acute Myocardial Infarction



Healed myocardial infarction





Regeneration of Smooth muscle

hyperplasia and hypertrophy

Muscular dystrophy

Duchenne muscular dystrophy

- Typical feature – the child uses his hands to climb up, while getting up from the floor.
- Wheelchair by age 12
- Fatal by age 30

Duchenne's Muscular Dystrophy

Sex-linked
recessive
inheritance

Mother
normal,
carrier

Father
normal

Only males affected,
but females may be
carriers



2 years

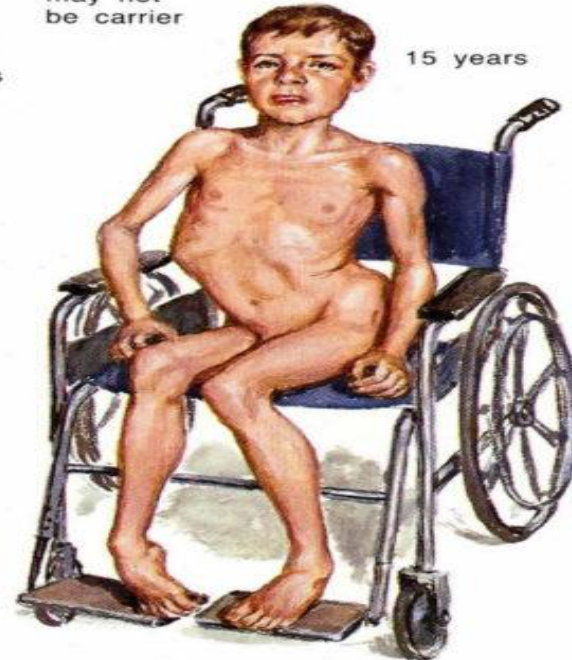


Minimal or no symptoms

8 years



15 years



Severe crippling
deformities and contractures

Progression with age

Weakness, especially of
pelvic girdle muscles;
marked lordosis,
enlarged calves



Calf muscles usually
but not always
enlarged



Lordosis disappears
when child sits

Thank you &
Good luck