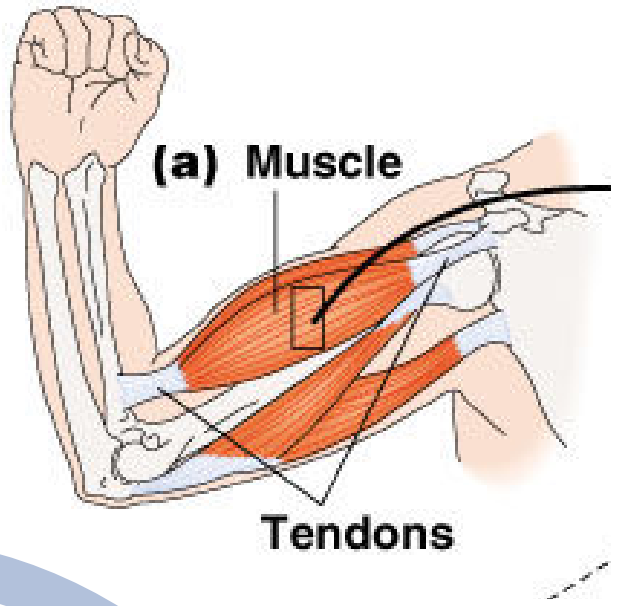
Nahda University

Dr. Samraa

Muscular Tissue



Muscular Tissue

- Mesodermal
- Made of elongated muscle cells (fibres).
- Its membrane = sarcolemma
- Its cytoplasm is acidophilic = sarcoplasm
- Rich in organelles (mitochondria , sER, myofibrils) and inclusions (glycogen and myoglobin)

Types

2- Cardiac:
striated,
involuntary.

tal:
ry.

oth:
ated,
tary.

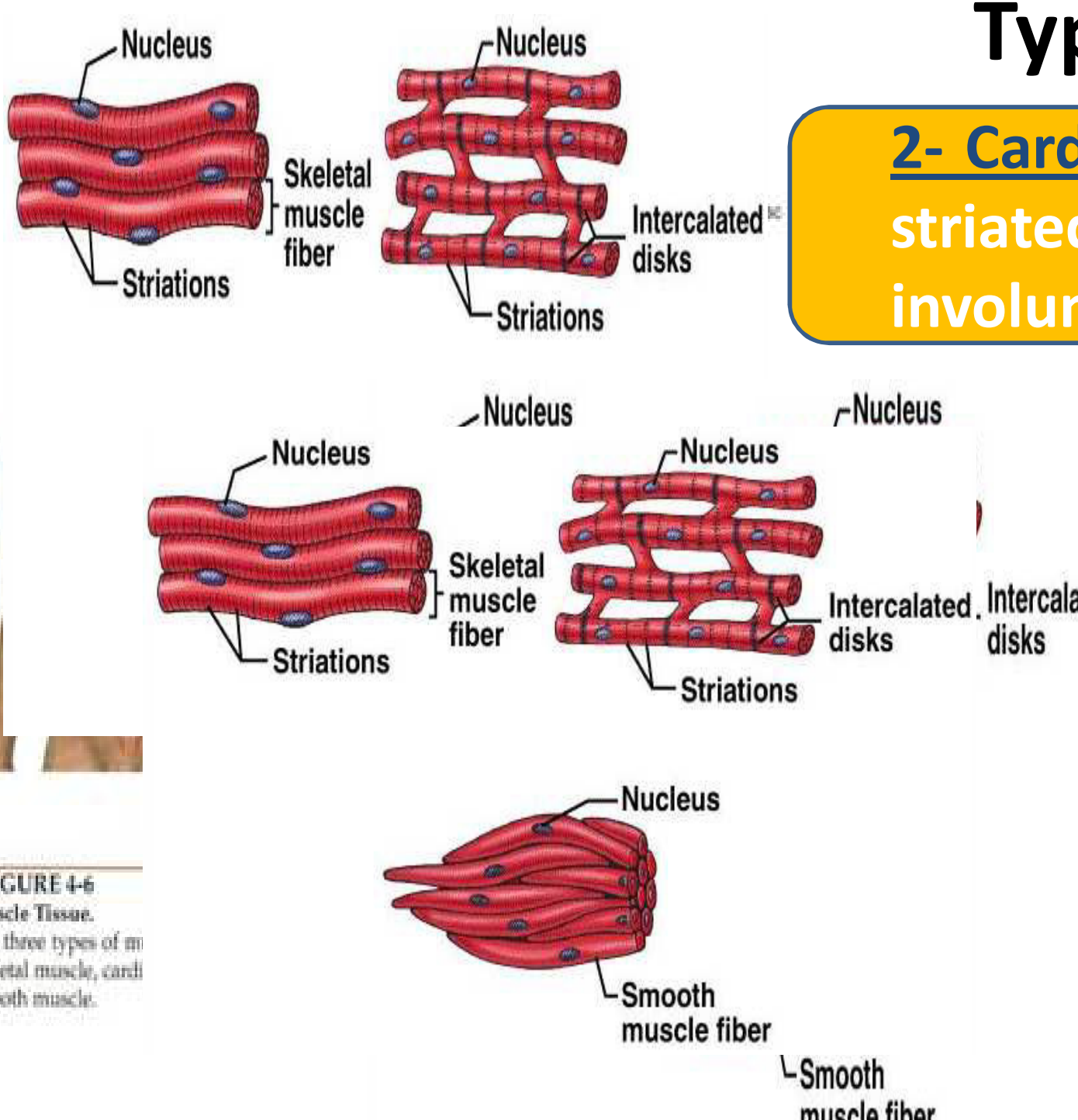
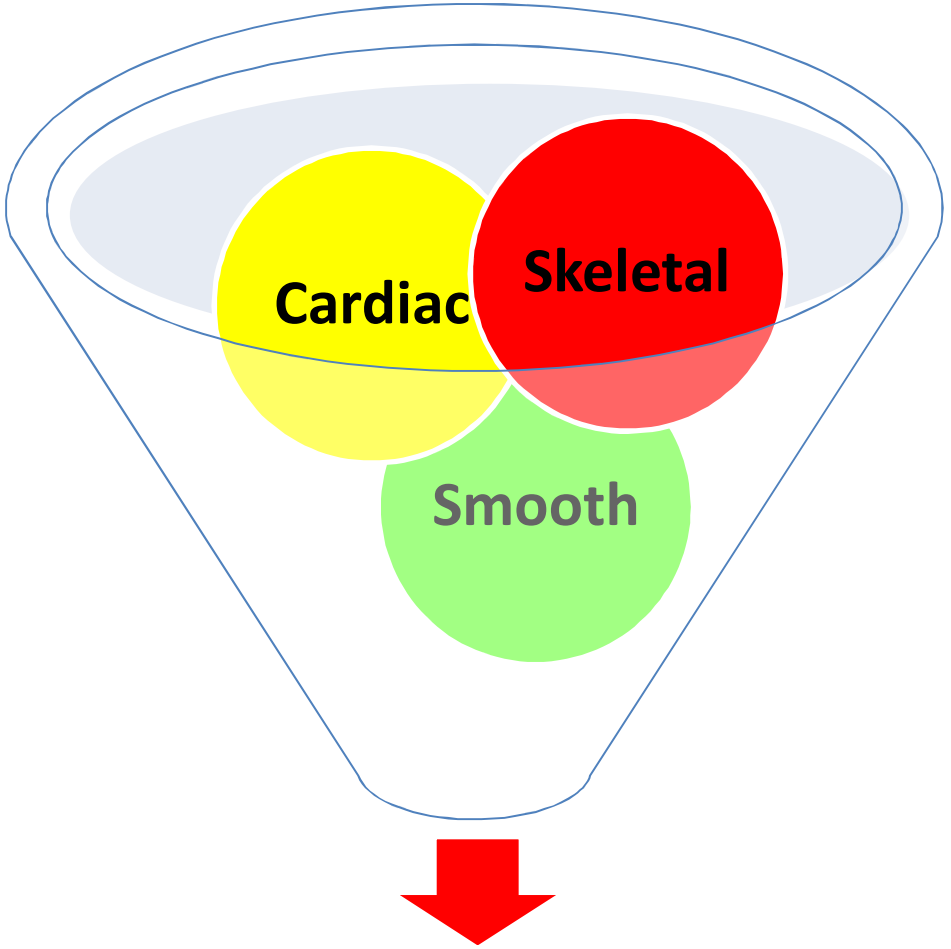


*FIGURE 4-6
Muscle Tissue.
The three types of m
skeletal muscle, cardi
smooth muscle.



How to differentiate between three muscle fibers?

1- Site

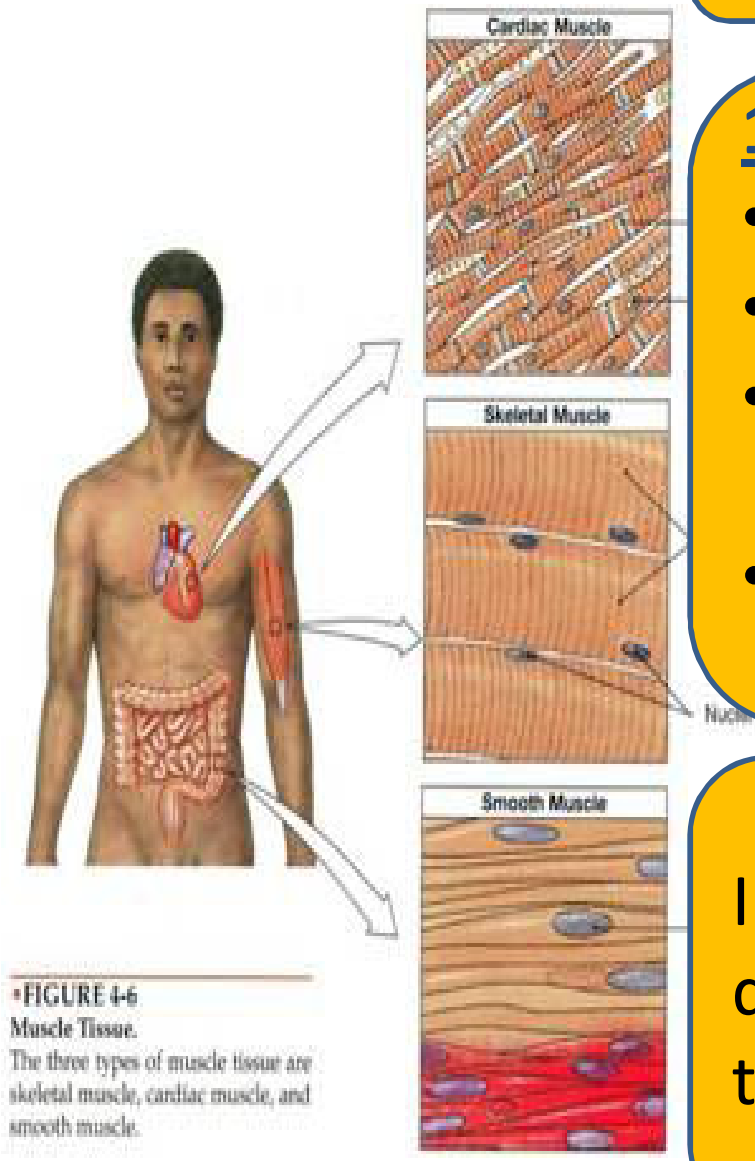


FIGURE 4-6
Muscle Tissue.
The three types of muscle tissue are skeletal muscle, cardiac muscle, and smooth muscle.

2- Cardiac:

Found in the myocardium

1- Skeletal:

- All muscles attached to skeleton
- Face & tongue
- Pharynx & upper 2/3 of oesophagus
- Diaphragm & cremasteric muscles

3- Smooth:

In walls of blood vessels, viscera , dermis of hairy skin and capsule of the spleen.

2- Action and innervations

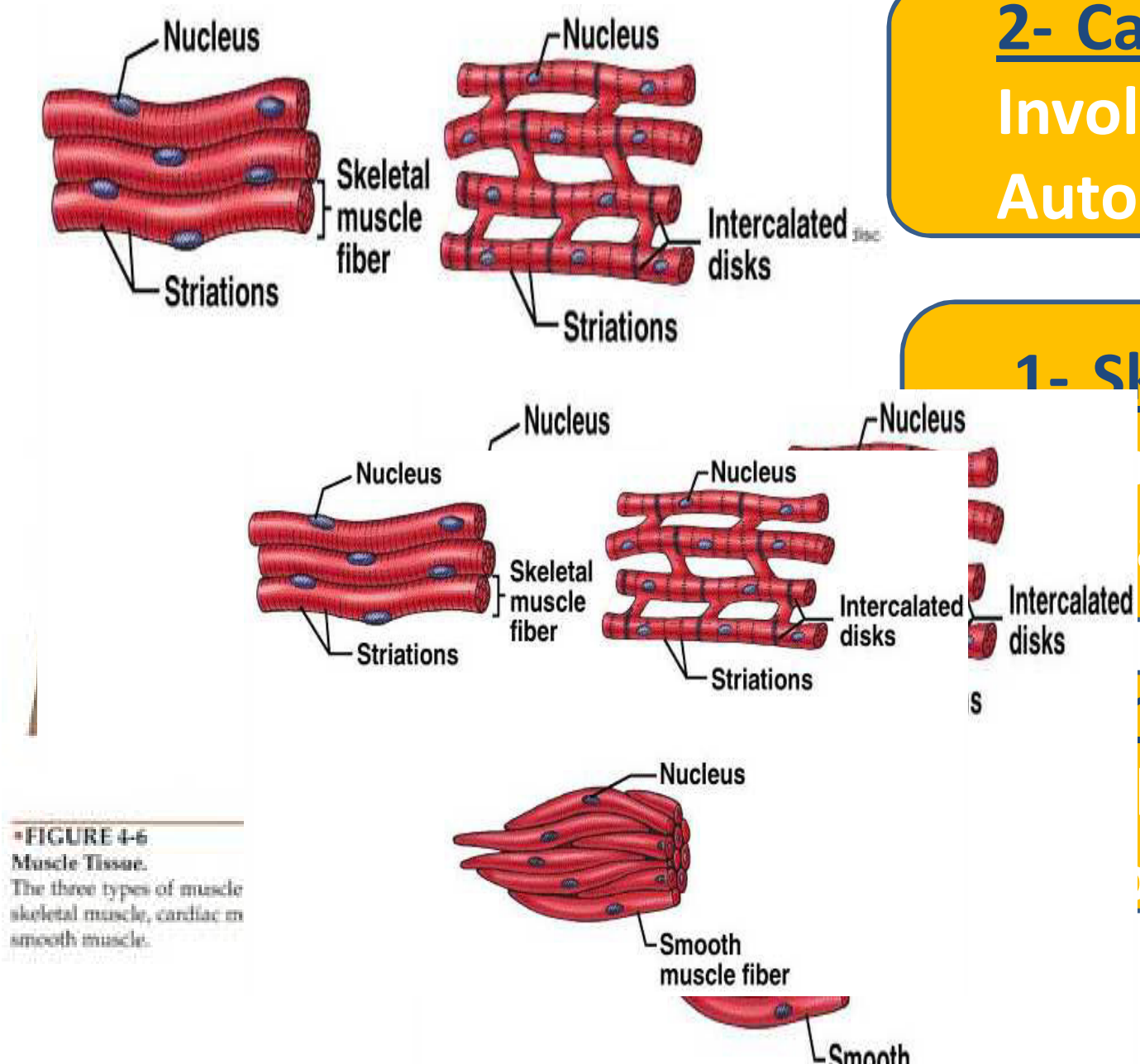


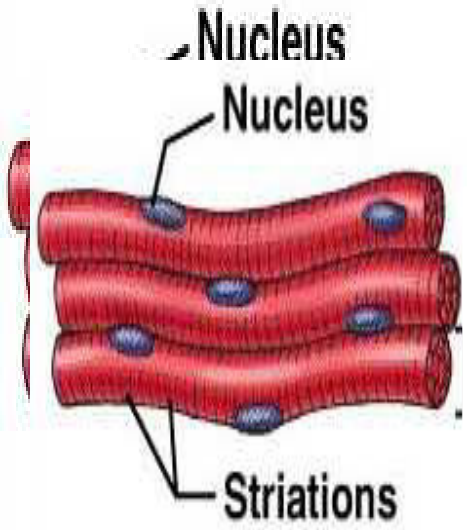
*FIGURE 4-6
Muscle Tissue.
The three types of muscle
skeletal muscle, cardiac m
smooth muscle.

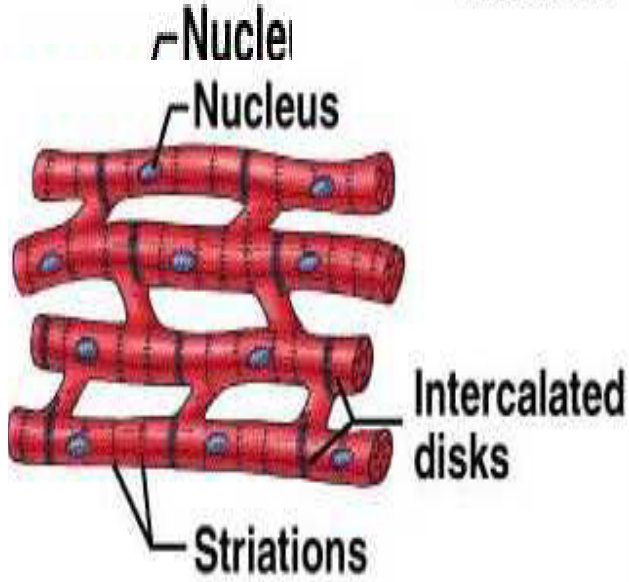
2- Cardiac:
Involuntary
Autonomic.

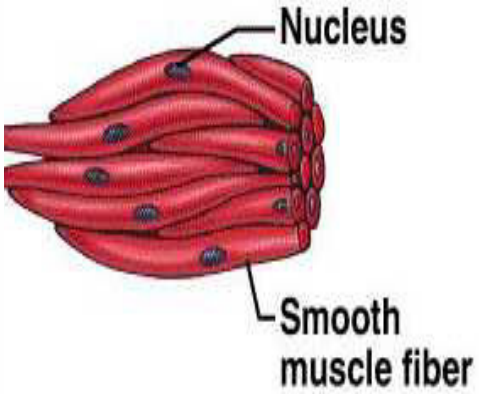
1- Skeletal:
ntary.
atic

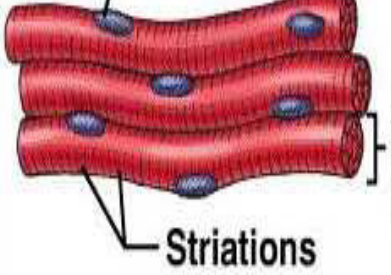
mooth:
luntary.
nomic

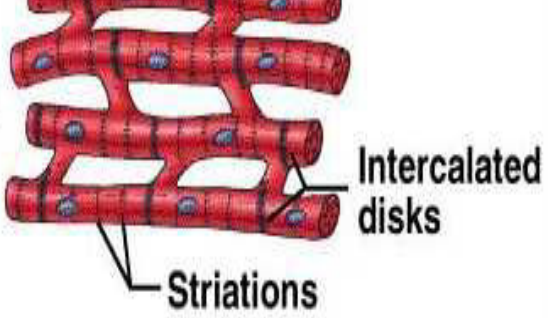
3, 4, 5- Size, sha









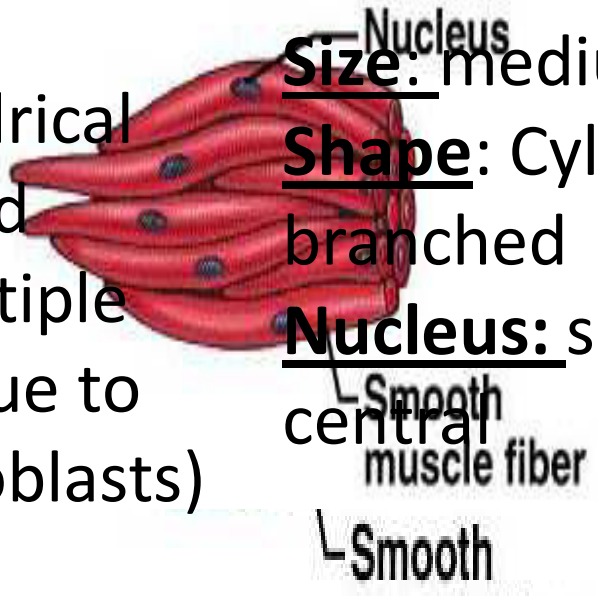


Skeletal

Size:Large

Shape: Cylindrical
Non-branched

Nucleus: multiple peripheral (due to fusion of myoblasts)



Cardiac

Size: medium

Shape: Cylindrical
branched

Nucleus: single central

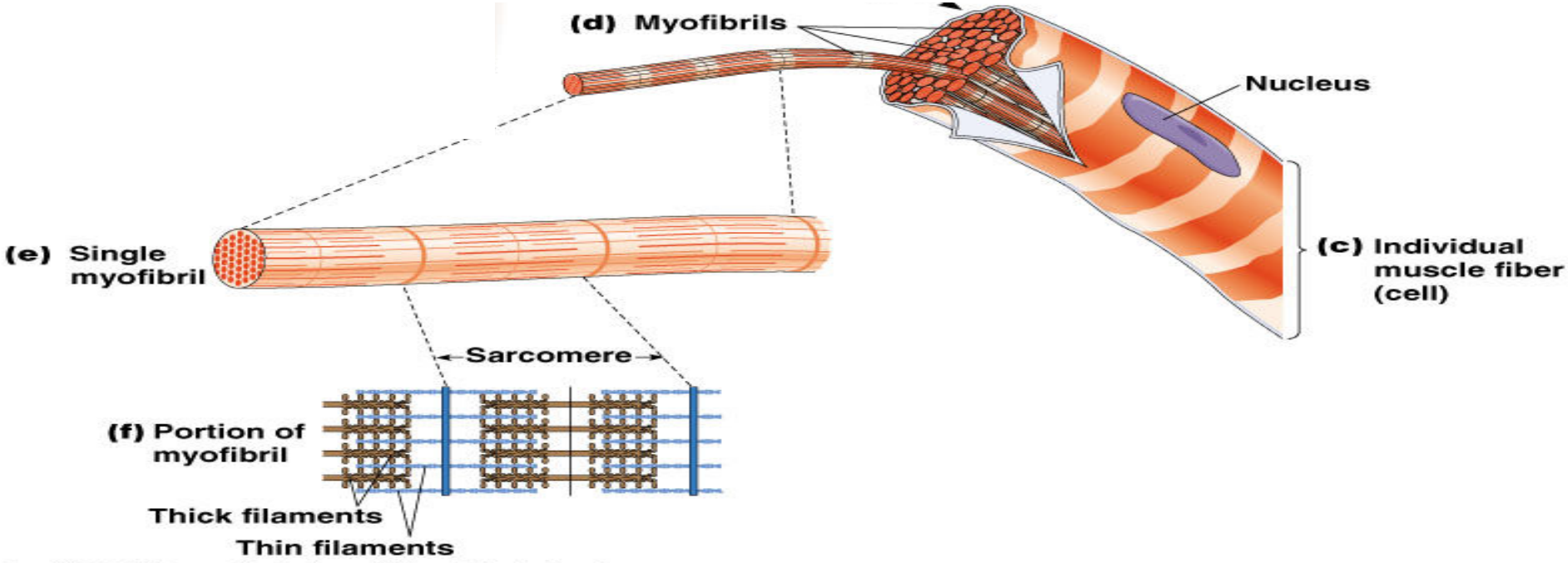
Smooth

Size: small

Shape: spindle
Non-branched

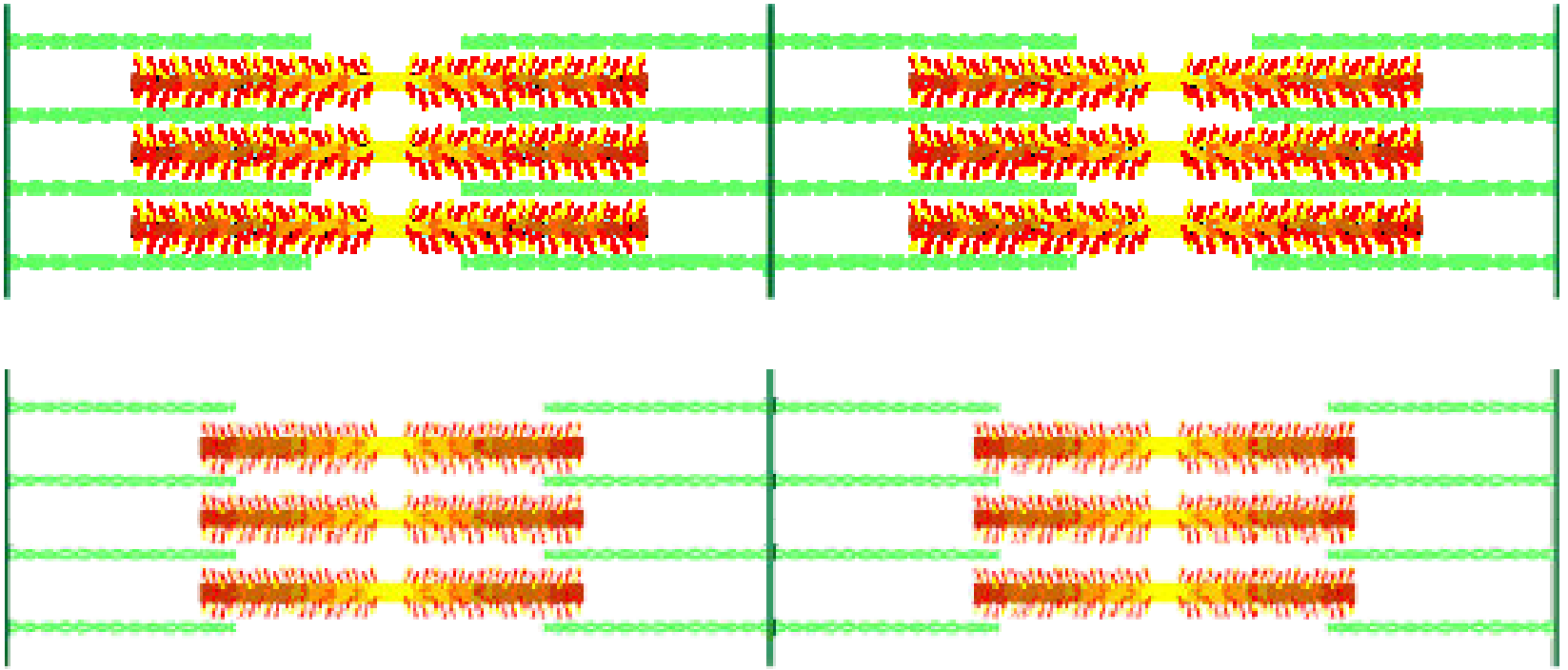
Nucleus: single central

6- Striations



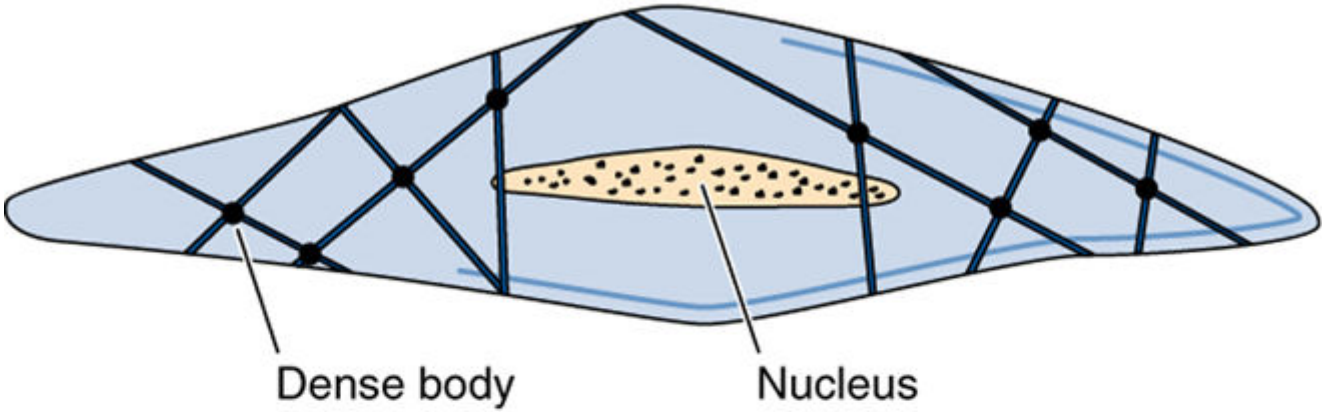
Sarcoplasm contains myofibrils which are parallel longtudinally arranged. Each myofibril show alternating dark and light bands giving the muscle fibre transverse striations. The dark **(A) band** is formed of thick myofilaments (myosin) while The light **(I) band** is formed of thin myofilaments (actin).

Animation of sliding filaments

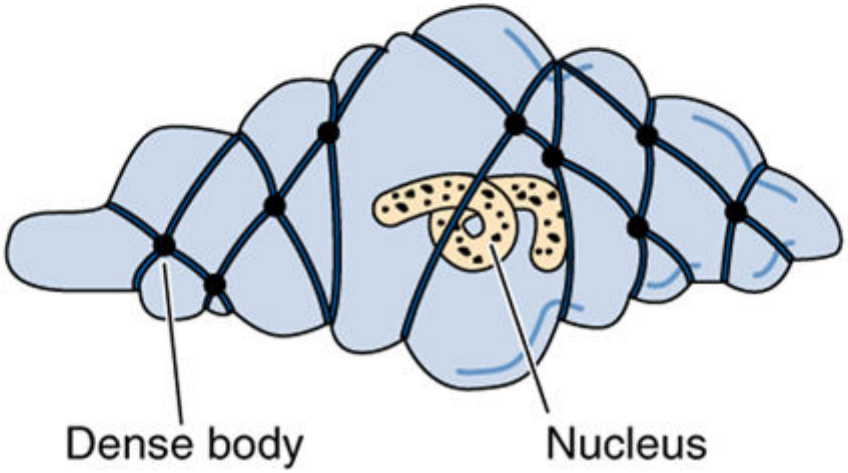


Thick filaments (red/yellow) = myosin motor protein
Thin filaments (green) = actin cytoskeletal protein

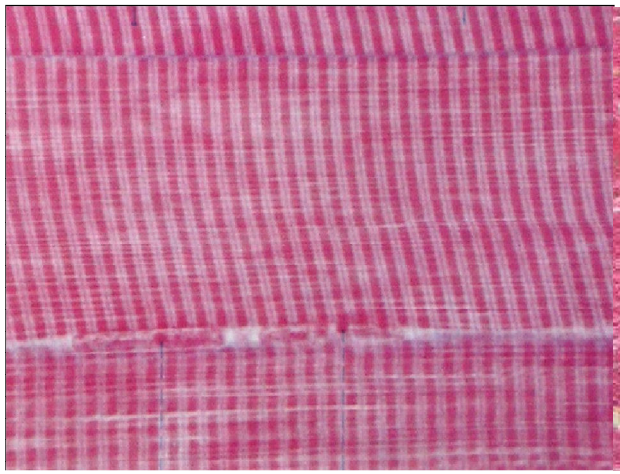
Relaxed smooth muscle cell

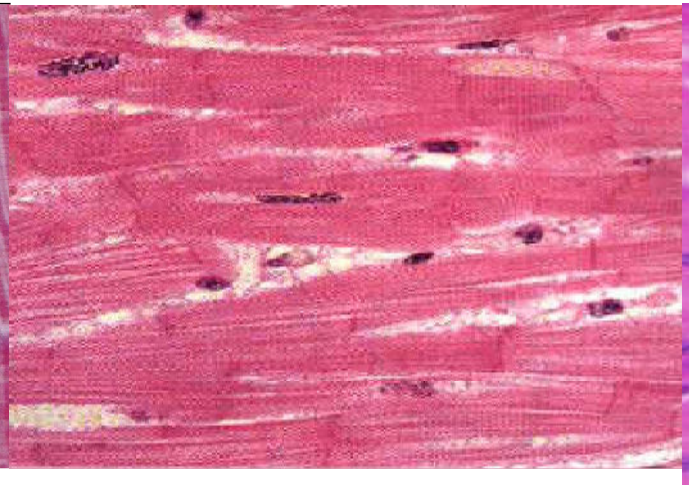


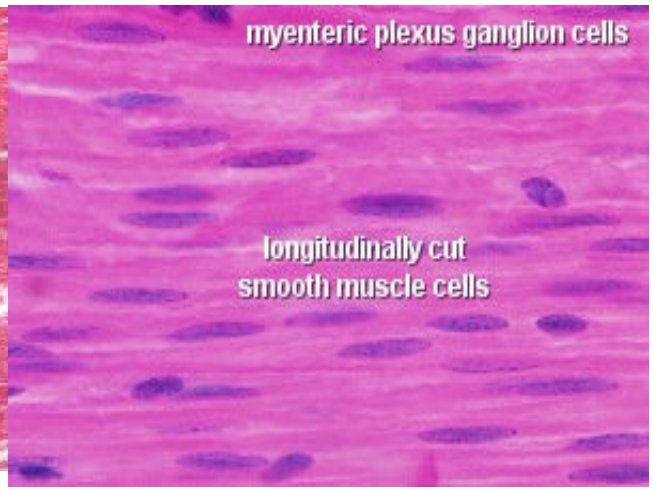
Contracted smooth muscle cell



6- Striations







Skeletal

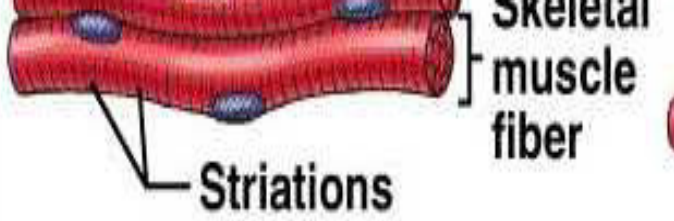
Regular striations (due to regular arrangement of microfilaments)

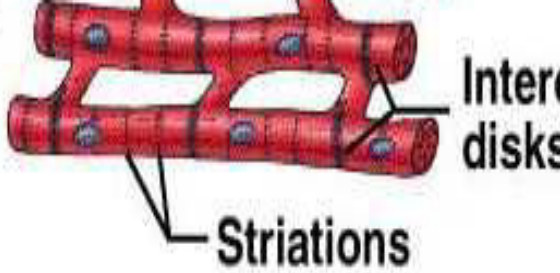
Cardiac

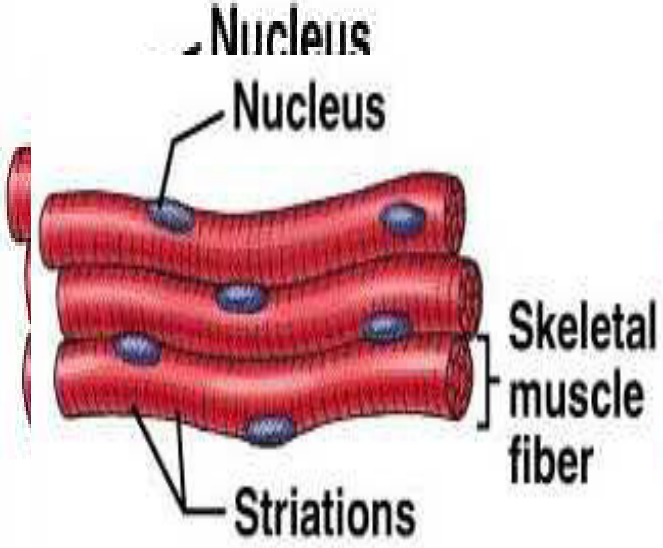
non-clear striations (due to presence of few myofibrils).

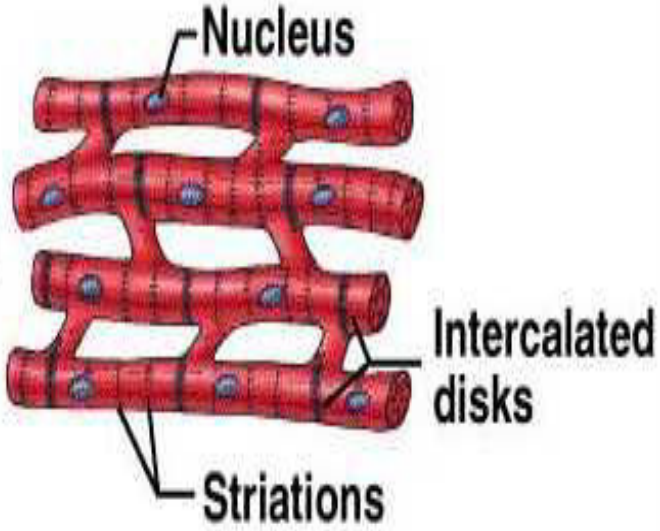
Smooth

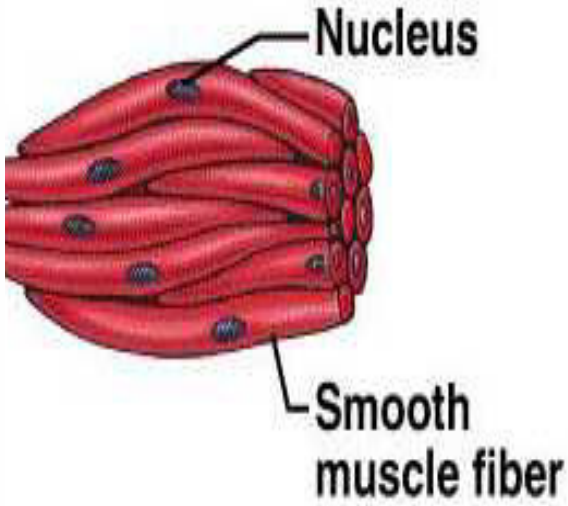
Non striated (due to irregular arrangement of microfilaments)

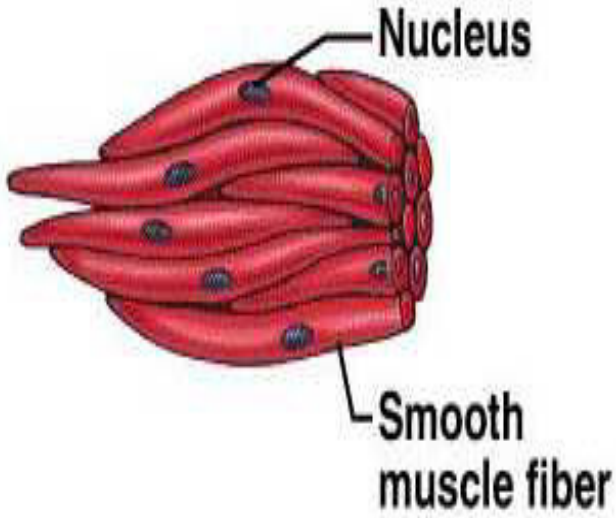


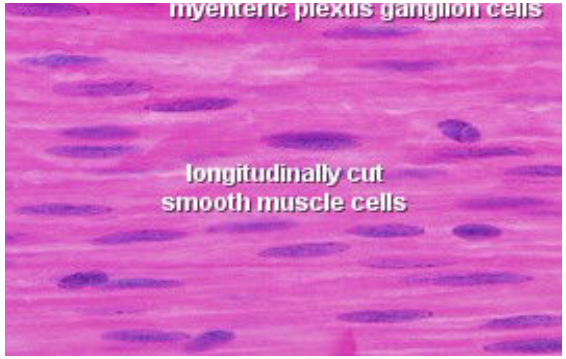






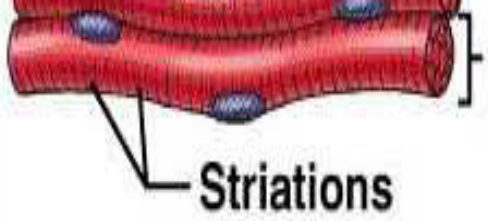


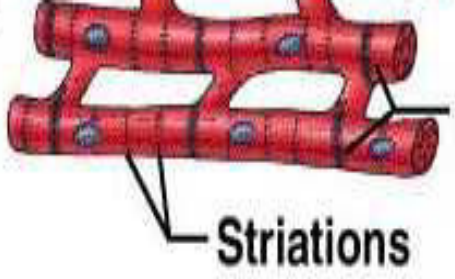




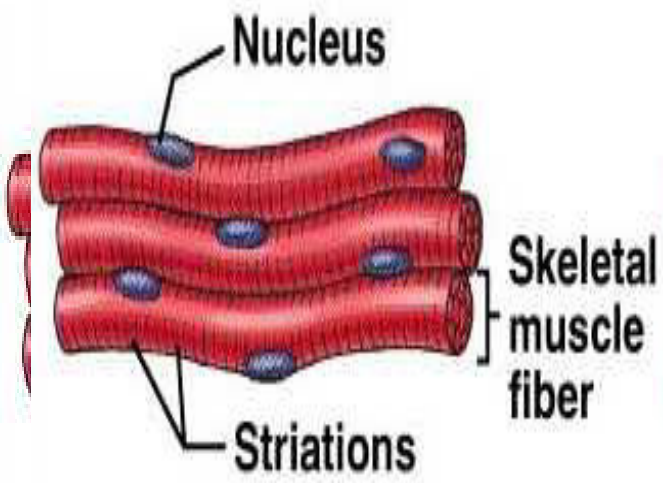
Smooth

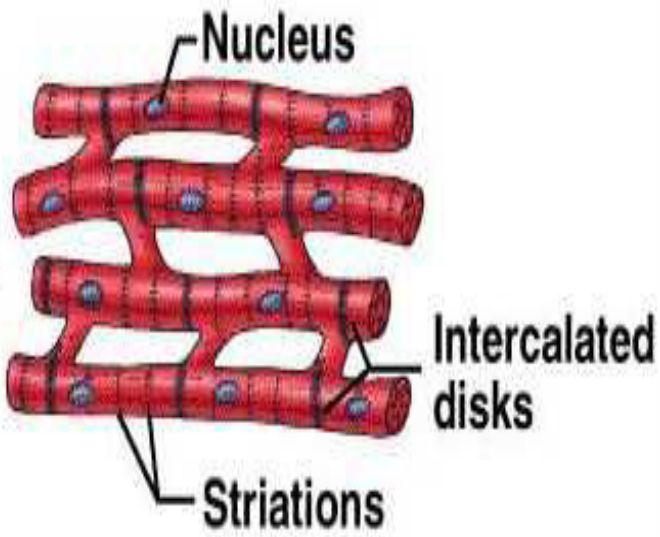
Non-branched

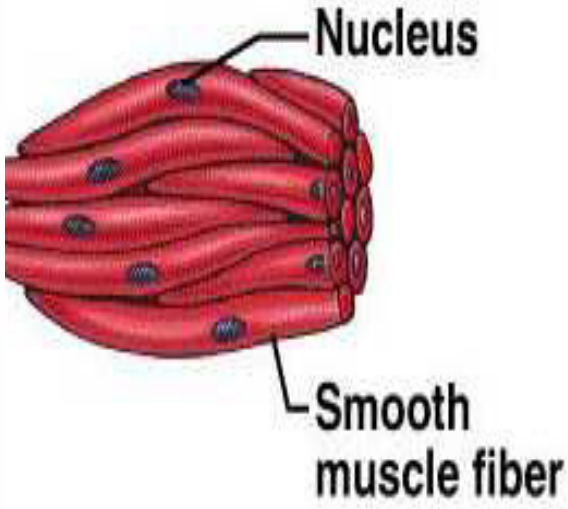


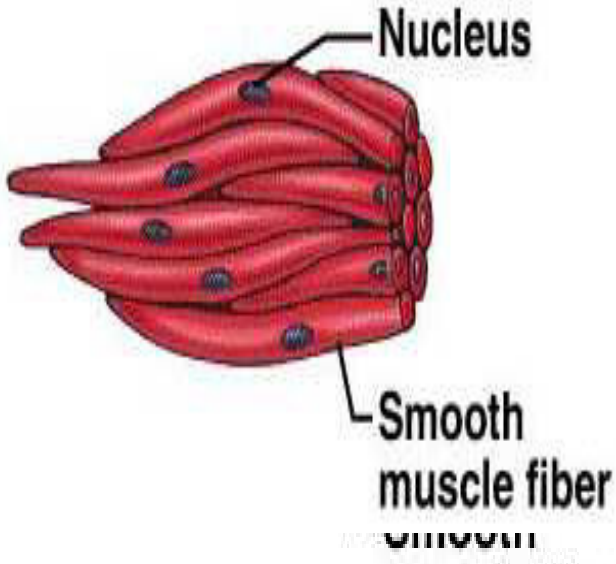


8- Sa







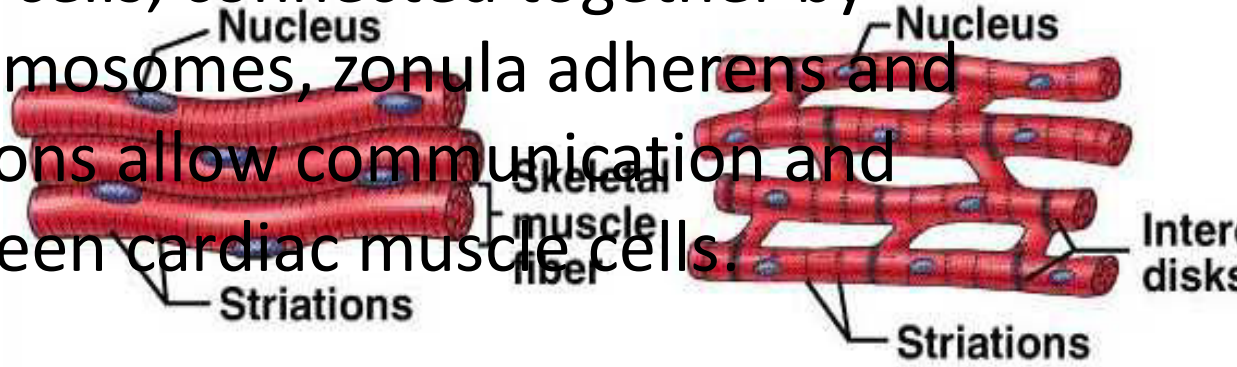


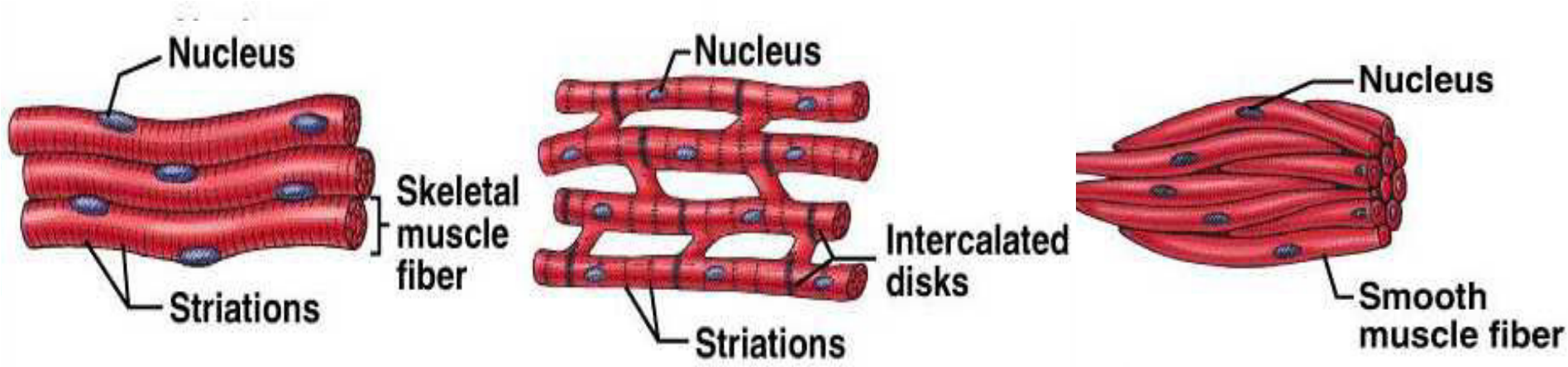
Smooth

Thin

8- Intercalated discs

– **Intercalated discs:** formed of the two cell membranes of 2 successive cardiac muscle cells, connected together by junctional complexes (desmosomes, zonula adherens and gap junctions). Gap junctions allow communication and passage of impulses between cardiac muscle cells.

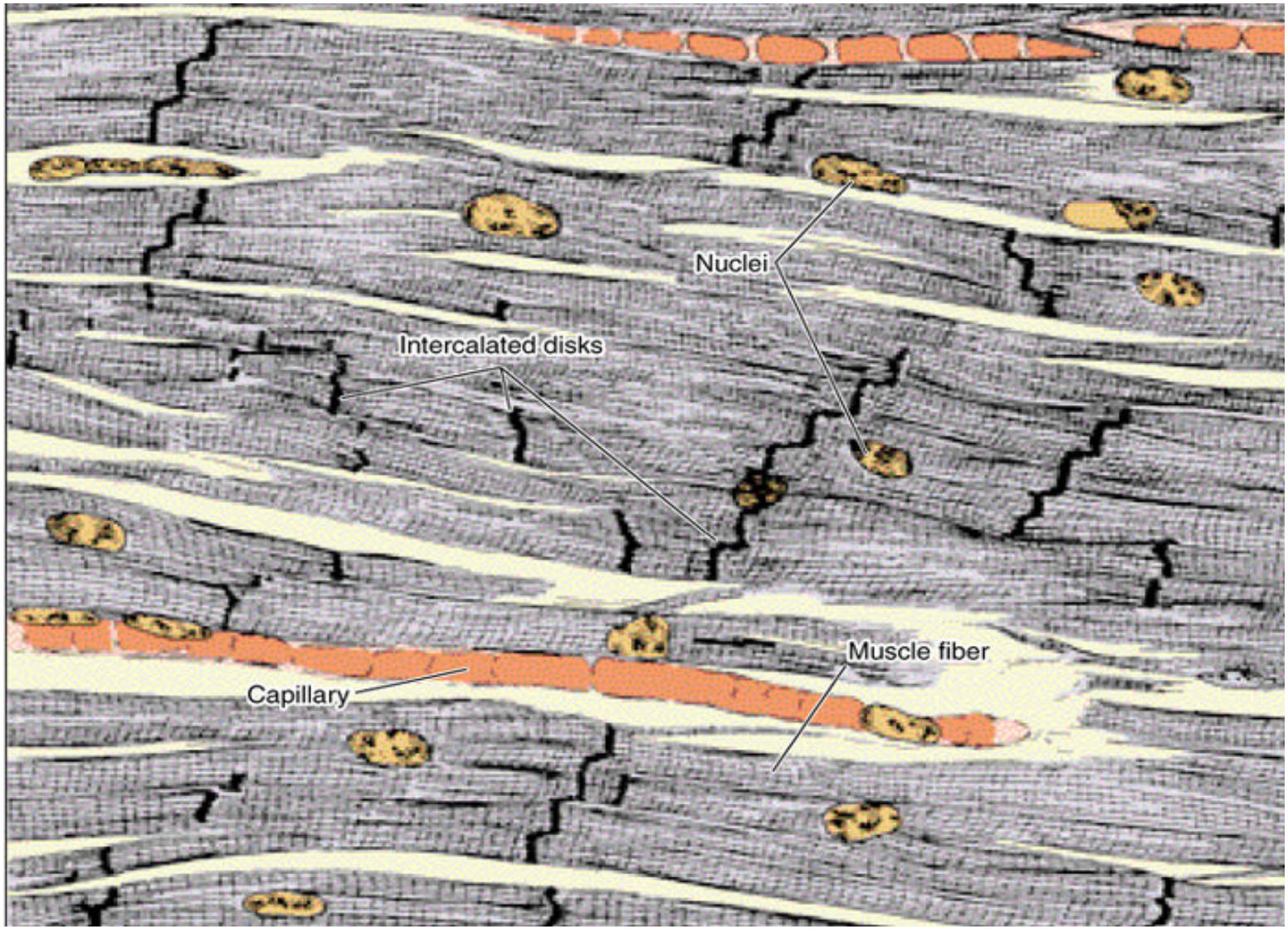




Smooth

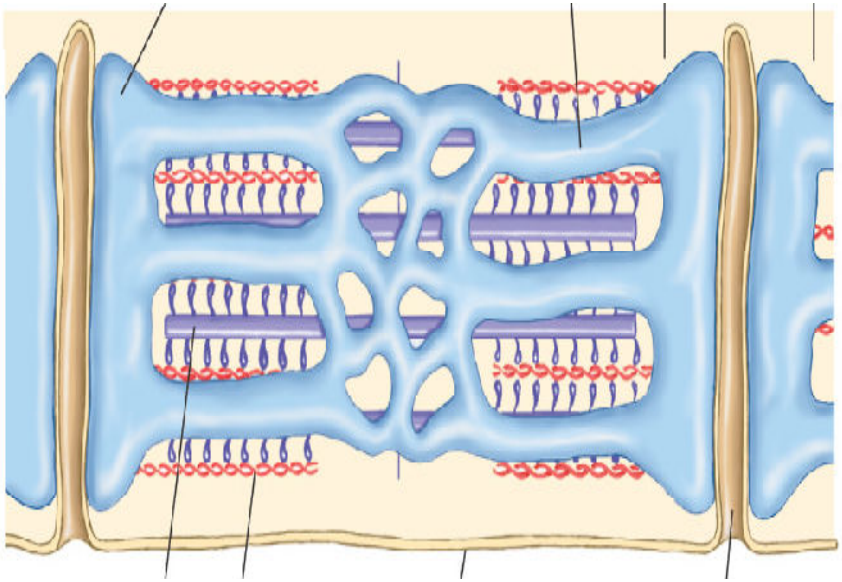
Absent

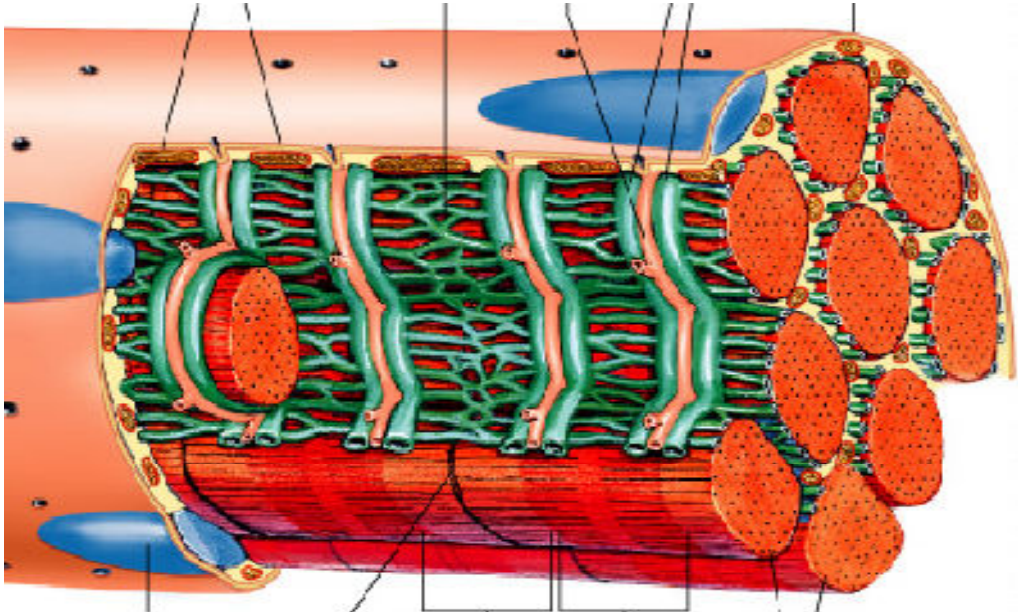
Intercalated discs



9- Tubular system

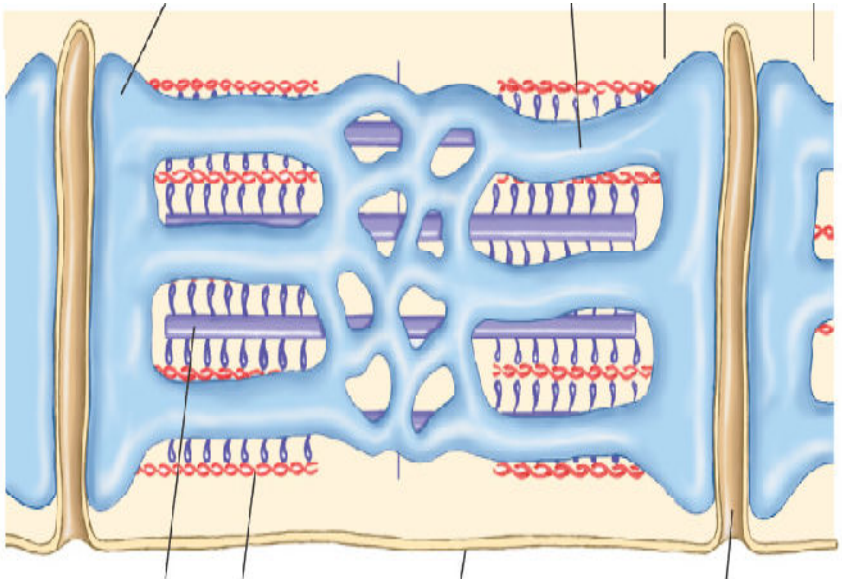
- The sarcolemma sends transverse invaginations into the sarcoplasm, (T-tubules).
- The sER forms transverse wider cisternae on either side of the T-tubule.
- The 2 cisternae of the sER and the T-tubule in-between them form the triad tubular system, which plays an important role during muscle contraction.

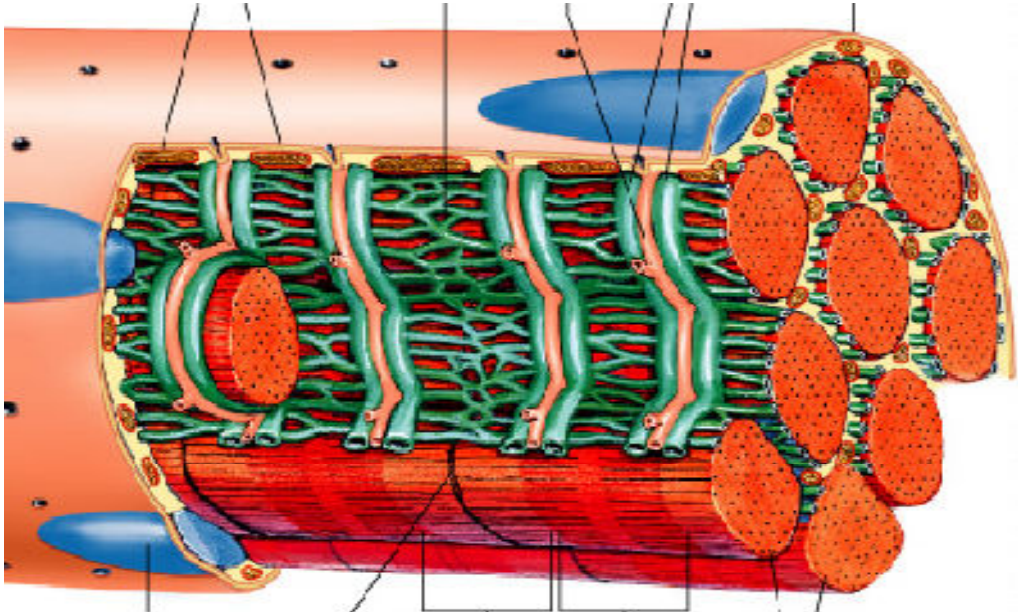


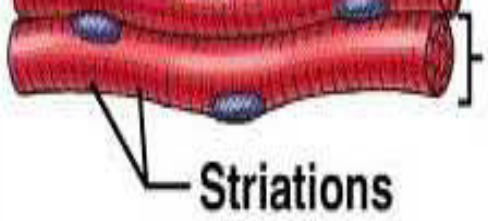


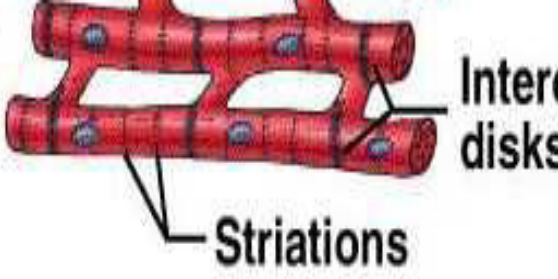
9- Tubular system

- **Skeletal:** Triad
- **Cardiac:** Diad
- **Smooth:** Absent

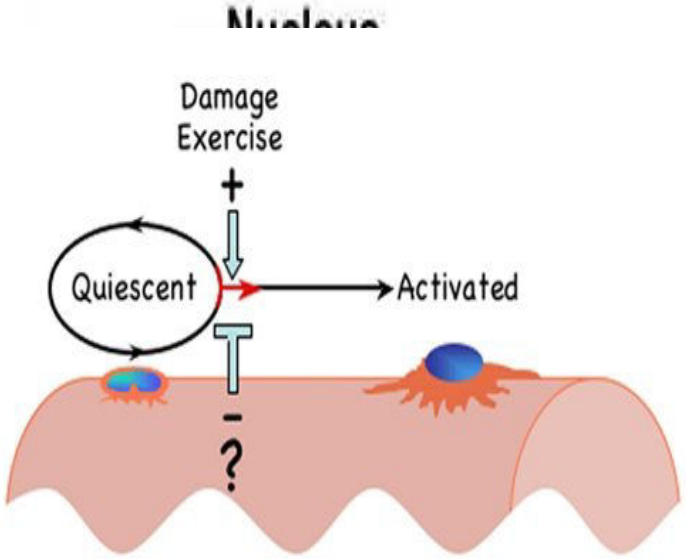


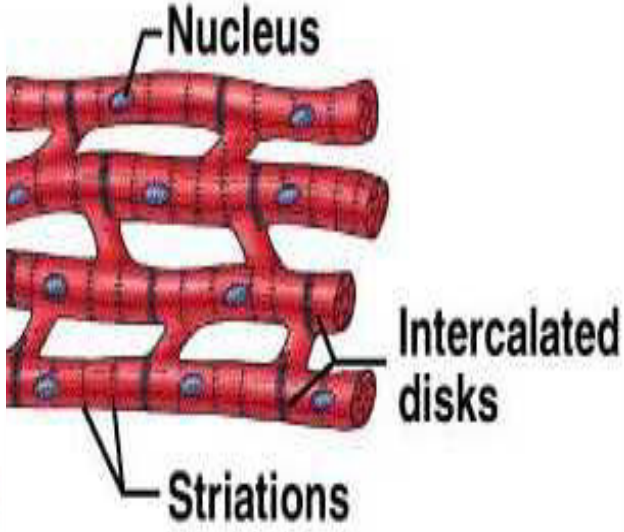


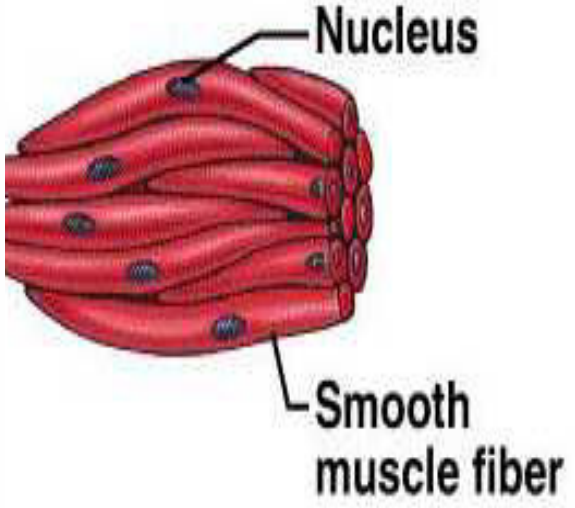


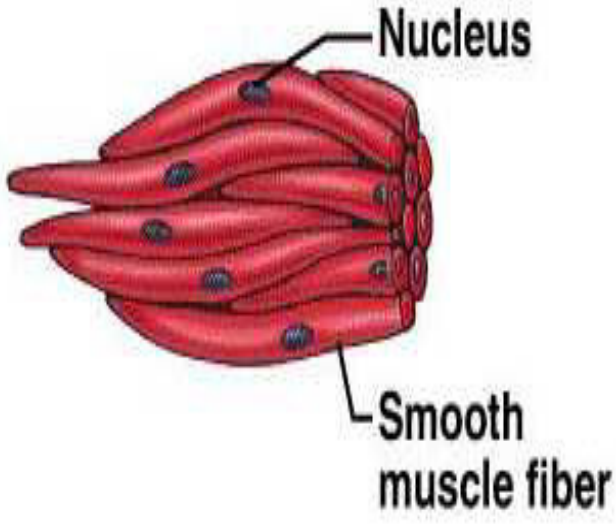


10- Re





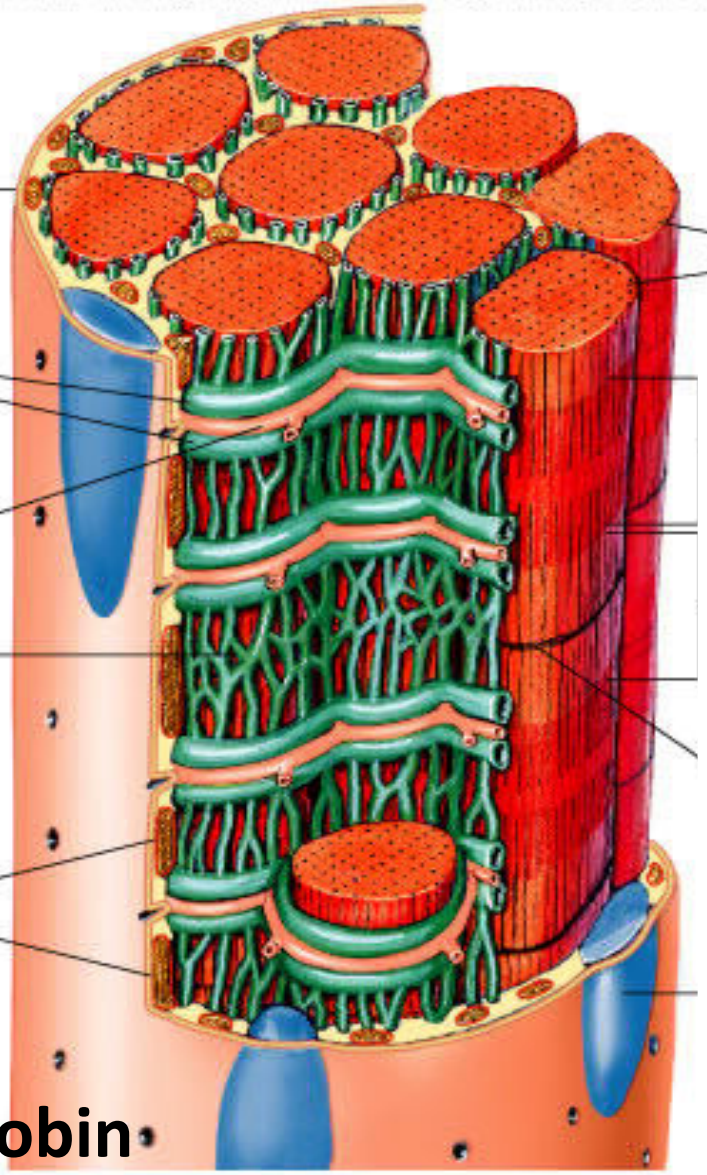




Smooth

From UMCs or pericytes by mitosis

EMP of Skeletal Muscle Fibres



2-Thick

Sarcolemma

Teminal cisternae

Transverse tubule

3-Sarcoplasmic reticulum

4-Numerous Mitochondria

5-Golgi & ribosomes

6- Glycogen & myoglobin

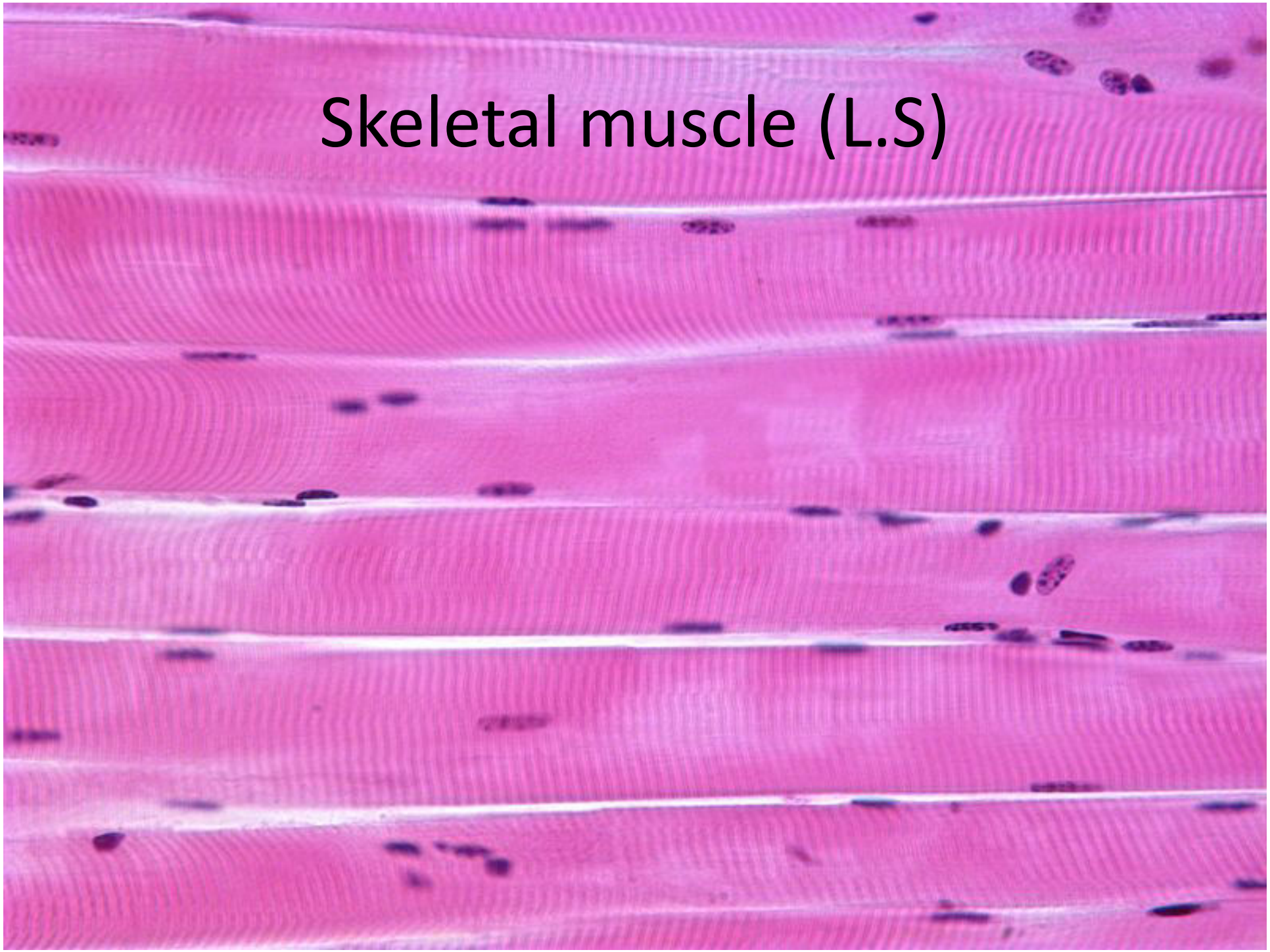
1- Myofibrils

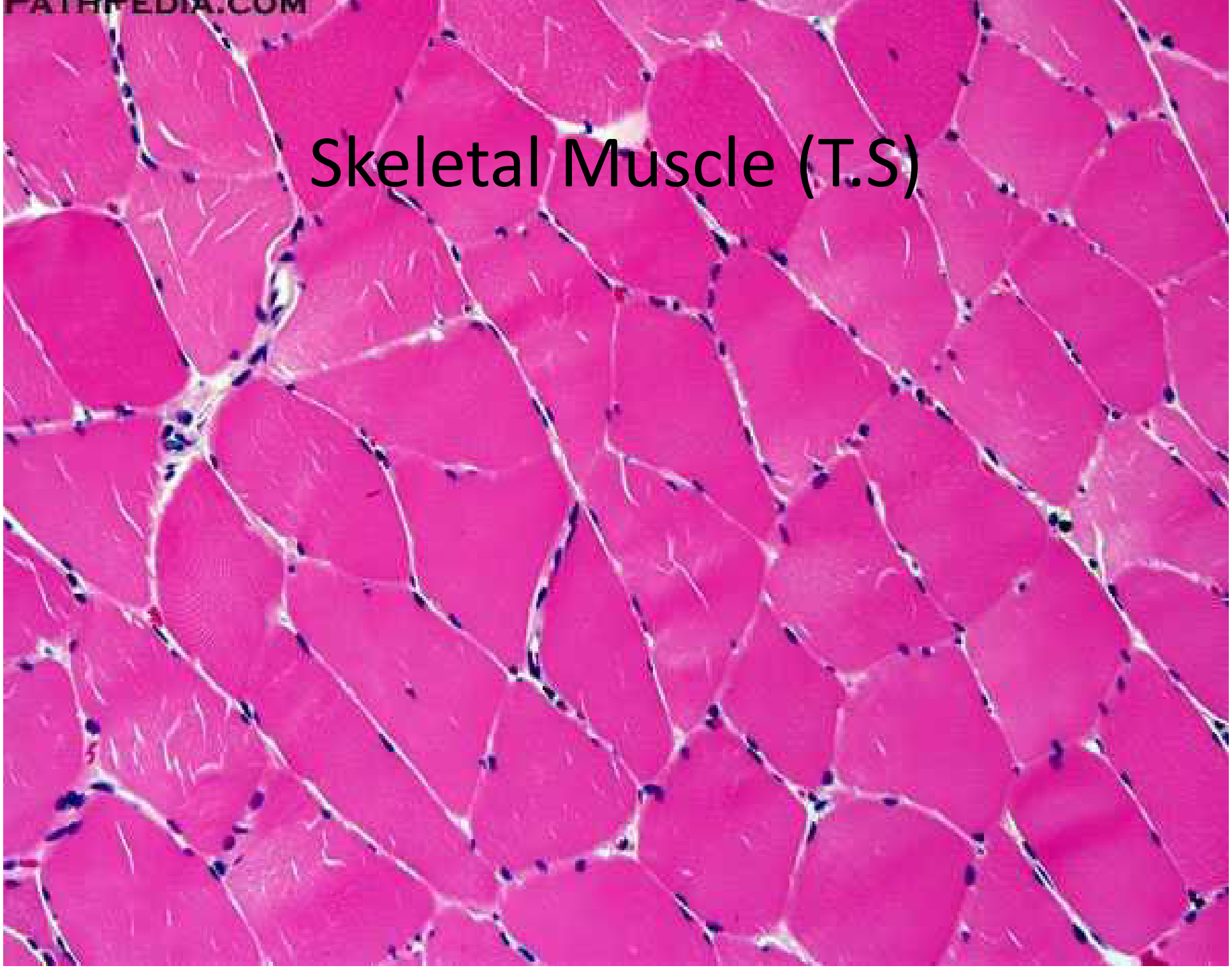
Differences between the three types of muscle

	Smooth muscle	Skeletal muscle	Cardiac muscle
Action	Involuntary (autonomic)	Voluntary (motor)	Involuntary (autonomic)
Site	Wall of the viscera	Attached to bone	The heart wall
Size	Smallest (8 μm)	Largest (80-100 μm)	Medium sized (20 μm)
Shape	Spindle-shaped	Cylindrical	Cylindrical
Striation	Non-striated	Striated	Non-clear striation
Sarcolemma	Thin	Thick	Very thin
Type	White	Red & white	Red
Branching	Non-branched	Non-branched	Branched
Nuclei	One, central & oval	Multiple & peripheral	One & central

	Smooth muscle	Skeletal muscle	Cardiac muscle
Intercalated discs	Absent	Absent	Present
Tubular system	Absent	Triad system	Diad system
Regeneration	Mitosis or from pericytes or UMC	Satellite cells	Cannot regenerate

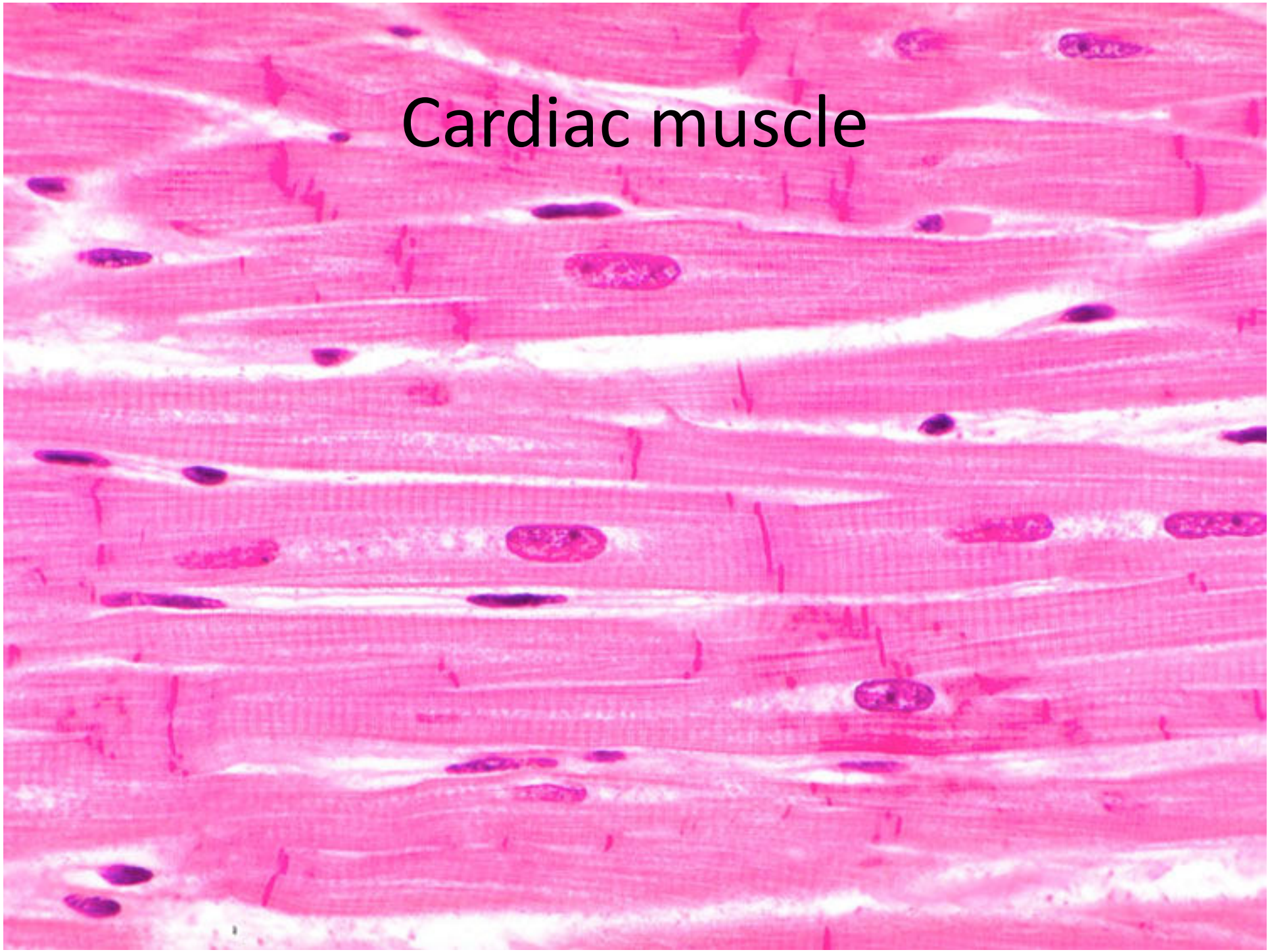
Skeletal muscle (L.S)





Skeletal Muscle (T.S)

Cardiac muscle



Smooth muscle


Thank you