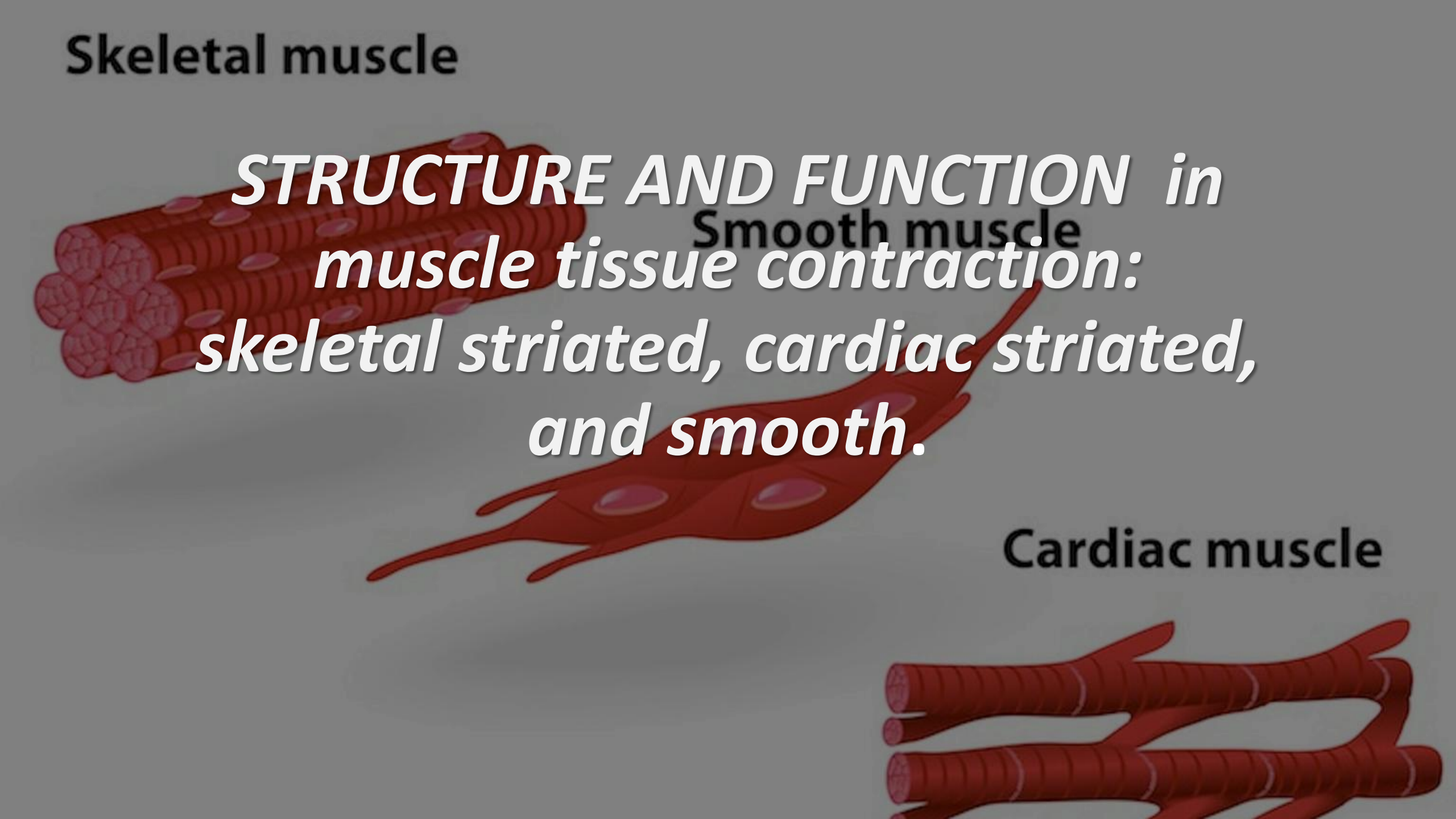
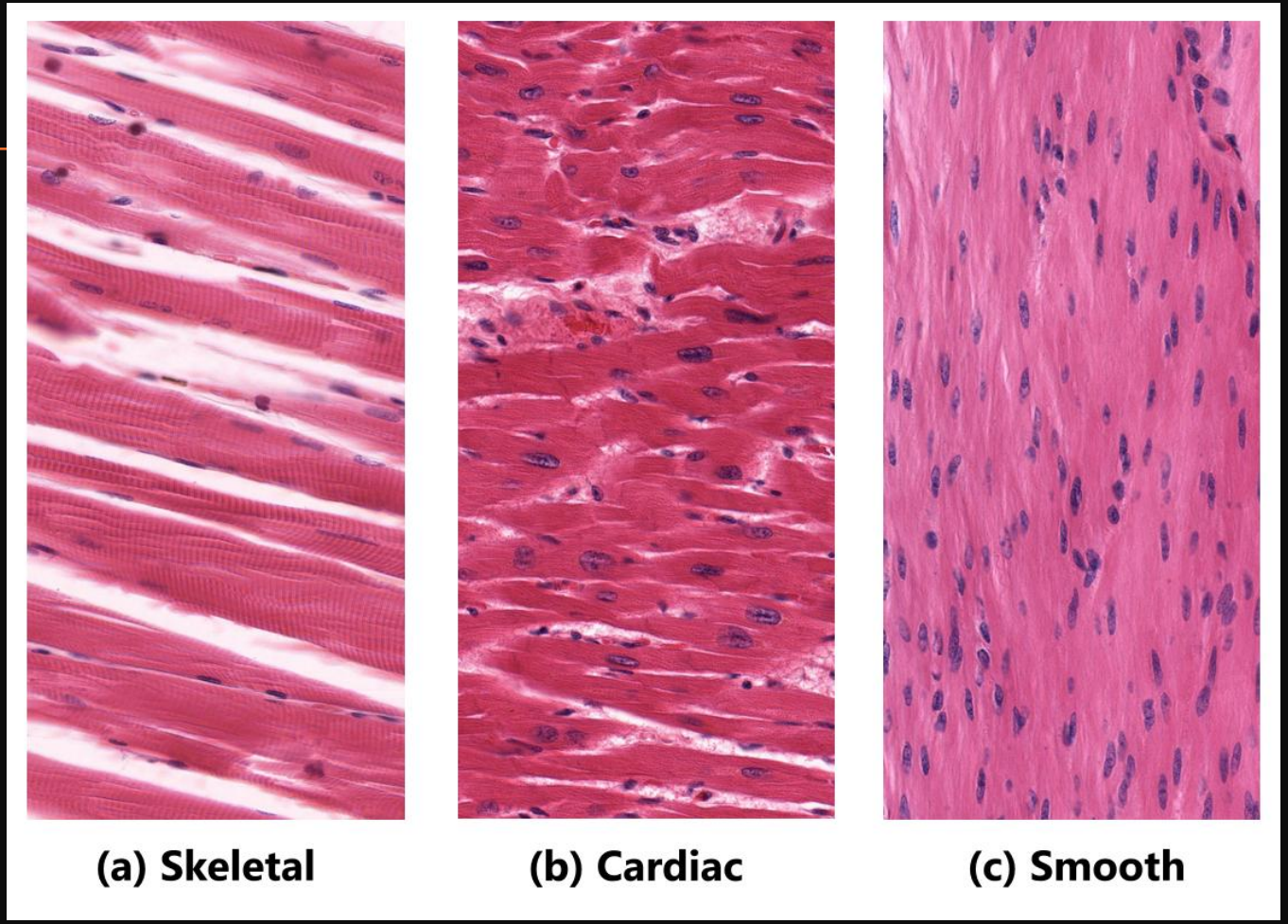
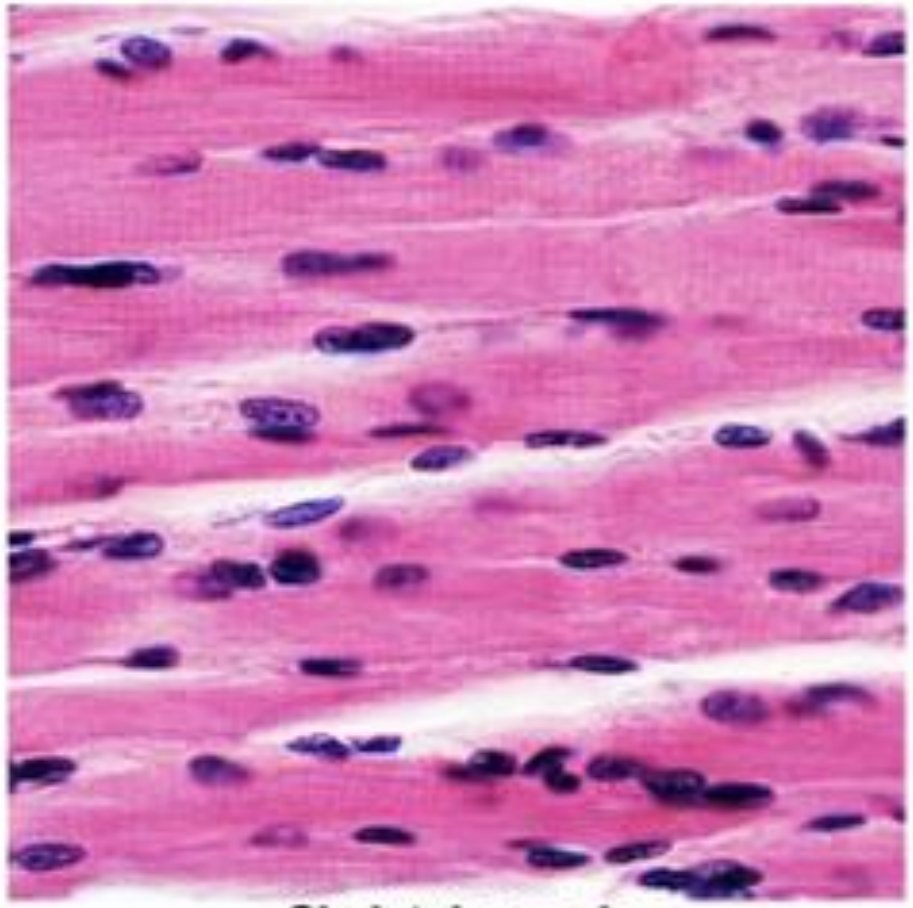


STRUCTURE AND FUNCTION in muscle tissue contraction: skeletal striated, cardiac striated, and smooth.

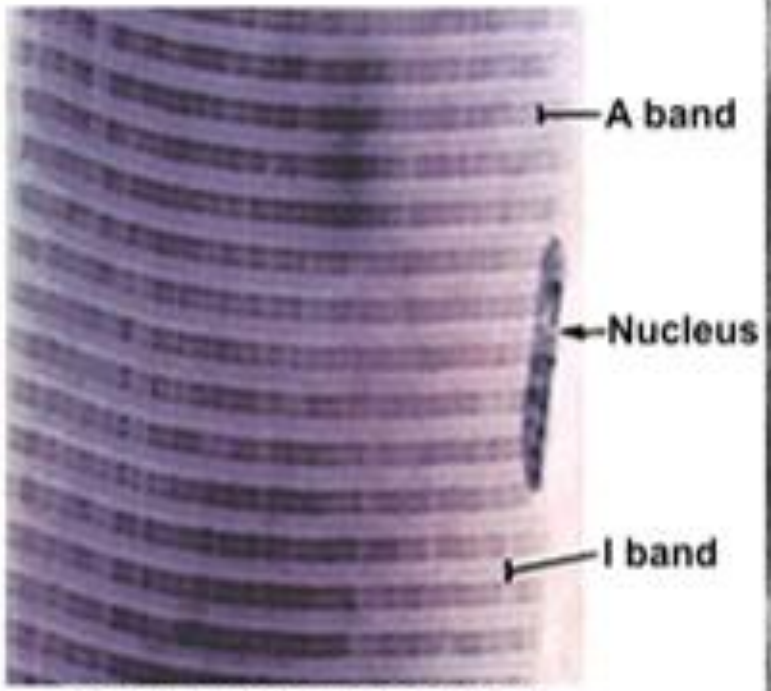
- All muscle tissues derive from the mesoderm and have the ability to contract thanks to actin and myosin myofilaments.

- Common purpose: to generate force and movement.

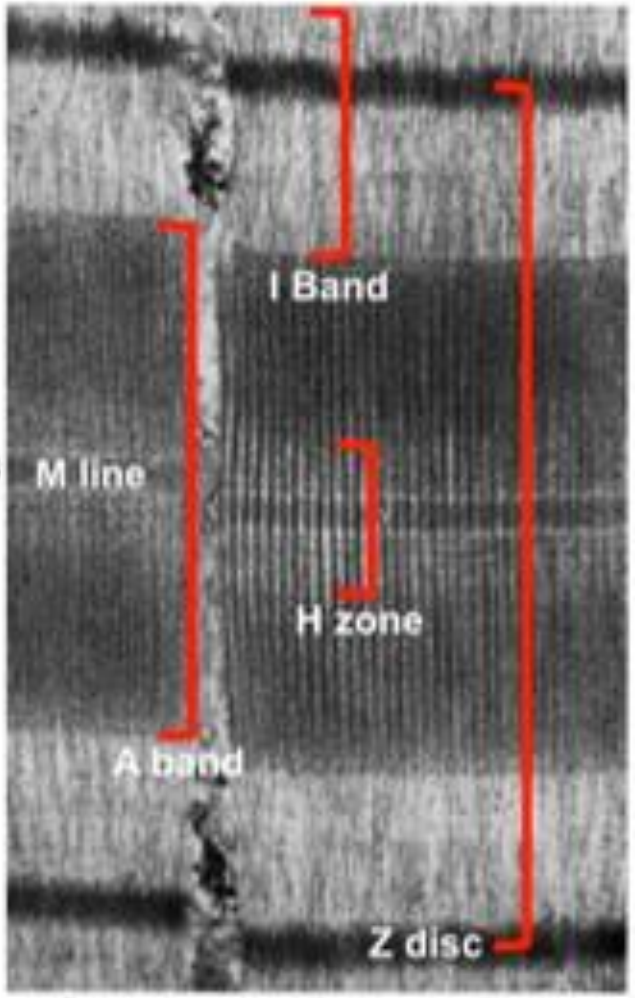




Skeletal muscle



Skeletal muscle striations



Sarcomere = Z disc to Z disc

STRIATED SKELETAL MUSCLE TISSUE

MECHANISM OF MUSCLE CONTRACTION

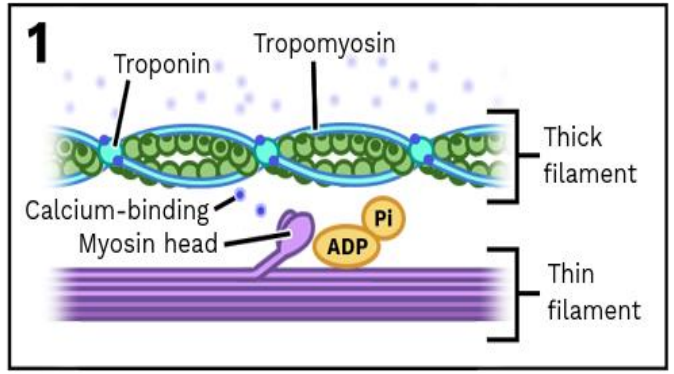
FOLLOWING THE MOTOR NEURON ACTION POTENTIAL, ACETYLCHOLINE IS RELEASED AT THE NEUROMUSCULAR JUNCTION..

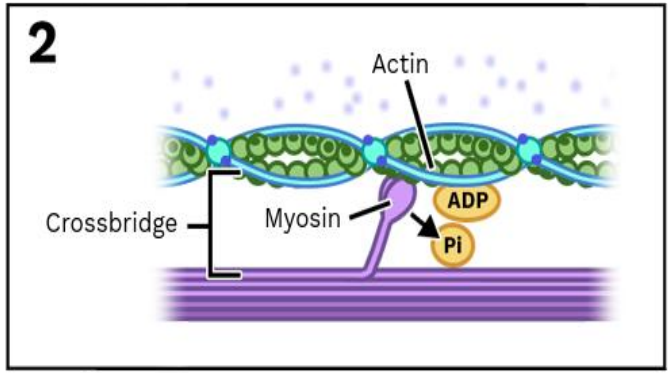
THE SARCOLEMMA AND THE T-TUBULES DEPOLARIZE.

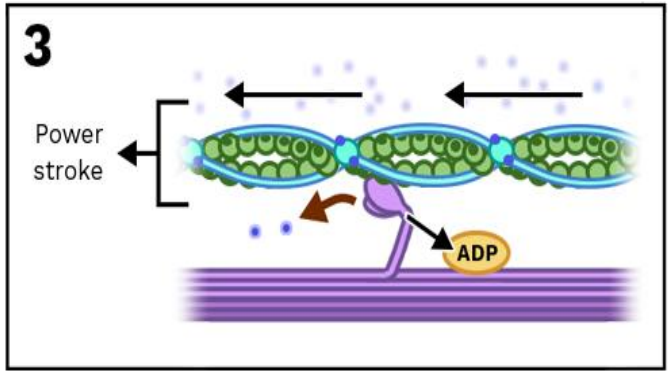
1.. Release of Ca^{2+} from the sarcoplasmic reticulum.

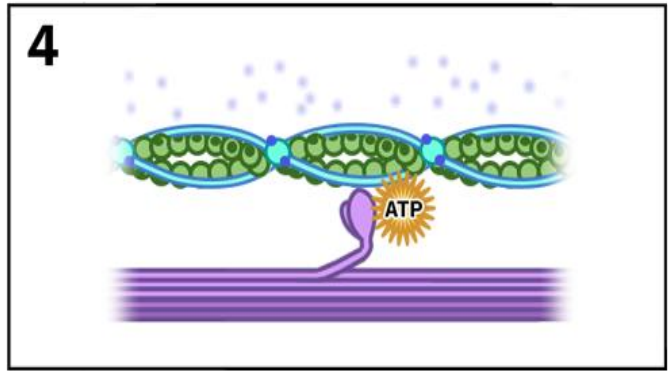
2. Ca^{2+} binds to troponin C → displacement of tropomyosin → actin–myosin interaction.

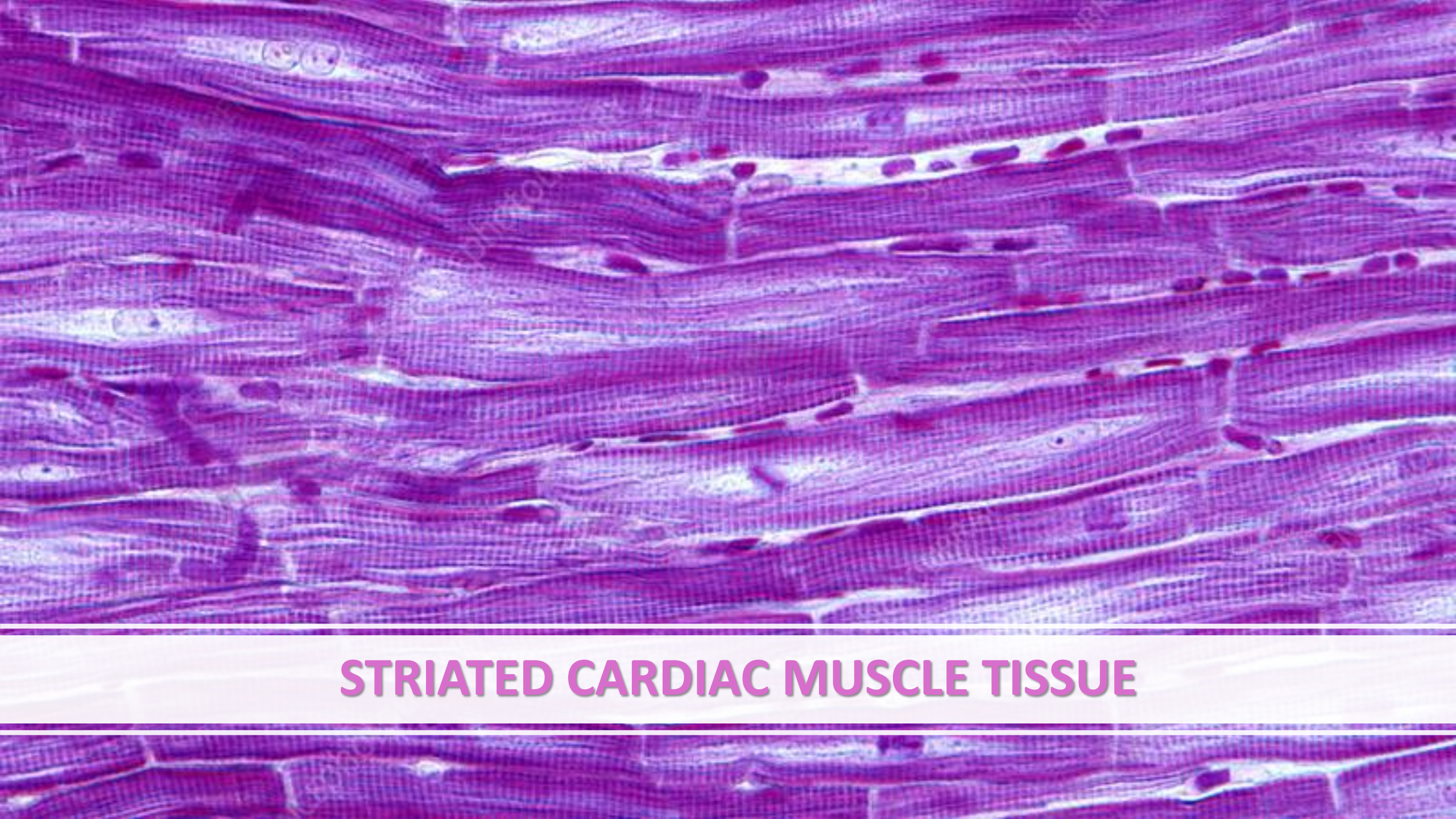
3. Cross-bridge cycle → filament sliding → contraction.









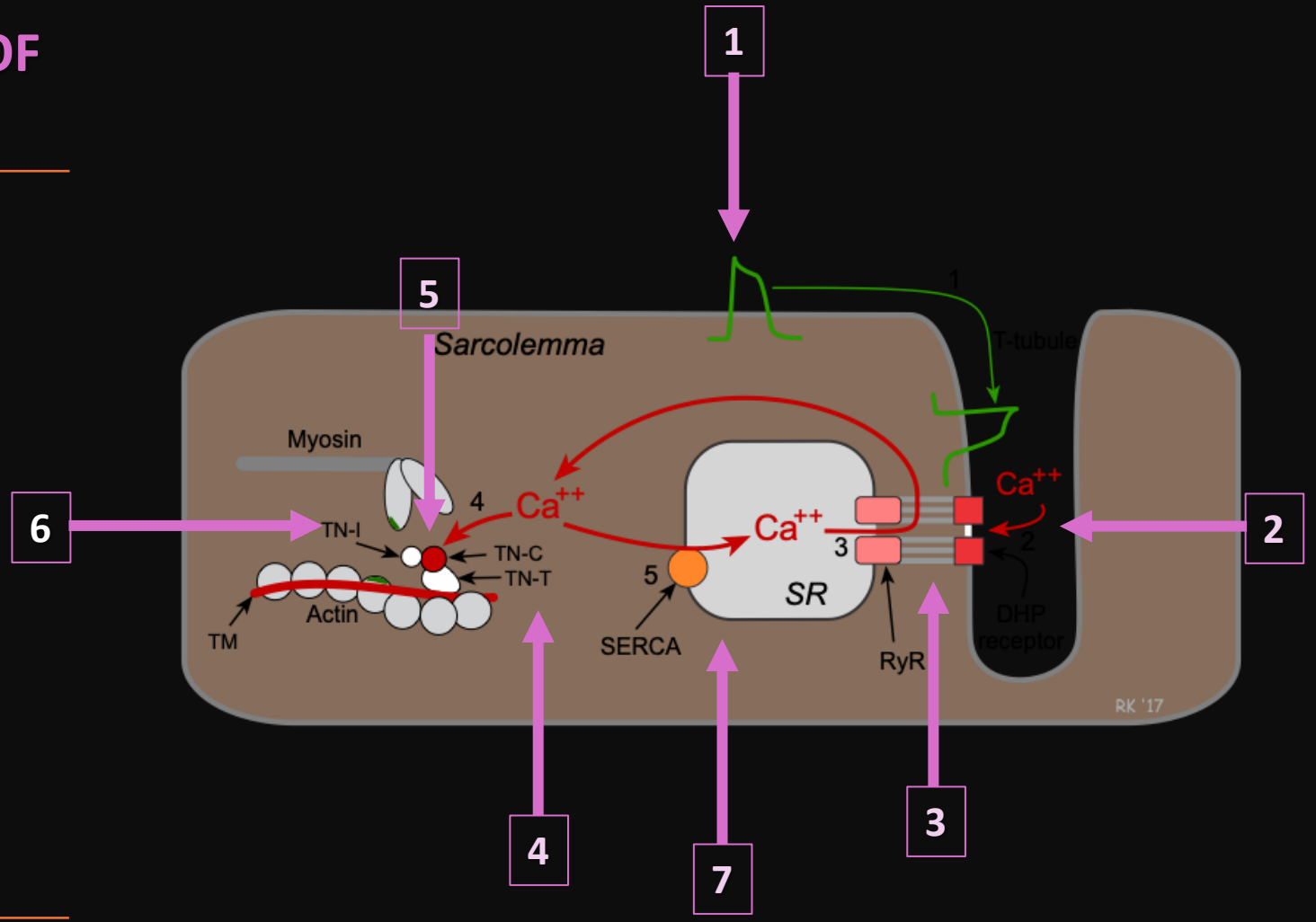


STRIATED CARDIAC MUSCLE TISSUE

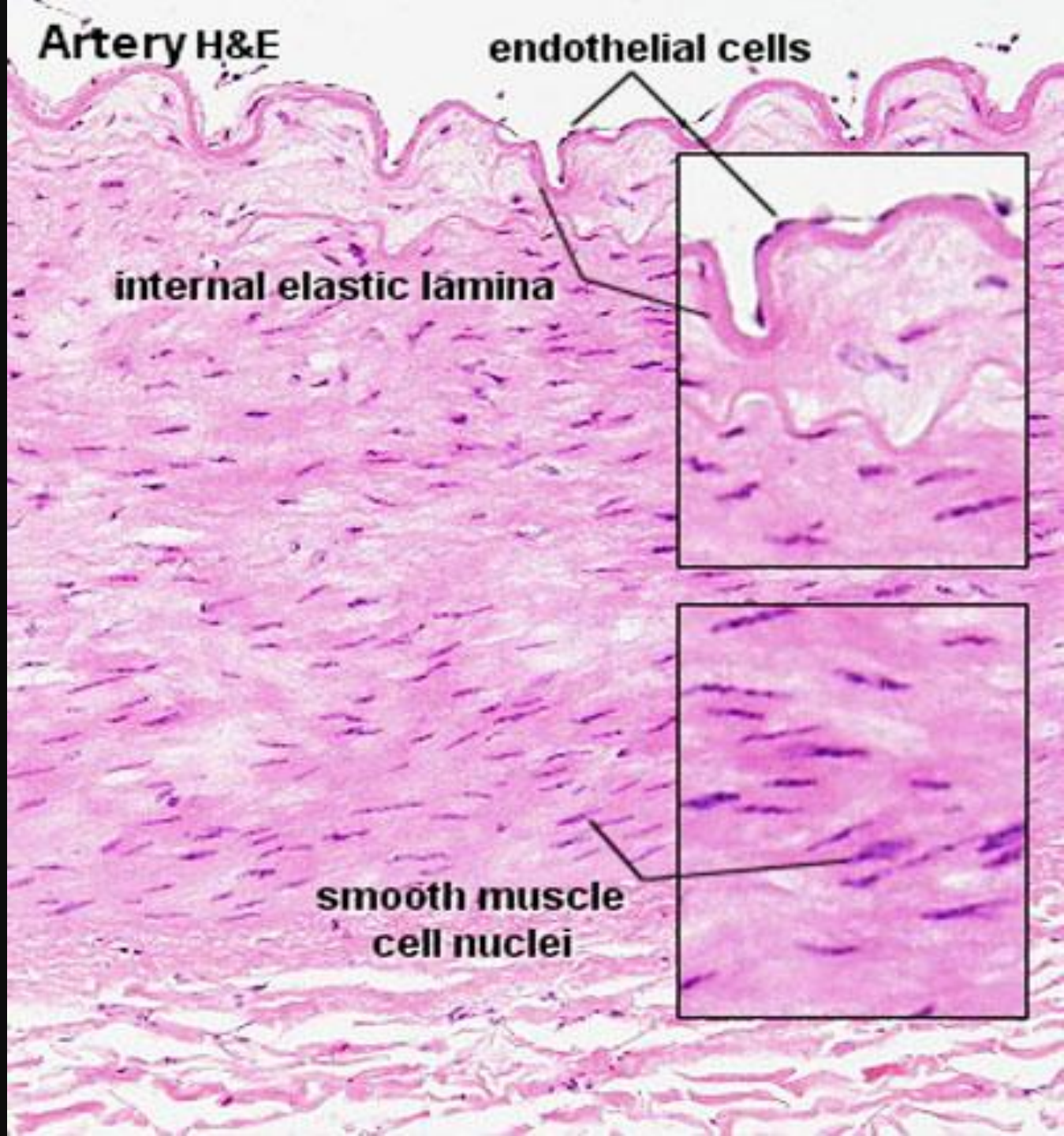
MECHANISM OF CONTRACTION OF CARDIAC MUSCLE CELLS

"SIMPLIFIED SCHEME OF EXCITATION–CONTRACTION COUPLING IN THE CARDIAC MYOCYTE:"

an **action potential** depolarizes the **membrane and T-tubules**
→ **Ca^{2+} entry through L-type calcium channels**
→ **Ca^{2+} release from the sarcoplasmic reticulum (RyR)**
→ **increase in cytosolic Ca^{2+}**
→ **binding to troponin C**
→ **activation of actin–myosin sliding**
→ **contraction**
→ **Ca^{2+} reuptake** (via **SERCA pumps and exchangers**) allows **relaxation**.

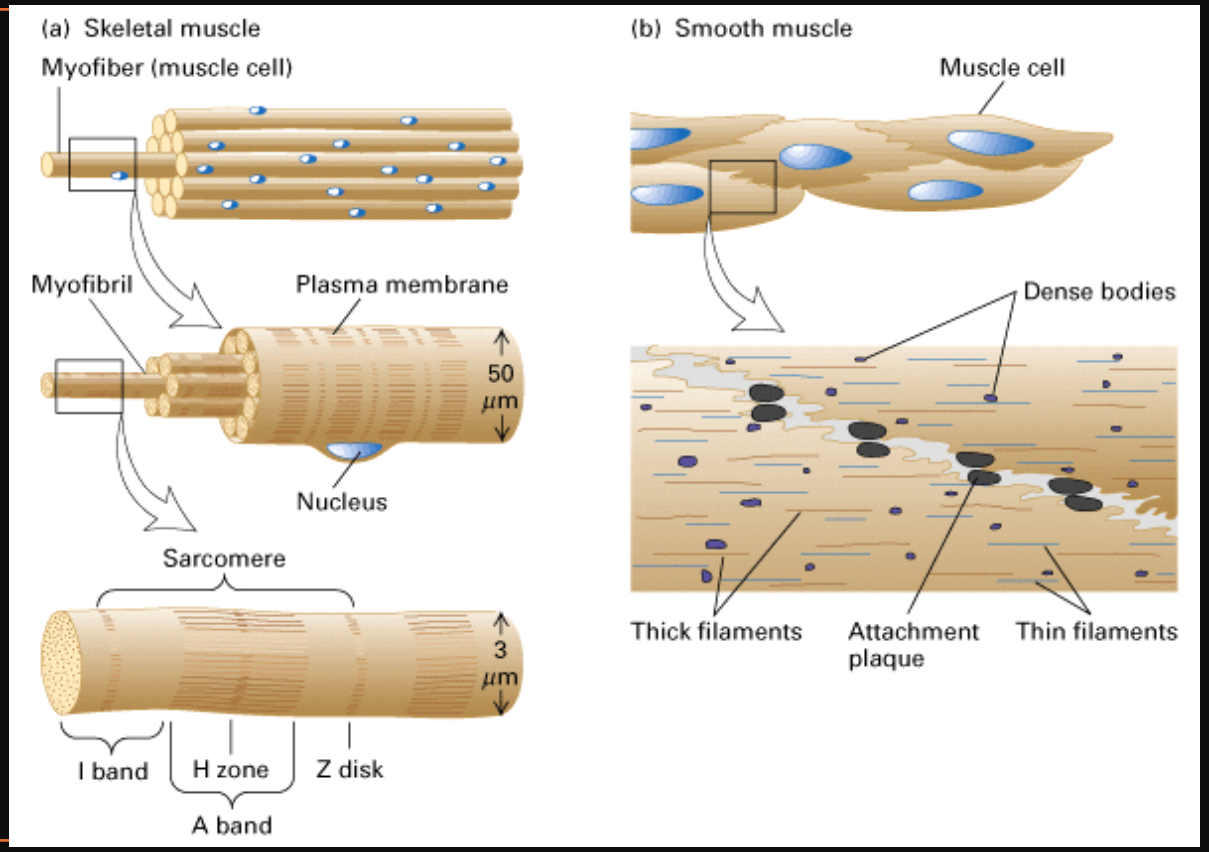


SMOOTH MUSCLE TISSUE

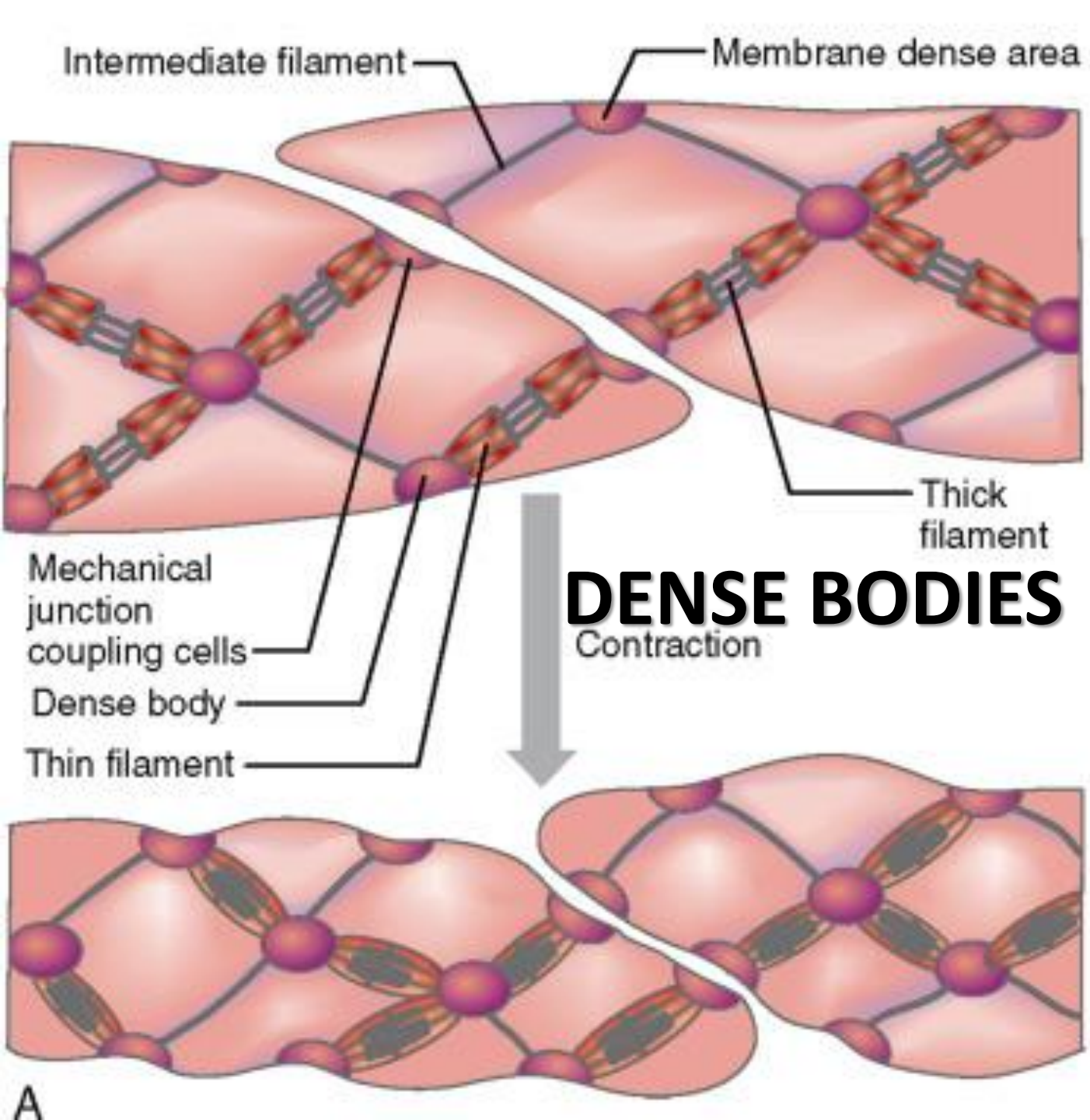


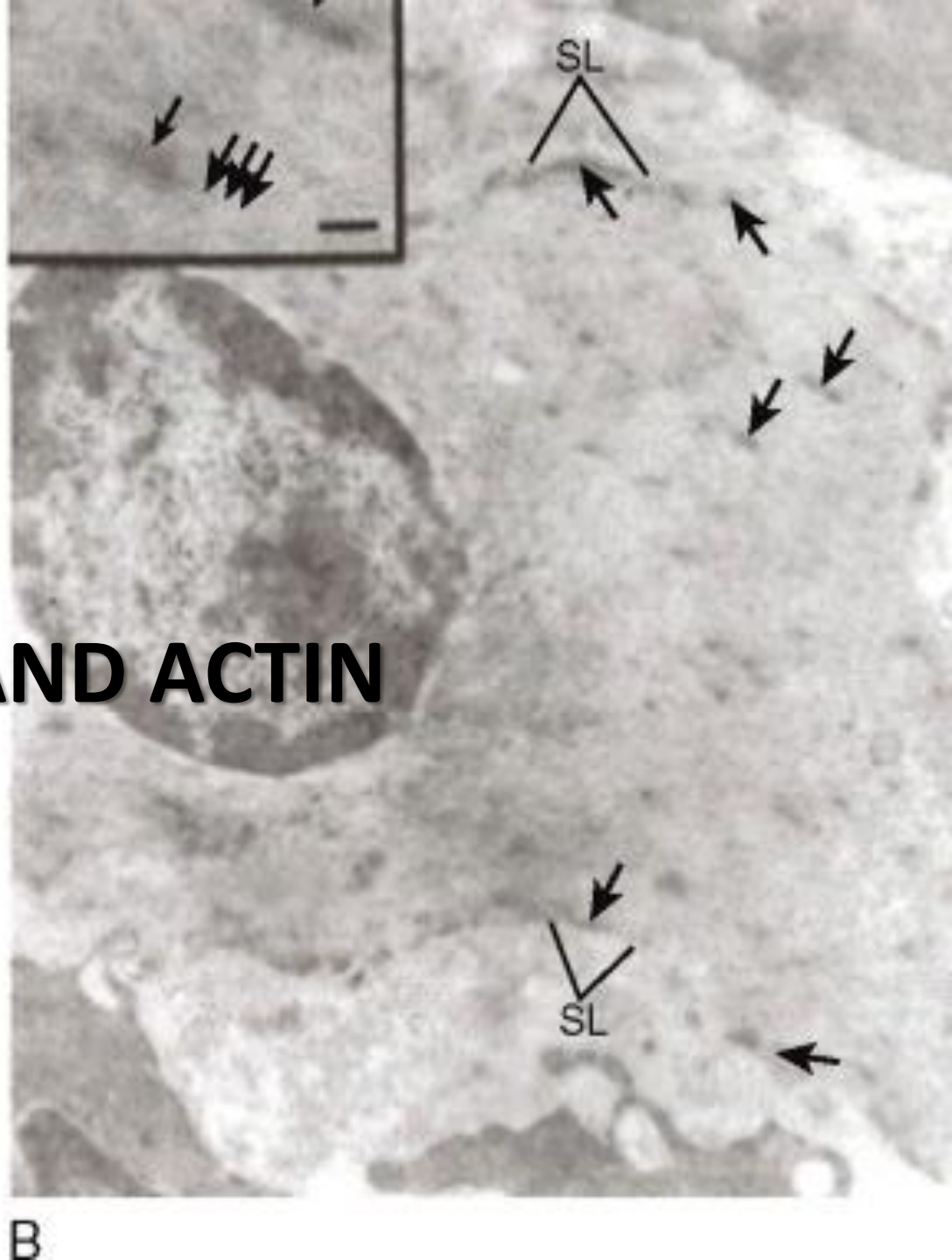
DIFFERENCES BETWEEN

STRIATED MUSCLE TISSUE
vs
SMOOTH MUSCLE TISSUE



DENSE BODIES AND ACTIN





COMPARISON

	Skeletal Muscle	Cardiac Muscle	Smooth Muscle
			
Location	Attached to bone	Heart	Walls or hollow organs, blood vessels, and glands
Appearance	 STRIATO	 STRIATO	 NON STRIATO
Cell Shape	Long, cylindrical	Branched	Spindle-shaped
Nucleus	* Multiple, peripheral	* Usually single, central	* Single, central
Special Features	SARCOMERI E TRIADI	Intercalated disks	Cell-to-cell attachments
Striations	Yes	Yes	* No
Autorhythmic	No	Yes	Yes
Control	Voluntary	Involuntary	* Involuntary
Function	Move the whole body	Contract heart to propel blood through the body	Compress organs, ducts, tubes, and so on