

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

**WALL OF THE HEART
AND
CARDIAC VALVES**

WALL OF THE HEART AND CARDIAC VALVES

By the end of the lecture, the student should be able to describe the microscopic structure of:

1. Wall of the heart:

- Endocardium.**
- Myocardium.**
- Epicardium.**

2. Cardiac valves.

WALL OF THE HEART

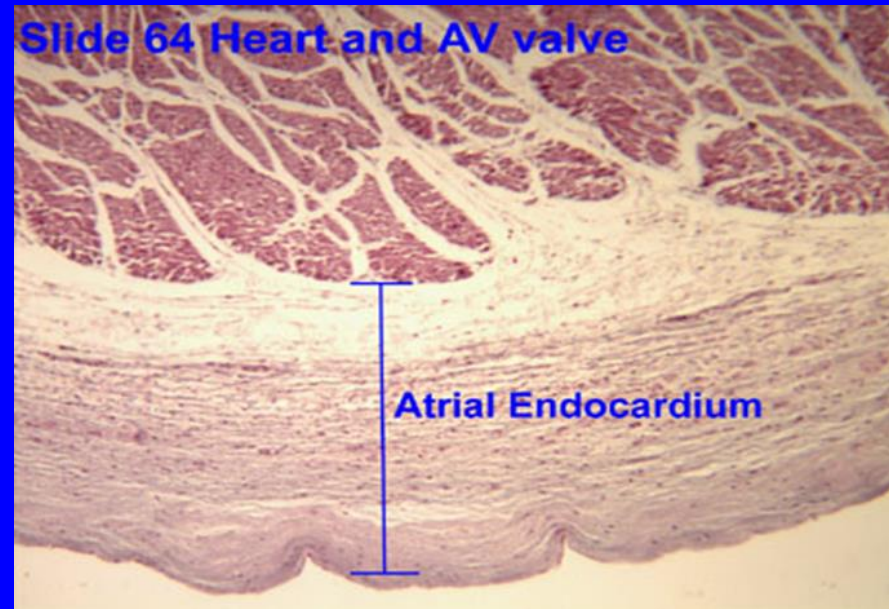
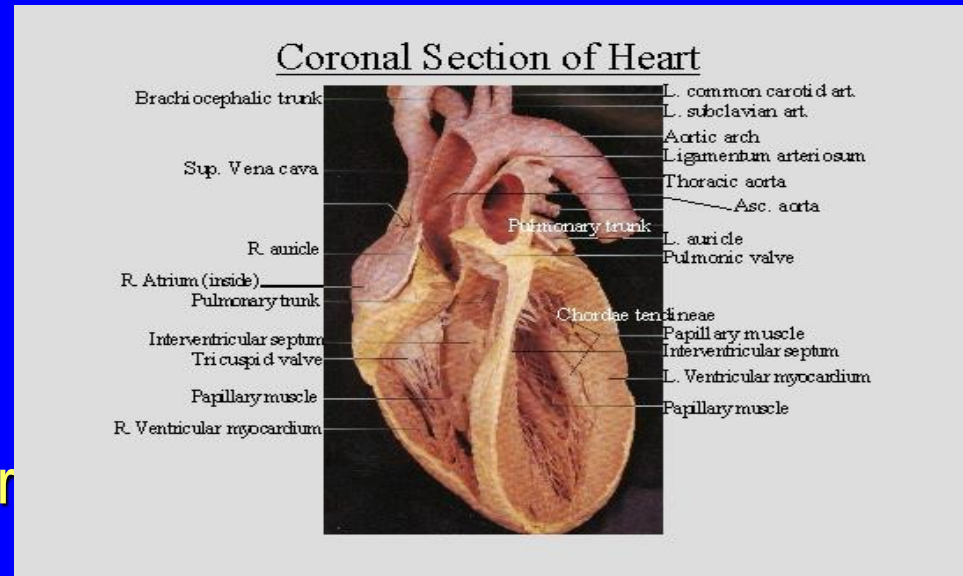
(A) Endocardium:

- 1- Endothelium
- 2- Subendothelial C.T.
- 3- Dense C.T. layer
- 4- Subendocardial layer

(B) Myocardium

(C) Epicardium:

- 1- Mesothelium
- 2- C.T. layer

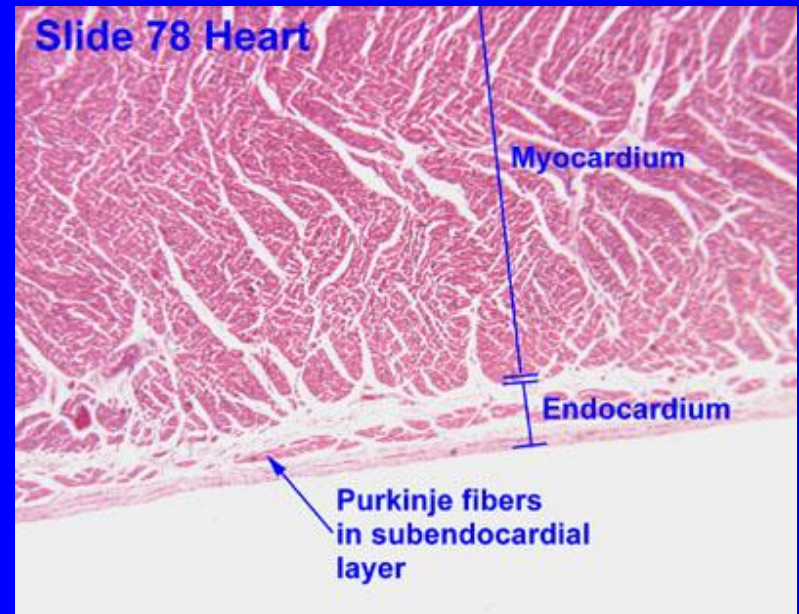
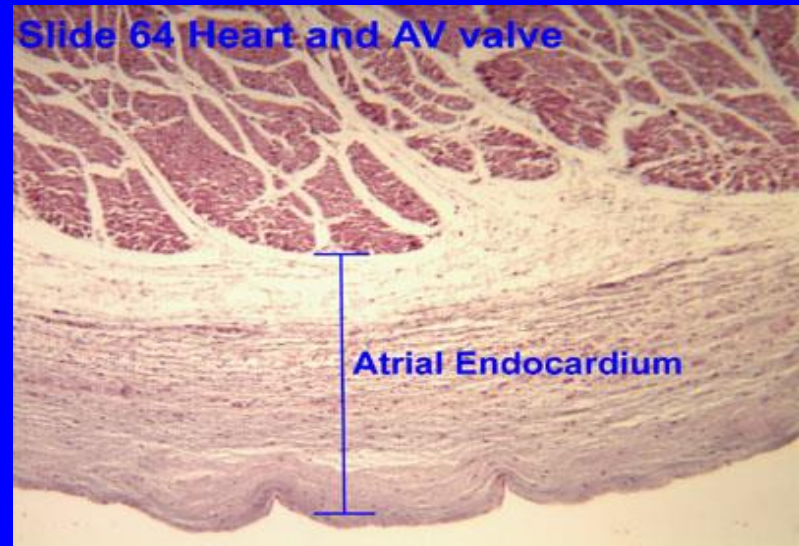


ENDOCARDIUM

- 1- Endothelium: simple squamous epithelium.
- 2- Subendothelial C.T. layer
- 3- Dense C.T. layer
- 4- Subendocardial layer:

❖ Loose C.T. layer that contains **Purkinje fibers**, small blood vessels & nerves.

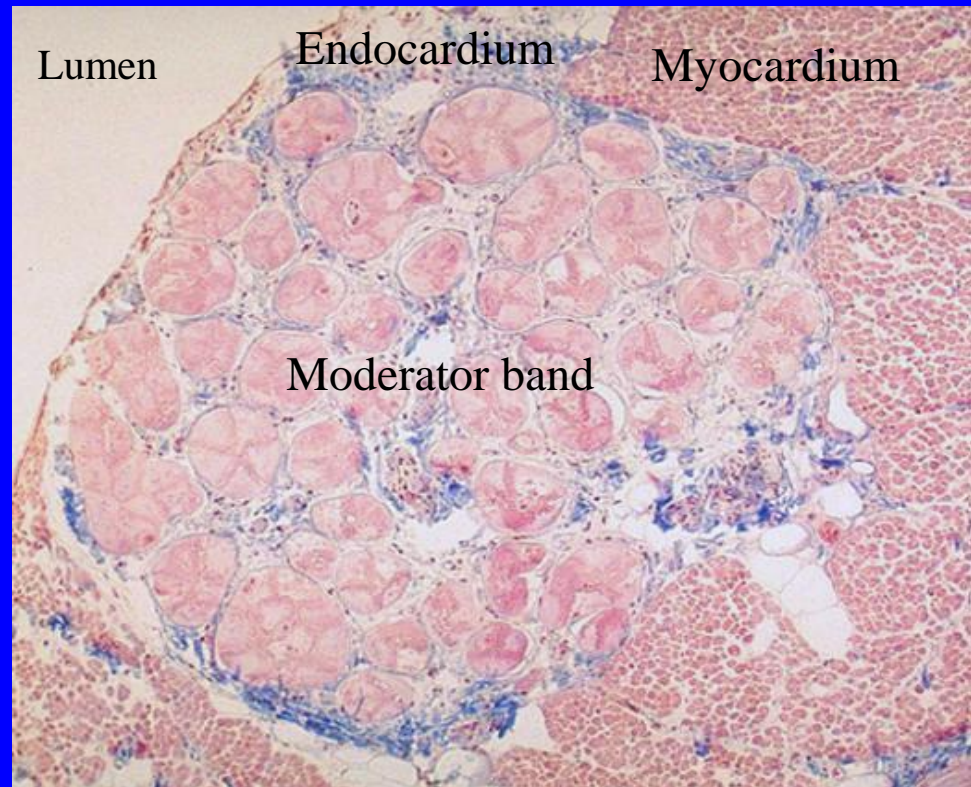
❖ It attaches to the endomysium of the cardiac muscle.



Purkinje Fibers (Moderator Band)

Purkinje fibers in comparison to cardiac muscle cells are:

- Larger in diameter.
- Paler in staining (more glycogen).
- Peripheral nuclei.
- Fewer myofibrils (mainly peripheral).
- No intercalated discs.

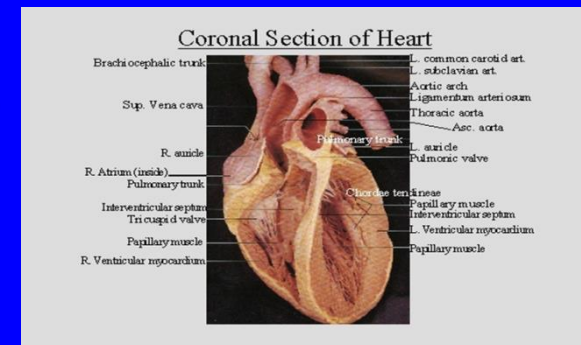
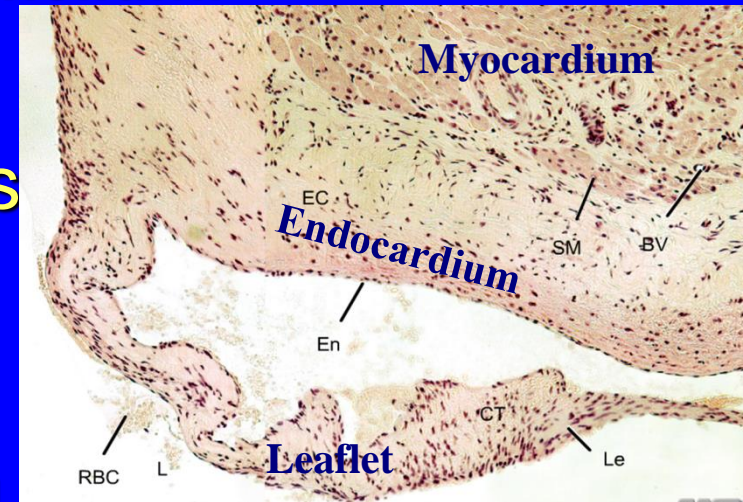


HEART VALVES (CARDIAC VALVES)

- Each leaflet (cusp) of heart valve is formed of:
 - (1) A core of C.T.
 - (2) This core is covered by: **Endothelium.**

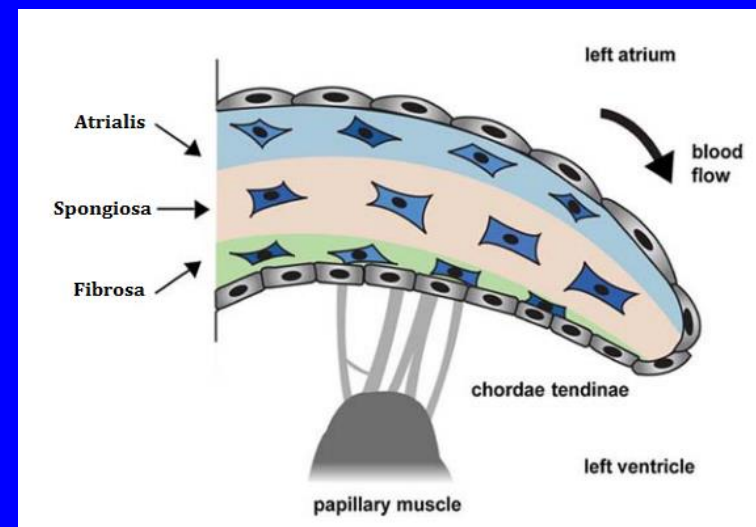
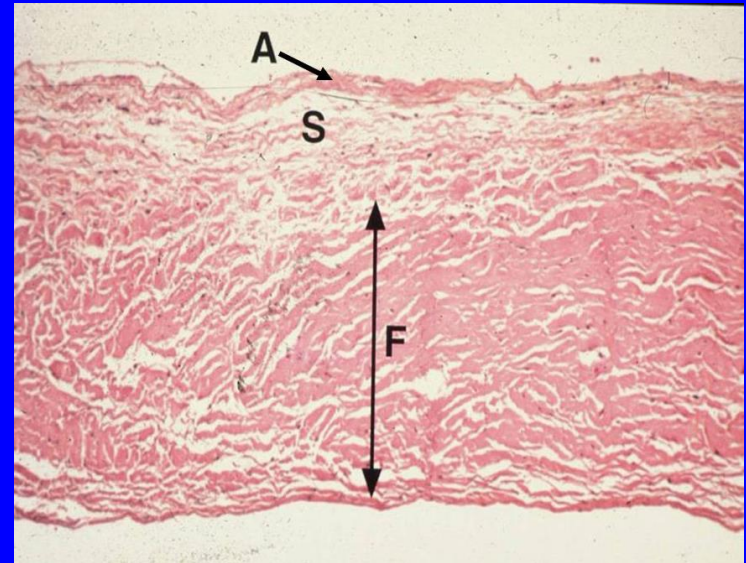
- The leaflets of the heart valves are normally **AVASCULAR.**

- Blood capillaries can be found **only** in the base or root of the leaflet.



LEAFLET (CUSP) OF ATRIOVENTRICULAR (AV) VALVE

- Each leaflet (cusp) of AV valve is formed of:
 1. **A core of C.T.:** 3 layers:
 - a. **Atrialis:** elastic & collagen fibers.
 - b. **Spongiosa:** proteoglycans (matrix), interstitial cells (e.g. fibroblasts) & few collagen fibers.
 - c. **Fibrosa:** mainly dense collagen fibers.
 2. This core is covered by: **Endothelium.**



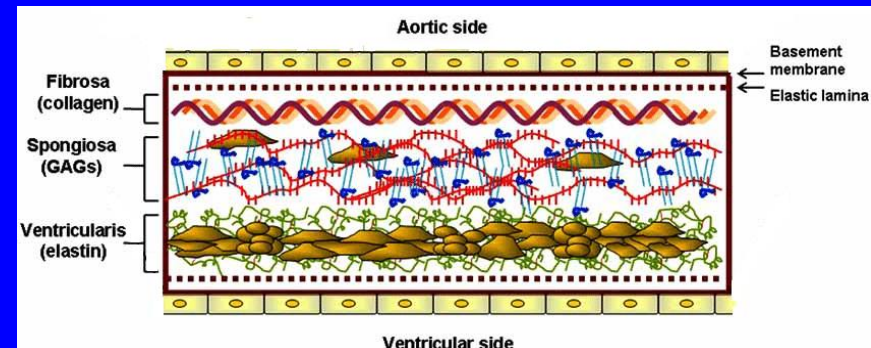
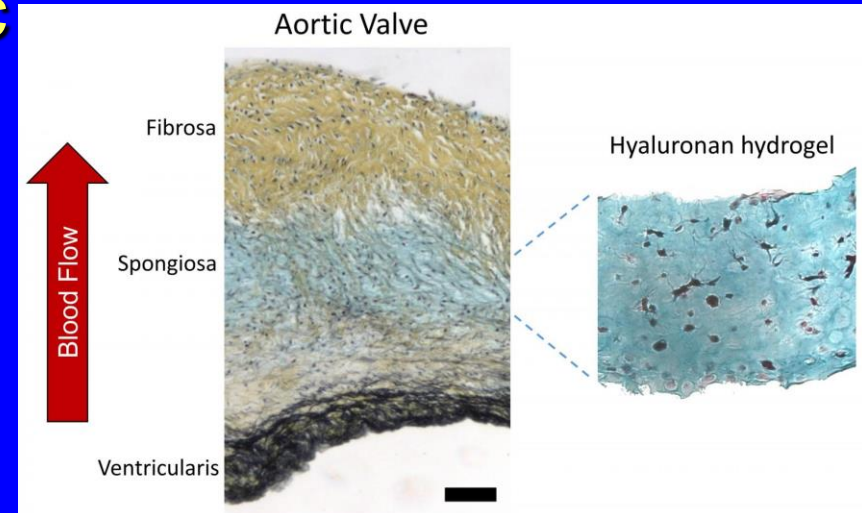
LEAFLET (CUSP) OF AORTIC VALVE

- Each leaflet (cusp) of aortic valve is formed of:

1. A core of C.T.: 3 layers:

- a. **Ventricularis**: elastic & collagen fibers.
- b. **Spongiosa**: proteoglycans (matrix), interstitial cells (e.g. fibroblasts) & few collagen fibers.
- c. **Fibrosa**: mainly dense collagen fibers.

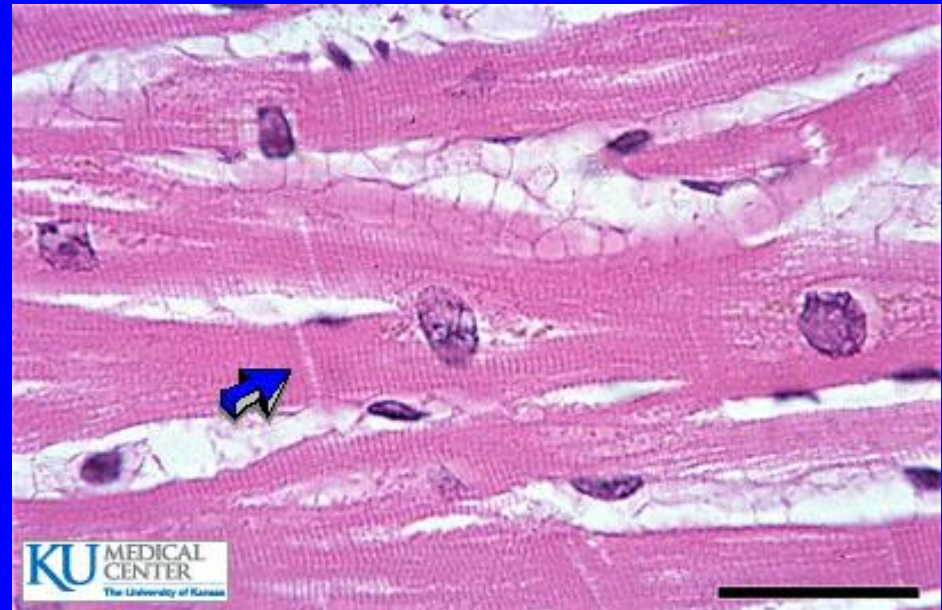
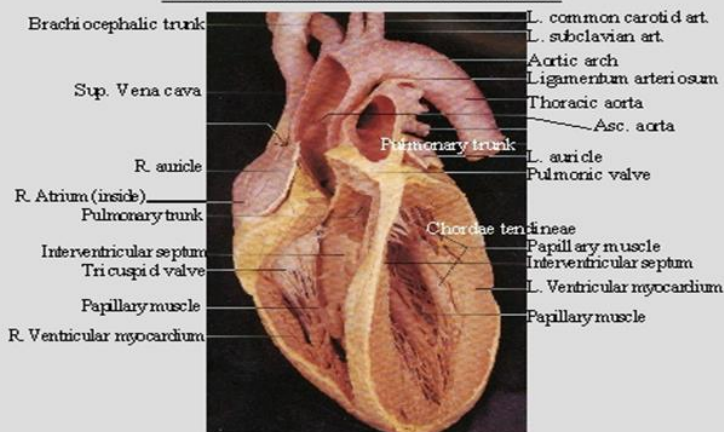
2. This core is covered by: Endothelium.



MYOCARDIUM

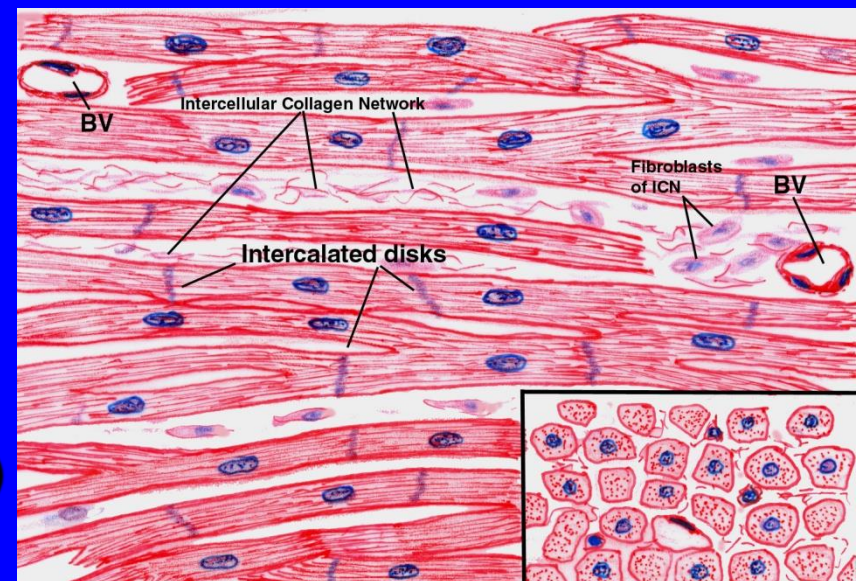
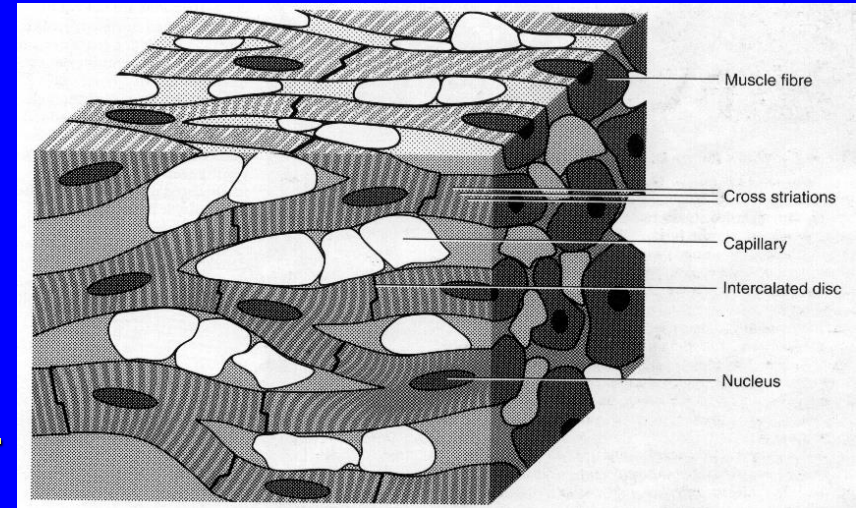
- It is the middle layer
- It is the most thick layer
- It contains cardiac muscle cells with endomysium (loose C.T.)

Coronal Section of Heart



CARDIAC MUSCLE

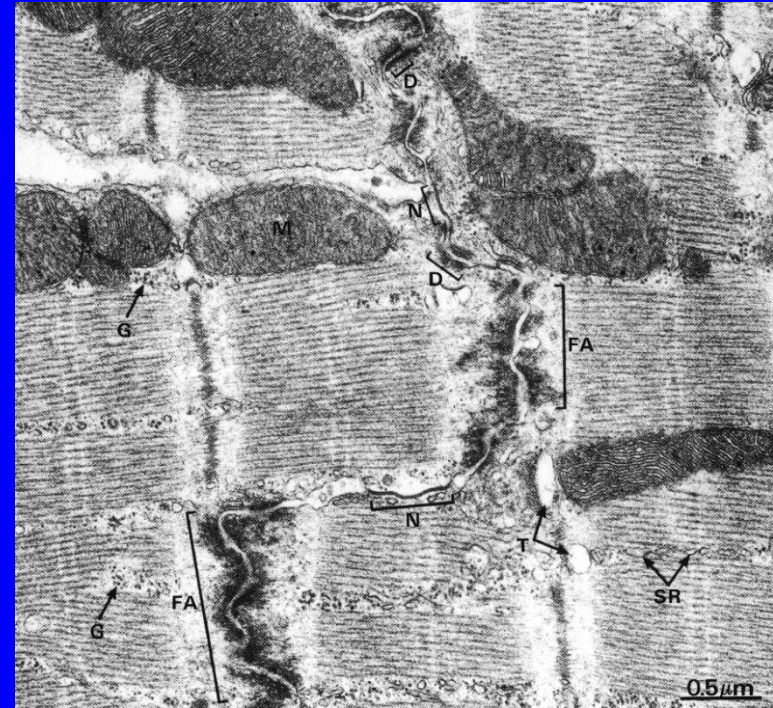
- Found in the myocardium.
- Striated and involuntary.
- **L.M. Picture of Cardiac Muscle Fibers:**
 - Cylindrical in shape.
 - Intermediate in diameter between skeletal and smooth muscle fibers.
 - Branch and anastomose.
 - Covered by a thin sarcolemma.
 - Mononucleated cardiac muscle cells. Nuclei are oval and central.
 - Sarcoplasm is **acidophilic** and shows non-clear striations (fewer myofibrils).
 - Divided into short segments (cells) by the intercalated discs.



Cardiac Muscle Fibers

■ E.M. Picture:

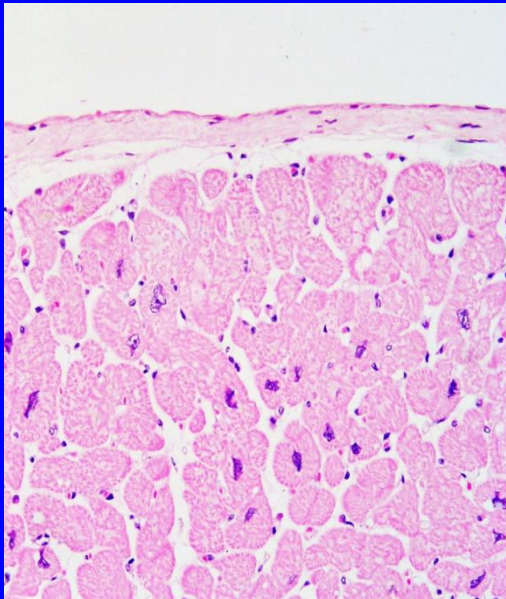
- Few myofibrils.
- Numerous mitochondria.
- Less abundant SR.
- T-tubules come in contact with only one cisterna of SR forming “Diads” (not triads).
- Glycogen & myoglobin.
- Intercalated discs: are formed of the two cell membranes of 2 successive cardiac muscle cells, connected together by junctional complexes (desmosomes and gap junctions).



EPICARDIUM

(Visceral layer of pericardium)

- **Mesothelium:** simple squamous epithelium.
- **Subepicardial C.T. layer:**
Loose C.T. contains the coronary vessels, nerves, ganglia & fat cells.



BEST WISHES