بسم الله الرحمن الرحيم

WALL OF THE HEART
AND
CARDIAC VALVES

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

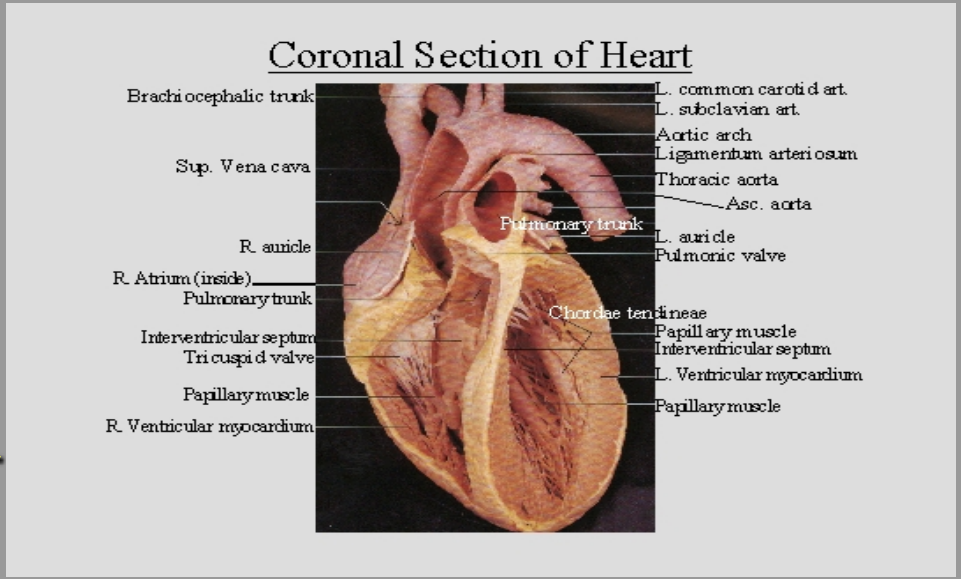
1. Wall of the heart:
   - Endocardium.
   - Myocardium.
   - Epicardium.
2. Cardiac valves.

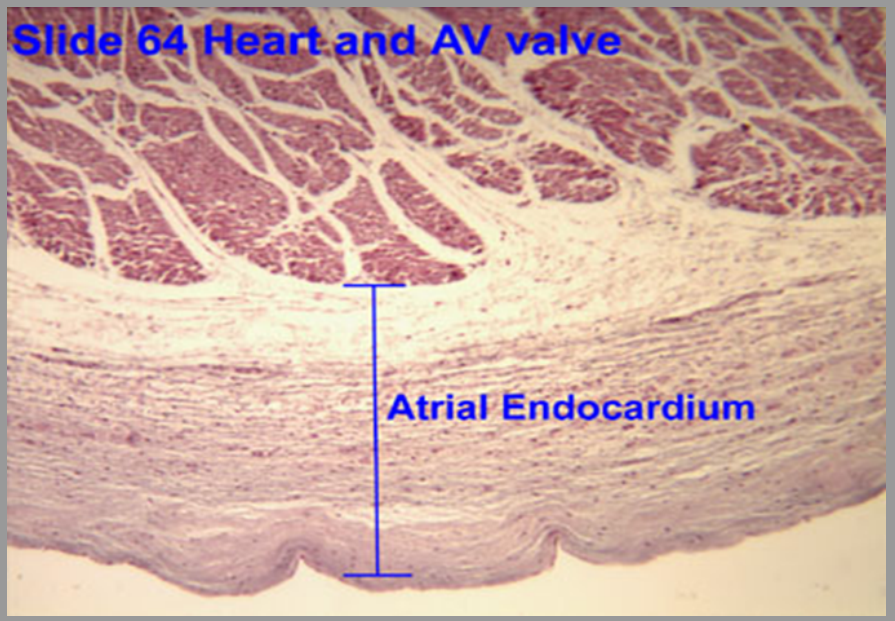
WALL OF THE HEART

(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

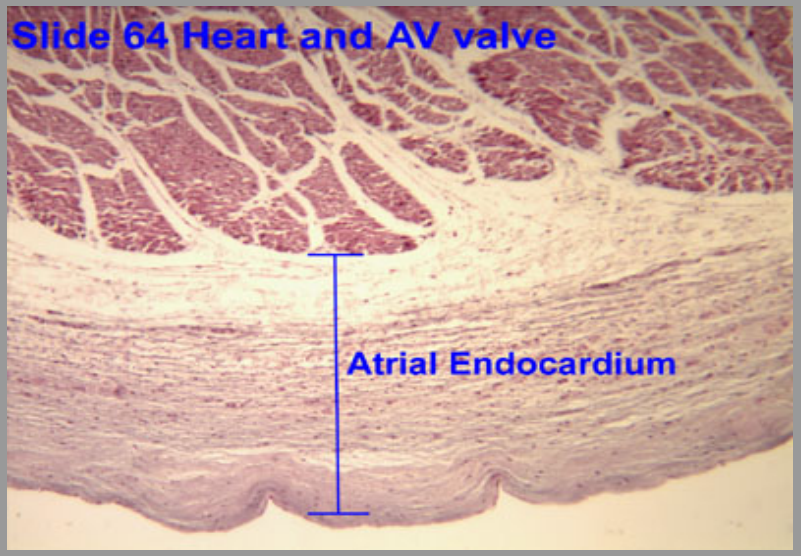
1- Endothelium: simple squamous epithelium.

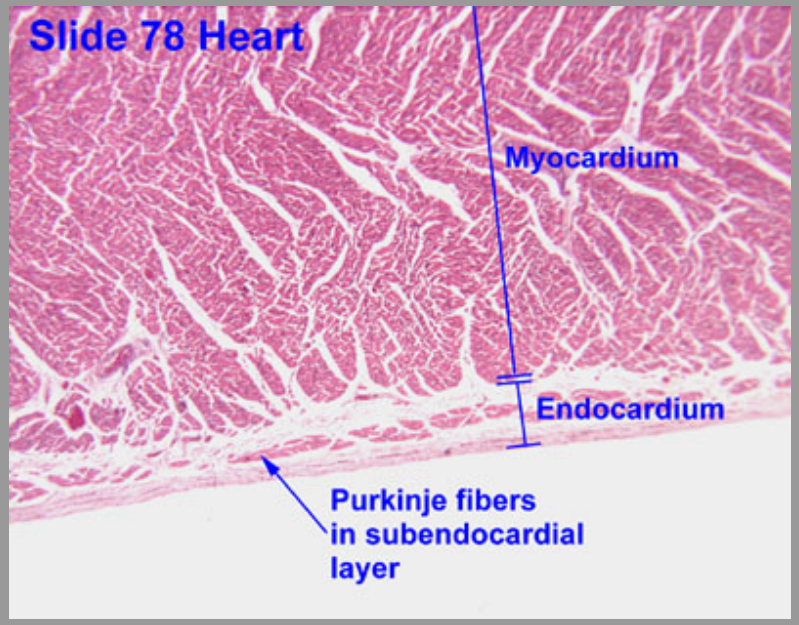
2- Subendothelial C.T. layer

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.

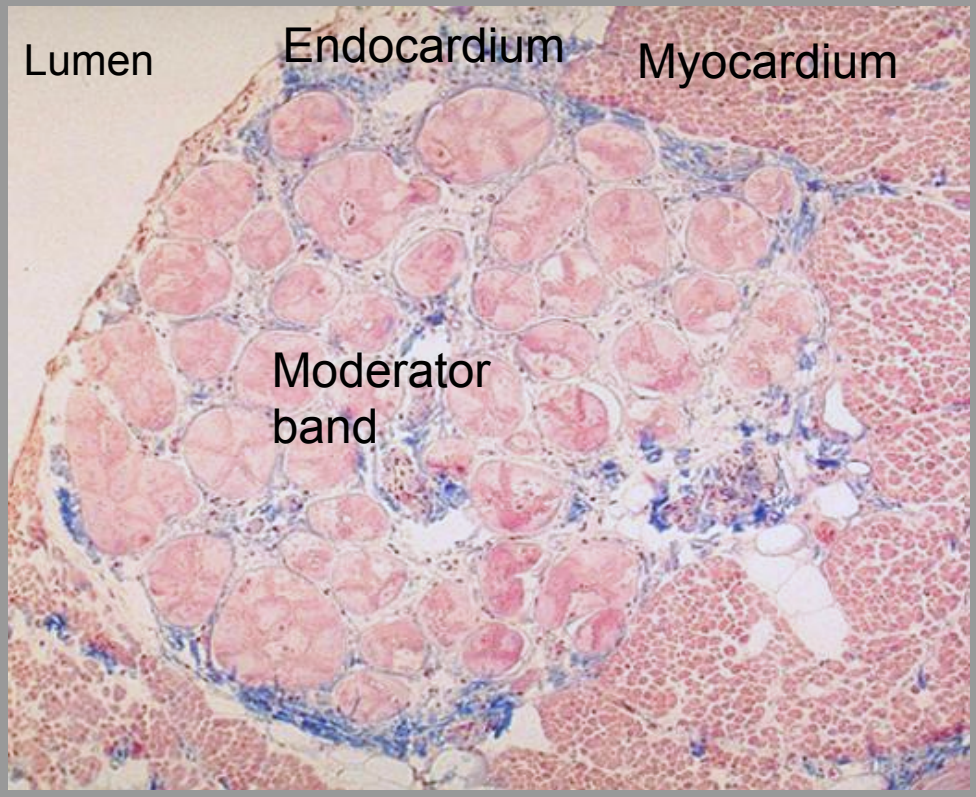




Purkinje Fibers (Moderator Band)

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.

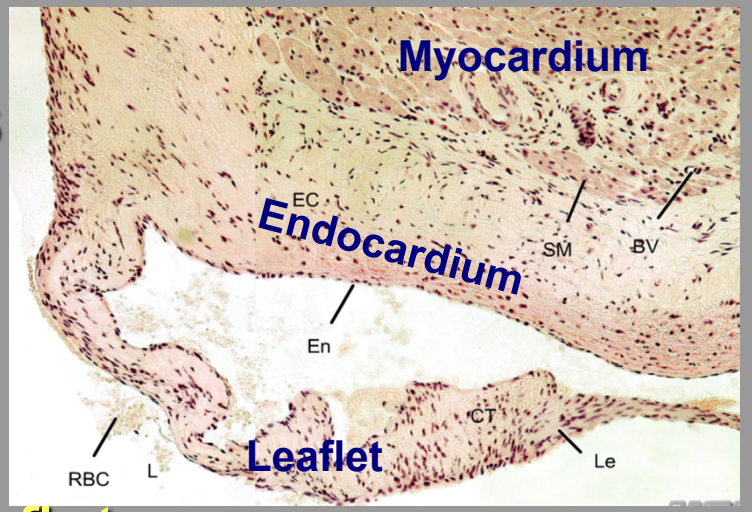


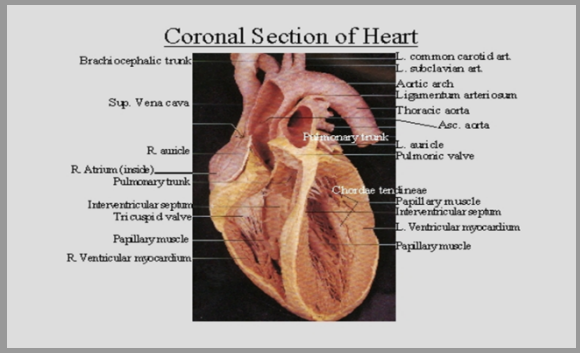
HEART VALVES (CARDIAC VALVES)

- 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**.

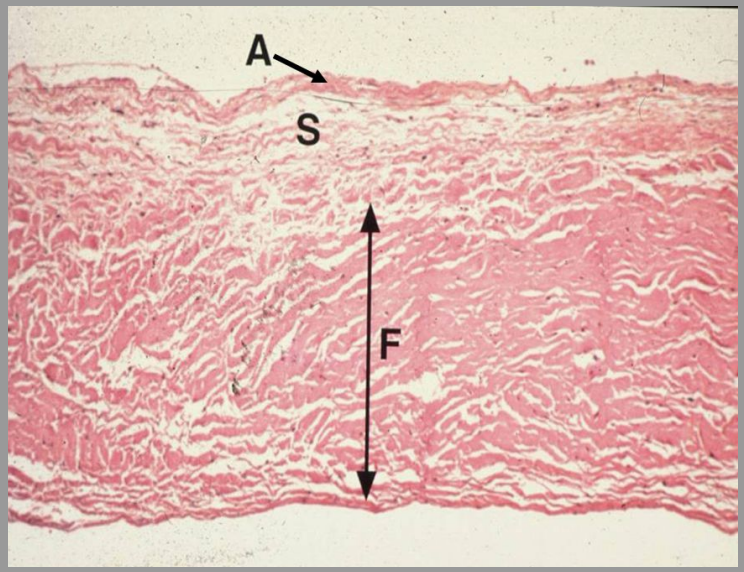
- Blood capillaries can be found **only** in the base or root of the leaflet.

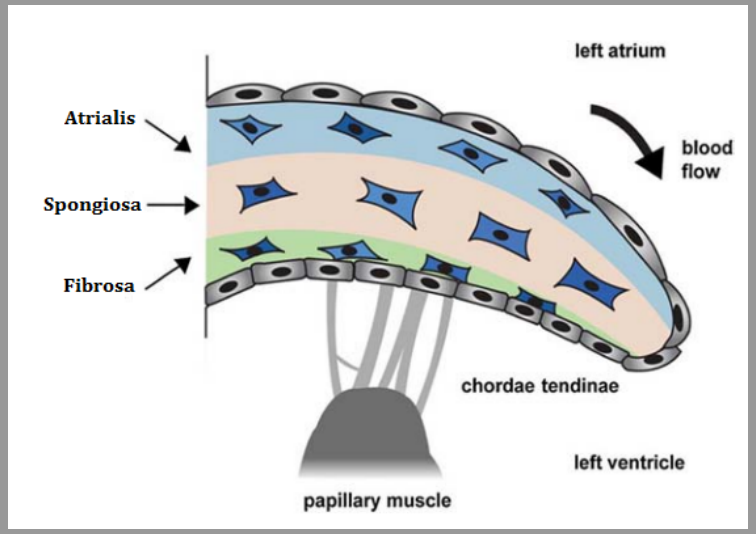




LEAFLET (CUSP) OF ATRIOVENTRICULAR (AV) VALVE

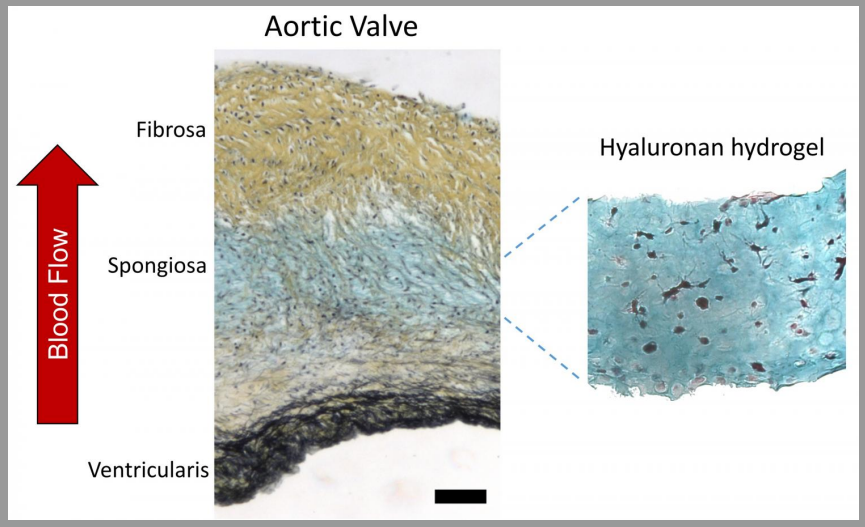
- Each leaflet (cusp) of AV valve is formed of:
  1. **A core of C.T.**: 3 layers:
     a. Atrialis: elastic & collagen fibers.
     b. Spongiosa: proteoglycans (matrix), interstitial cells (e.g. fibroblasts) & few collagen fibers.
     c. Fibrosa: mainly dense collagen fibers.
  2. This core is covered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

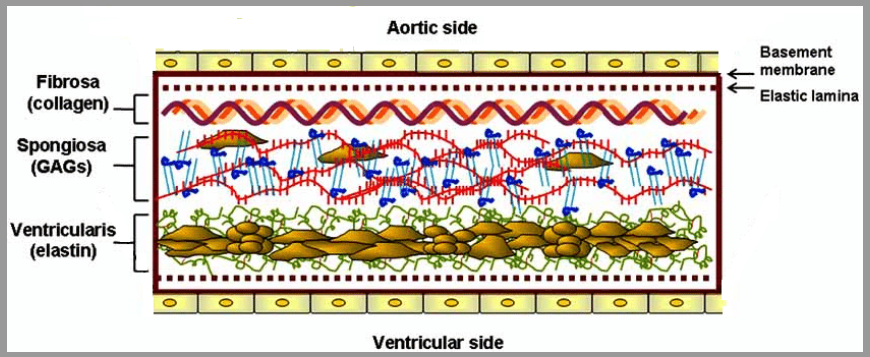




LEAFLET (CUSP) OF AORTIC VALVE

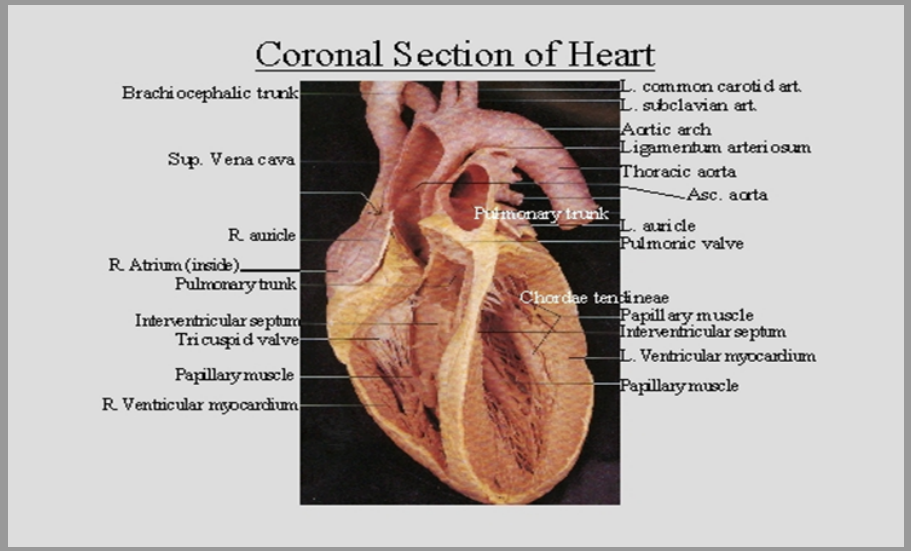
- Each leaflet (cusp) of aortic valve is formed of:
  1. **A <u>core</u> of C.T.**: 3 layers:
     a. Ventricularis: elastic & collagen fibers.
     b. Spongiosa: proteoglycans (matrix), interstitial cells (e.g. fibroblasts) & few collagen fibers.
     c. Fibrosa: mainly dense collagen fibers.
  2. **This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

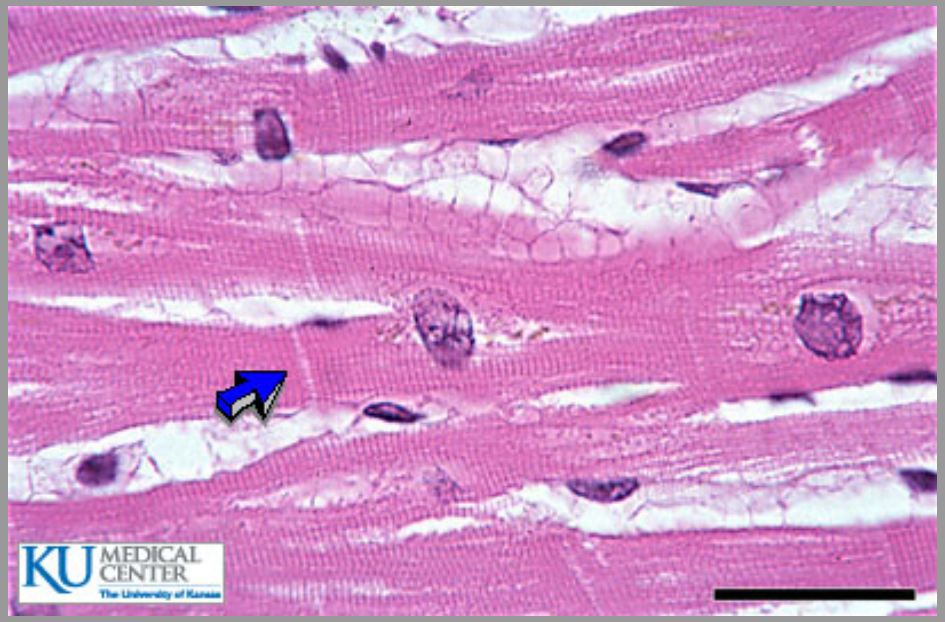




MYOCARDIUM

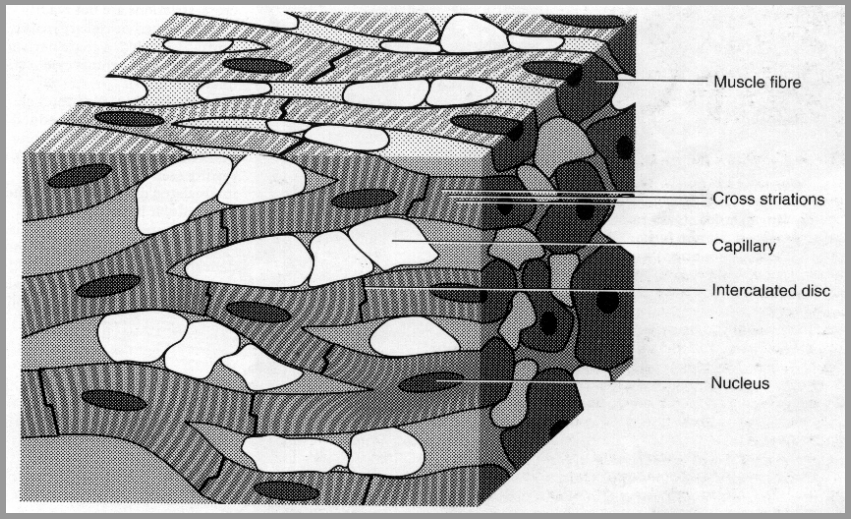
- It is the middle layer
- It is the most thick layer
- It contains cardiac muscle cells with endomysium (loose C.T.)

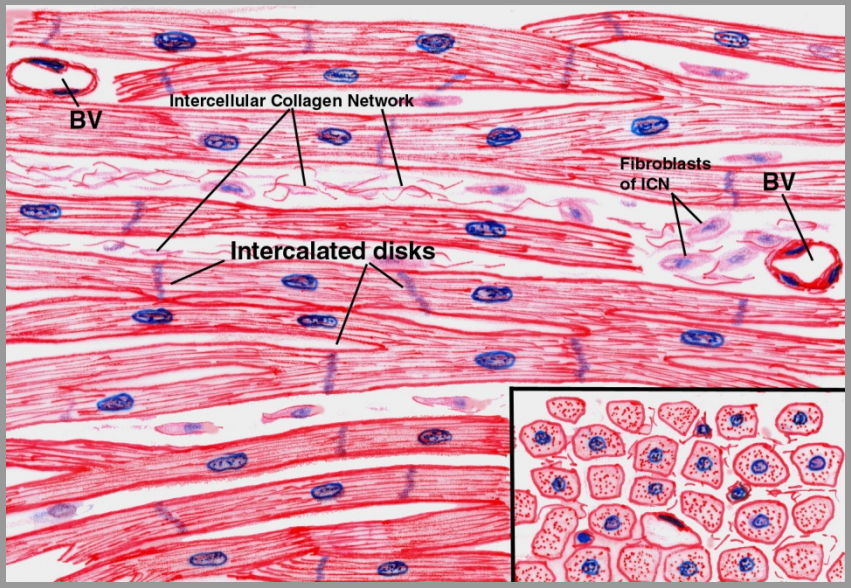




CARDIAC MUSCLE

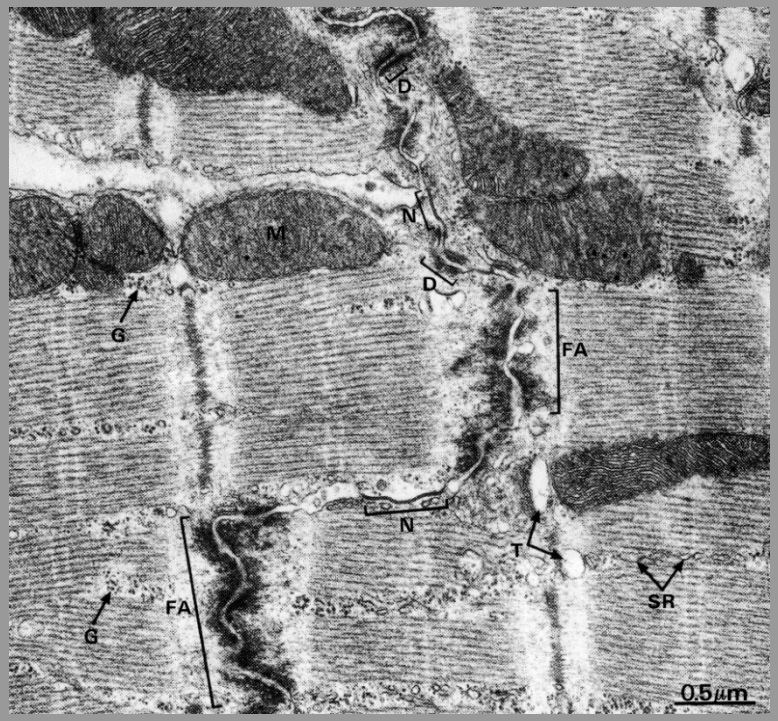
- Found in the myocardium.
- Striated and involuntary.
- **L.M. Picture of Cardiac Muscle Fibers:**
  - Cylindrical in shape.
  - Intermediate in diameter between skeletal and smooth muscle fibers.
  - Branch and anastomose.
  - Covered by a thin sarcolemma.
  - Mononucleated cardiac muscle cells. Nuclei 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

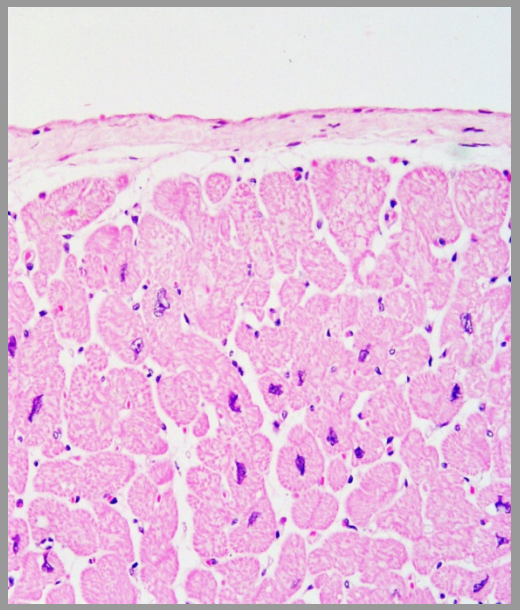
- **E.M. Picture**:
  - Few myofibrils.
  - Numerous mitochondria.
  - Less abundant SR.
  - T-tubules come in contact with only one cisterna of SR forming "Diads" (not triads).
  - Glycogen & myoglobin.
  - Intercalated discs: are formed of the two cell membranes of 2 successive cardiac muscle cells,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

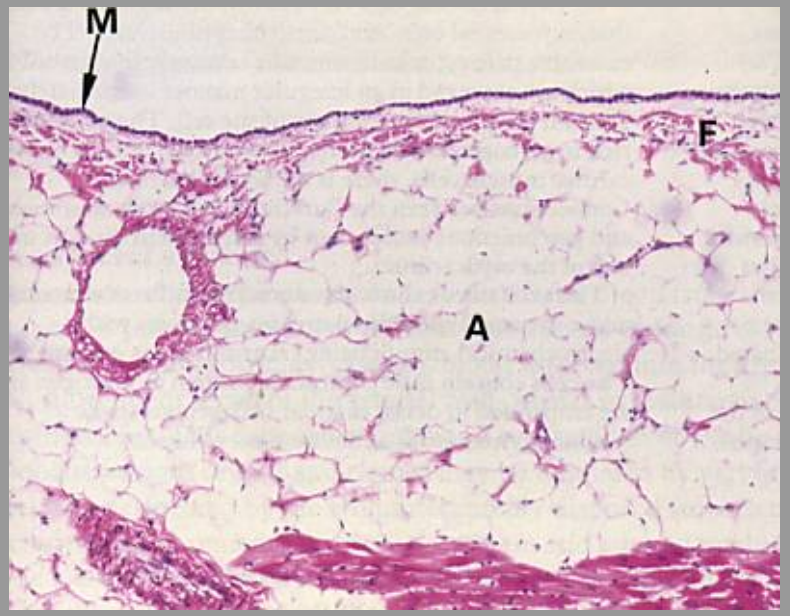


EPICARDIUM
(Visceral layer of pericardium)

- **Mesothelium:** simple squamous epithelium.
- **Subepicardial C.T. layer:**

  Loose C.T. contains the coronary vessels, nerves, ganglia & fat cells.





BEST WISHES