

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

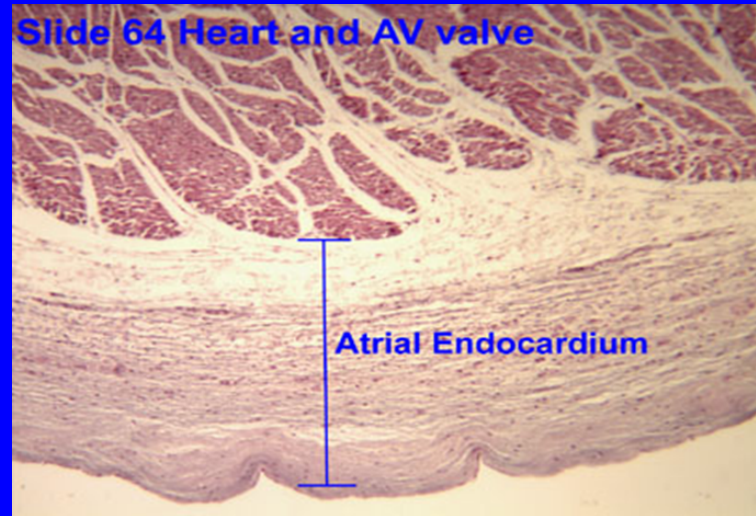
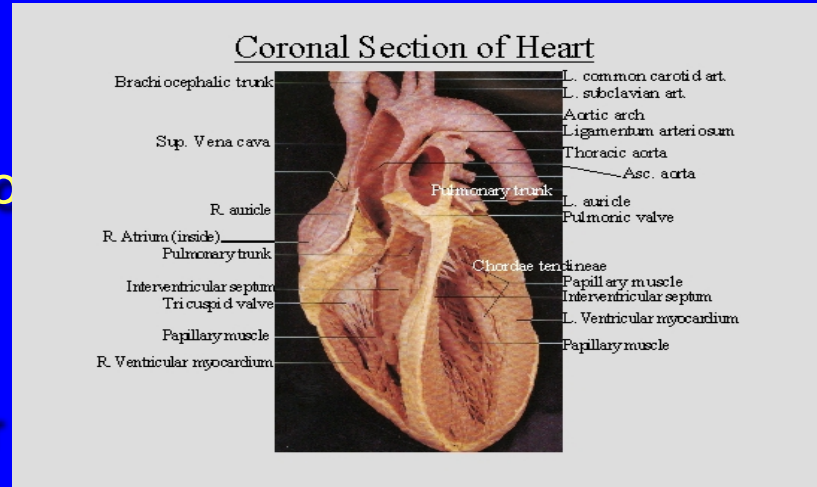
(A) Endocardium:

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

(B) Myocardium

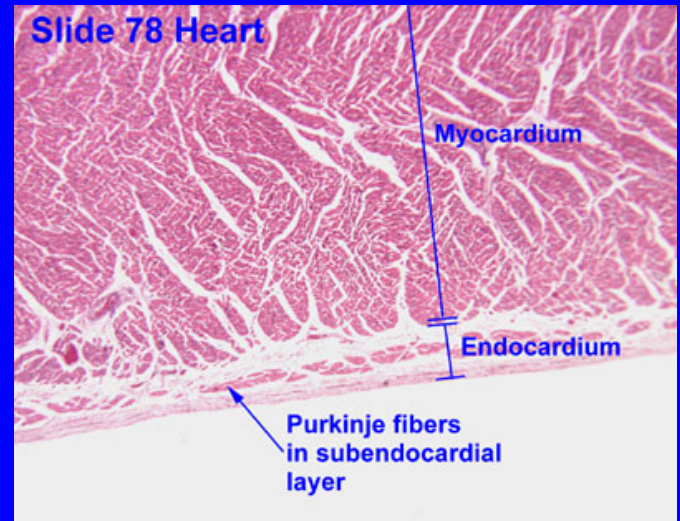
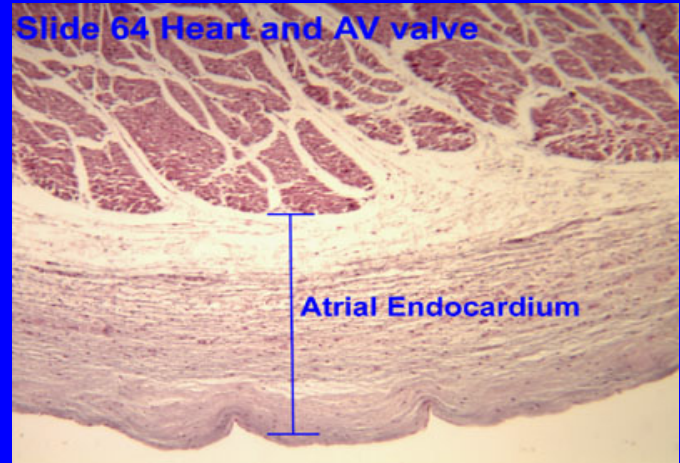
(C) Epicardium:

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



ENDOCARDIUM

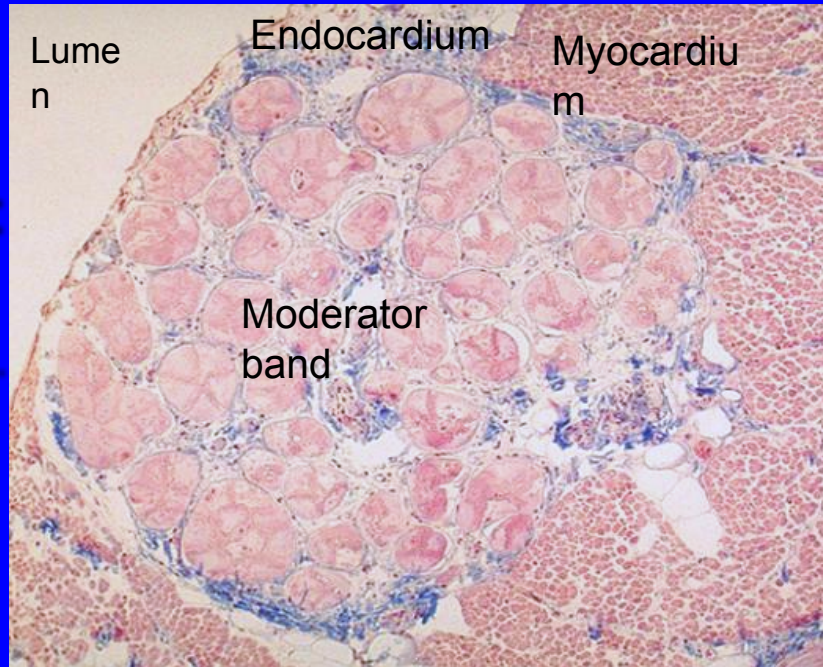
- 1- Endothelium: simple squamous epithelium.
- 2- Subendothelial C.T. layer;
Loose fibroelastic C.T.
- 3- Dense C.T. layer:
Dense Fibroelasti C.T.
- 4- Subendocardial layer:
Loose C.T. layer that contains **Purkinje fibers**, small blood vessels & nerves.
It attaches to the endomysium of the cardiac muscle.



Purkinje Fibers (Moderator Band)

Purkinje fibers in comparison to ordinary cardiac muscle cells are:

- Larger in diameter.
- Paler in staining (more glycogen).
- Peripheral spherical nuclei.
- Often binucleated
- Fewer myofibrils (mainly peripheral).
- No intercalated discs.
- Connected together by desmosomes and gap junctions.
- Almost no t-tubules.



HEART VALVES (CARDIAC VALVES)

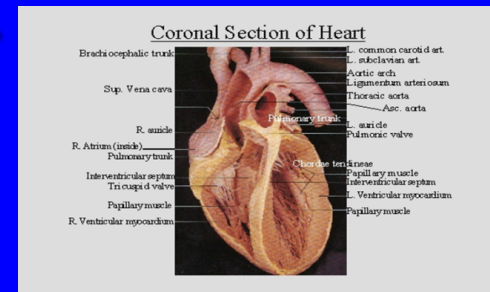
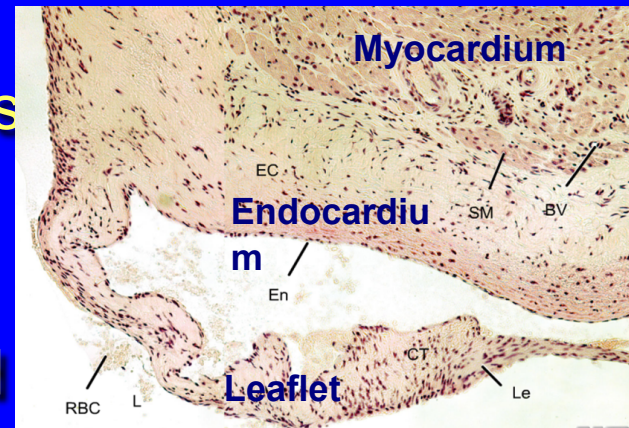
Each leaflet (cusp) of heart valve is formed of:

(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:

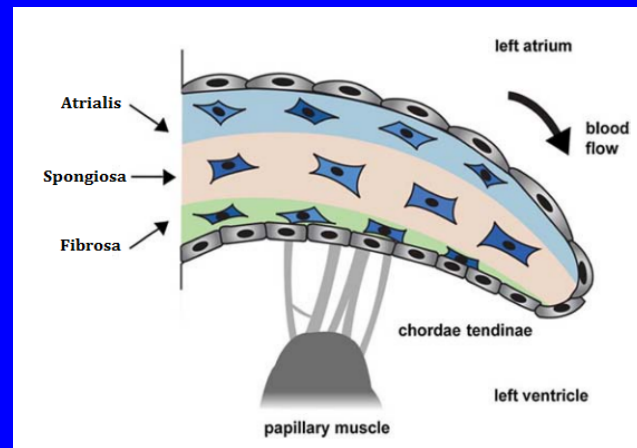
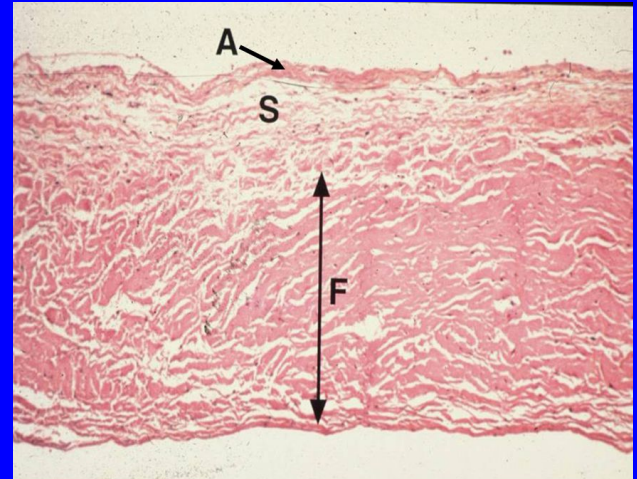
A core of C.T.: 3 layers:

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:

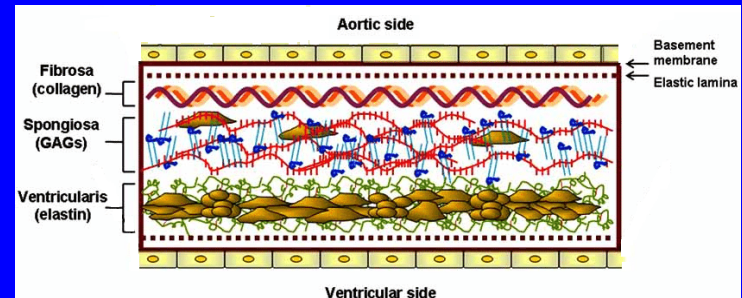
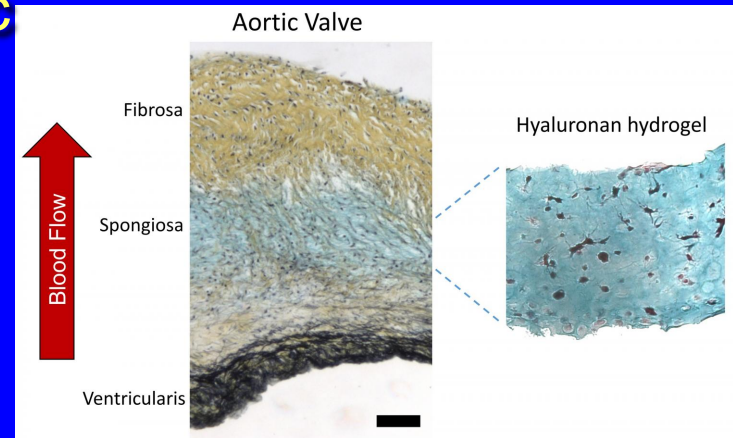
A core of C.T.: 3 layers:

Ventricularis: elastic & collagen fibers.

Spongiosa: proteoglycans (matrix), interstitial cells (e.g. fibroblasts) & few collagen fibers.

Fibrosa: mainly dense collagen fibers.

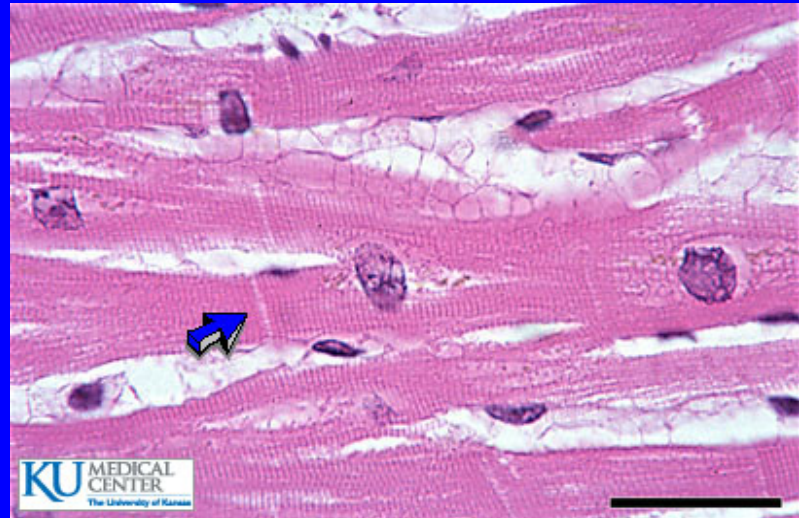
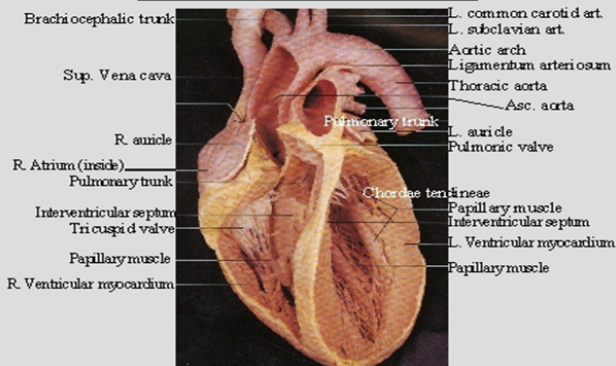
This core is covered by: Endothelium.



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 (versus Skeletal muscle fibers):

Cylindrical in shape.

Intermediate in diameter between skeletal and smooth muscle fibers.

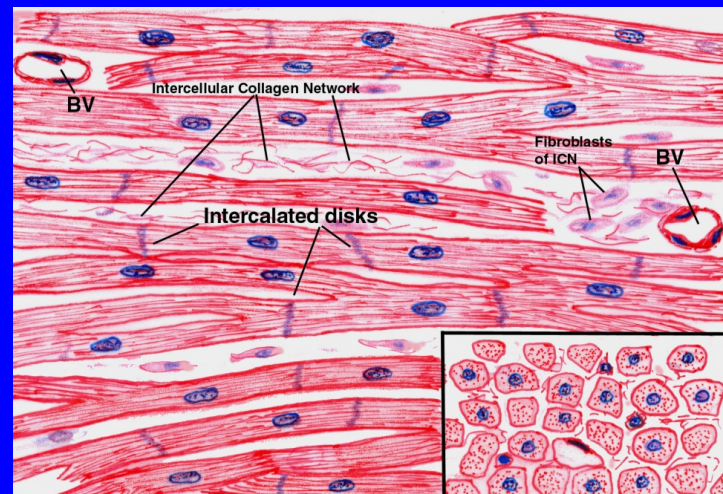
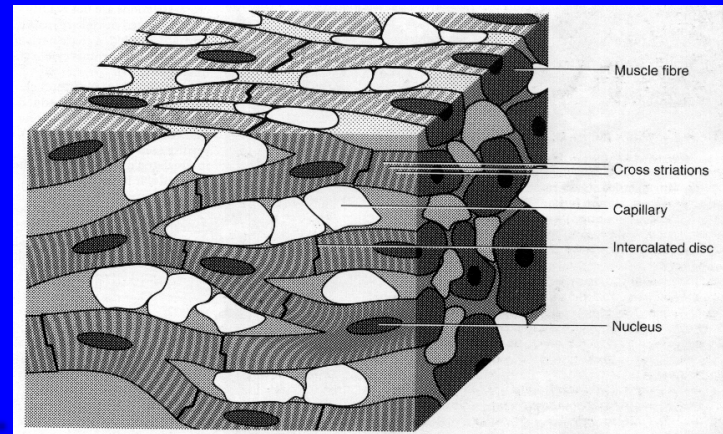
Branch and anastomose.

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



Cardiac Muscle Fibers

E.M. Picture:

Few myofibrils.

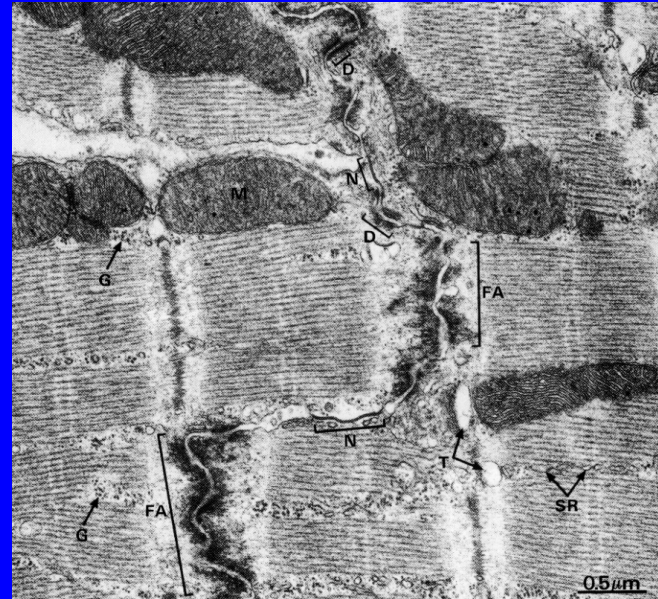
Numerous mitochondria.

Less abundant SR.

T-tubules come in contact with only one cisterna of SR forming "Diads" (not triads).

Glycogen & myoglobin.

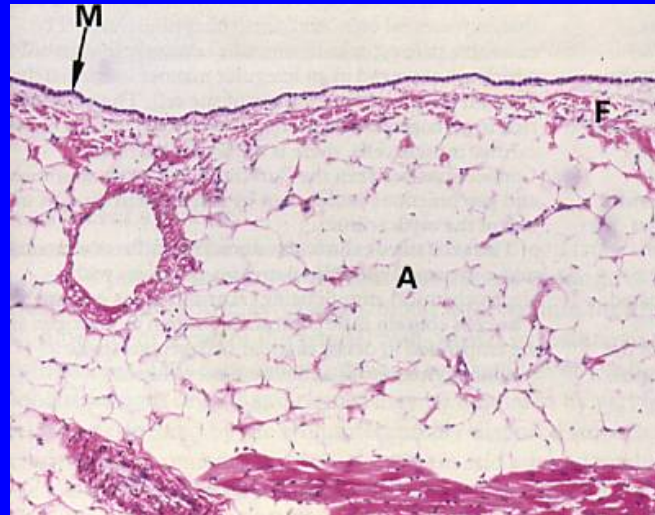
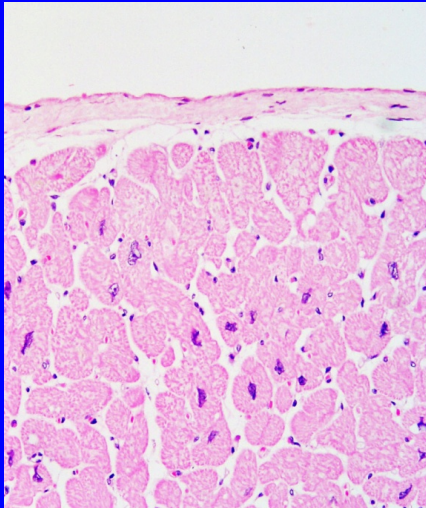
Intercalated discs: are formed of the two cell membranes of 2 successive cardiac muscle cells, connected together by junctional complexes (desmosomes, fascia adherens junctions and gap junctions).



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