Wall of the heart & cardiac valves

Red: important.
Black: in male|female slides.
Gray: notes|extra.

Editing file

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Revised by

➢ OBJECTIVES

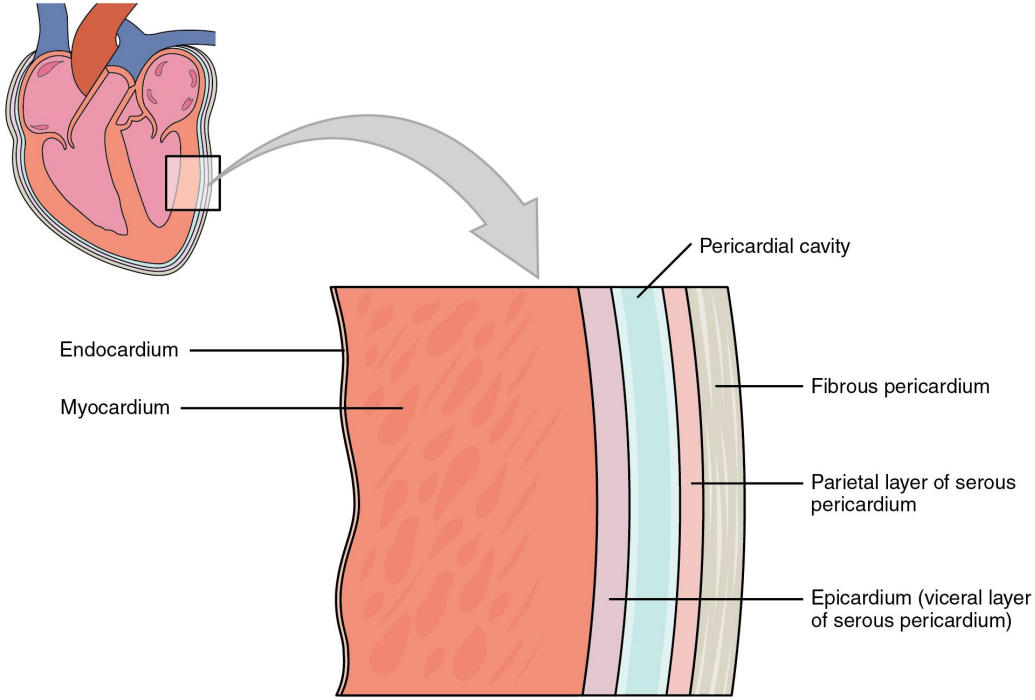
1- Wall of the heart:

- Endocardium.
- Myocardium.
- Epicardium.

2- Cardiac valves.

➢ WALL OF THE HEART

EXTRA:



WALL OF THE HEART

The wall of heart is formed of

Endocardium

(direct contact with blood)

1. Endothelium: simple squamous epithelium.

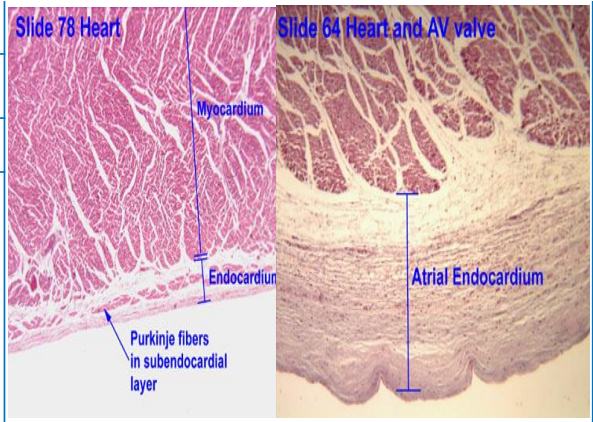
2. Subendothelial C.T. layer (rich in elastic fibers)

3. Dense C.T. layer (rich in collagen fibers type 1)

4. Subendocardial layer:

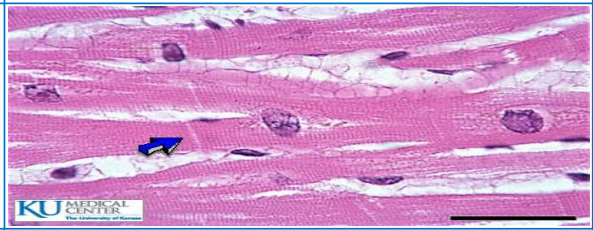
- Loose C.T. layer that contains **Purkinje fibers**, small blood vessels & nerves.
- It attaches to the endomysium of the cardiac muscle.

Note: have loos C.T which overlap with myocardium layer to form the endomysium



Myocardium

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



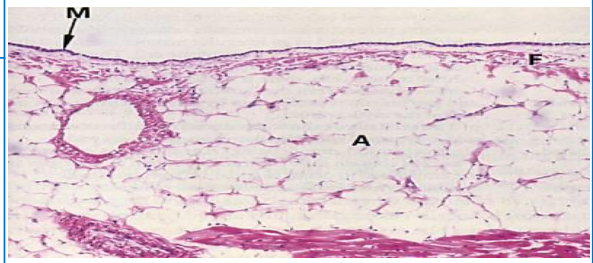
Epicardium

(Visceral layer of pericardium)

Thickening of epicedium depends on total body fat

Mesothelium: simple squamous epithelium.

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

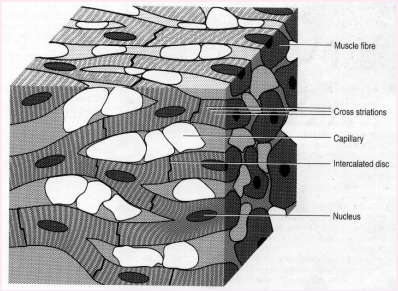


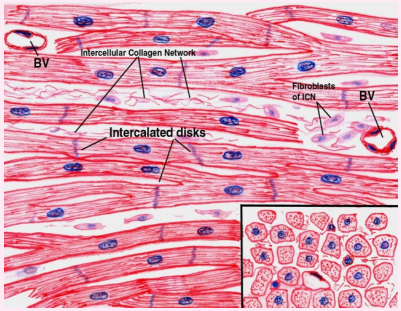
CARDIAC MUSCLE

- Found in the myocardium.
- Striated and involuntary.

L.M. Picture

- Cylindrical in shape.
- Intermediate in diameter between skeletal and smooth muscle fibers.
- Branch and anastomose.
- Covered by a thin sarcolemma.
- Mononucleated. Nuclei are oval and central.
- Sarcoplasm is acidophilic and shows non-clear striations (fewer myofibrils).
- Divided into short segments (cells) by the intercalated discs.

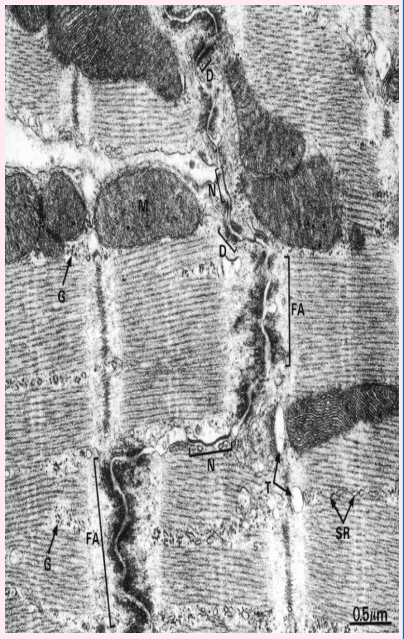




E.M. Picture

- Few myofibrils.
- Numerous mitochondria.
- Less abundant SR.
- T-tubules come in contact with only one cisterna of SR forming "Diads = pairs|two" (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*).

*Gap junctions allow communication and passage of impulses between cardiac muscle



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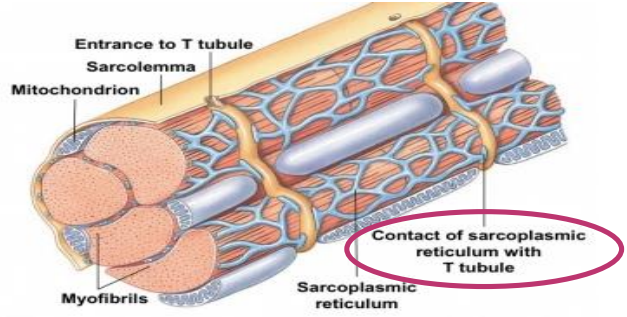
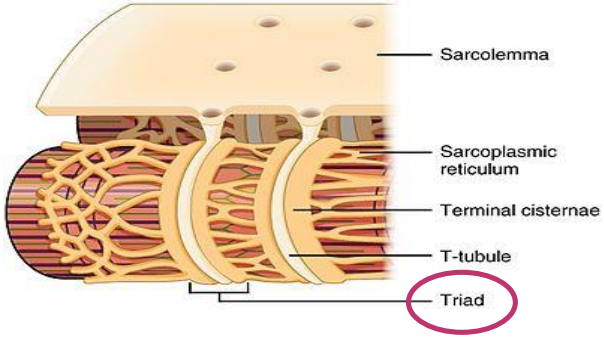
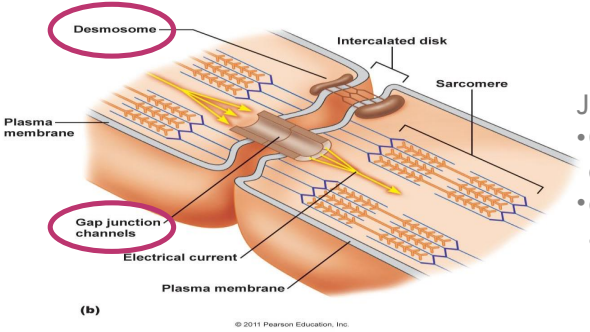


Diads: T-tube come in contact with 1 cisterna of SR Found in heart muscle (cardiac muscle)



Triads: T- tube come in contact With 2 cisterna of SR one on each side Found in skeletal muscle



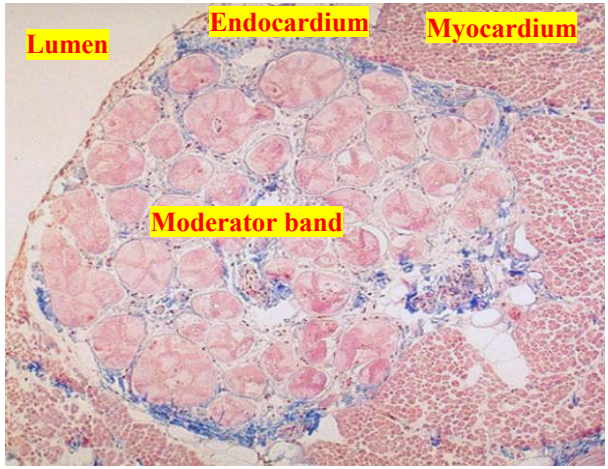
Junctional complex (desmosome and gap junction)

- Gap junctions allow communication and passage of impulses between cardiac muscle cells
- desomsomes are the structures by which two adjacent cells are attached

➢ Purkinje Fibers (Moderator Band)

Purkinje fibers (modified cardiac muscle cells) in comparison to cardiac muscle cells are:

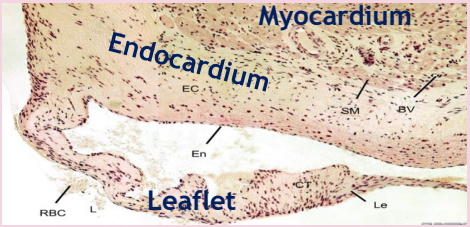
- Larger in diameter.
- Paler in staining (more glycogen).
- Peripheral nuclei.
- Fewer myofibrils (mainly peripheral).
- No intercalated discs.
- Purkinje Fiber conducts cardiac action potentials more quickly and efficiently than any other cells in the heart and it helps in maintaining heart rhythm.



Note: Purkinje Fibers is found in Subendocardial layer of the endocardium

HEART VALVES = CARDIAC VALVES

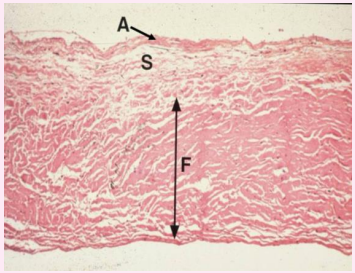
- Each leaflet (cusp) of heart valve is formed of:
  (1) **A core of C.T.**
  (2) This core is covered by: **Endothelium** (mainly connective tissue).
- The leaflets of the heart valves are normally **AVASCULAR**.
- Blood capillaries can be found **only** in the base or root of the leaflet.
- leaflet (cusp) of heart valve is part of endocardium layer but modifies

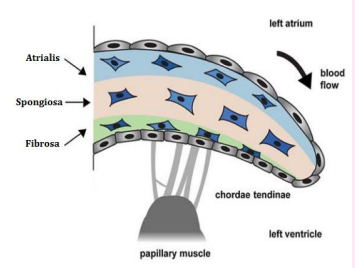


LEAFLET (CUSP) OF ATRIOVENTRICULAR (AV) VALVE

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.**

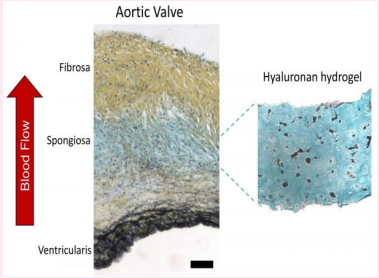


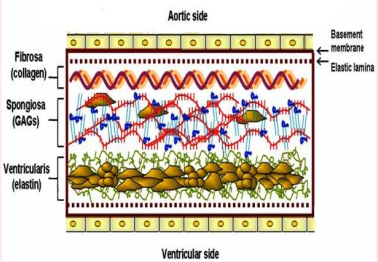


LEAFLET (CUSP) OF AORTIC VALVE

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.**

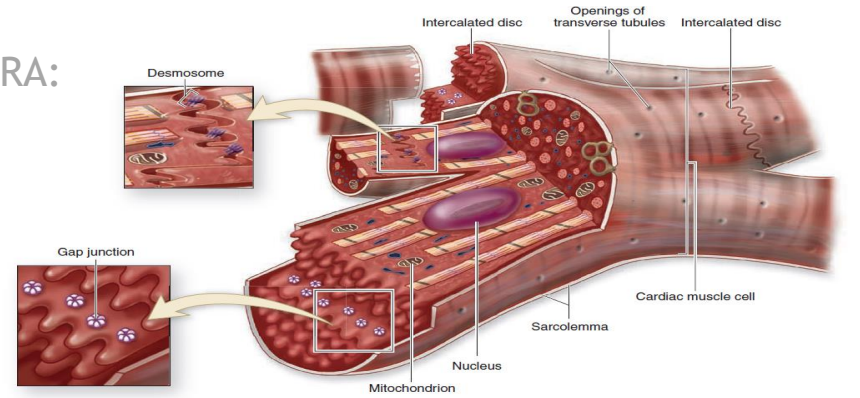




From 436 team

Don’t get confused between the **EPICARDIUM** and the **PERICARDIUM**
PERICARDIUM: is formed of a fibrous layer and a serous layer & since it’s serous layer it’s composed of a partial and a visceral layer
EPICARDIUM: is simply the visceral layer of the serous pericardium

EXTRA:



The diagram of cardiac muscle cells indicates characteristic features of this muscle type. The fibers consist of separate cells in a series with interdigitating processes where they are held together. These regions of contact are called the **intercalated discs**, which cross an entire fiber between two cells. The transverse regions of the steplike intercalated disc have abundant **desmosomes** and other adherent junctions for firm adhesion, while longitudinal regions of the discs contain many physiologically important **gap junctions**.

Cardiac muscle cells have central nuclei and myofibrils that are less dense and less well-organized than those of skeletal muscle. Also, the cells are often branched, allowing the muscle fibers to interweave in a more complicated arrangement within fascicles that produces an efficient contraction mechanism for emptying the heart.

HISTOLOGY TEAM 437

➢ QUESTIONS:

Q1: Which one of these is the visceral layer of pericardium?
A) Endocardium B) Myocardium C) Epicardium D) Non of them

Q2: The thickest layer in wall of the heart is?
A) Endocardium B) Myocardium C) Epicardium D) Non of them

Q3: Purkinje fibers are found in?
A) Endocardium B) Myocardium C) Epicardium D) All of them

Q4: What type of epithelium is found in Mesothelium?
A) Simple squamous epithelium B) Scolumnar epithelium
C) Respiratory epithelium D) Simple cuboidal epithelium

Q5: Coronary vessels are found in?
A) Endocardium B) Myocardium C) Epicardium D) All of them

1- C
2- B
3- A
4- A
5- C

Q6: Purkinje fibers have?

A) Peripheral nuclei B) No glycogen C) Intercalated discs D) All of them

Q7: What is NOT true about cardiac muscle?

A) Basophilic B) Branched C) Mononucleated D) Central nucleus

Q8: Which layer is attached to the endomysium of the cardiac muscle?

A) Subendothelial C.T. layer B) Endothelium

C) Dense C.T. layer D) Subendocardial layer

Q9: Each leaflet (cusp) of heart valve is formed of?

A) Simple columnar epithelium B) A core of C.T. covered by Endothelium

C) Endothelium covered by C.T. D) Simple cuboidal epithelium

Q10: Proteoglycans (matrix) is found in?

A) Atrialis B) Ventricularis C) Fibrosa D) Spongiosa

6- A
7- A
8- D
9- B
10- D

HISTOLOGY TEAM 437

Special thank for Fatimah Albassam

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