MED439
KING SAUD UNIVERSITY

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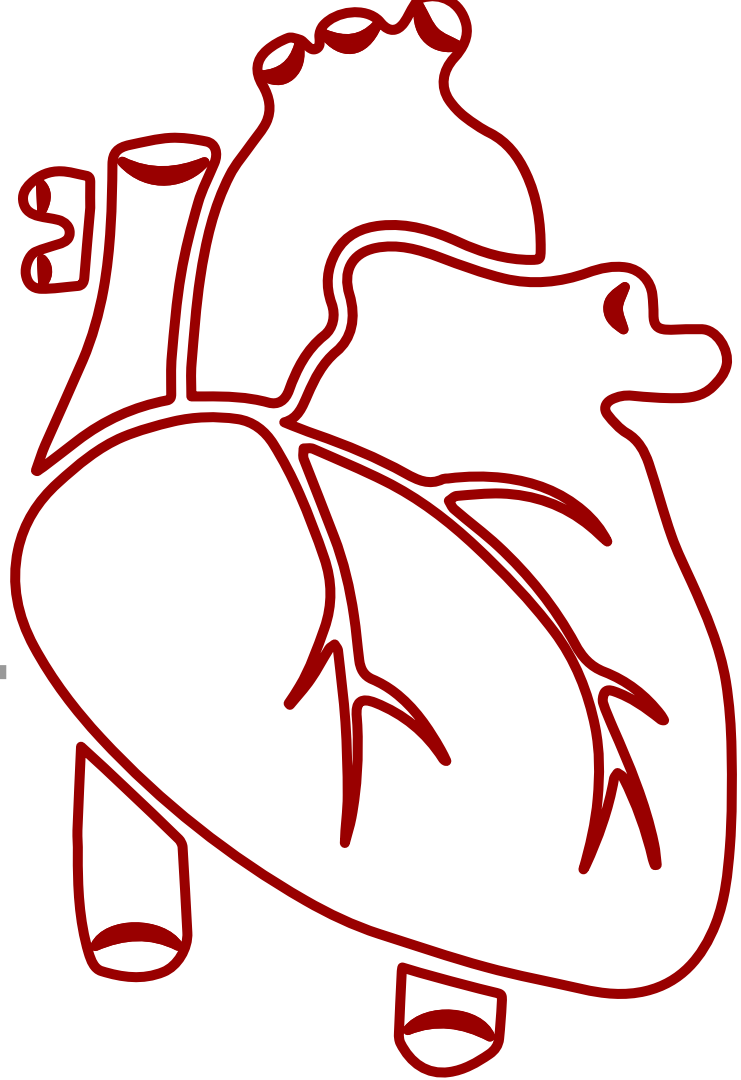
WALL OF THE HEART AND CARDIAC VALVES



Color index

Important

Extra notes

Notes

Editing file

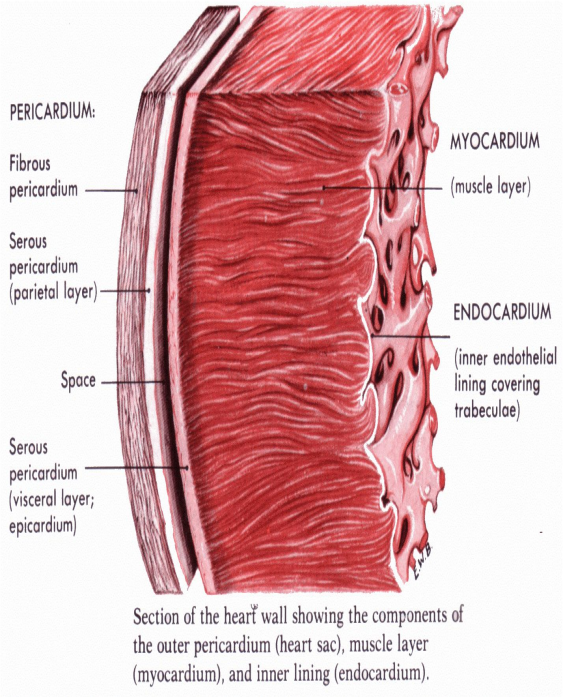
Objectives:

by the end of the lecture, our future doctors should be able to describe the microscopic structure of:

Wall of the heart:

1. Endocardium
2. Myocardium
3. Epicardium

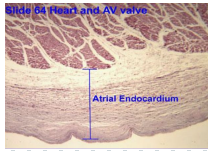
Cardiac valves

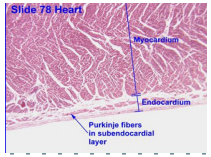


Section of the heart wall showing the components of the outer pericardium (heart sac), muscle layer (myocardium), and inner lining (endocardium).

Wall of the heart

1-Endocardium (inner)





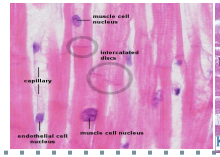
Endothelium
Simple squamous epithelium.
same as in blood vessels

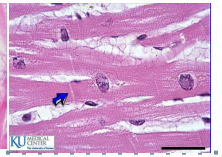
subendothelial C.T layer
Thin loose C.T for nutrition

dense C.T layer
(Collagen).

subendocardial layers
Loose C.T layer that contains **Purkinje fibers**
small blood vessels and nerves.
It Attaches to endomysium.

2-Myocardium (middle)



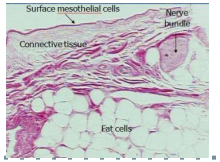


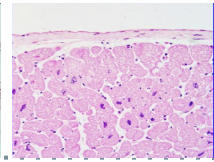
Middle layer

Most thick

Contains cardiac muscle cells with endomysium(loose C.T.)

3-Epicardium (outer) visceral layer of pericardium.



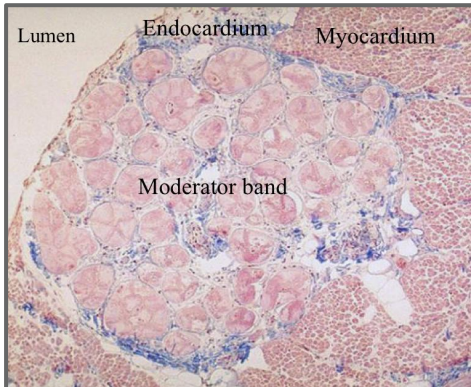


Mesothelium
Simple squamous epithelium.

Subepicardial C.T layer
Loose C.T. contains:
- coronary vessels
- nerves
- ganglia
- fat cells

Purkinje fibers (Moderator Band) vs. cardiac muscle cells

	Purkinje fibers	Cardiac muscle
Nuclei	**Peripheral**. usually binucleated	Central
Diameter	**Large**	Medium sized.
Stain	**Paler in staining** (more glycogen ,Why? For more energy).	Darker stain.
Number of myofibrils	**Fewer** myofibrils (mainly peripheral).	Numbered myofibrils.
Intercalated disc	**Absent**	Present

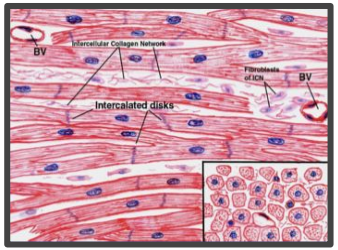


Cardiac muscle and fibers

- -Found in the myocardium
- -Striated and involuntary

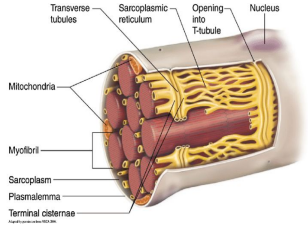
L.M

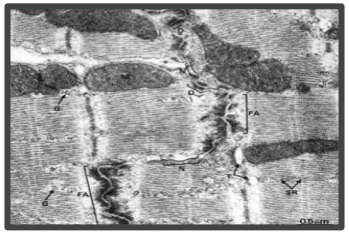
Cylindrical in shape.
-Intermediate in diameter between skeletal and smooth muscle fibers.
-Branch and anastomose.
-Covered by a thin sarcolemma.
-Mononucleated cells.
-Nuclei oval central.
-Sarcoplasm is **acidophilic** and shows non-clear striations (fewer myofibrils).
-Divided into short segments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



E.M

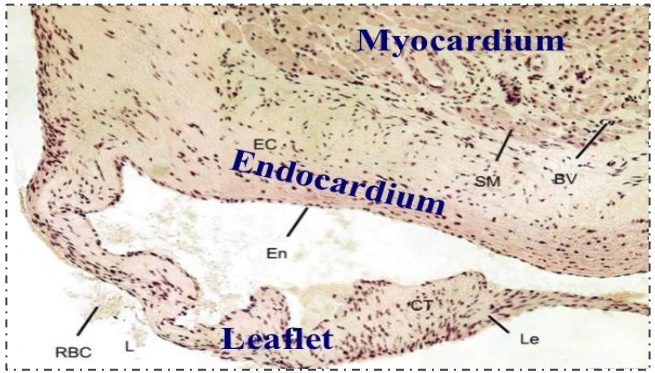
– Few myofibrils.
– Numerous mitochondria.
– Less abundant SR.
– T-tubules come in contact with only one cisterna of SR forming Diads (not triads)
– Glycogen & myoglobin.
– Intercalated discs: are formed of the two cell membranes of 2 successive cardiac muscle cells, connected together by junctional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



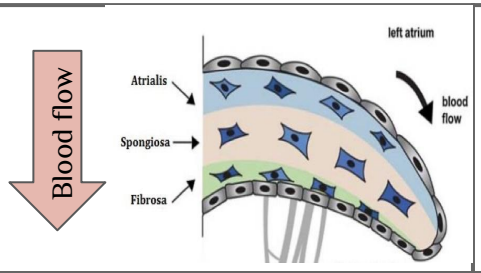


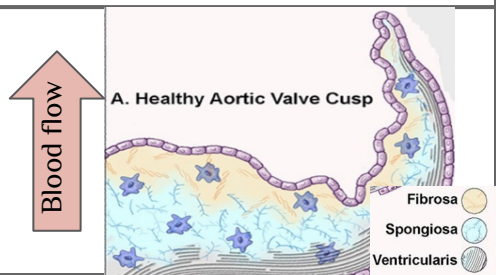
HEART VALVES (CARDIAC VALVES)

- The leaflets of the heart valves are normally AVASCULAR.
  "receives the blood supply & nutrition from capillaries in the root of the cusp"
- Blood capillaries can be found **only** in the base or root of the leaflet.
- Each leaflet (cusp) of the atrioventricular and aortic valve is formed of:
  - A core of C.T , this core is
    - covered by endothelium.
    - Formed by 3 layers :



ATRIOVENTRICULAR(AV valve) from atrium to ventricle	AORTIC VALVE from ventricle to Aorta
Atrialis: elastic & collagen fibers.	**Ventricularis**: elastic & collagen fibers.
Spongiosa: proteoglycans (matrix), interstitial cells (e.g.fibroblasts) & few collagen fibers.	
Fibrosa: mainly dense collagen fibers.	





MCQ's

1) The heart valves are formed of a core of connective tissue covered by ..
   A) endothelium
   B) smooth muscle
   C) Mesothelium
   D) Collagen

2) Which one of the following is the visceral layer of pericardium?
   A) Endocardium
   B) Epicardium
   C) Myocardium
   D) Non of them

3) What is the type of epithelium found in endothelium and mesothelium ?
   A) simple cuboidal epithelium
   B) simple columnar epithelium
   C) simple squamous epithelium
   D) all above

4) The most thick layer in the wall of the heart is..
   A) Endocardium
   B) Epicardium
   C) Subendothlial C.T
   D) Myocardium

5) Sarcoplasm of cardiac muscle is ..
   A) acidophilic
   B) shows non-clear striations
   C) Divided by intercalated discs.
   D) All of above

Answers key:

5) D
4) D
3) C
2) B
1) A

Summary

The heart		
Wall of the heart	Endocardium	1. Endothelium: simple squamous epithelium 2. Subendothelial C.T. layer 3. Dense C.T layer 4. Subendocardial layer: contains Purkinje fibers
	Myocardium	-The most thick layer -It contains cardiac muscle cells with endomysium
	Epicardium	-Mesothelium: simple squamous epithelium -Supepicardial C.T layer: contain coronary vessels, nerves, ganglia & fat cells
Heart valves	Leaflet of AV valve	1. Core of C.T. (avascular): -Atrilais: elastic & collagen fibers -Spongiosa: matrix, fibroblast and few collagen fibers -Fibrosa: dense collagen fibers 2. This core is covered by: Endothelium
	Leaflet of aortic valve	1. Core of C.T.: (avascular): -Ventricularis: elastic & collagen fibers -Spongiosa: matrix, fibroblast and few collagen fibers -Fibrosa: dense collagen fibers 2. This core is covered by: Endothelium

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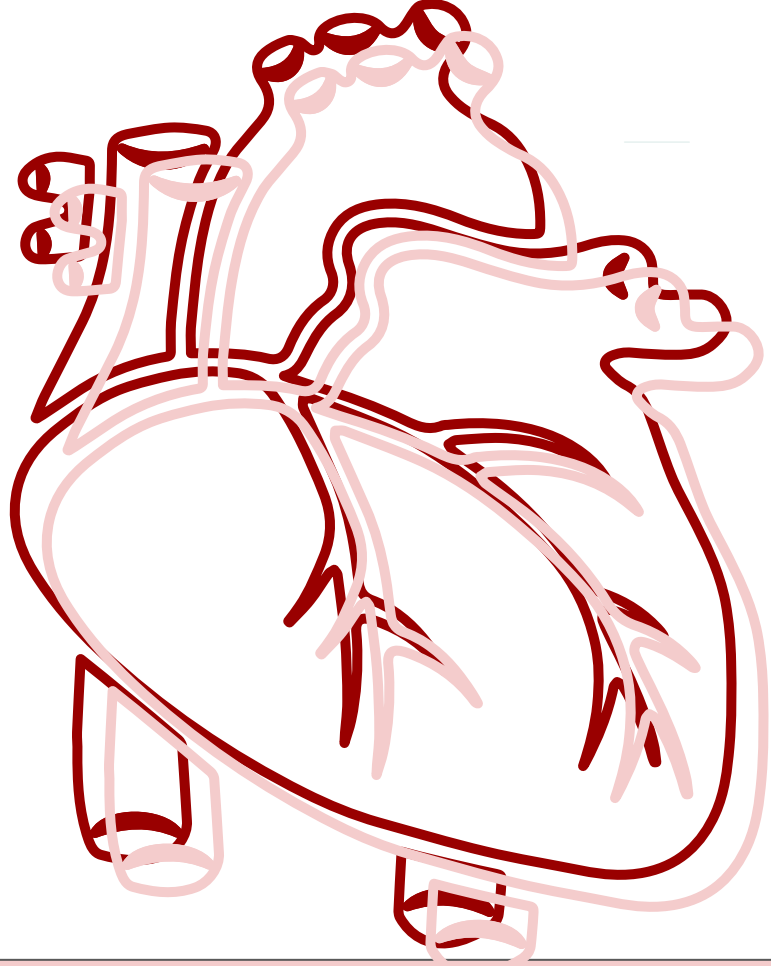

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