



MED441
KING SAUD UNIVERSITY



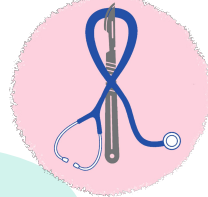
Histology team

Cardiovascular Block | Histology

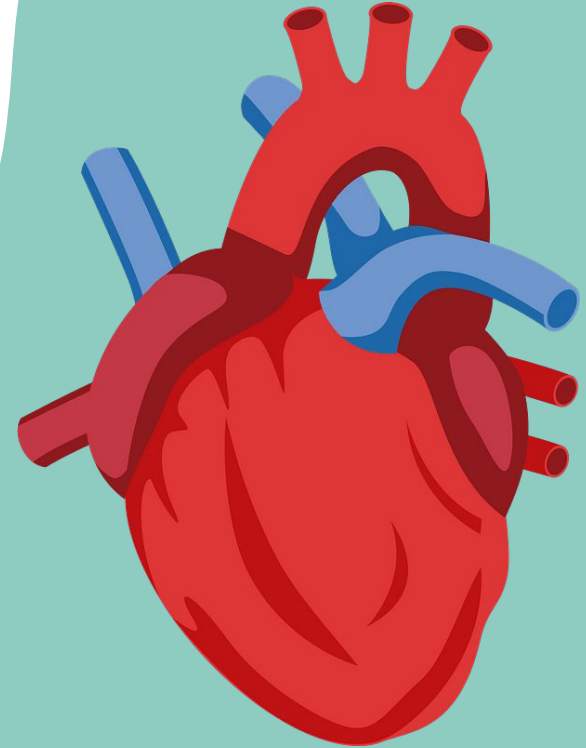
Wall of The Heart & Cardiac Vaves

- Color index :
- Main text
- Important
- Female slide
- Male slide
- DR.Notes
- extra

Revised & Reviewed
by
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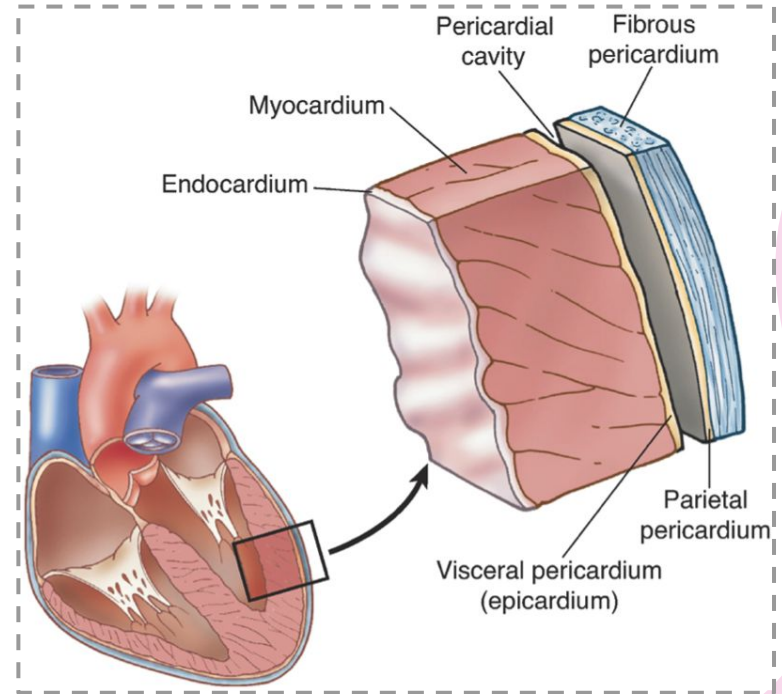
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Objectives :

Describe the microscopic structure of :

- Wall of the heart
 - Endocardium
 - Myocardium
 - Epicardium
- Cardiac valves



Wall of the heart

Consist of 3 layers

Inner

Outer



Endocardium

Myocardium

Epicardium

Endothelium

Dense C.T layer

Subendothelial
C.T

Subendocardial
layer

Mesothelium

C.T layer

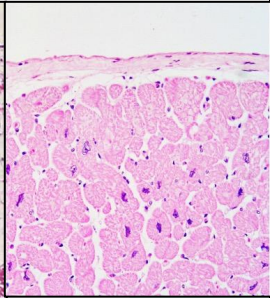
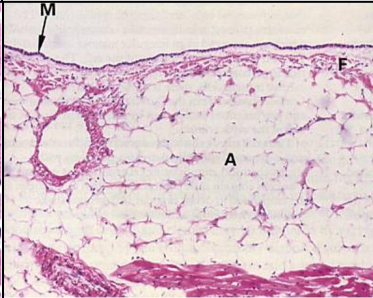
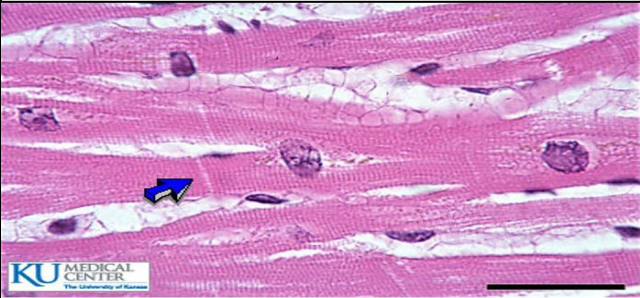
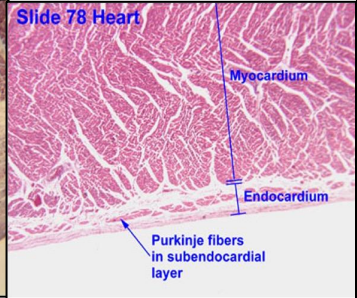
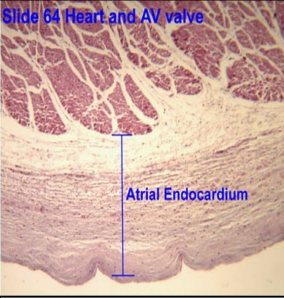


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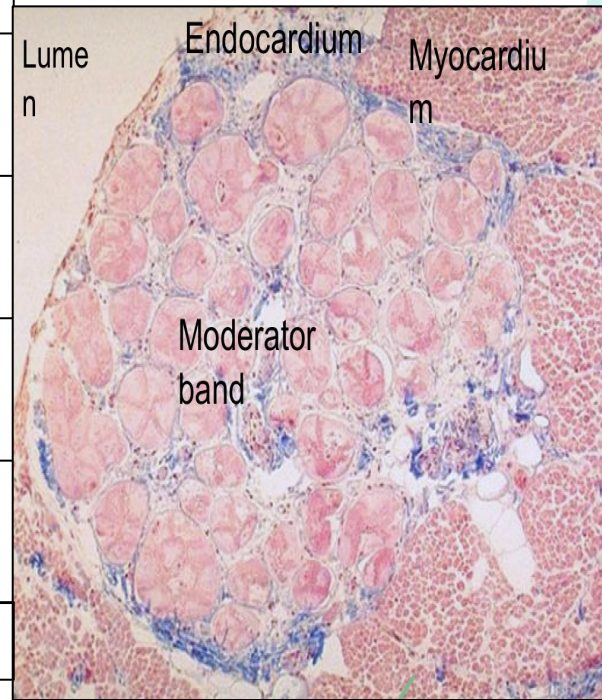
Wall of the heart

Endocardium : <u>Attaches to the Endomysium of the cardiac muscles</u>	Myocardium	Epicardium
Endothelium: Simple Squamous Epithelium	Middle layer	Mesothelium: Simple squamous Epithelium.
Subendothelium C.T.layer (Loose <u>Fibroelastic</u> C.T)	The most thick layer	Visceral layer of <u>Pericardium</u> (Outer)
Dense C.T layer (Dense <u>Fibroelastic</u> C.T)	Contains Cardiac Muscle cells with Endomysium (Loose C.T)	Subepicardial C.T layer (Loose C.T) contains: <ul style="list-style-type: none"> ● Coronary vessels ● Nerves ● Ganglia ● Fat cells (the amount of cells is affected by weight)
Subendocardial layer (Loose C.T) Contains: <ul style="list-style-type: none"> ● Purkinje fiber (modified cardiac muscles) ● Small Blood Vessels ● Nerves 		



Purkinje Fibers (Moderator Band) Vs. Cardiac muscles

	Purkinje fibers	Cardiac muscles
Nuclei	Peripheral (more than one nucleus)	Central
Diameter	Larger	Intermediate (Medium)
Stain	Paler (More glycogen)	Darker
N.Myofibrils	Fewer Myofibrils (actin & myosin) (Mainly peripheral)	Few Myofibrils
Intercalated discs	No intercalated discs	Present
Unique Features of Purkinje fibers	<ul style="list-style-type: none"> • Connected together by desmosomes and gap junctions • Almost no t-Tubules 	



Cardiac muscles

- Found in **Myocardium**

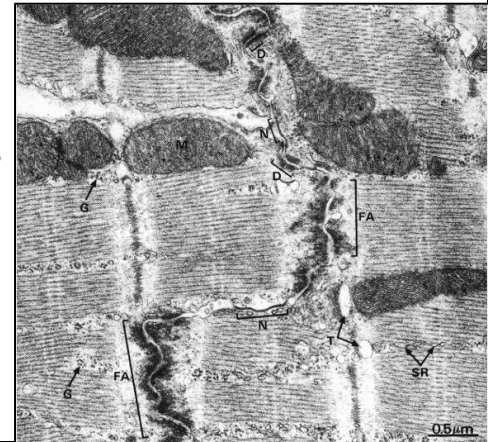
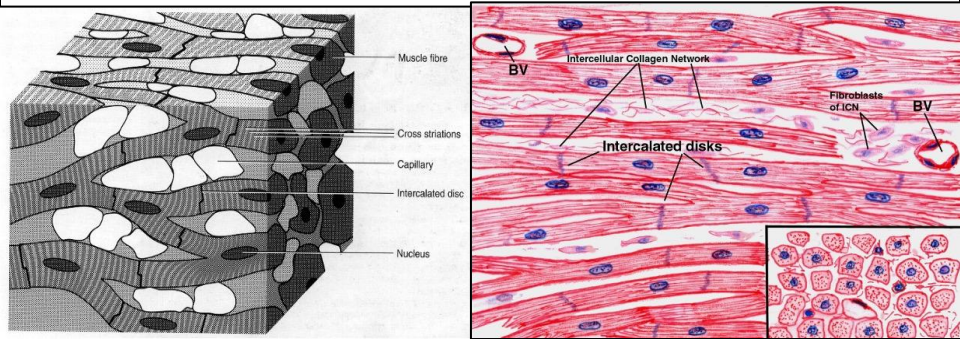
- **Striated and involuntary**

L.M

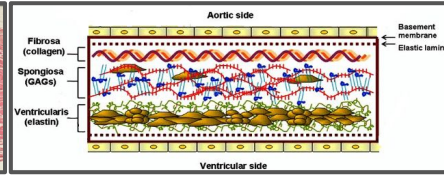
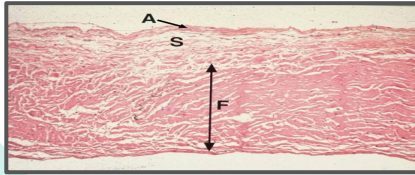
E.M

- **Cylindrical** in shape & **intermediate** in diameter between skeletal & smooth muscle fibers
- **Branched & anastomoses**
- Covered by a thin sarcolemma
- **Central - Oval - Mononucleated** cardiac muscle cells
- Sarcoplasm is **Acidophilic** with non clear striation because (Fewer Myofibrils)
- Divided into short segments (cells) by intercalated discs

- Few myofibrils
- Numerous mitochondria
- Less abundant SR sarcoplasmic reticulum
- Glycogen & myoglobin
- **T-tubules** come in contact with only 1 cisterna of SR forming **Diads** (not triads)
- **Intercalated discs** :
 - formed of 2 cell membranes of 2 successive cardiac muscle cells, connected together by junctional complex (desmosomes , fascia adherens junctions and gap junctions)



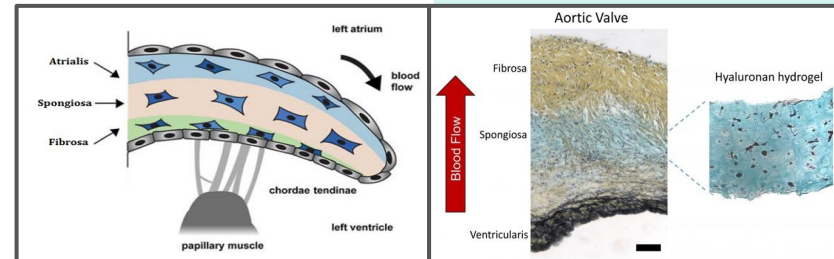
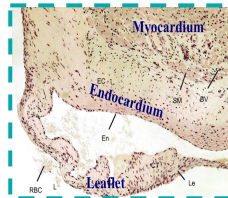
Heart valves (Cardiac Valves)



Description

Leaflets = Cusps /// Atrioventricular = AV

- The leaflets of the heart valves are normally **Avascular**
- 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:
 - Core of C.T Formed by **3 Layers**
 - Covered by **Endothelium**



Atrioventricular valve

Aortic valve

Atrialis:

1

Ventricularis:

Elastic & Collagen Fibers

2

Spongiosa:

- Proteoglycans (Matrix)
- Interstitial cells (**Fibroblasts**)
- Few **Collagen** Fibers.

3

Fibrosa:

- Mainly Dense **Collagen** Fibers

Summary

WALL OF THE HEART			THE HEART'S VALVES	
Endocardium	Myocardium	Epicardium	AV valve	Aortic valve
<p>Contains:</p> <p>1- Endothelium: simple squamous epithelium</p> <p>2- Subendothelial C.T : Loose fibroelastic C.T</p> <p>3- Dense C.T layer : Dense Fibroelastic C.T</p> <p>4- Subendocardial layer:</p> <ul style="list-style-type: none"> Loose C.T. layer that contains Purkinje fibers, small blood vessels & nerves. Attached to endomysium 	<ul style="list-style-type: none"> Middle layer The Thickest layer Contains cardiac muscles (below) and endomysium 	<ul style="list-style-type: none"> Visceral layer of pericardium. 	<p>Formed of:</p> <ul style="list-style-type: none"> Core of C.T. This core is covered By: Endothelium. 	<p>AVASCULAR, Blood capillaries can be found only in the base or root of the leaflet</p>
	<ul style="list-style-type: none"> Cylindrical Intermediate in diameter Branch and anastomose Covered by sarcolemma Mononucleated, Nuclei are oval and central Sarcoplasm is acidophilic and shows non-clear striations (fewer myofibrils) Divided by the intercalated discs. 	<ul style="list-style-type: none"> Mesothelium: simple squamous epithelium. Subepicardial C.T. layer: Loose C.T. contains the coronary vessels, nerves, ganglia & fat cells. 	<p>A core of C.T. 3 layers:</p> <ul style="list-style-type: none"> Atrialis: elastic & collagen fibers. Spongiosa: proteoglycans (matrix), interstitial cells (e.g.fibroblasts) , few collagen fibers. Fibrosa: mainly dense collagen fibers. 	<p>A core of C.T. 3 layers:</p> <ul style="list-style-type: none"> Ventricularis: elastic & collagen fibers. Spongiosa: proteoglycans (matrix), interstitial cells(e.g.fibroblast), few collagen fibers. Fibrosa: mainly dense collagen fibers.

The Creative Crew!

Cardiovascular Block | Histology Team (441)



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Click [here](#) for questions done by Q Bank team