



BLOOD VESSELS

CARDIOVASCULAR BLOCK



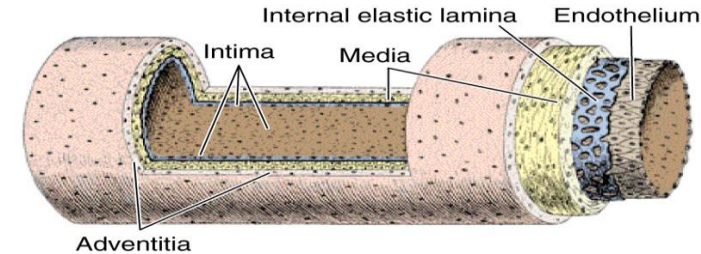
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General Structure of Blood Vessels

The wall of blood vessel is formed of three concentric layers:

- Tunica intima (interna)
- Tunica media
- Tunica adventitia (externa)

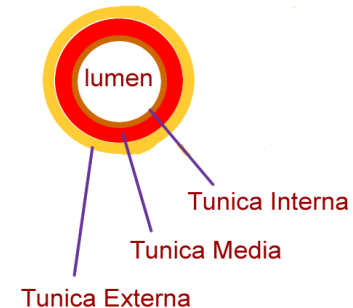
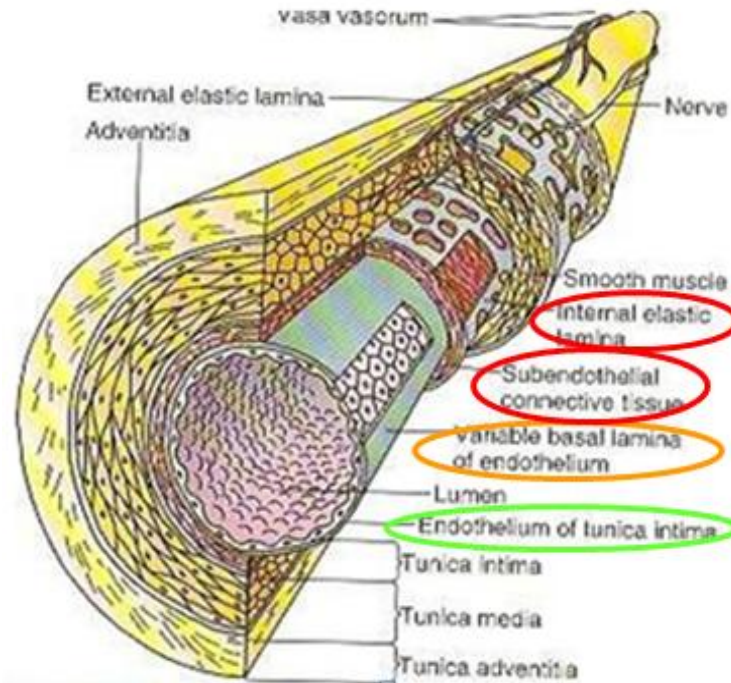


Tunica Intima

Is the innermost layer

Composed of:

- Endothelial cells:
Simple squamous epithelium
- Subendothelial layer:
loose C.T.
- Internal elastic lamina:
fenestrated elastic sheet.



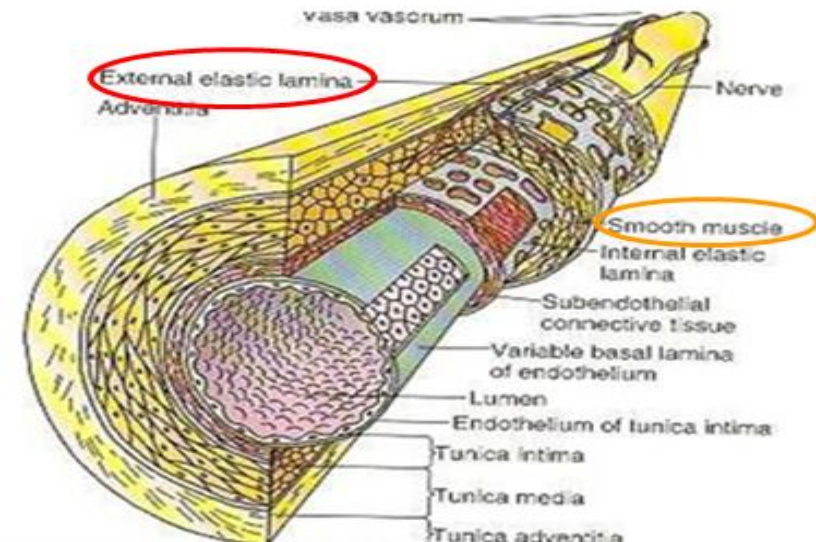
Tunica Media

Intermediate layer

Composed of:

1. Smooth muscles.
2. Elastic fibers.
3. Type III collagen (reticular fibers).
4. Type I collagen.

NB: Large muscular arteries have external elastic lamina, separating the tunica media from the tunica adventitia



Tunica Adventitia

Outermost layer

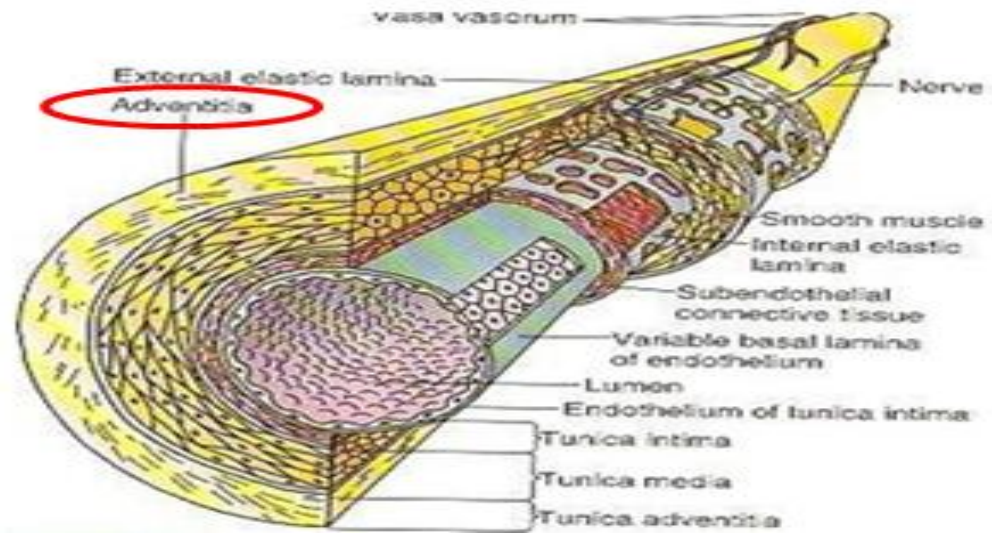
Composed of connective tissue containing

Vasa vasorum:

They are small arterioles in tunica adventitia and the outer part of tunica media.

They are more prevalent in the walls of veins than arteries – why?

Venous blood contains less oxygen and nutrients than arterial blood.



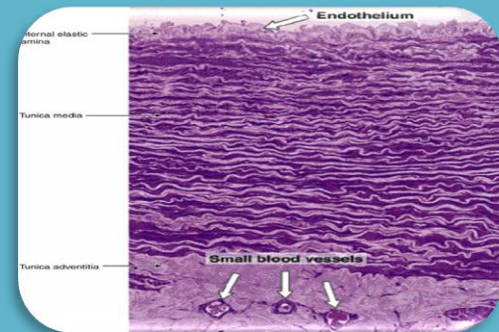
ELASTIC ARTERIES

Examples: aorta, common carotid a., subclavian a., common iliac a, pulmonary Trunk. Cardiovascular

Microscopic structure:

1- T. Intima:

- *Endothelium.
- *Subendothelial C.T.
- *Internal elastic lamina: (not prominent) (indistinct)



2- T. Media: it consists of:

- Fenestrated elastic membranes (sheets) (lamellae):
It is the main component of T.M.
- In between, there are:
 - Smooth muscle cells.
 - Collagen fibers (type I collagen).
 - Reticular fibers (type III collagen).
 - Elastic fibers.



3- T. Adventitia:

- Much thinner than T.M.
It is composed of loose C.T.
Contains vasa vasorum
→ send branches to the outer part of T.M.

MUSCULAR ARTERIES

(Medium-sized artery)

Examples: brachial, ulnar, renal.

Microscopic structure:

1- T. Intima:

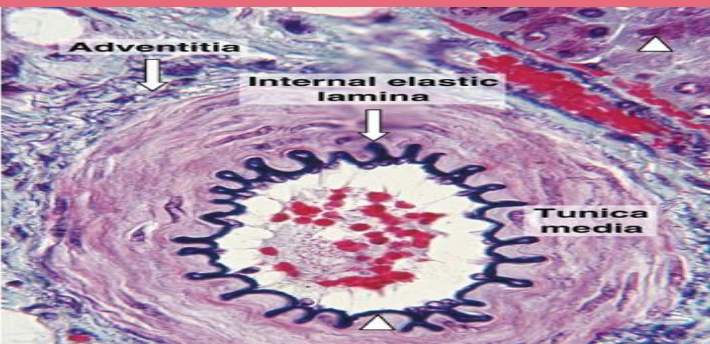
Endothelium.

Subendothelial C.T. layer.

Internal elastic lamina:

Is prominent.

Displays an undulating surface.



2- T. Media:(Thicker than T. Adventitia or similar in thickness).

Components:

A. Smooth muscle cells (SMCs): are the predominant component.

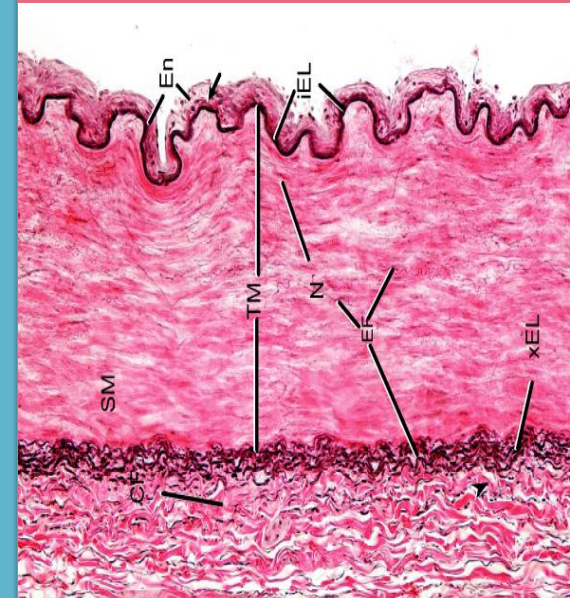
B. In between there are:
Elastic fibers.

Type III collagen fibers.

Type I collagen fibers.

C. External elastic lamina: may be identifiable.

3- T. Adventitia.: loose C.T.



ARTERIES

	Elastic artery	Muscular artery
Tunica intima	<p>Endothelium. *Subendothelial C.T. *Internal elastic lamina: (not prominent) (indistinct)</p>	<p>Endothelium. Subendothelial C.T. layer. Internal elastic lamina: <u>Is prominent.</u> Displays an undulating surface.</p>
Tunica media	<p>A-Fenestrated elastic Membranes B-In between, there are: 1.Smooth muscle cells. 2. Collagen fibers (type I collagen). 3. Reticular fibers (type III collagen). 4. Elastic fibers.</p>	<p>Thicker than T. Adventitia or similar in thickness A-Smooth muscle cells (SMCs): are the predominant component. B. In between there are: Elastic fibers. Type III collagen fibers. Type I collagen fibers. C-External elastic lamina: may be identifiable.</p>
Tunica adventitia	<p>Much thinner than T.M. It is composed of loose C.T. Contains vasa vasorum → send branches to the outer part of T.M.</p>	<p>loose C.T.</p>
Example	<p>aorta, common carotid a., subclavian a., common iliac a, pulmonary Trunk</p>	<p>brachial, ulnar, renal</p>

MEDIUM-SIZED VEIN

Thickness of the wall: thinner than the accompanying artery.

T. Intima:

- *usually forms valves.
- *no internal elastic lamina

T. Adventitia:

thicker than T. Media

T. Media:

Thinner than T. Adventitia

Consists of:

Fewer SMCs.

Types I & III Collagen fibers.

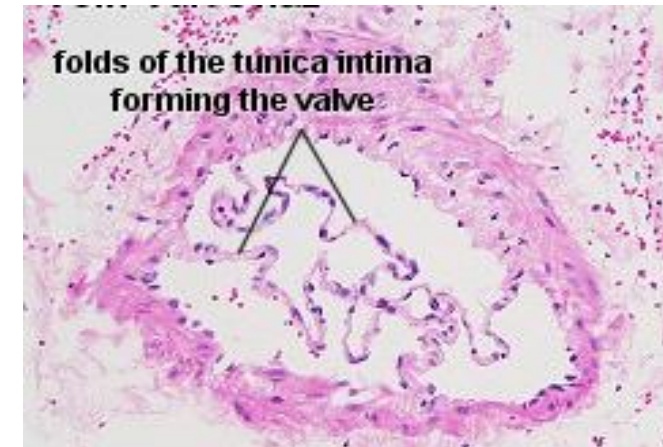
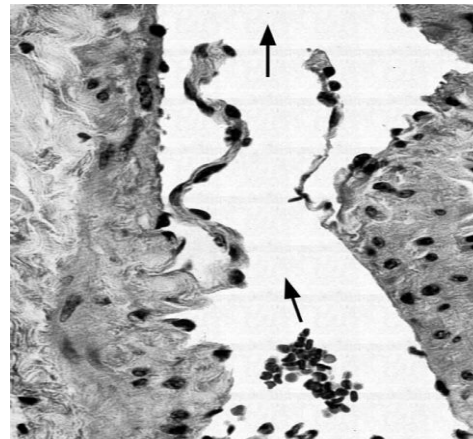


VALVES OF VEINS

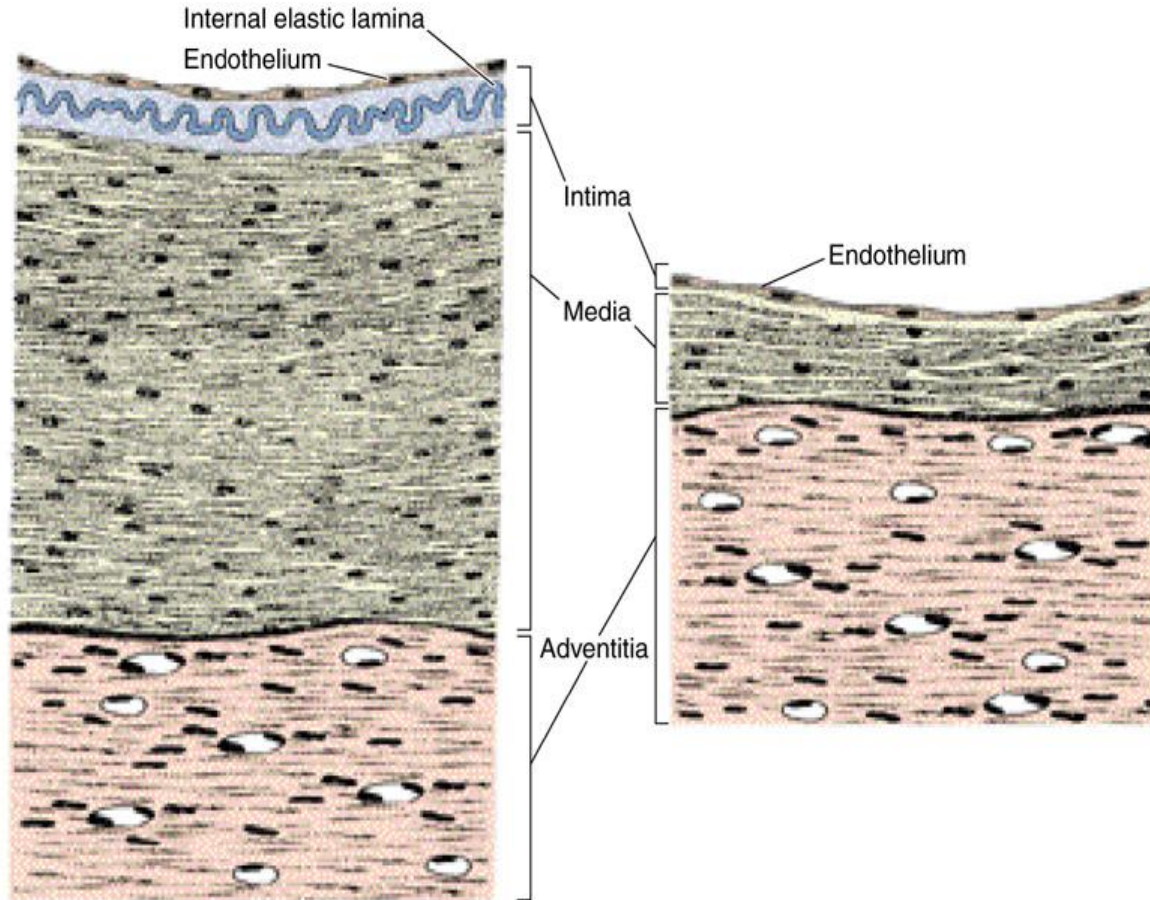
Valve of a vein is composed of 2 leaflets
Each leaflet has a thin fold of the T. Intima.

Components:

- Endothelium
- Core of C.T.



MEDIUM-SIZED ARTERY AND VEIN



BLOOD CAPILLARIES

Diameter: usually 8-10 μm .

Microscopic structure:

1. Single layer of squamous endothelial cells.
2. Basal lamina: surrounds the external surface of the endothelial cells.
3. Pericytes:
Have processes.
Share the basal lamina of the endothelial cells.

Types:

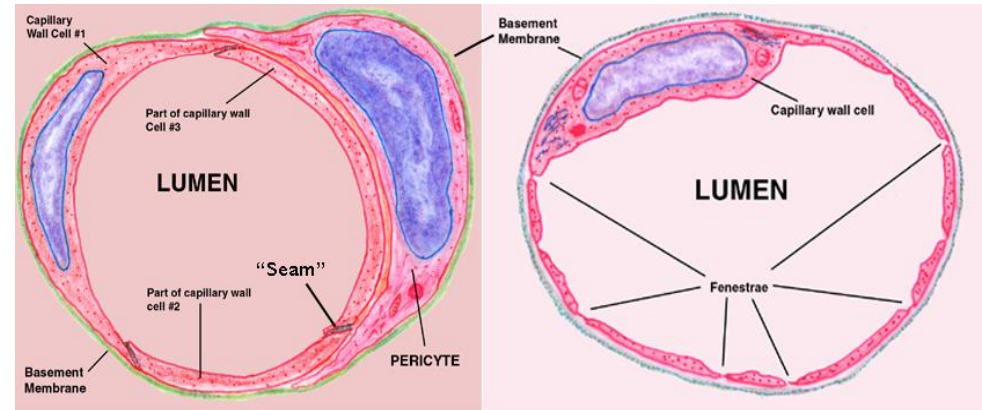
1- Continuous blood capillaries

2- Fenestrated blood capillaries

a- with diaphragms

b- without diaphragms

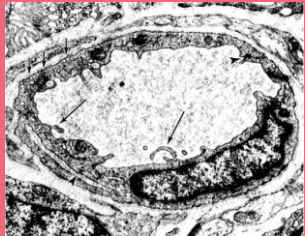
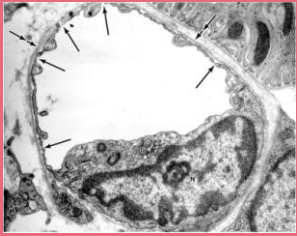
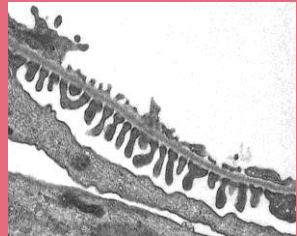
3- Sinusoidal blood capillaries



Closed or Continuous
Capillary

Fenestrated Capillary

BLOOD CAPILLARIES

	<u>Continuous blood capillaries</u>	<u>Fenestrated blood capillaries with diaphragms</u>	<u>Fenestrated blood capillaries without diaphragms</u>	<u>Sinusoidal blood capillaries</u>
Microscopic structure	<p>No pores or fenestrae in their walls.</p> 	<p>The walls of their endothelial cells have pores. These pores are covered by diaphragms.</p> 	<p>The walls of their endothelial cells have pores. These pores are <u>NOT</u> covered by diaphragms.</p> 	<ul style="list-style-type: none"> -Their endothelial cells have fenestrae without diaphragms. -They possess discontinuous endothelial cells. -They possess discontinuous basal lamina. -Macrophages may be located in or along the outside of the endothelial wall.
Distribution	In muscles, nervous T., C.T.	In intestine, pancreas and endocrine glands.	In renal glomerulus	Red bone marrow, liver, spleen and certain endocrine glands

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