HOSTOLOGY

BY

Ass. Prof. Safaa Said

Lecture 3
Types of blood vessels

Learning objectives:

After this lecture, students should be able to:

-Recognize the different Types of blood vessels.

-Discuss the structure of Large Elastic Arteries (Aorta)

-Describe the structure of Large Veins.

-Discuss the difference between medium sized artery and vein

-Identify and describe the structure of Specialized Medium Sized Arteries

Types of blood vessels

Blood vessels are classified by reference to their wall structure and thickness and to a lesser extent, their caliber into:

Arteries:

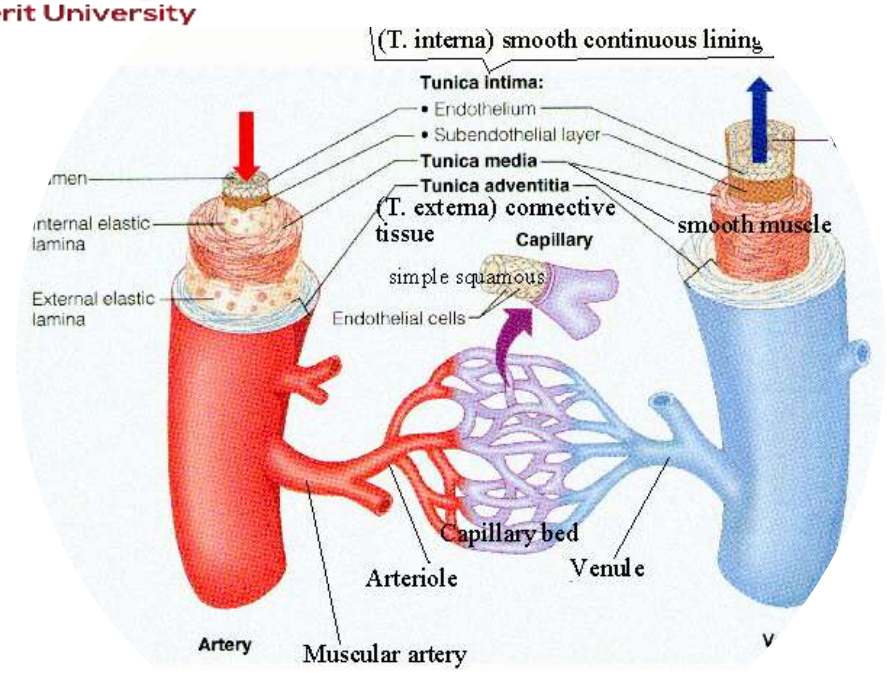
Large, elastic or conducting

Medium, muscular or distributing arteries.

Small arteries or arterioles.

Veins: small, medium and large

Capillaries



Large Elastic Arteries (Aorta)

Elastic arteries or conducting arteries, comprise large arteries that leave the heart. The aorta and the major first branches from the heart, such as the brachiocephalic artery, common carotid, and subclavian

Histological structure:

Tunica intim:

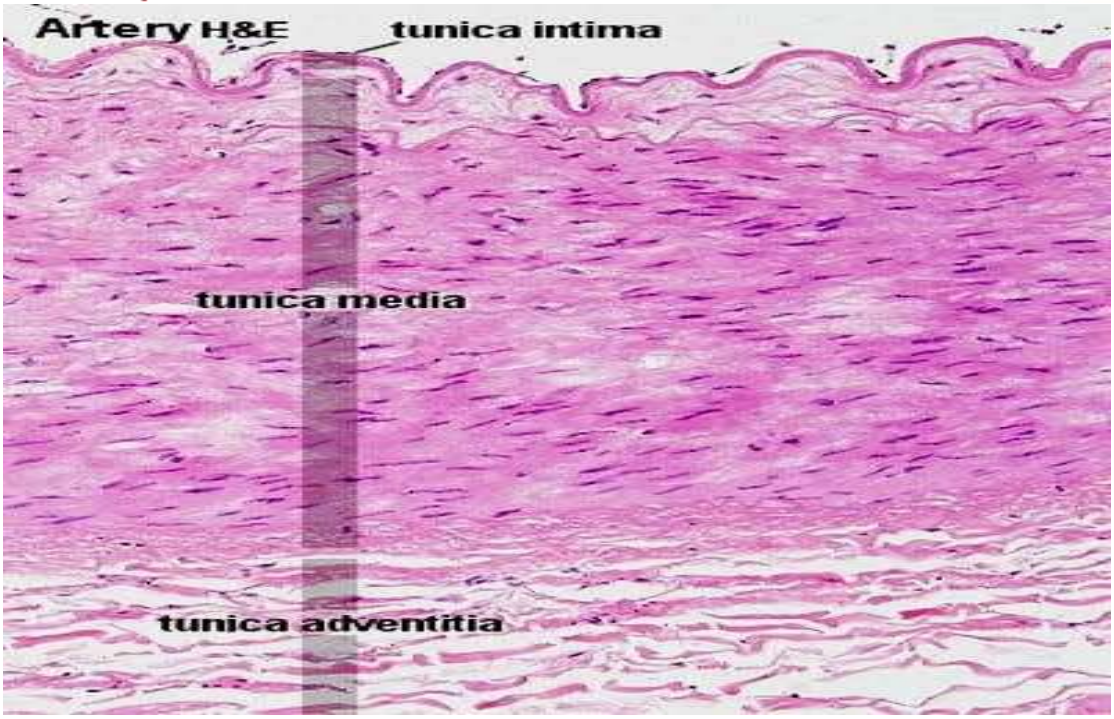
It is composed of an endothelium supported by a narrow sub endothelial layer of C.T. The internal elastic lamina is present but indistinct

Tunica media: (the thickest layer)

It consists of many fenestrated lamellae of elastin alternating with circularly oriented layers of smooth muscle cells. Smooth muscle cells are less abundant in elastic arteries

Tunica Adventitia:

It is thin layer of loose fibroelastic C.T. containing vasa vasorum



Large Veins

These vessels have a diameter larger than 10 mm, such as the venae cava and pulmonary vein.

Inferior venae cavae*:*

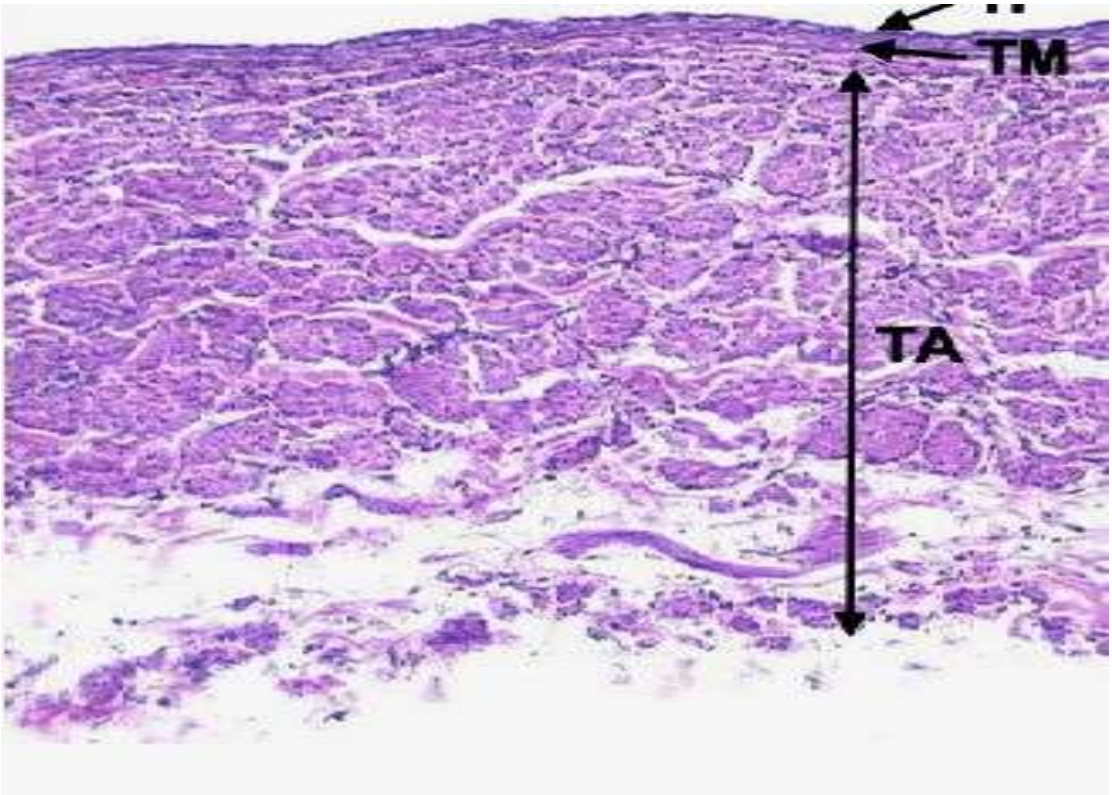
Histological structure:

Tunica intima: Has endothelium and thick subendothelial C.T. containing collagen fibers & few elastic fibers. A delicate internal elastic lamina may be present.

Tunica media: It is very thin and contains few layers of smooth muscle cells & abundant C.T. No external elastic Lamina.

Tunica adventitia: It is the thickest layer. Contains many collagen fibers and vasa vasorum & few elastic fibers.

NB. The inferior vena cava has longitudinally arranged bundles of smooth muscle fibers in tunica adventitia. Contraction of these muscle fibers helps in propelling blood towards the heart against gravity. This explains the absence of these bundles of muscle fibers in the new born, and their development by the age of 2 years.

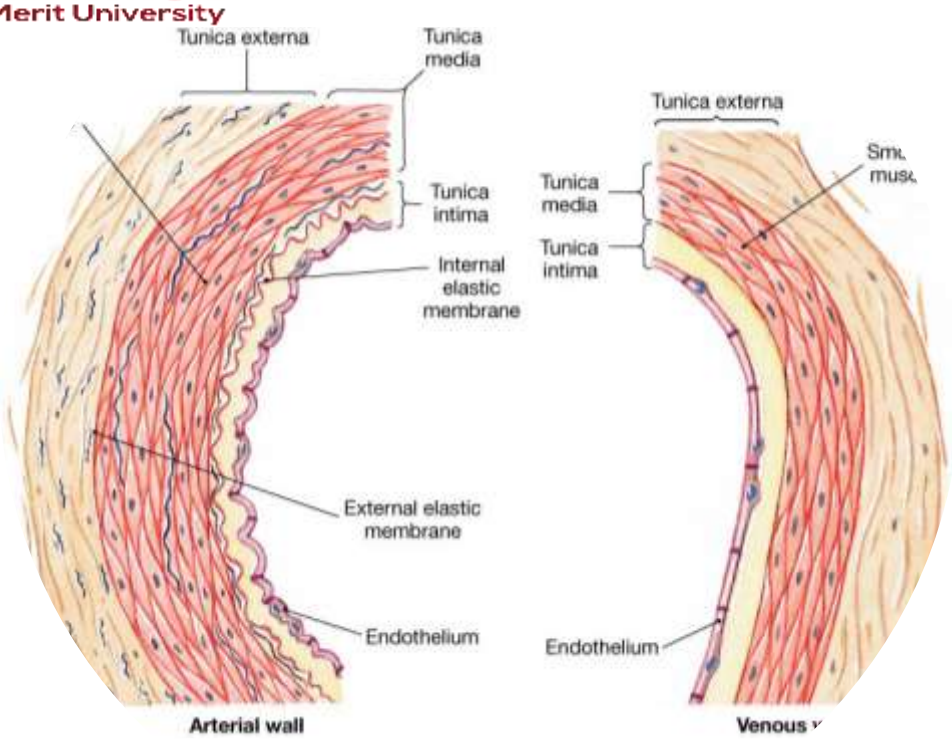


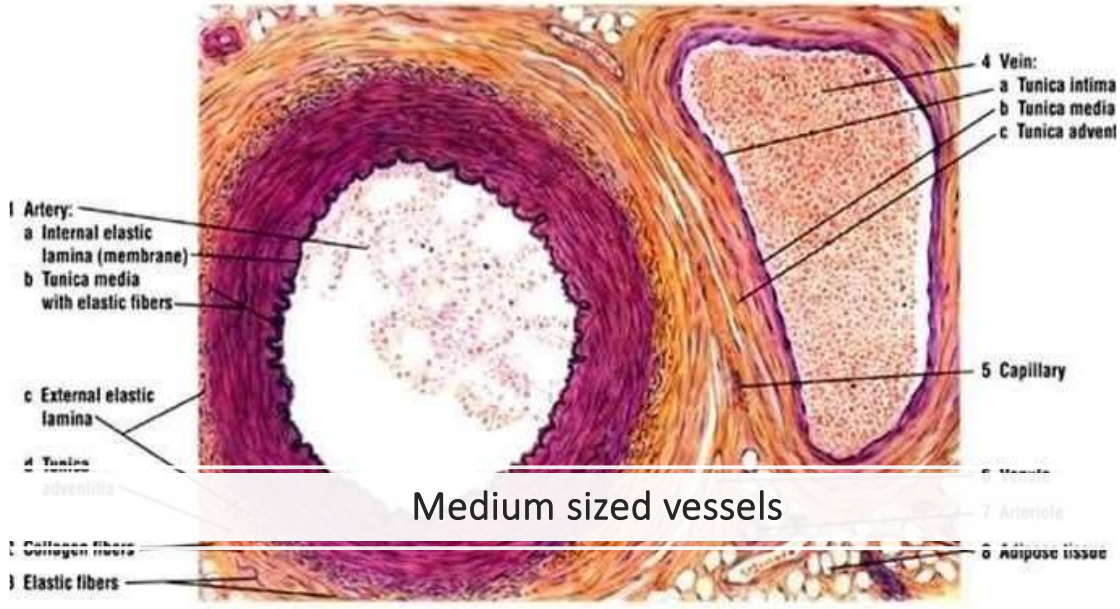
Histological Comparison between Aorta and Inferior Vena Cava

Feature	Large Elastic Arteries (Aorta)	Inferior Vena Cava
Tunica intima	-Endothelium supported by a narrow subendothelial layer. - Internal elastic lamina present but indistinct.	-Endothelium with thick subendothelial connective tissue . -A delicate internal elastic lamina may be present.
Tunica media	Thickest layer. Many fenestrated elastic lamellae alternating with circular smooth muscle layers.	Very thin. Few smooth muscle layers -No external elastic lamina.
Tunica adventitia	Thin layer -containing vasa vasorum.	Thickest layer. -Many vasa vasorum. -Contains longitudinal smooth muscle bundles (develop after age 2).
Special note	—less vasa vasorum	Longitudinal smooth muscle bundles -More vasa vasorum

Medium sized vessels

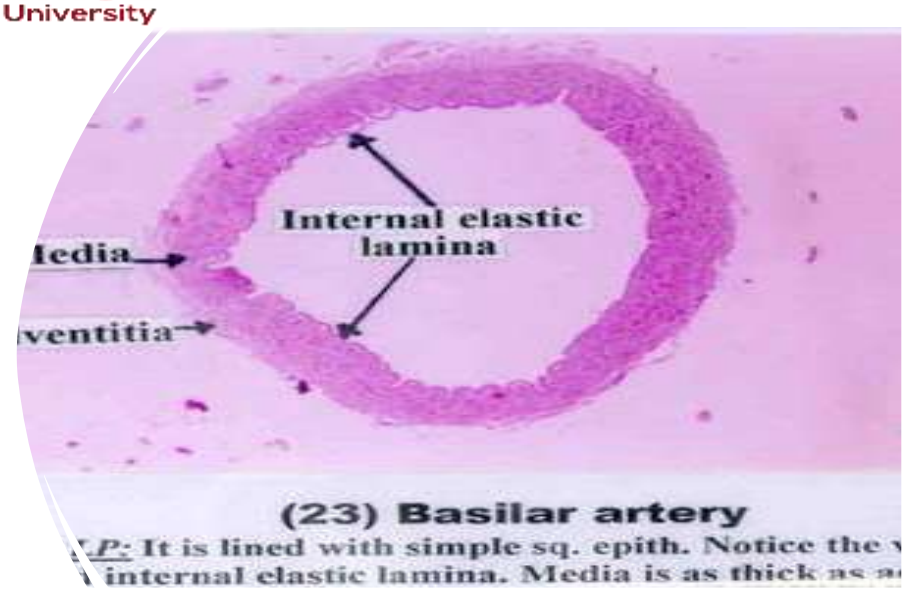
	Medium sized artery	Medium sized vein
*Wall	Thicker	Thinner
*Lumen	Narrow Lumen usually Circular in section	Lumen usually collapsed.
*Valves	No valves are present.	Valves may be present.
*Tunica intima	Well developed	Poorly developed
*External &internal elastic lamina	Well developed internal elastic lamina & well developed external elastic lamina.	No internal elastic lamina. No external elastic lamina.
*Tunica media	Thick, about 50%formed of muscle tissue with elastic fibers.	Thin, 30%formed of muscle fibers, no elastic fibers.
*Tunica Adventitia	It is a thick layer as the tunica media. Contains elastic and collagenous fibers.	Much thicker than the media (70%) Contains collagenous fibers, but no elastic fibers.
*Vasa vasora	May contain Vasa vasora.	Contains more vasa vasora.





Special vessels

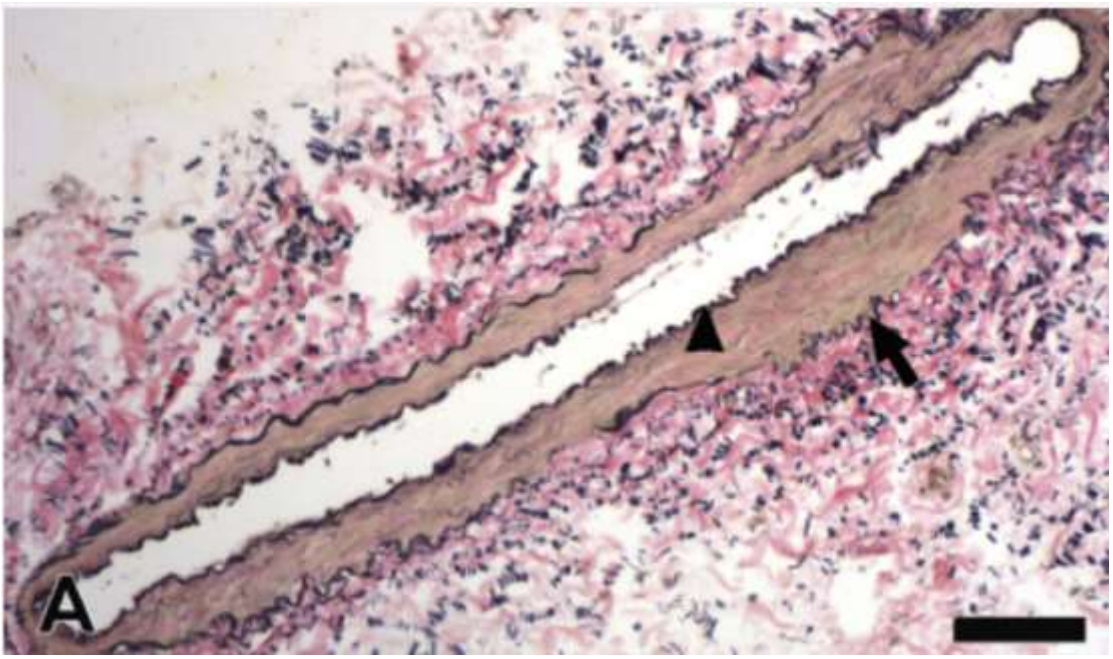
- **Cerebral (basilar) Arteries:**
- Specialized Medium Sized Arteries
- They have thin wall because they are protected from external forces by skull. The tunica media is thin and devoid of elastic fibers.
- The internal elastic lamina is well developed.



Pulmonary Arteries

*These vessels are thin walled, because they are exposed to low pulmonary blood pressure.

*They contain less muscular and elastic tissue.



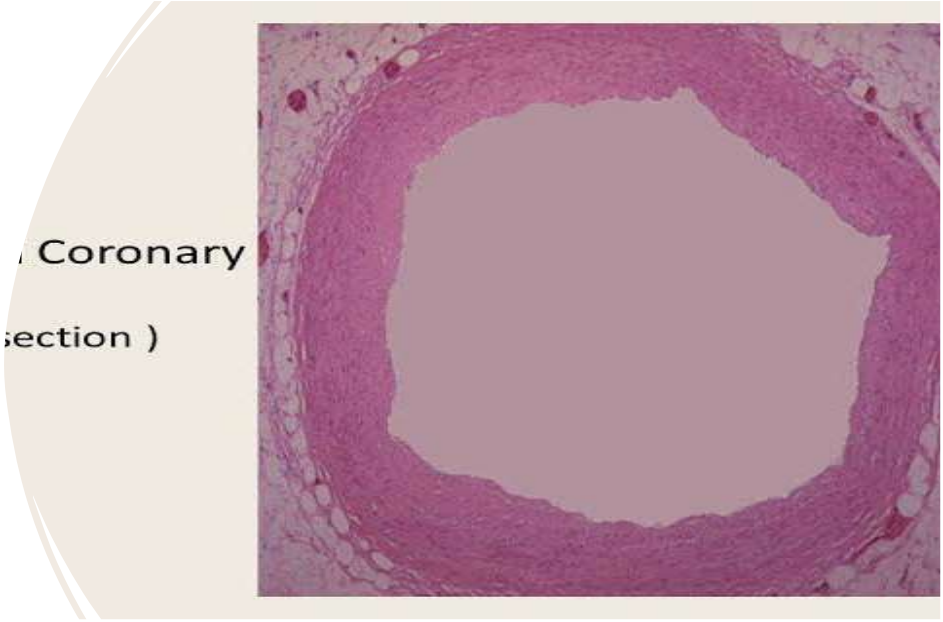
Coronary Arteries:

*They have a very thick wall because they are subjected to high pressure.

*The intima is thickened.

*The sub endothelium contains longitudinal smooth muscle fibers, elastic fibers, amorphous intercellular substance, fat droplets and monocytes.

* They have thicker media to withstand internal pressure and external forces.



Lecture References:

-Kaplan Medical, USMLE Step 1 Lecture Notes, Pathology, 2021

-Elsevier ’s integrated Histology: 1st edition

-Junqueira's Basic Histology: Text and Atlas 14th Edition