

HOSTOLOGY

BY

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Lecture 2

General structure of blood vessels

Learning objectives

After this lecture, students should be able to:

- Mention the general structure of blood vessels.
 - Recognize the different parts of the blood vessel wall.
 - Discuss the normal structure of endothelial cells.
- Discuss the function of endothelial cells.

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General structure of blood vessels:

*All blood vessels larger than capillaries have three layers: Moving from the inside to outside, these layers, called tunics (singular tunica), are:

- 1- Tunica intima (innermost)
- 2- Tunica media (middle)
- 3- Tunica adventitia (outermost)

Tunica intima, which lies next to the lumen. It is composed of:

- 1- Simple squamous epithelium called endothelium that lies on a basement membrane.

Under the microscope, the endothelial lining is very thin and can be identified by the nuclei of the simple squamous epithelial cells that protrude into the lumen of the blood vessel. The tunica intima of arteries appears wavy because of the elastic fibers below it. This “wrinkling” allows for stretching without excessive stress on the endothelial cell layer. (endothelium) ,subendothelial C.T.&

Internal elastic lamina.

Tunica media, the middle layer. Composed of helically arranged smooth muscle cells with some elastic and collagen fibers interspersed between them.

An external elastic lamina between tunica media &tunica adventitia may be present.

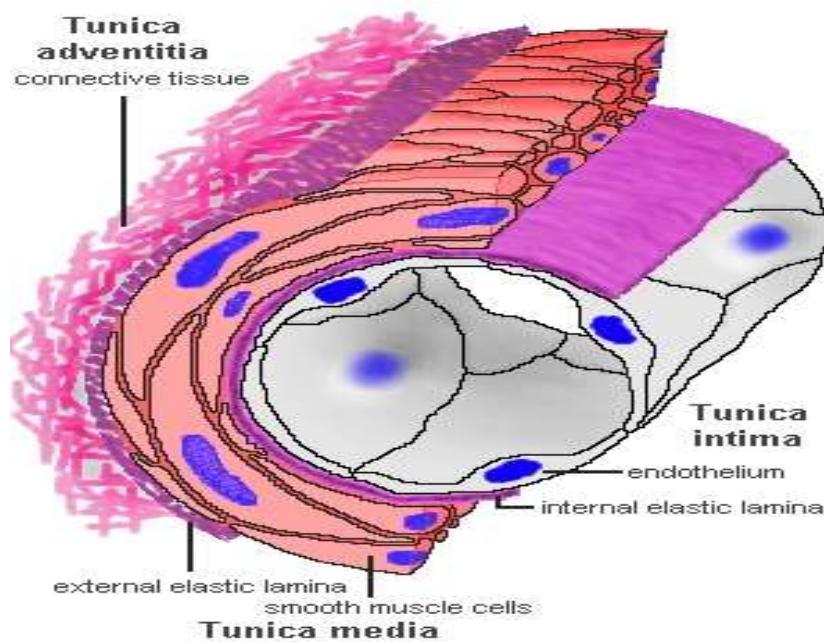
Capillaries & postcapillary venules do not have a tunica media, in these small vessels pericytes replace the tunica media.

Tunica adventitia (the outermost layer). It is usually continuous with the surrounding C.T. It is composed of ordinary C.T. containing fibroblast, Collagen and elastic fibers.

Vasa vasorum

The walls of arteries and veins are composed of living cells that require nourishment and produce waste. Since blood passes through the larger vessels relatively quickly, there is limited opportunity for blood in the lumen of the vessel to provide nourishment to or remove waste from the blood vessel's walls. Also, the walls of larger vessels are too thick for nutrients to diffuse through it to all of the cells.

So, like the heart, larger blood vessels receive a blood supply from outside their structure through a system of small vessels called the *vasa vasorum* in the tunica adventitia. *Vasa vasorum* are more found in the walls of veins than arteries.



Endothelial cell

*This specialized simple squamous epithelial cell lines the endocardium of the heart, lines all the arteries and veins, and makes up all the capillaries

*The endothelial cells rest on a basal lamina. These flattened polygonal cells are elongated in the direction of blood flow. The nucleus causes the cell to bulge into the capillary lumen. The cytoplasm contains few organelles including a small Golgi complex, mitochondria, free ribosomes & a few cisternae of RER. Endothelial cells are connected to each other by tight junctions.

Functions of endothelial cells:

- 1-They provide smooth surface.
- 2-They secrete collagen, lamin, endothelin and nitric oxide.
- 3-They have membrane bound enzymes for bradykinin, serotonin, prostaglandins, thrombin, norepinephrine and lipoprotein lipase.