



(The circulatory system)

The circulatory system it includes both the blood and lymphatic vascular systems, pumps and directs blood cells and substances carried in blood to all tissues of the body.

The blood vascular system, or cardiovascular system **composed of the following structures:**

- The **heart** an organ whose function is to pump the blood .
- **The arteries**, a series of efferent vessels from the heart that become smaller as they branch and whose function is to carry the blood with nutrient and oxygen to the tissues.
- **Capillaries**, the smallest vessels constitution a complex network of thin tubules that branch profusely in almost every organ and through whose walls the interchange between blood and tissues takes place .
- **Veins** , which results from the convergence of capillaries into a system of larger channels that continue enlarging as they approach the heart, toward which they convey the blood to be pumped again.



HEART:

The heart is a muscular organ that contracts rhythmically ,pumping the blood through the circulatory system .the right and left ventricles pump blood respectively , right and left atria receive blood from the body and the pulmonary veins respectively.

the walls of **all four heart** chambers consist of **three major layers or tunics :**

1-the internal endocardium

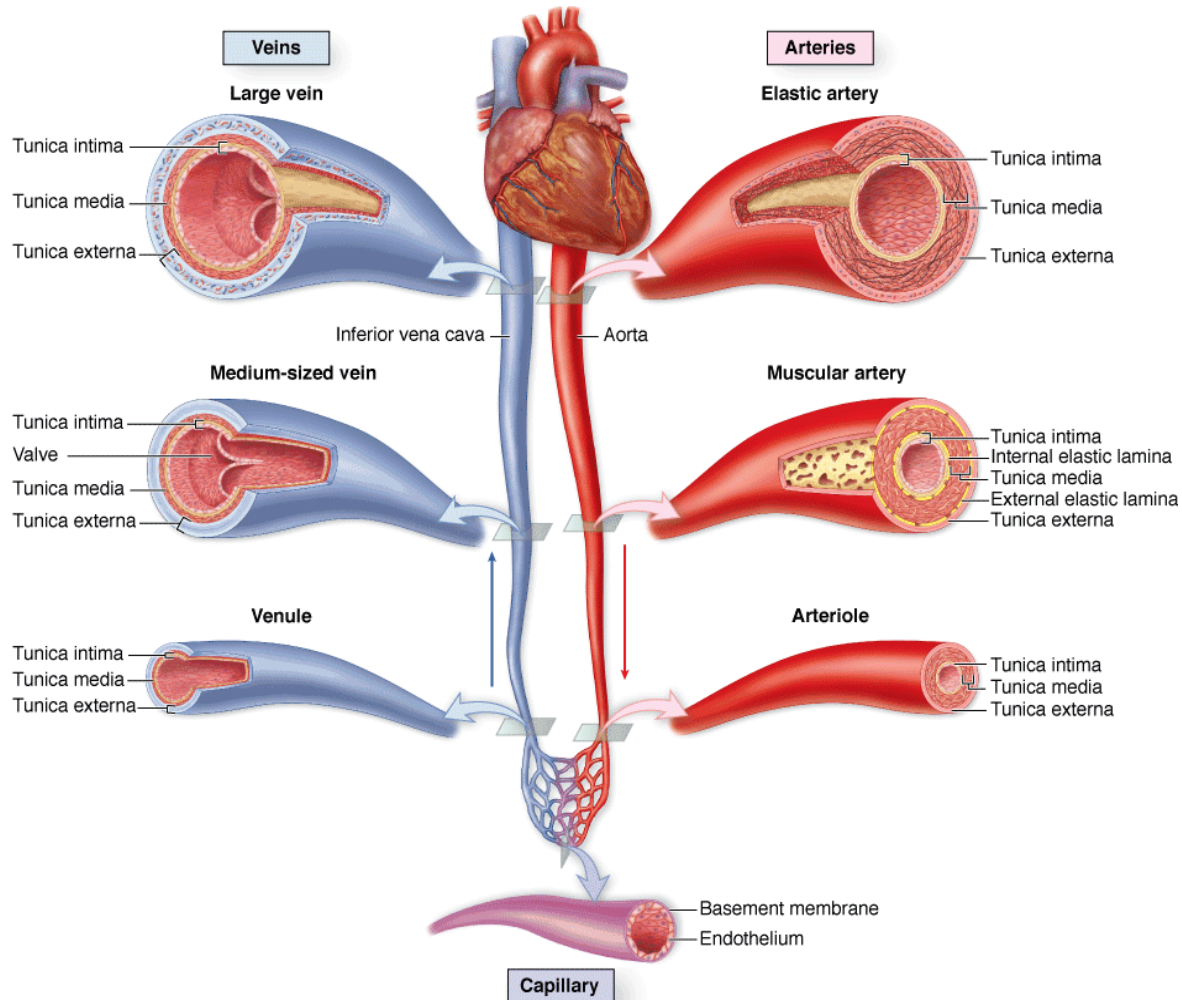
2- the middle myocardium

3- the external epicardium .

The endocardium consists of a single layer of squamous endothelial cells on a thin layer of loose connective tissue containing elastic and collagen fibers as well as some smooth muscle cells,connecting this sub endothelial layer to the myocardium is additional connective tissue (called the sub endocardial layer)containing veins,nerves, and branches of the impulse conducting system of the heart.

The myocardium is the thickest of the tunics and consists of cardiac muscle cells arranged in layers that surround the heart chambers in .complex spiral.

The heart is covered externally by simple squamous epithelium (mesothelium) supported by thin layer of connective tissue that constitutes the epicardium.



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Tissues of the vascular wall :

Walls of larger blood vessels contain Three basic structural components:

1-A simple squamous endothelium

2- Smooth muscle

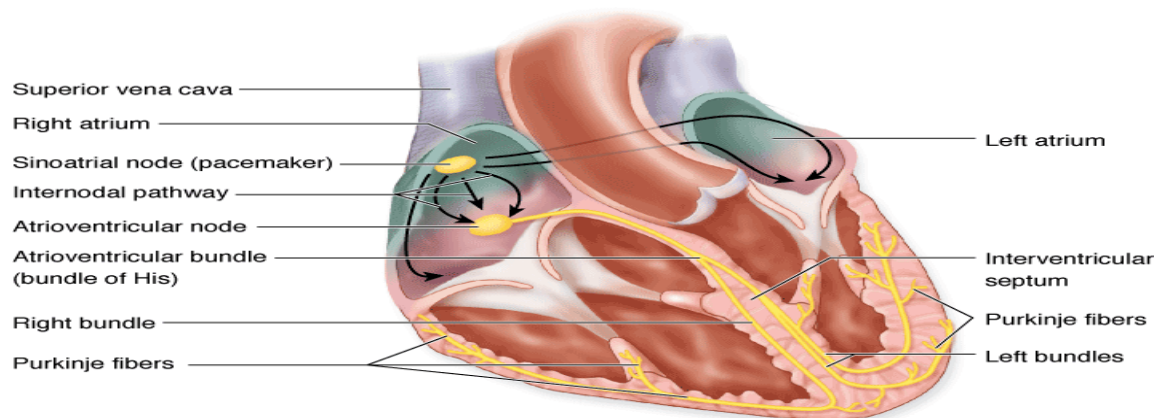
3- Connective tissue with elastic elements in addition to collagen .

The amount and arrangement of these tissues in vessels are influenced by:

1- Mechanical factors

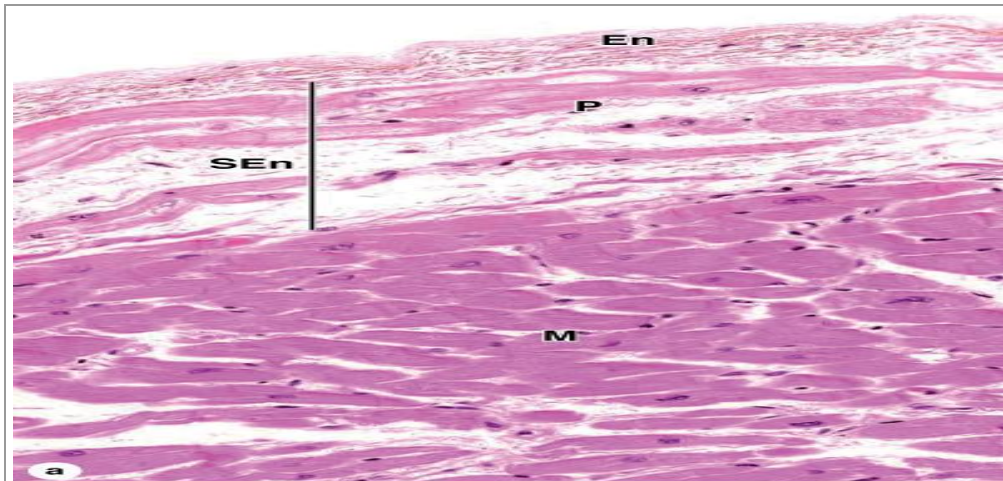
2-primarily blood pressure

3-Metabolic factors reflecting local needs of tissue .



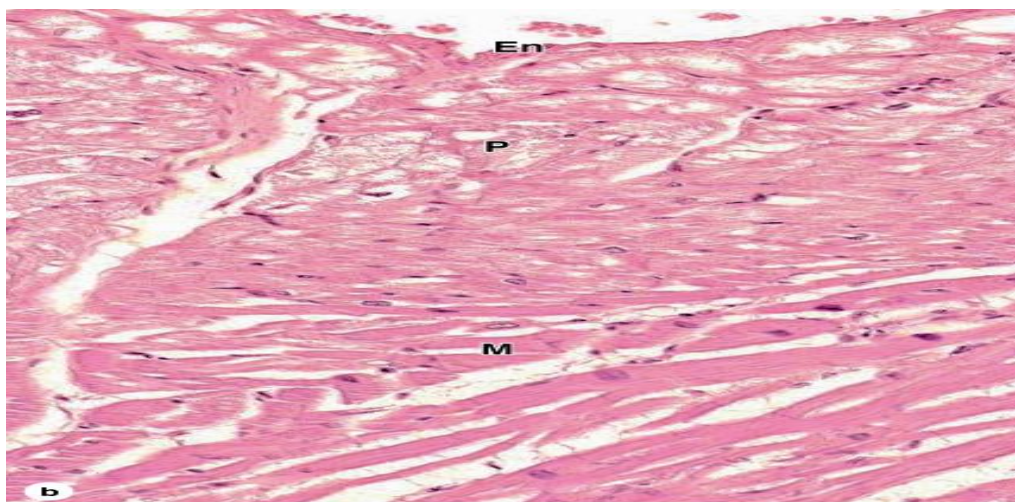
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Major histological features of the heart.



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Endocardium & subendocardial conducting network.



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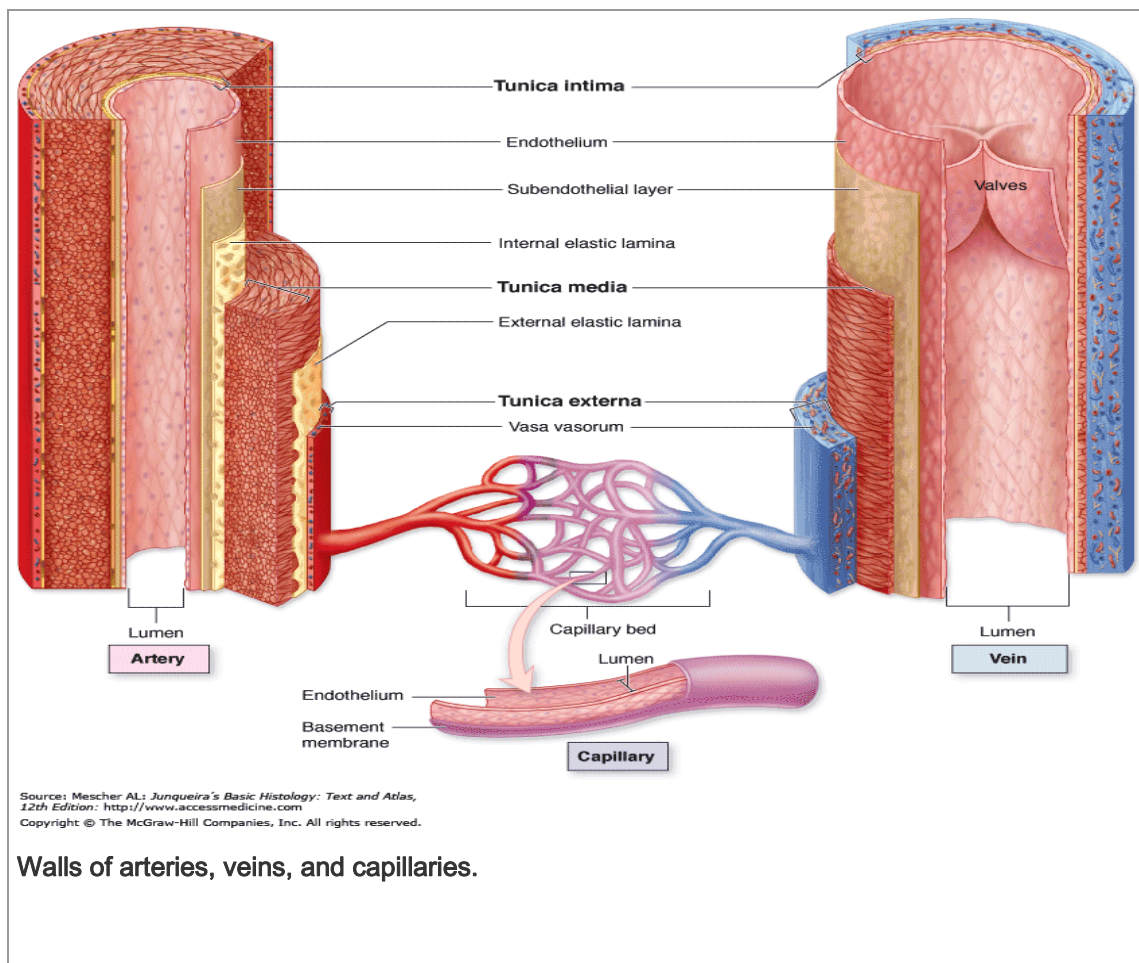
Structural Plan of Blood Vessels

. Blood vessels are usually composed of the following layers, or tunics

§ The **tunica intima** has one layer of endothelial cells supported by a thin subendothelial layer of loose connective tissue with occasional smooth muscle cells.

§ The **tunica media**, the middle layer, consists chiefly of concentric layers of helically arranged smooth muscle cells

§ The **tunica adventitia** or tunica externa consists principally of type I collagen and elastic fibers



Walls of arteries, veins, and capillaries.