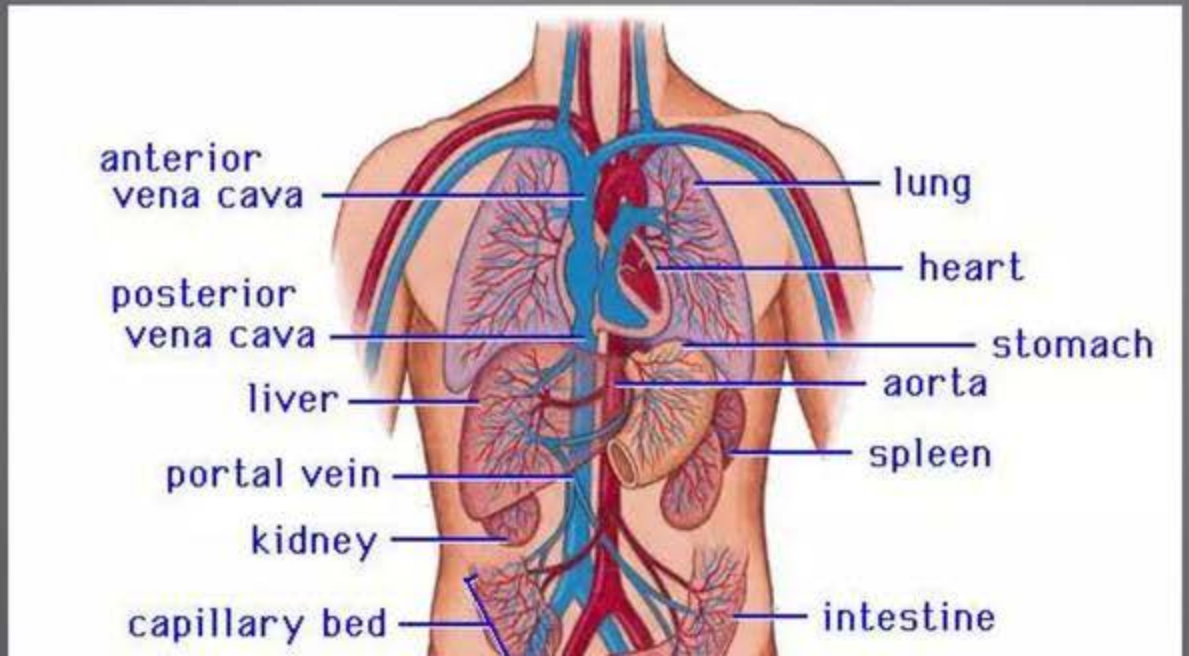
The Cardiovascular Sy

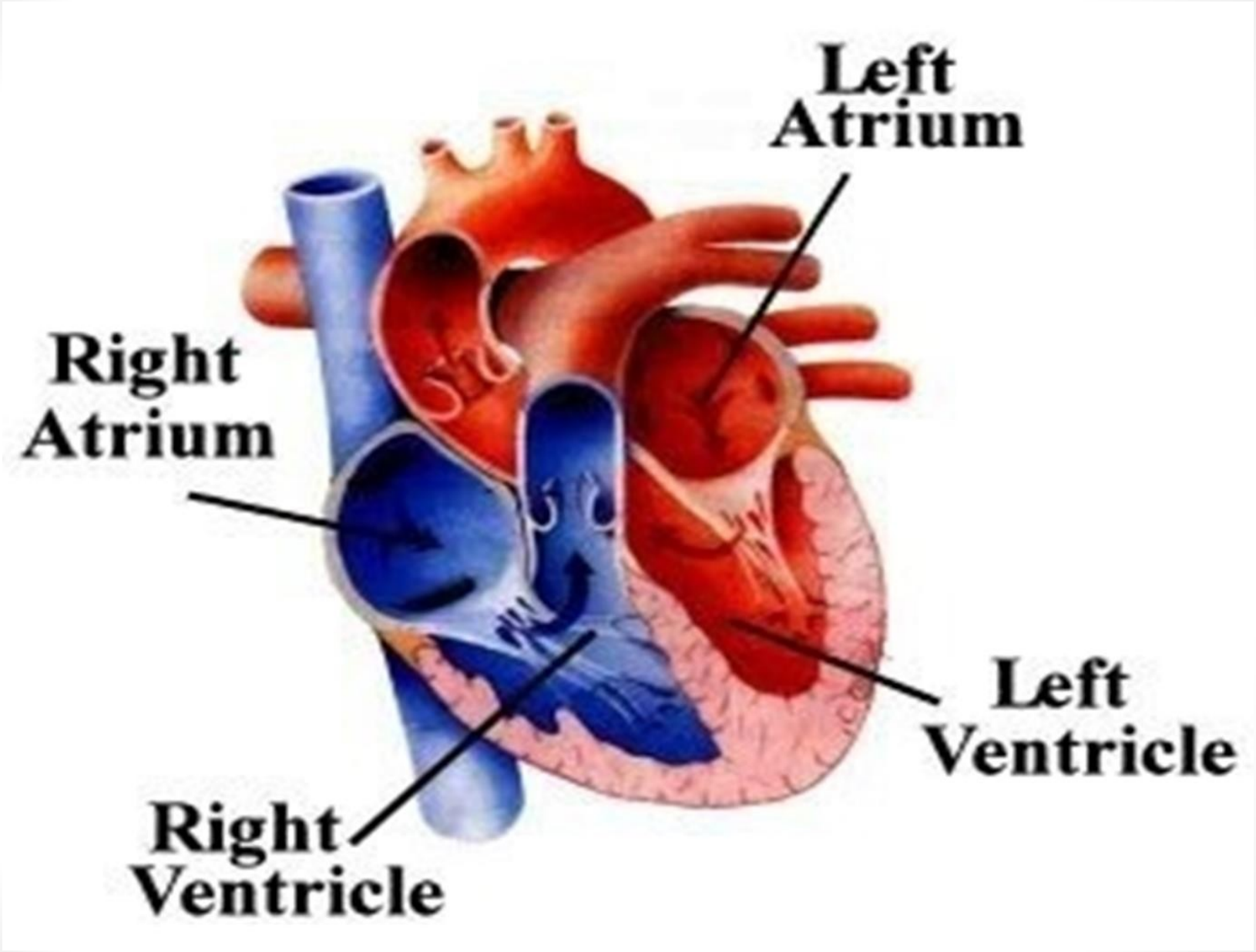


The cardiovascular system includes:

- The heart, a muscular pump
- The blood a fluid connective tissue
- The blood vessels, arteries, veins and capillaries
- The heart :rests on the diaphragm, near the midline of the thoracic cavity. The heart lies in the mediastinum, an anatomical region that extends from the sternum to the vertebral column, from the first rib to the diaphragm, and between the lungs.

Heart

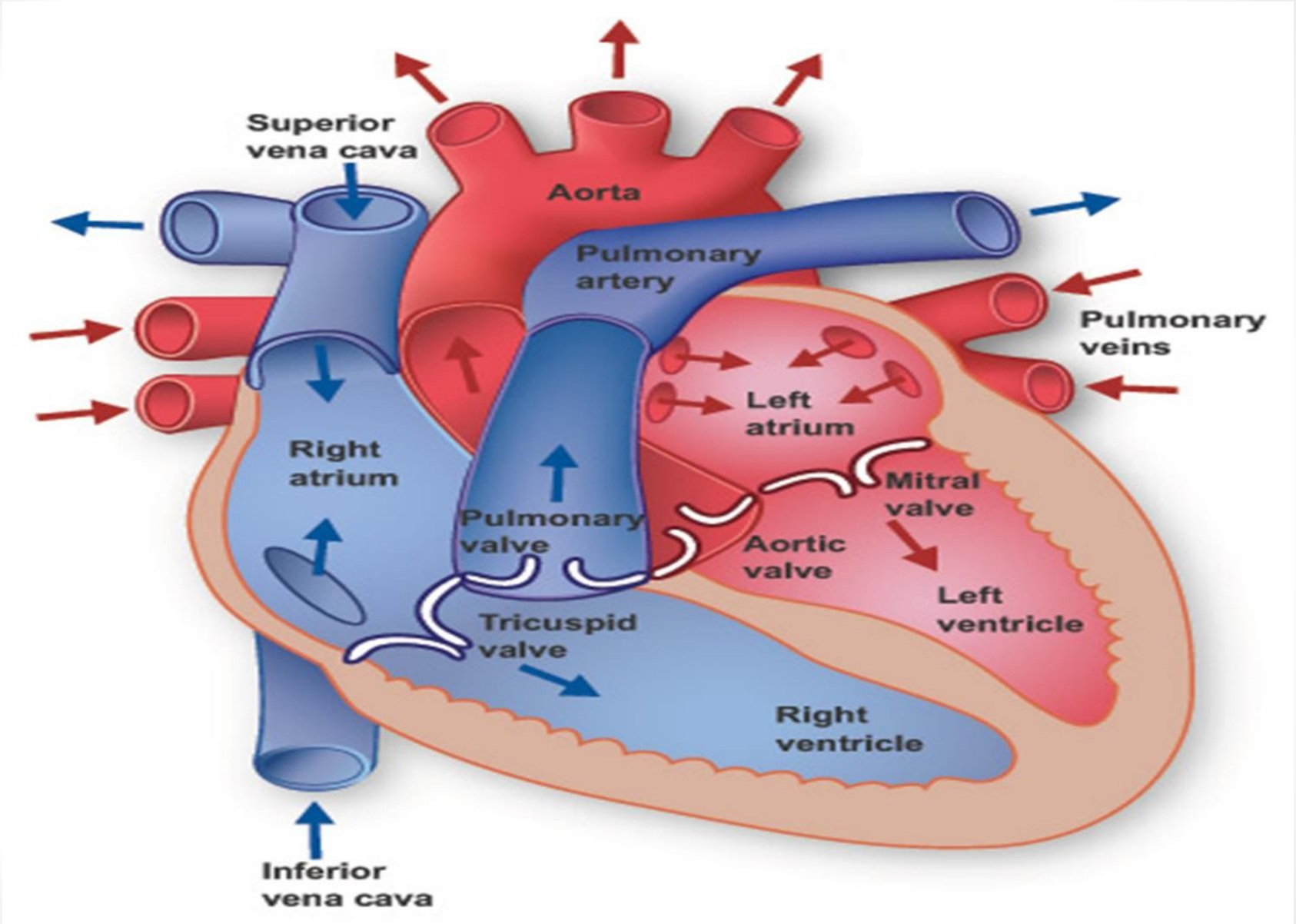
- Heart has 4 chambers.
- The upper chambers are called the left and right atria،
- and the lower chambers are called the left and right ventricles.
- A wall of muscle called the septum separates the left and right atria and the left and right ventricles.
- The left ventricle is the largest and strongest chamber have enough force to push blood through the aortic valve


Left
Atrium
Right
Atrium
Left
Ventricle
Right
Ventricle

The Heart Valves

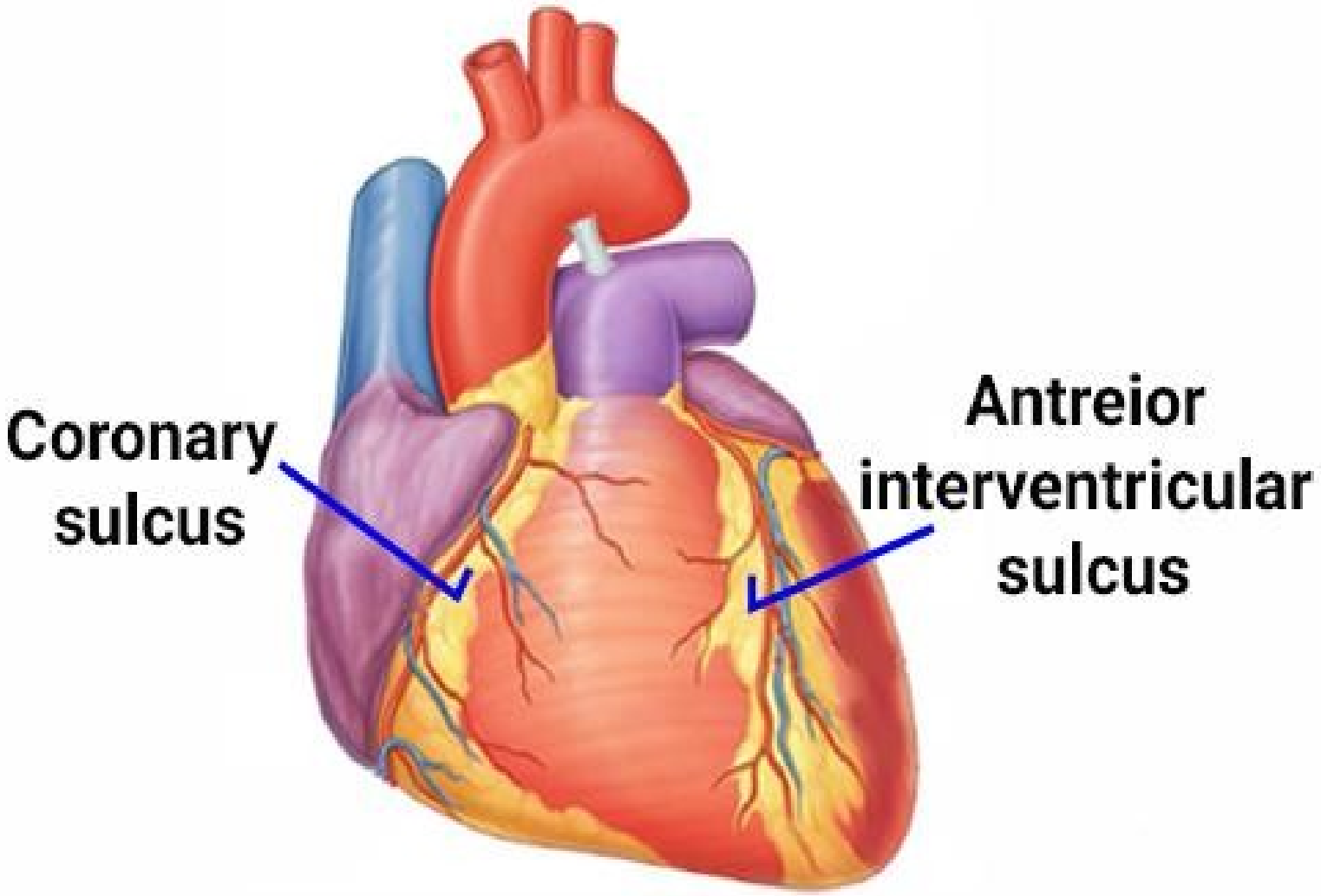
Four valves regulate blood flow through the heart:

- The tricuspid valve regulates blood flow between the right atrium and right ventricle.
- The pulmonary valve controls blood flow from the right ventricle into the pulmonary arteries, which carry blood to your lungs to pick up oxygen.
- The mitral valve lets oxygen-rich blood from your lungs pass from the left atrium into the left ventricle.
- The aortic valve opens the way for oxygen-rich blood to pass from the left ventricle into the aorta, your body's largest artery.


Superior vena cava
Aorta
Pulmonary artery
Pulmonary veins
Left atrium
Right atrium
Mitral valve
Pulmonary valve
Aortic valve
Left ventricle
Tricuspid valve
Right ventricle
Inferior vena cava

Grooves

- **Coronary sulcus** (circular sulcus) which marks the division between atria and ventricles, contains the trunks of the coronary vessels and completely encircles the heart.
- **Interatrial groove** separates the two atria and is hidden by pulmonary trunk and aorta in front.
- **Interventricular grooves** anterior and posterior, mark the division between ventricles (which separates the RV from the LV), the two grooves extend from the base of the ventricular portion to a notch called: **the cardiac apical incisure.**


Coronary sulcus
Antreior interventricular sulcus

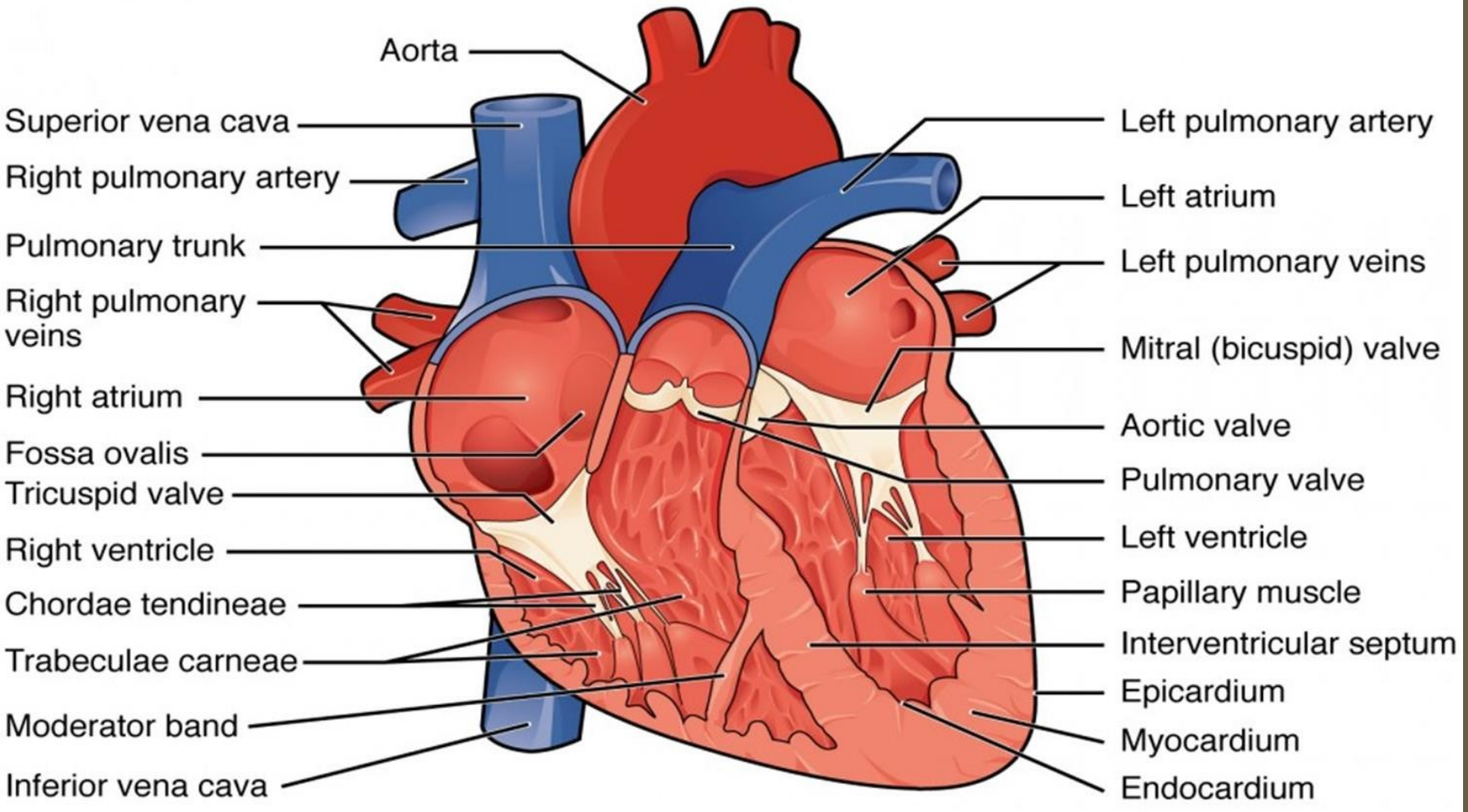
The membrane that surrounds and protects the heart is the **pericardium**. It consists of two main parts:

(1)the fibrous pericardium (2) serous pericardium

Layers of the Heart Wall

The heart wall is composed of connective tissue,endothelium ،and cardiac muscle.The heart wall is divided into 3 layers:

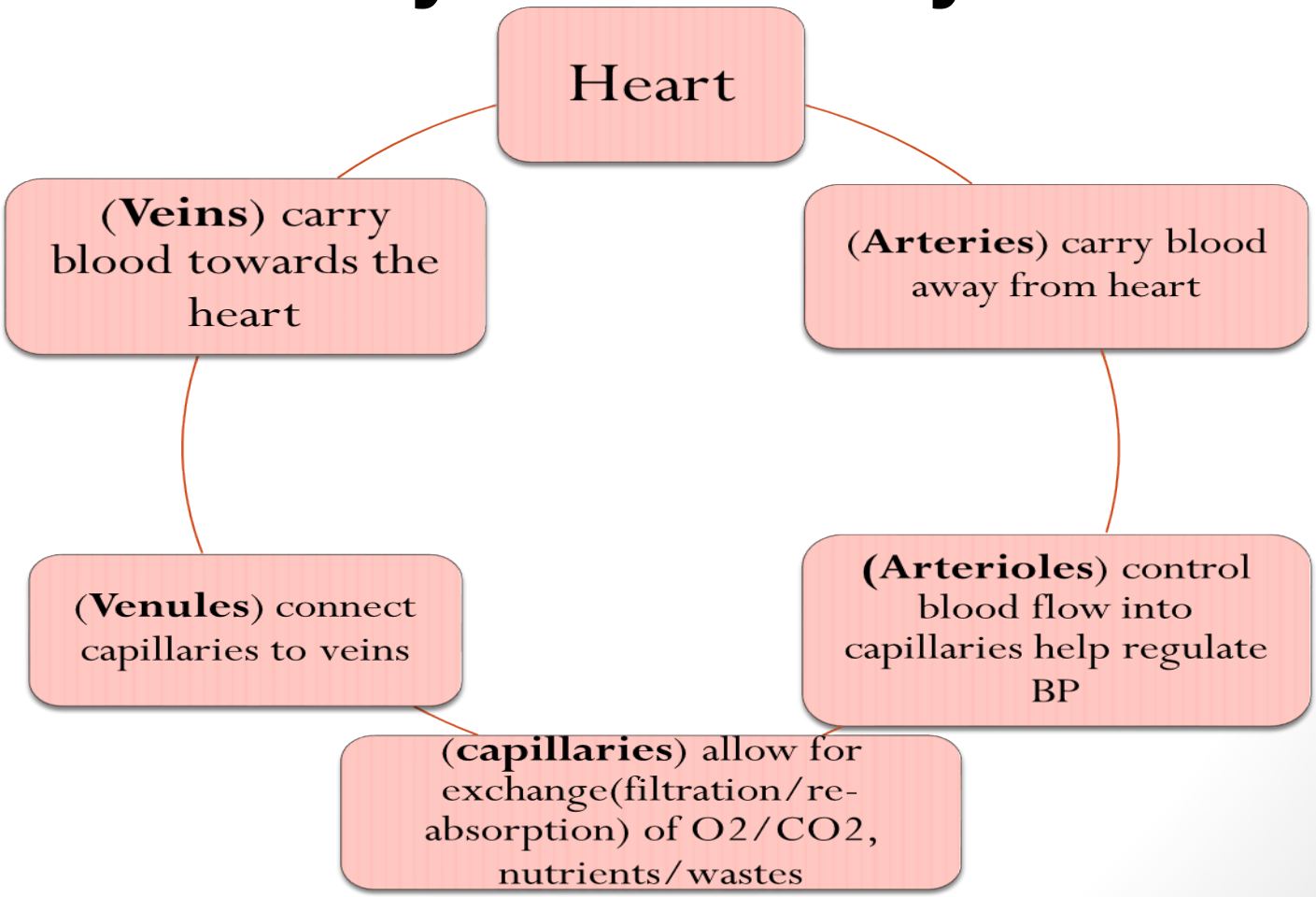
- **Epicardium—** outer protective layer of the heart.
- **Myocardium—**muscular middle layer wall of the heart.
- **Endocardium—**inner layer of the heart



Anterior view

Blood Vessel

Basic Anatomy of Circulatory routes



Structure of Blood Vessels

Arteries and veins

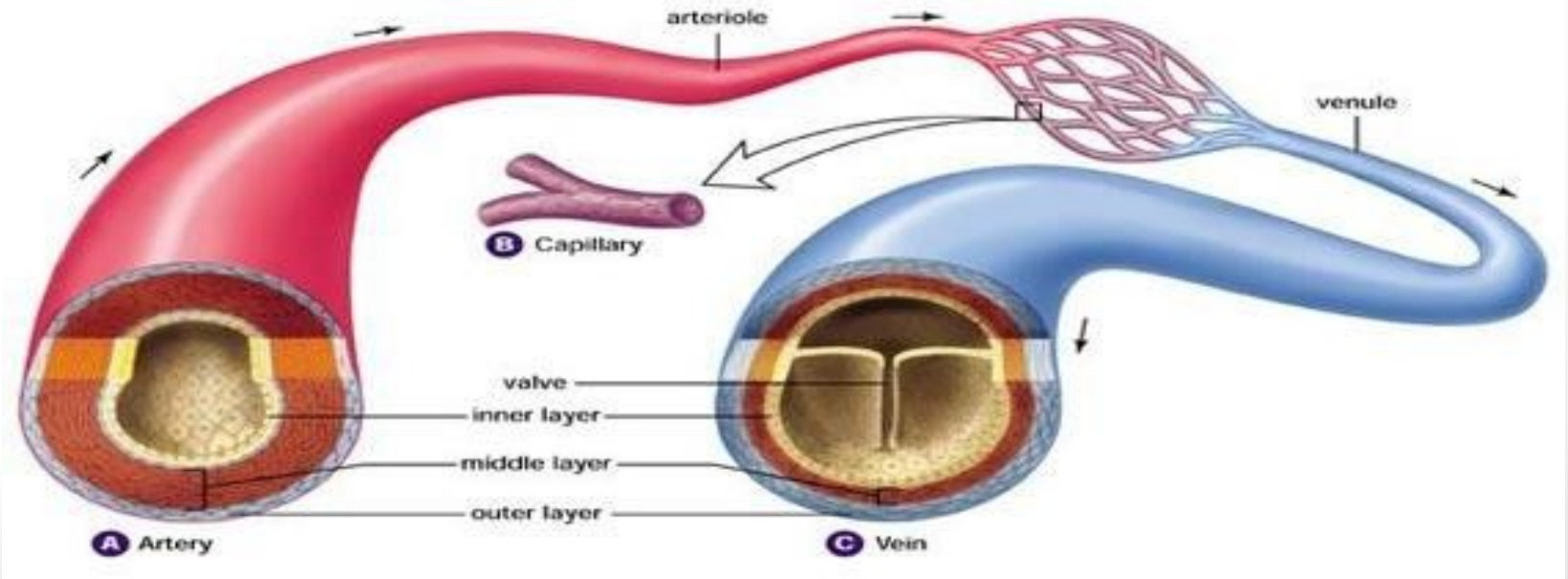
Both are comprised of 3 layers of tissue surrounding "lumen" through which blood will flow:

Tunica Interna

Tunica Media

Tunica Externa

Structural difference between **Arteries and veins** due to differences in pressure of blood flowing within.



Tunica Interna-(inner layer), simple squamous endothelium + basement membrane.

Arteries- have an "internal elastic lamina" of elastic CT to allow for expansion under pressure.

Veins- may have "valves" (folds of endothelium + CT (to prevent backflow of blood due to low pressure.

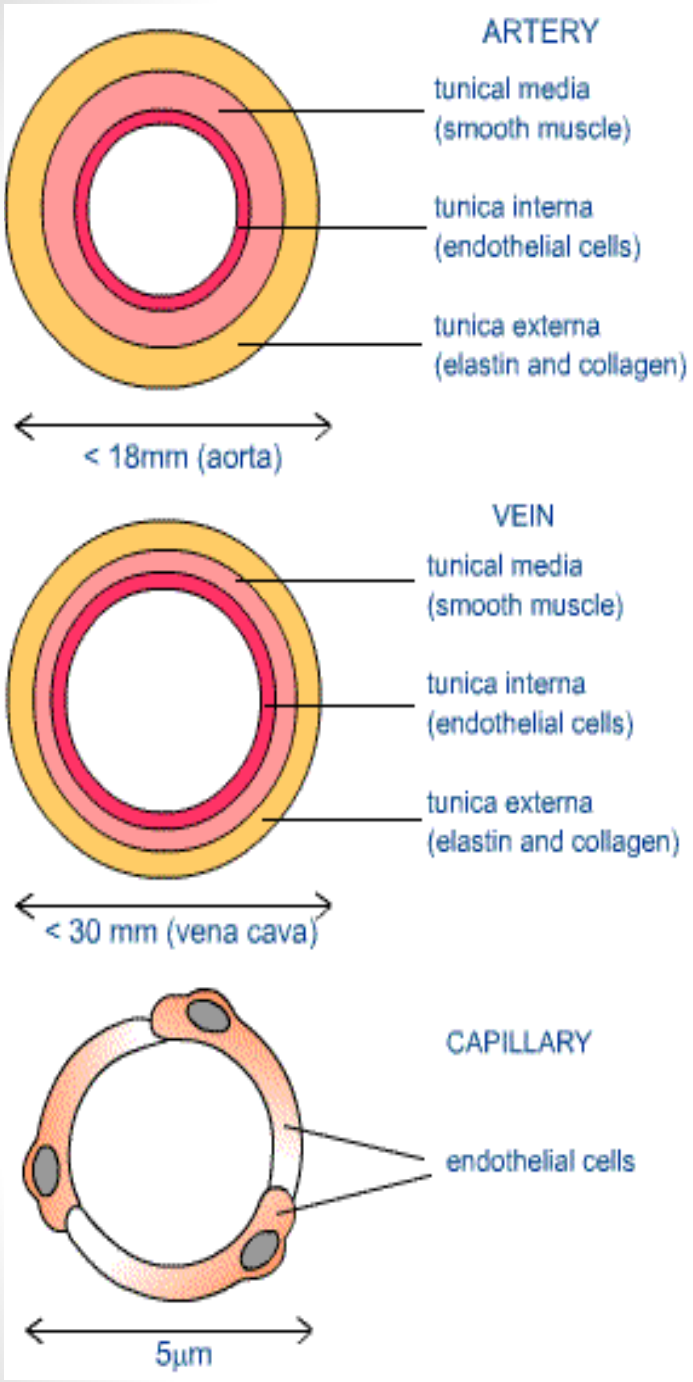
Tunica Media- Surrounding the tunica interna is the tunica media, comprised of smooth muscle (for contractility/vasoconstriction) and elastic CT(for elasticity.(

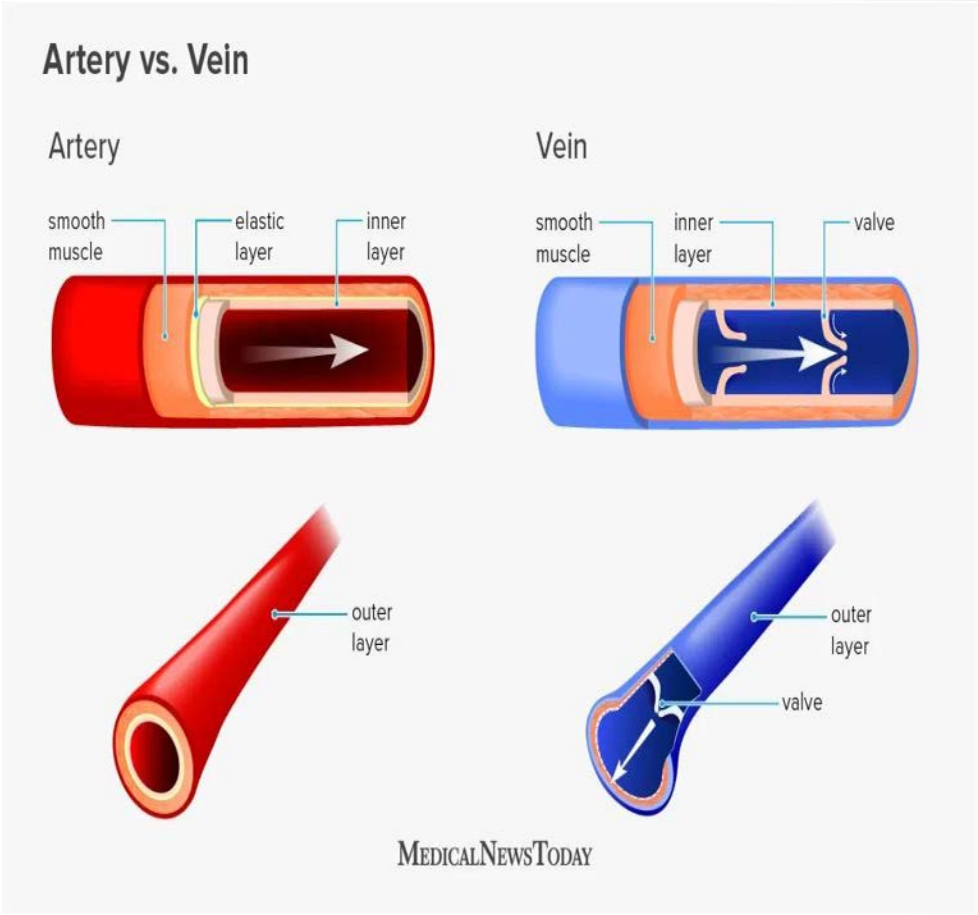
Arteries- have relatively thick tunica media allowing for significant vasoconstriction & elasticity.

- Elastic/conducting arteries-relatively more elastic tissue than smooth muscle; ie. Aorta.
- Muscular/distributing arteries-relatively more smooth muscle than elastic tissue; ie. Brachial.

Veins- relatively thin Tunica Media therefore no significant constriction/elasticity.

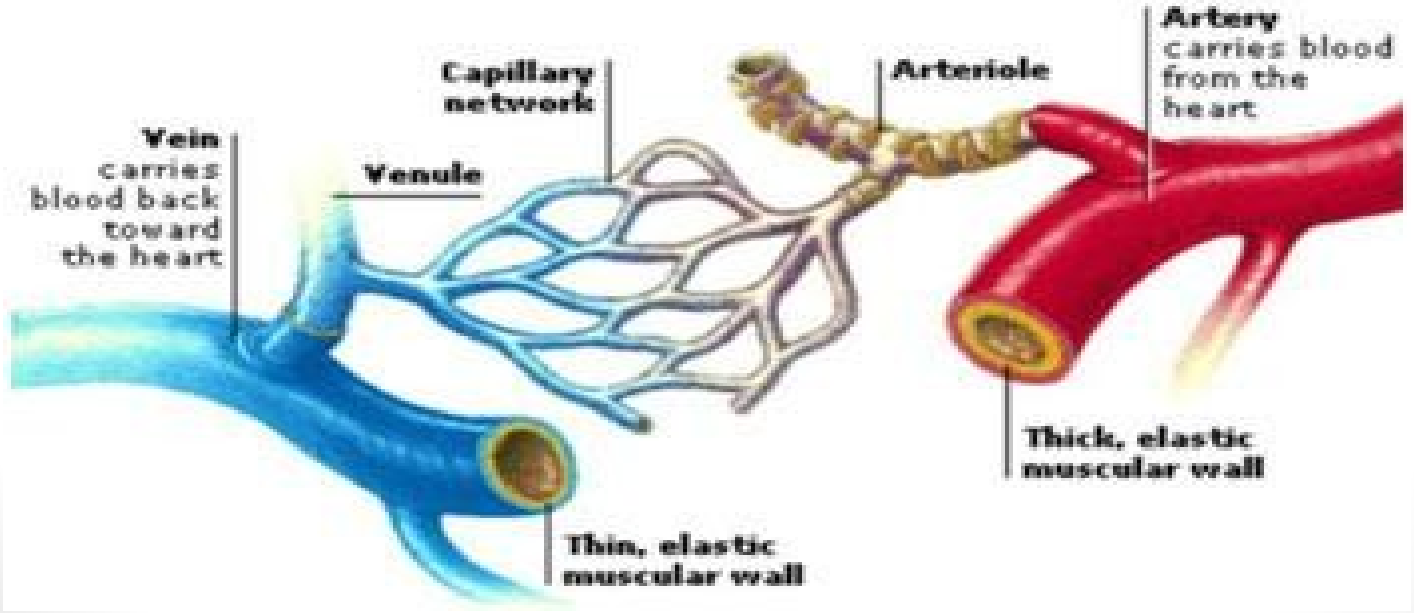
- Tunica Externa : made of collagenous CT.
- Arteries-thin layer.
- Veins-thick layer


ARTERY
tunical media
(smooth muscle)
tunica interna
(endothelial cells)
tunica externa
(elastin and collagen)
< 18mm (aorta)
VEIN
tunical media
(smooth muscle)
tunica interna
(endothelial cells)
tunica externa
(elastin and collagen)
< 30 mm (vena cava)
CAPILLARY
endothelial cells
5µm

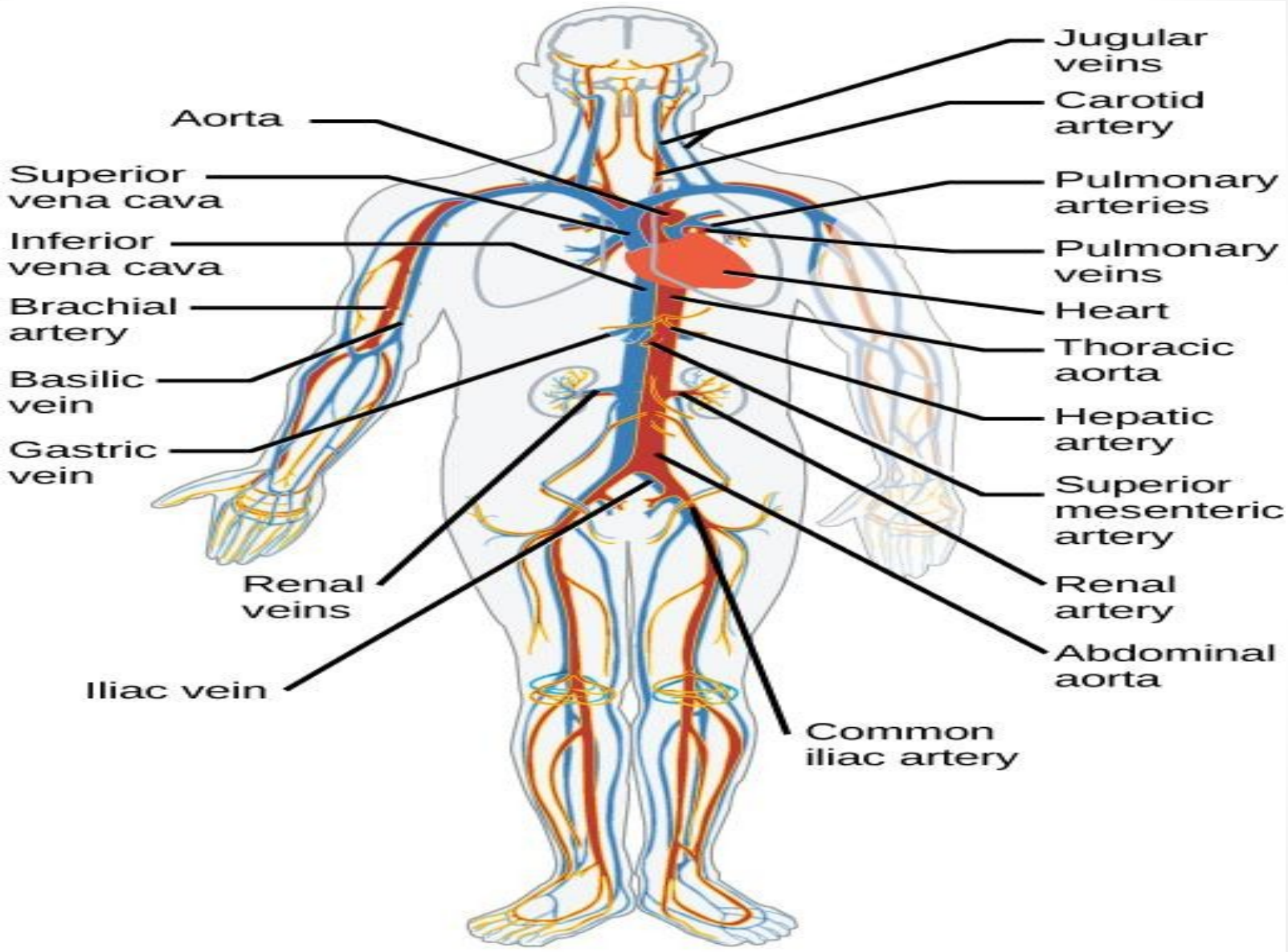

Artery vs. Vein
Artery
smooth muscle
elastic layer
inner layer
outer layer
Vein
smooth muscle
inner layer
valve
outer layer
valve
MedicalNewsToday

Capillaries

- **Capillaries**, the smallest of blood vessels that connect the arterial outflow to the venous return, have very thin walls composed of only a single layer of endothelial cells and a basement membrane, lack both a tunica media and a tunica externa
- The primary function of capillaries is the exchange of substances between the blood and tissue.

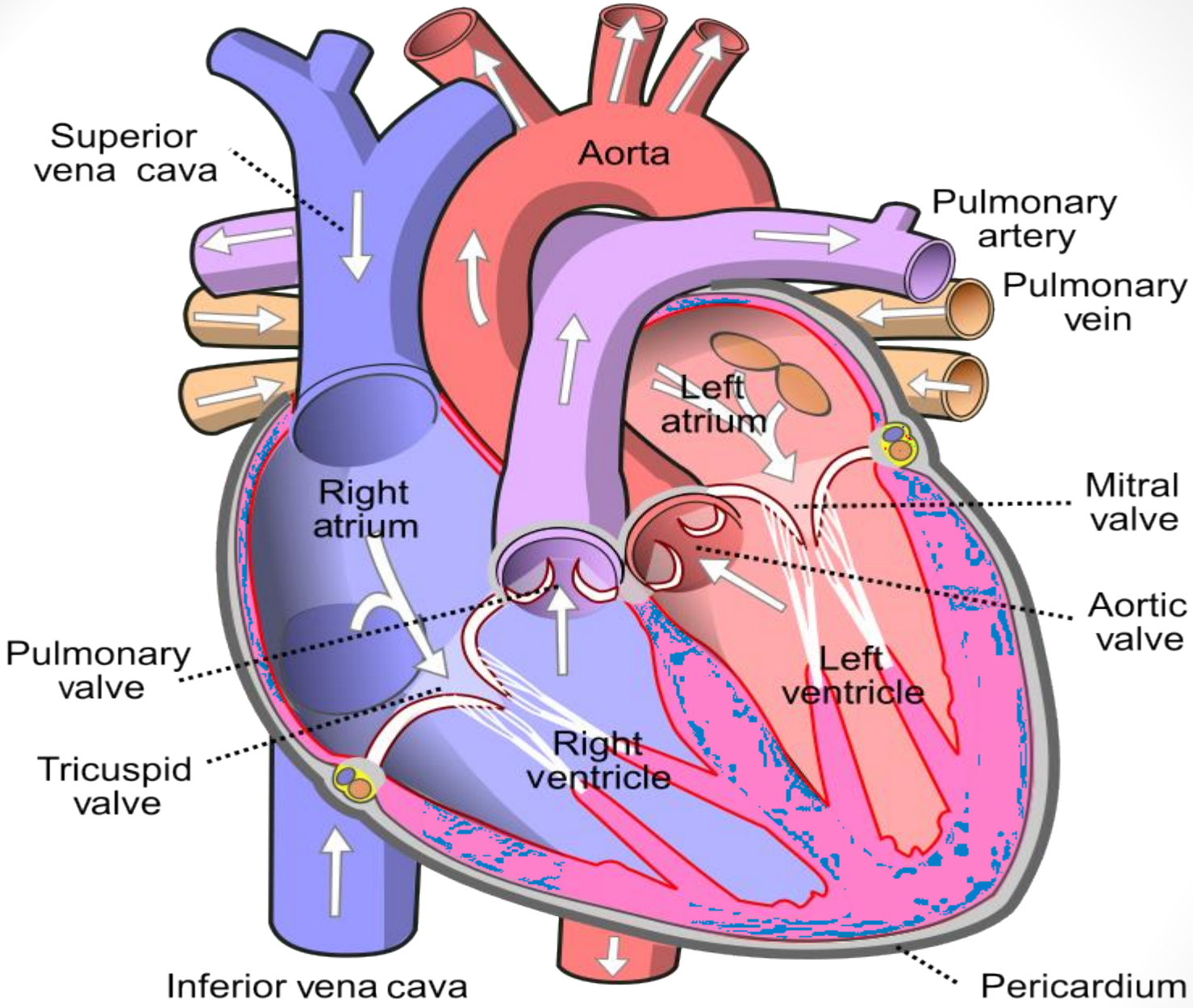


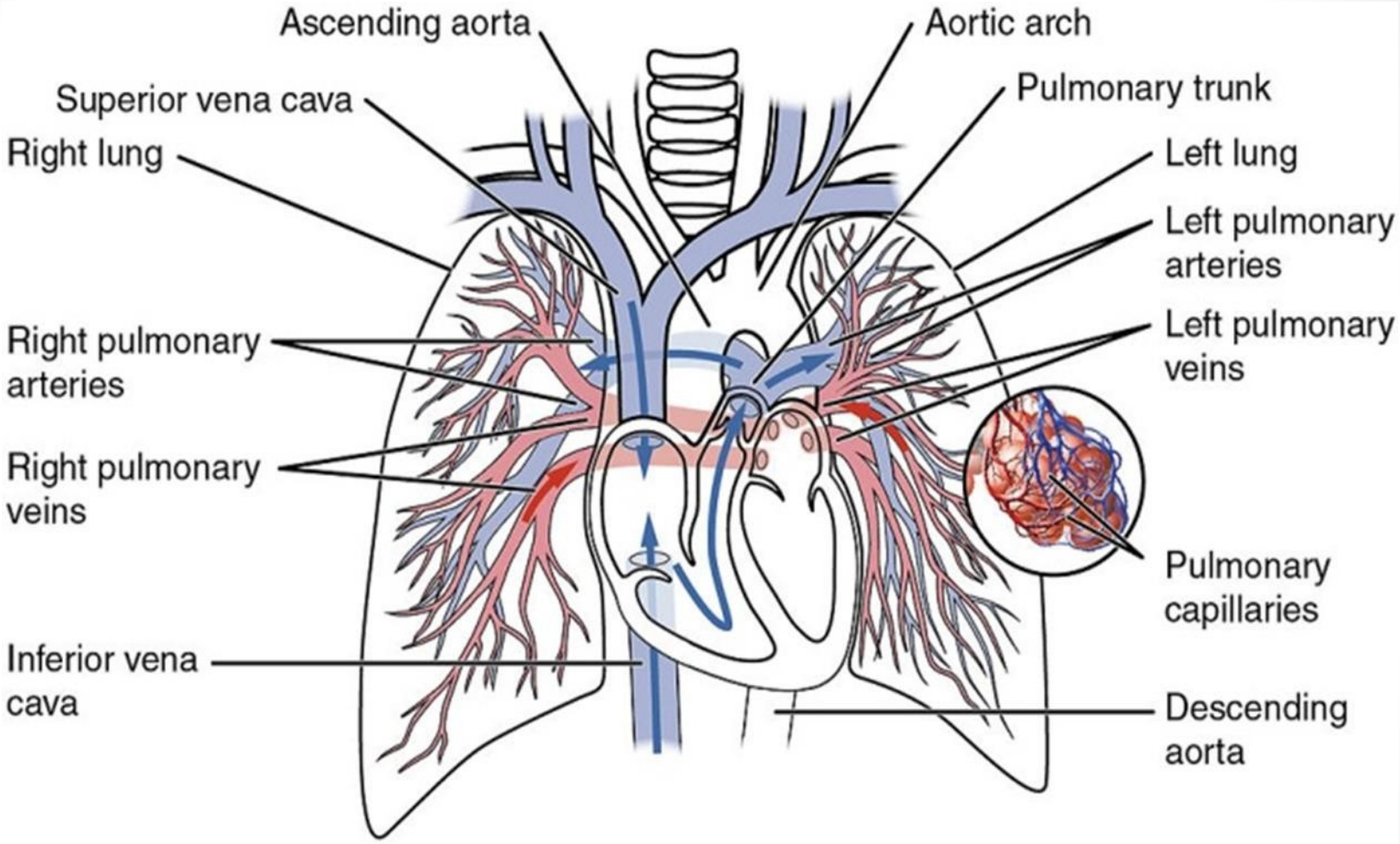
The Systemic circuit-Arteries &Venis



Pulmonary Circuit

- •Right ventricle into pulmonary trunk to pulmonary arteries to lungs.
- •Return by way of 4 pulmonary veins to left atrium.


Superior vena cava
Aorta
Pulmonary artery
Pulmonary vein
Left atrium
Right atrium
Mitral valve
Aortic valve
Pulmonary valve
Left ventricle
Right ventricle
Tricuspid valve
Inferior vena cava
Pericardium


Ascending aorta
Aortic arch
Superior vena cava
Pulmonary trunk
Right lung
Left lung
Left pulmonary arteries
Right pulmonary arteries
Left pulmonary veins
Right pulmonary veins
Pulmonary capillaries
Inferior vena cava
Descending aorta

Superior vena cava

Inferior vena cava

right atrium

tricuspid valve

right ventricle

pulmonary valve

pulmonary artery

lungs

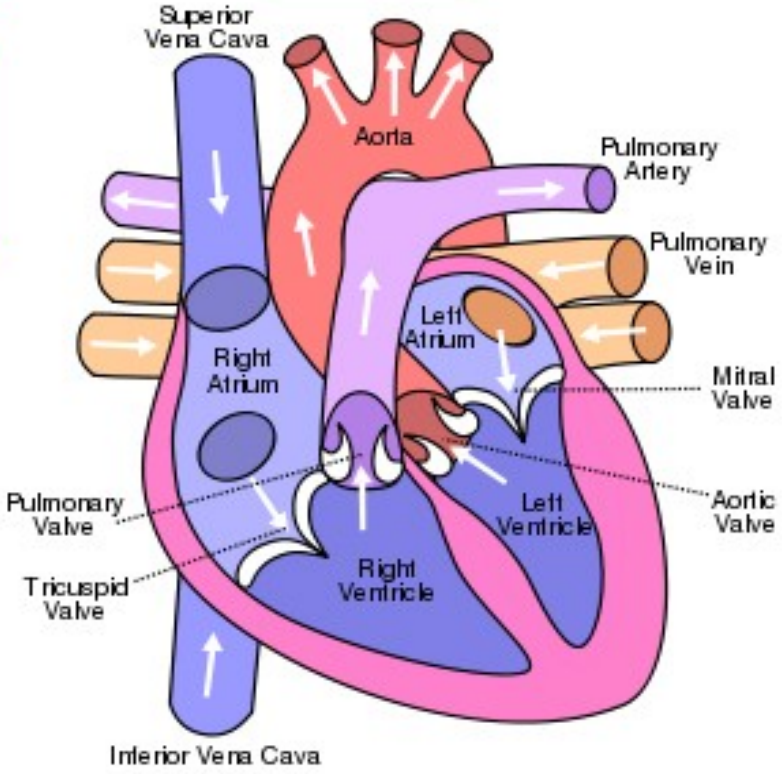
left atrium

left ventricle

aorta

rest of body

Circulation of Blood Through the Heart:




THANK
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