The Cardiovascular System

Anatomy and Physiology

Written by: Algozha B.
002-02

The Heart

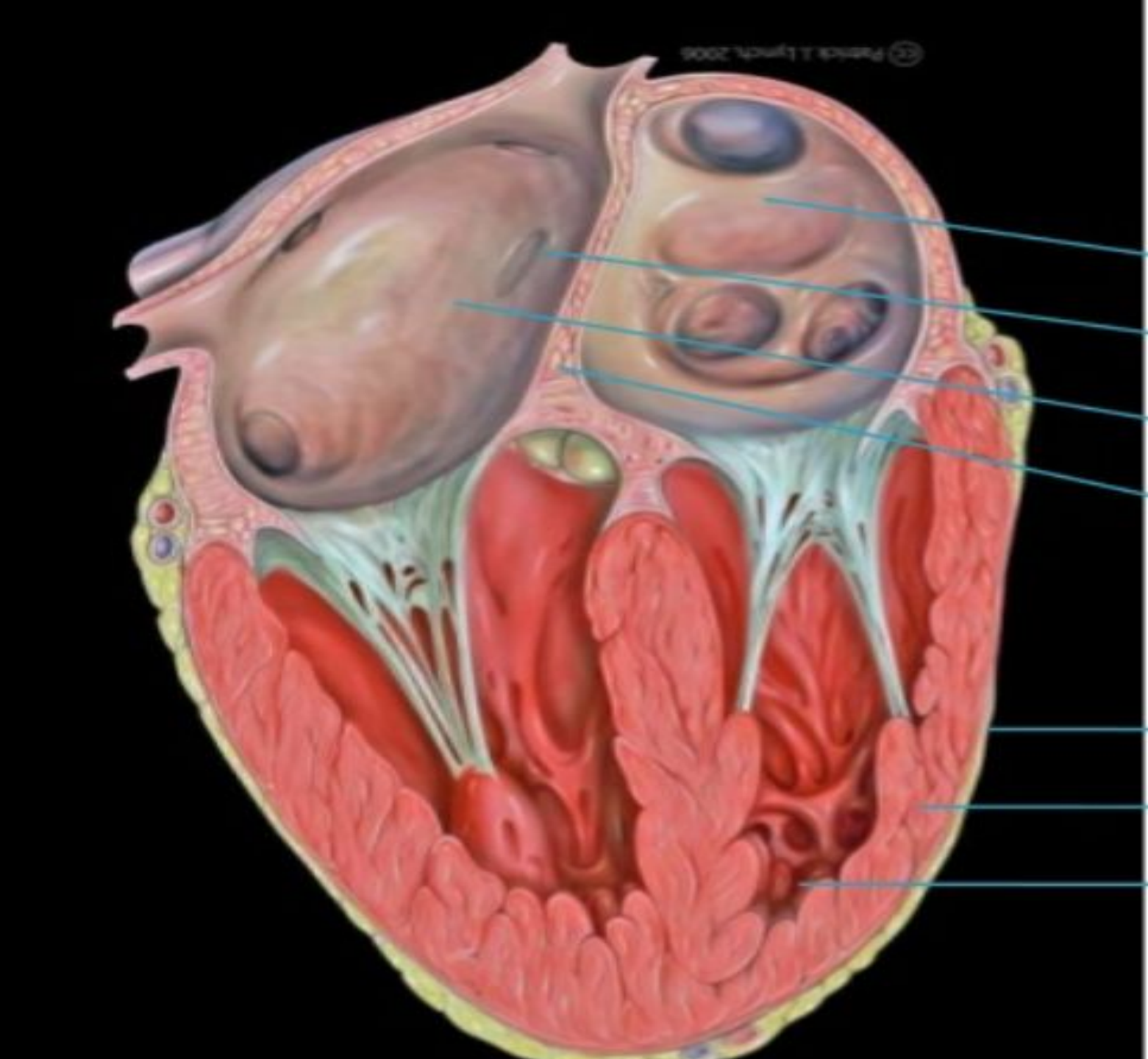
- Is about 4.8 inches tall and 3.35 inches wide
- Weighs about .68 lb. in men and .56 lb. in women
- Beats about 100,000 times per day
- Beats 2.5 billion time in an average 70 yr. lifetime
- Pumps about 2000 gallons of blood each day
- Circulates blood completely 1000 times each day
- Pumps blood through 62,000 miles of vessels
- Suffers 7.2 mil. CAD deaths worldwide each year

Three Layers of The Heart

- The heart resides in the pericardium
  - A loose membranous sac.
- Epicardium
  - Continuous with the pericardium
- Myocardium
  - Composed of bands of involuntary striated muscle fibers
- Endocardium
  - Thin layer of tissue lining the inside of the heart

Four Chambers of The Heart

- Atria
  - Thin-walled upper chambers
  - Separated by atrial septum
  - Right side of septum has oval depression, fossa ovalis cordis, remnant of the foramen ovale
  - Act as receiving chamber for blood returning from the body and lungs



Left atrium

Fossa ovalis cordis

Right atrium

Atrial septum

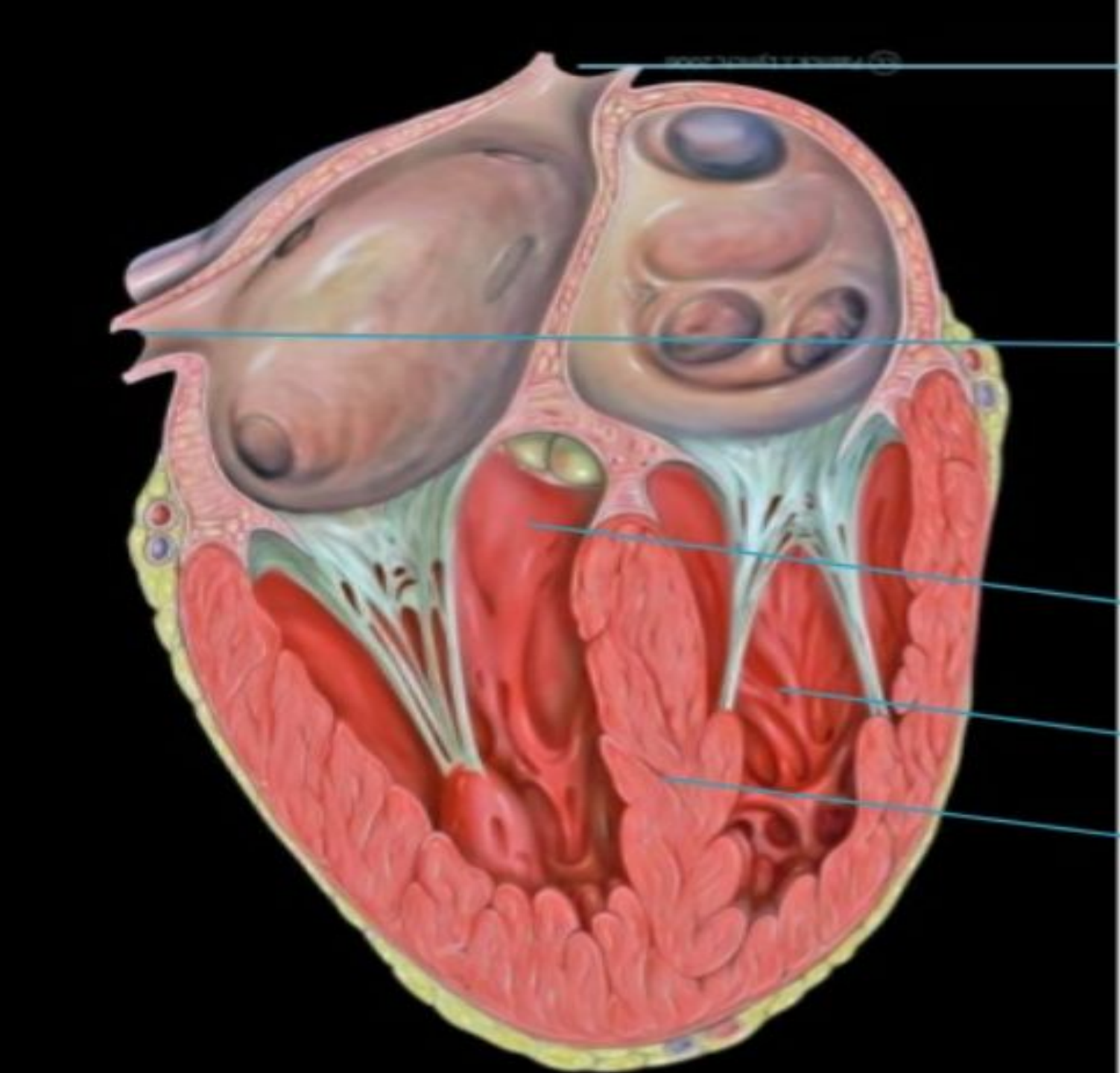
Epicardium

Myocardium

Endocardium

Four Chambers of The Heart

- Ventricles
  - Lower chambers which make up the bulk of the muscle mass of the heart
  - Left ventricle 2/3 larger than right ventricle
  - Right ventricle is a thin-walled and oblong, like pocket attached to left ventricle



Superior vena cava

Inferior vena cava

Right ventricle

Left ventricle

Intraventricular septum

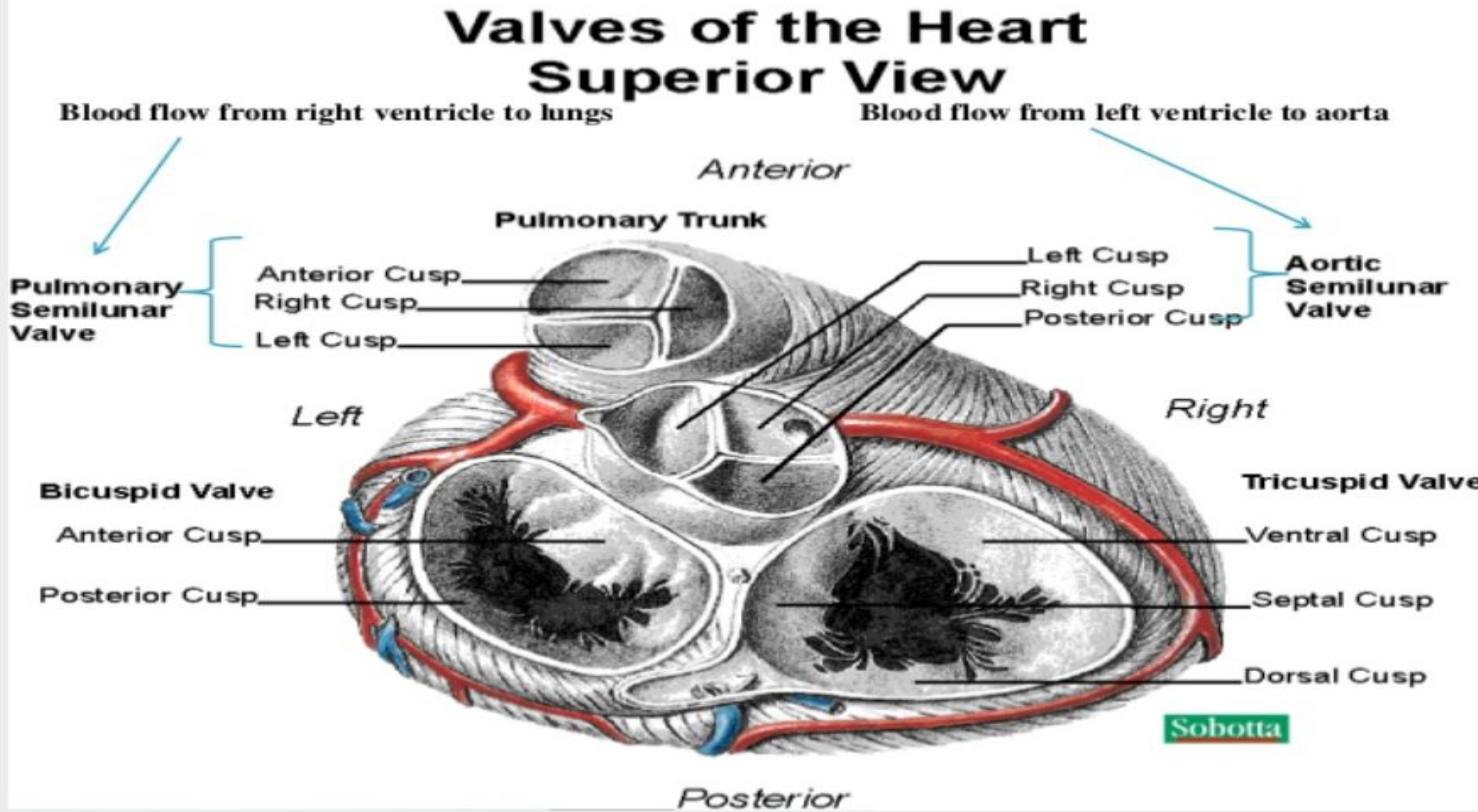
Four Valves of the Heart

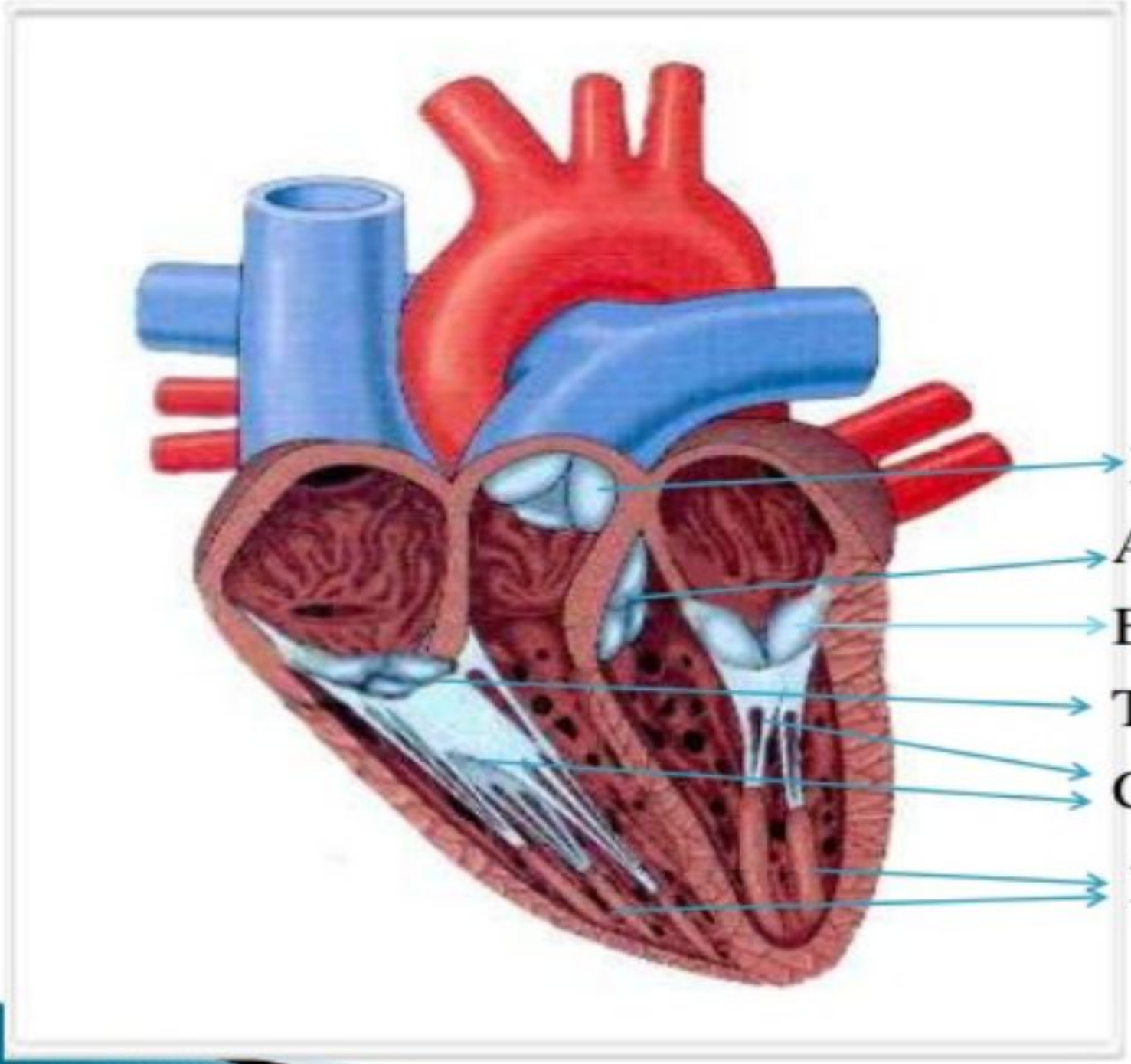
- Tricuspid valve
  - Separates right atrium from right ventricle
- Pulmonic semilunar valve
  - Separates right ventricle from pulmonary artery

Four Valves of the Heart

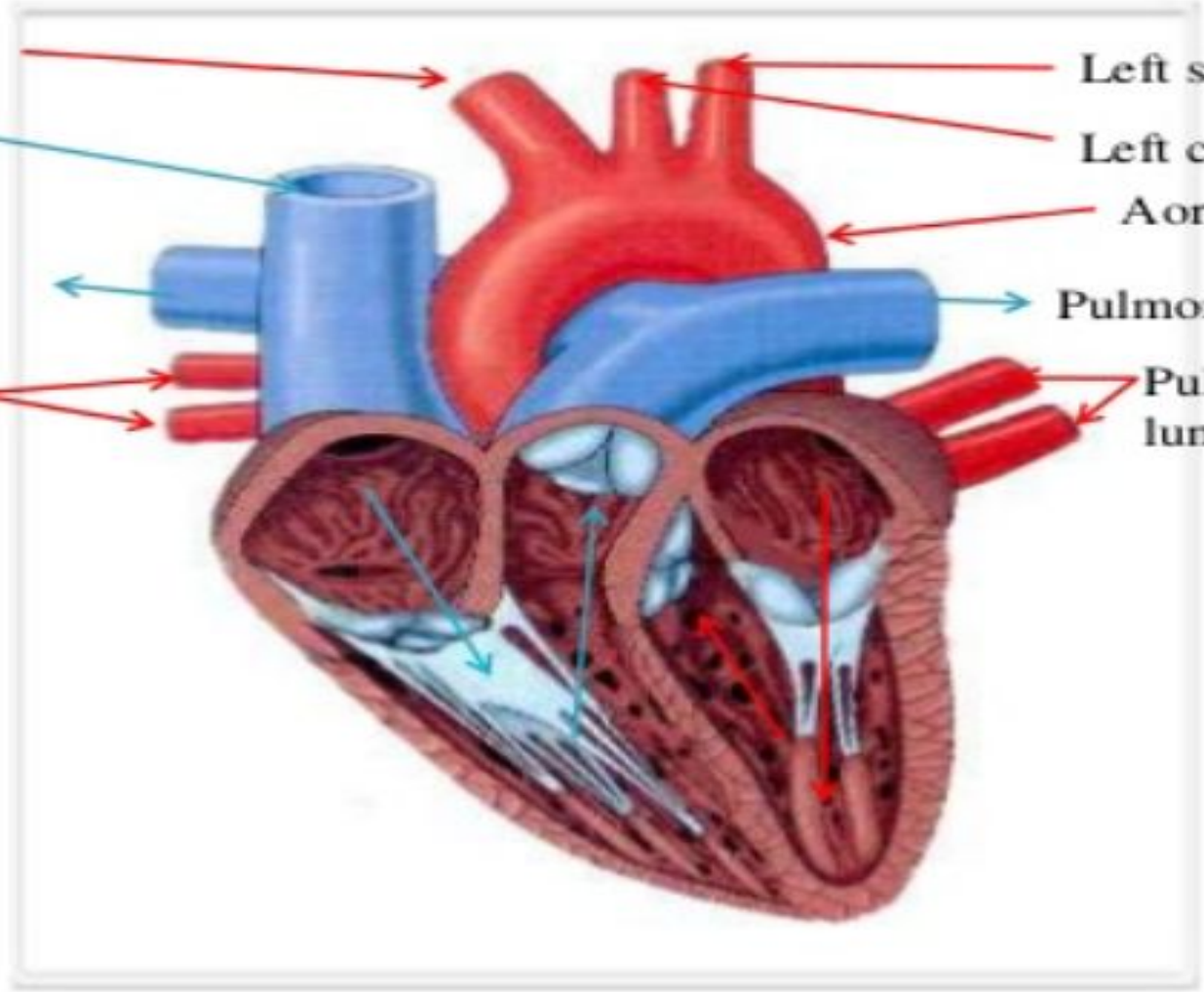
- Bicuspid (mitral) valve
  - Separates left atrium from left ventricle
- Aortic semilunar valve
  - Separates left ventricle from aorta

Valves of the Heart
Superior View



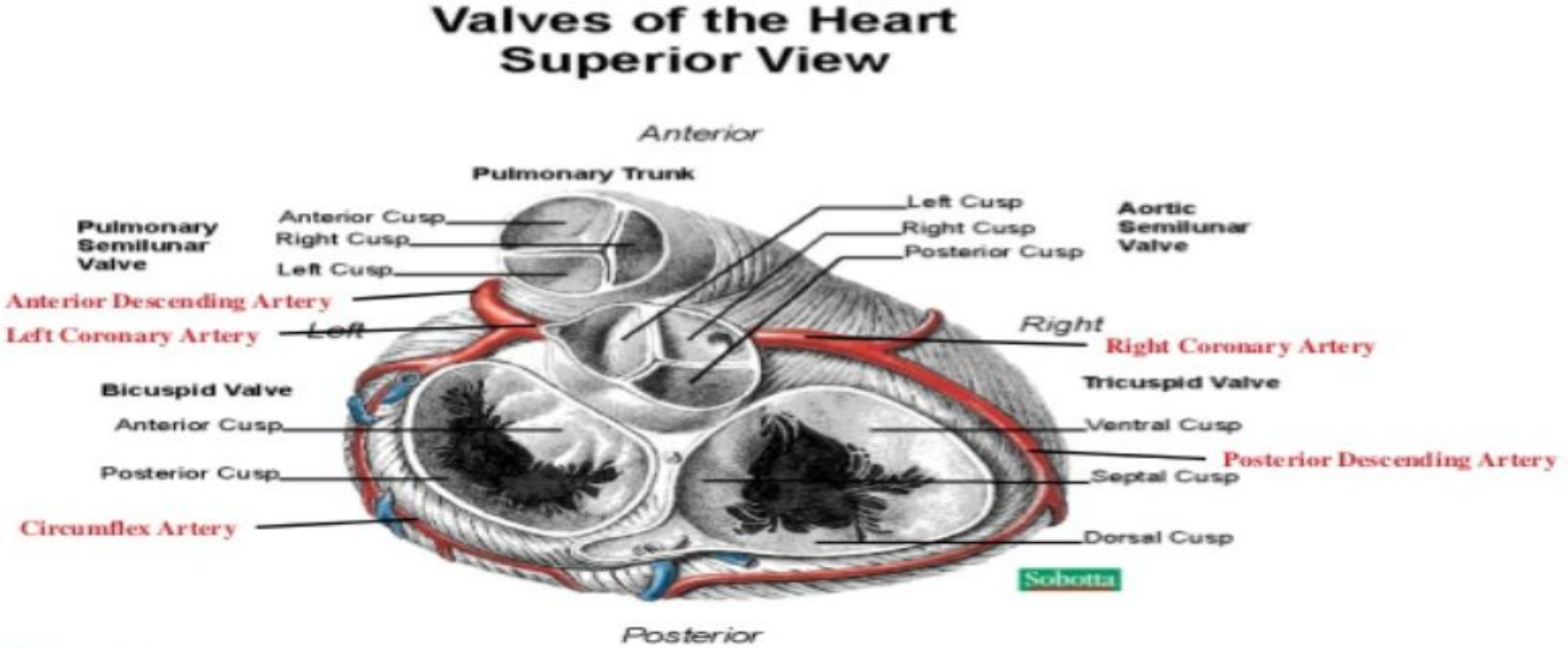

Pulmonic semilunar valve
Aortic semilunar valve
Bicuspid (mitral) valve
Tricuspid valve
Chordae tendineae cordis
Papillary muscles

Cardiac Circulation



Coronary Circulation

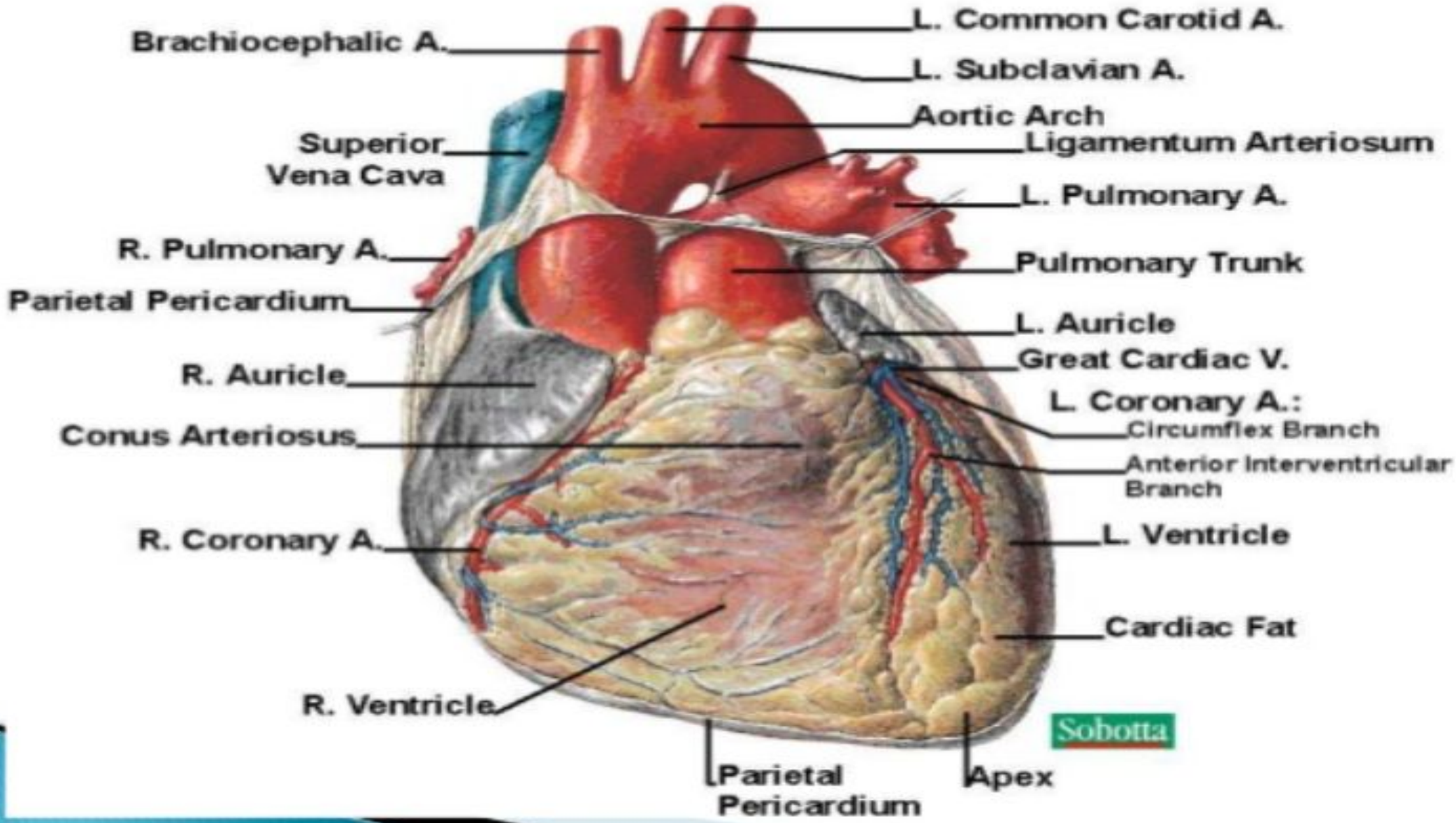
- Arises from root of the aorta



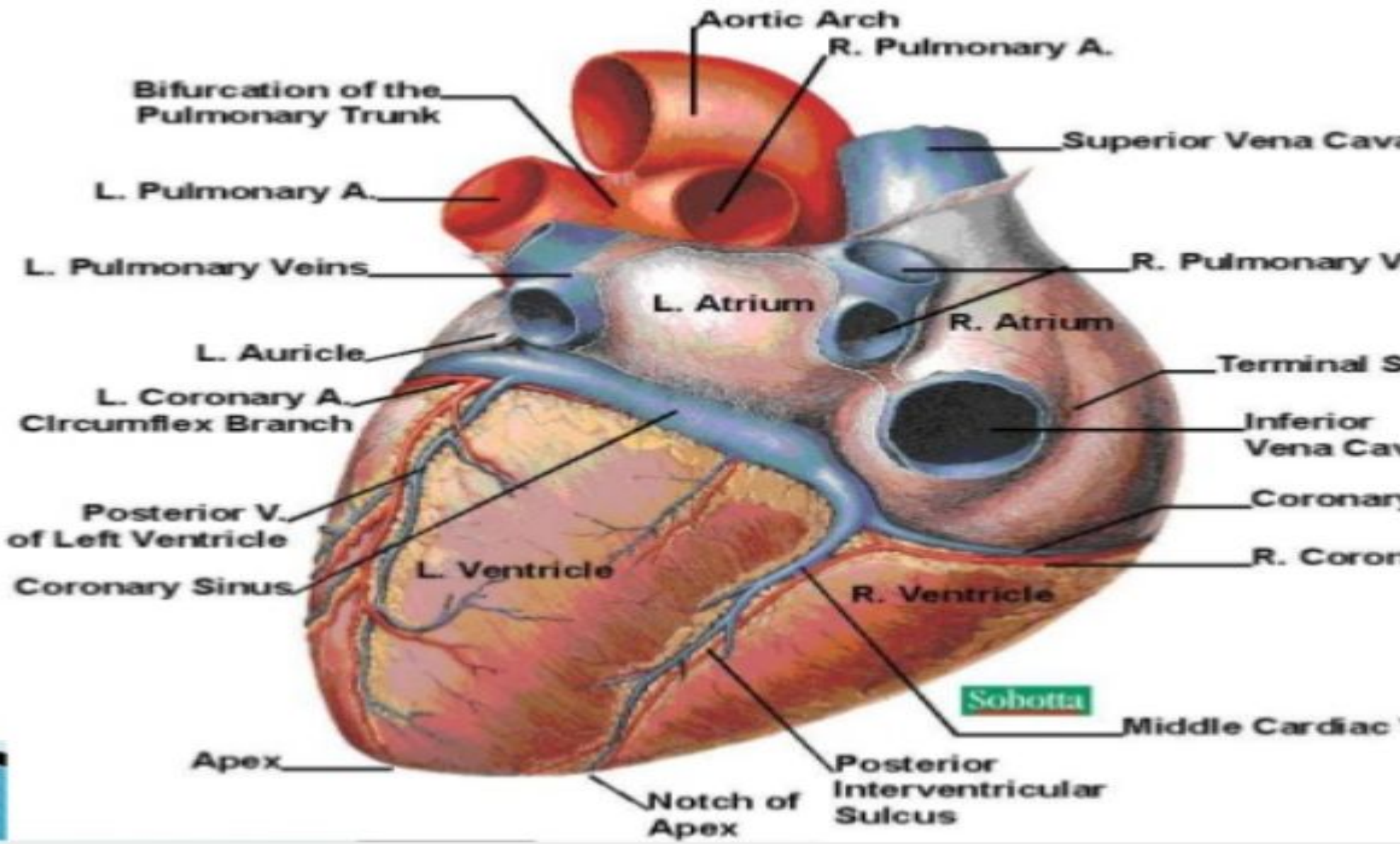
Circulation of the Blood

1) Blood enters the heart through the inferior and superior vena cava, flowing into the right atrium.
2) The blood passes through the tricuspid valve into the right ventricle.
3) It then passes through the pulmonic semilunar valve, entering the pulmonary artery of the pulmonary circulation.
4) It flows through the pulmonary bed of the right and left lungs to the pulmonary vein, reentering the heart at the left atrium.
5) It then flows through the bicuspid valve into the left ventricle.
6) Passing through the aortic semilunar valve, the blood enters the aorta and systemic vascular system.

Anterior View



Posterior View



Coronary Veins

- Closely parallel the arterial system
- Some coronary venous blood enters the heart through the Thebesian veins
  - Thebesian veins empty directly into all chambers thus creating some venous admixture lowering $Pa0_2$

Blood Vessels

The Vascular System

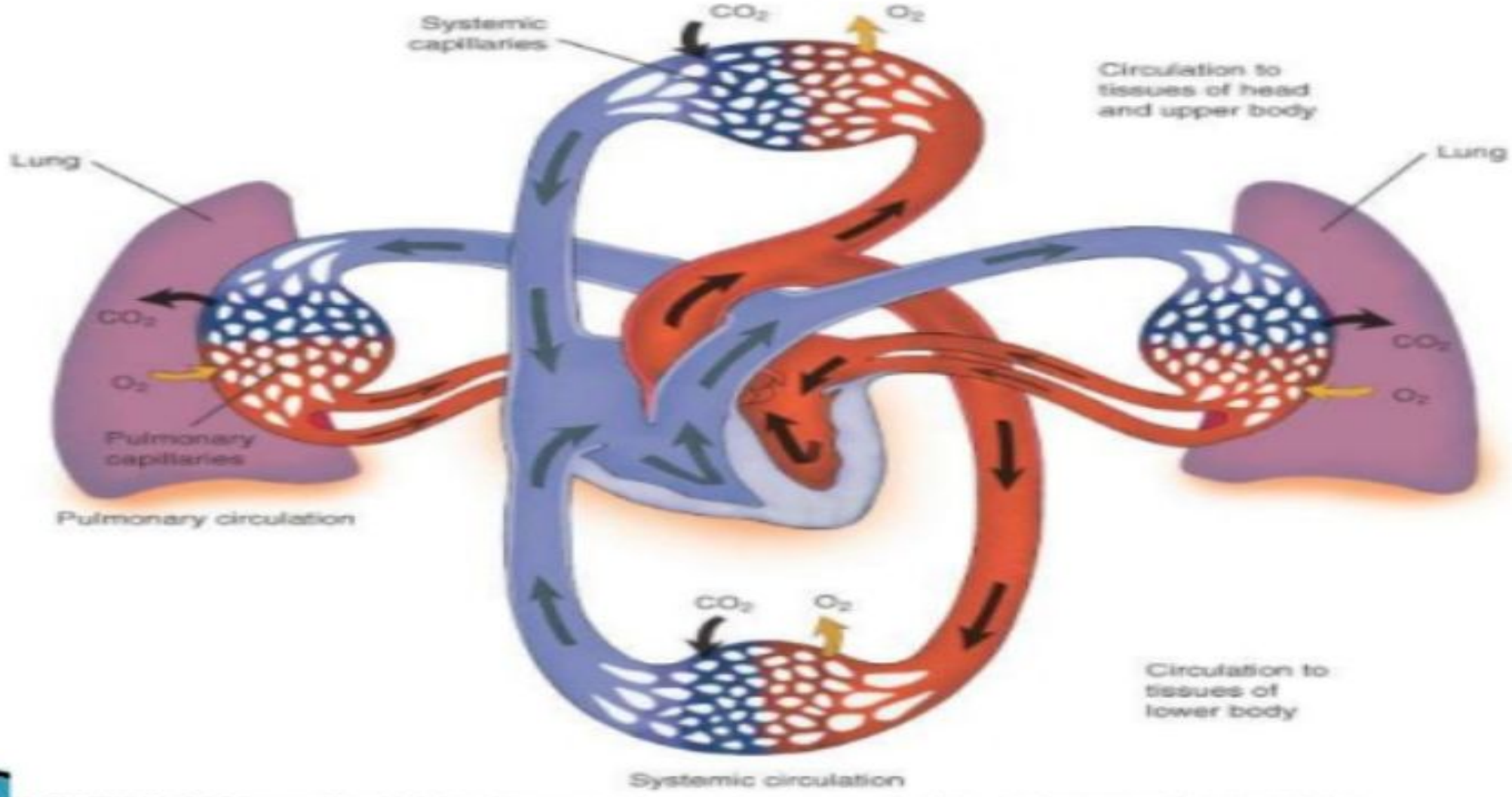
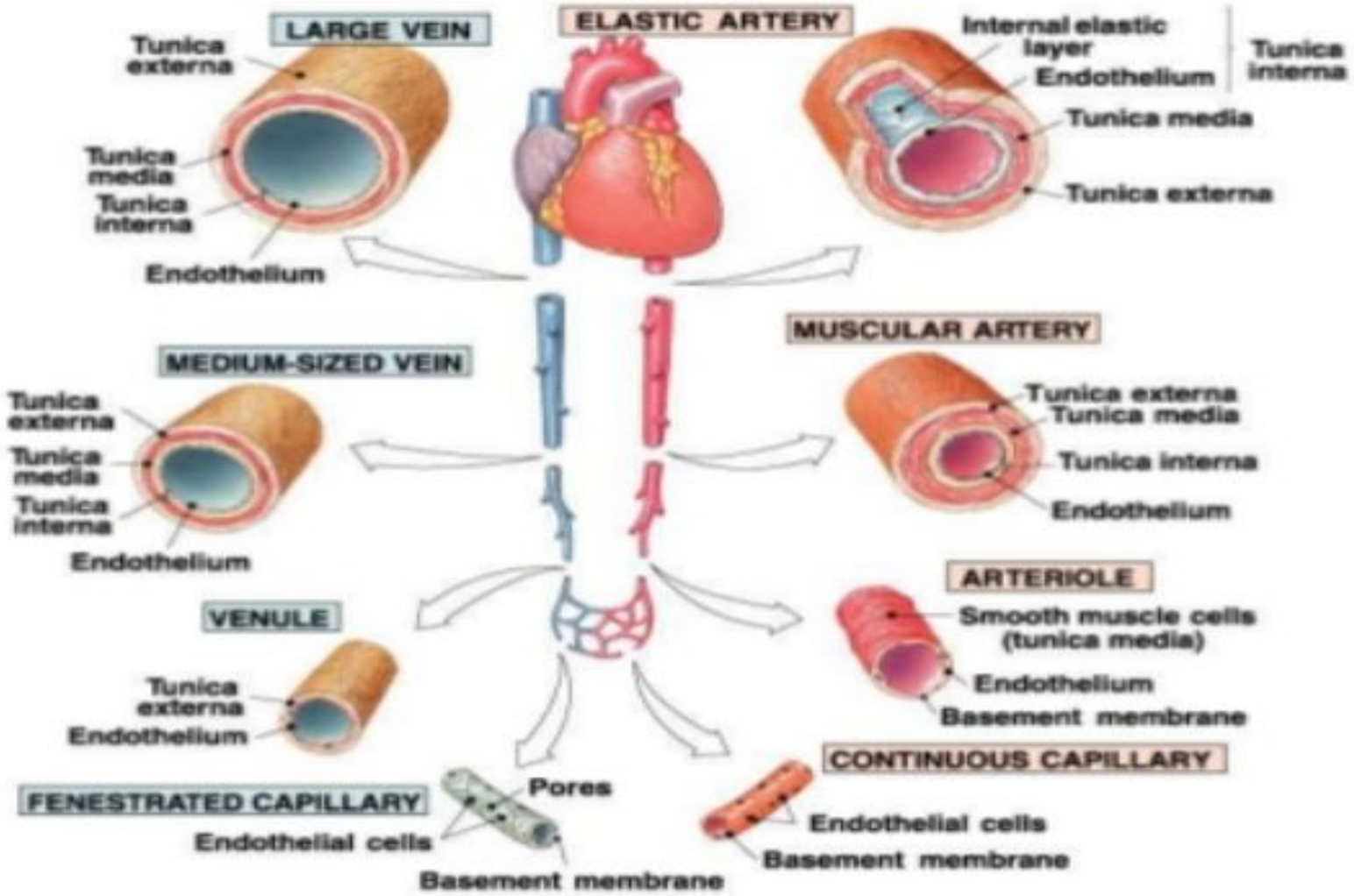


FIGURE 9-6 Generalized circulatory pathways between the heart, lung, and extremities.

Histological Structure of Blood Vessels



Composition of Blood

- Consists of formed elements (cells) suspended & carried in plasma (fluid part)
- Total blood volume: 60–80 mL/kg of body weight
- Plasma is straw-colored liquid consisting of 90% H_20 & dissolved solutes
  - Includes ions, metabolites, hormones, antibodies, proteins

The Vascular System–Blood Pressure

- Systolic pressure
  - Pressure during contraction phase of heart
  - Normal value: 90 – 140 mmHg
- Diastolic pressure
  - Pressure during relaxation phase of heart
  - Normal value: 60 – 90 mmHg

Thank you for attention!