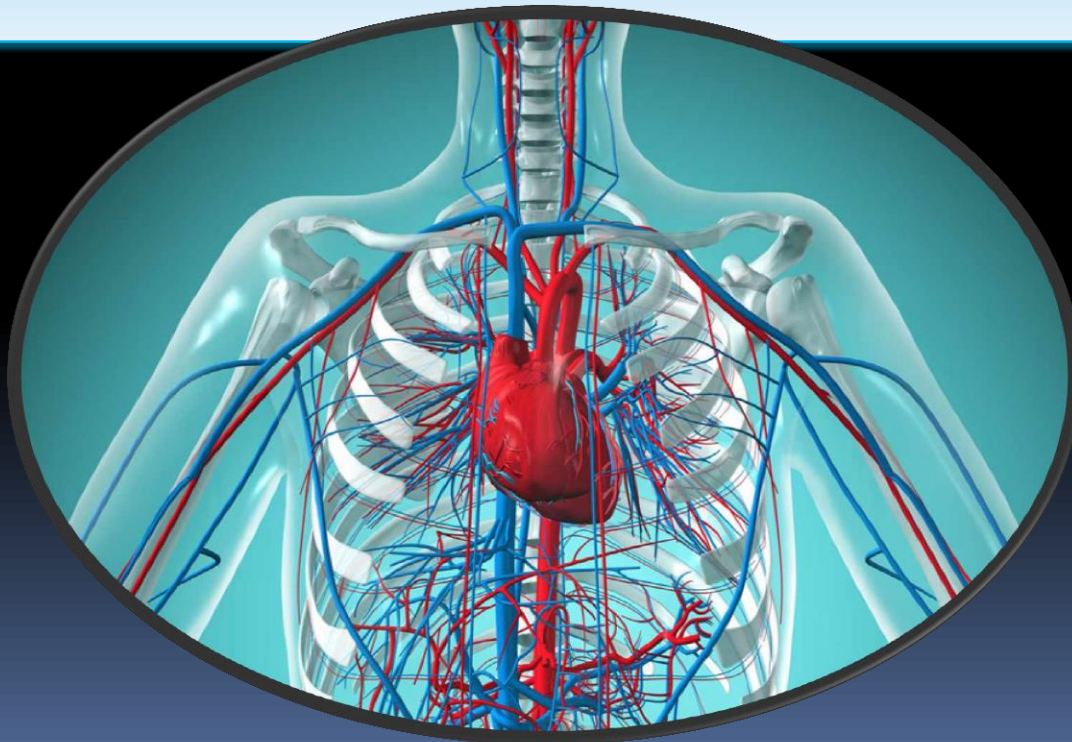


Cardiovascular System

8Th & 9th Lecture



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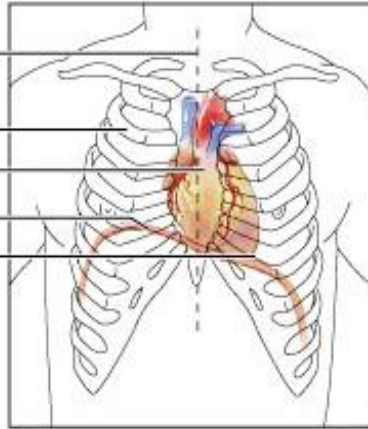
FUNCTIONS OF THE HEART

- **Generating blood pressure**
- **Routing blood**
 - Heart separates pulmonary and systemic circulations**
- **Ensuring one-way blood flow**
 - Heart valves ensure one-way flow**
- **Regulating blood supply**
 - Changes in contraction rate and force match blood delivery to changing metabolic needs**

HEART

- **Heart is a four chambered, hollow muscular organ approximately the size of your fist**
- **Location:**
 - **Superior surface of diaphragm**
 - **Left of the midline**
 - **Anterior to the vertebral column, posterior to the sternum**

Midsternal
line
2nd rib
Sternum
Diaphragm
Point of
maximal
intensity
(PMI)



(a)

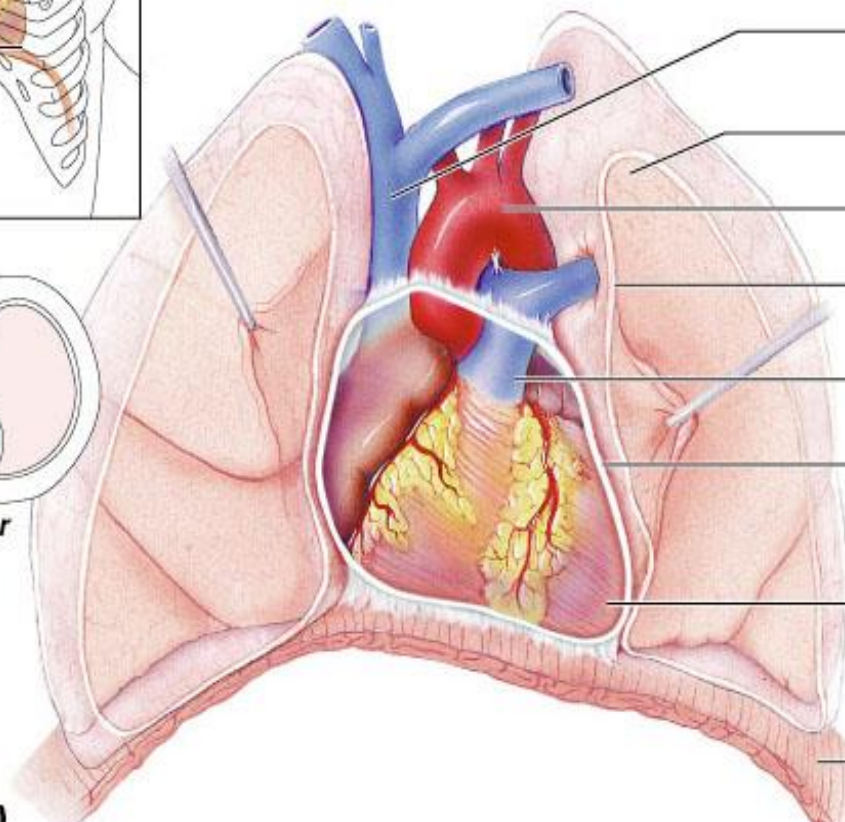
Right lung
Heart



(b)

(c)

Superior
vena cava
Left lung
Aorta
Parietal
pleura (cut)
Pulmonary
trunk
Parietal
pericardium
(cut)
Apex of
heart
Diaphragm



The Parts of the Cardiac System

The cardiac system consists of the heart.

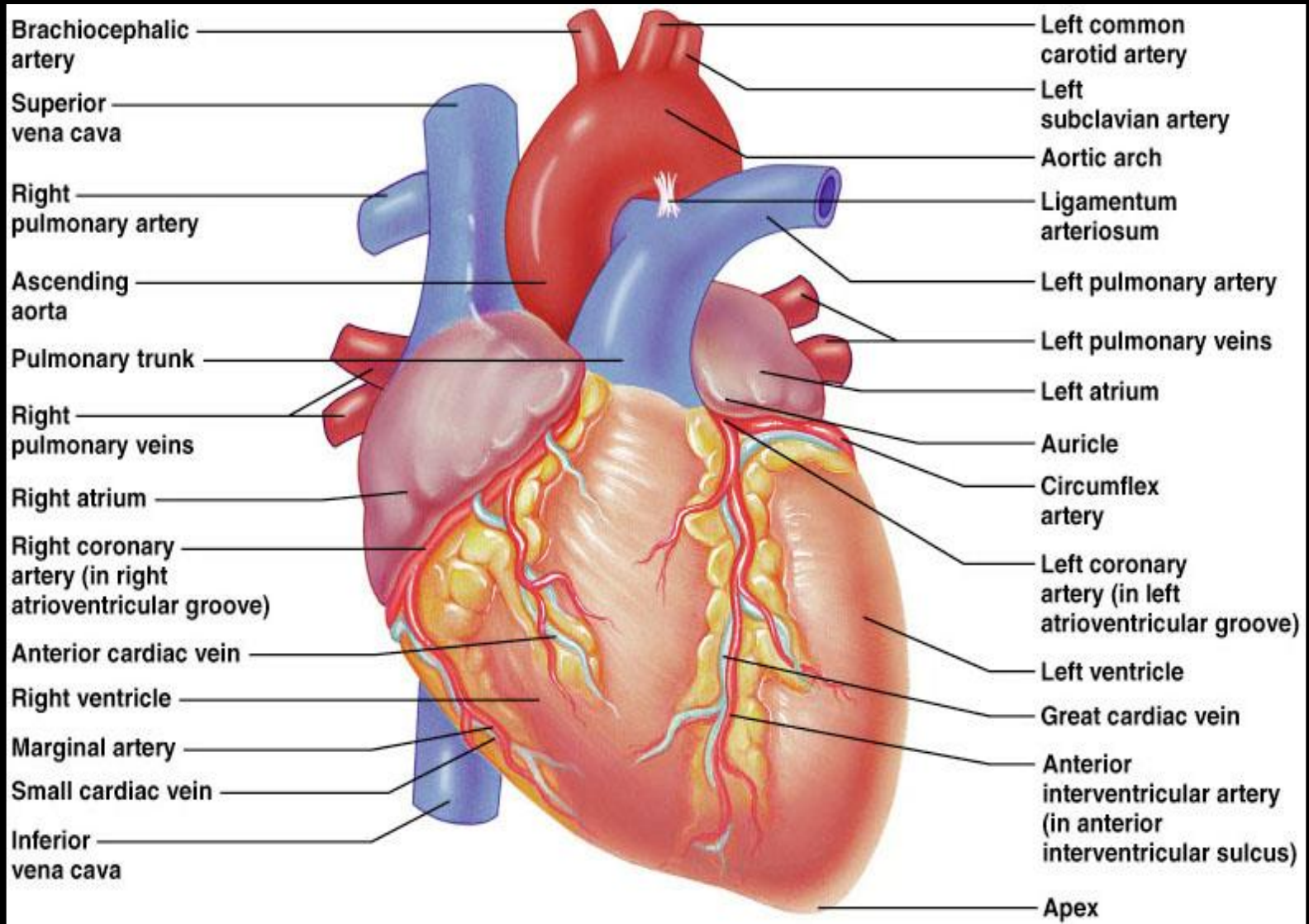
The cardiovascular system consists of the heart and the circulatory system

Vessels returning blood to the heart:

- 1. Right and left pulmonary veins**
- 2. Superior and inferior venae cavae**

Vessels conveying blood away from the heart:

- 1. Aorta**
- 2. Right and left pulmonary arteries**



The Layers of the Heart

- 1. Epicardium**
- 2. Myocardium**
- 3. Endocardium**

Pericardium – a double-walled sac around the heart composed of:

A superficial fibrous pericardium.

A deep two-layer serous pericardium.

The parietal layer lines the internal surface of the fibrous pericardium.

The visceral layer or epicardium lines the surface of the heart.

They are separated by the fluid-filled pericardial cavity.

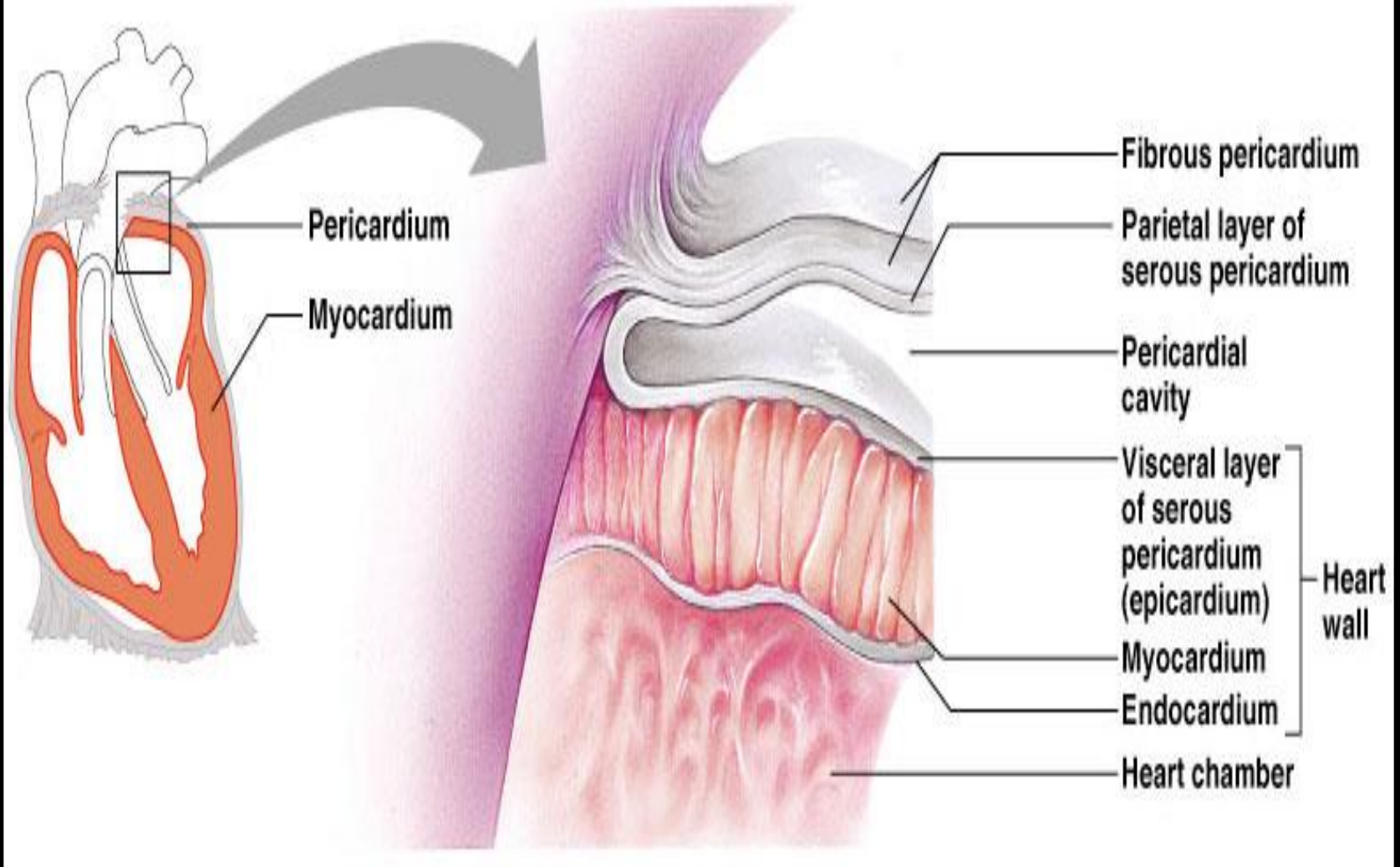
The Function of the Pericardium:

Protects and anchors the heart

Prevents overfilling of the heart with blood

Allows for the heart to work in a relatively friction-free environment

- **Myocardium – cardiac muscle layer forming the bulk of the heart**
- **Endocardium – endothelial layer of the inner myocardial surface**



The Chambers of the Heart:

The four chambers of the heart are the:

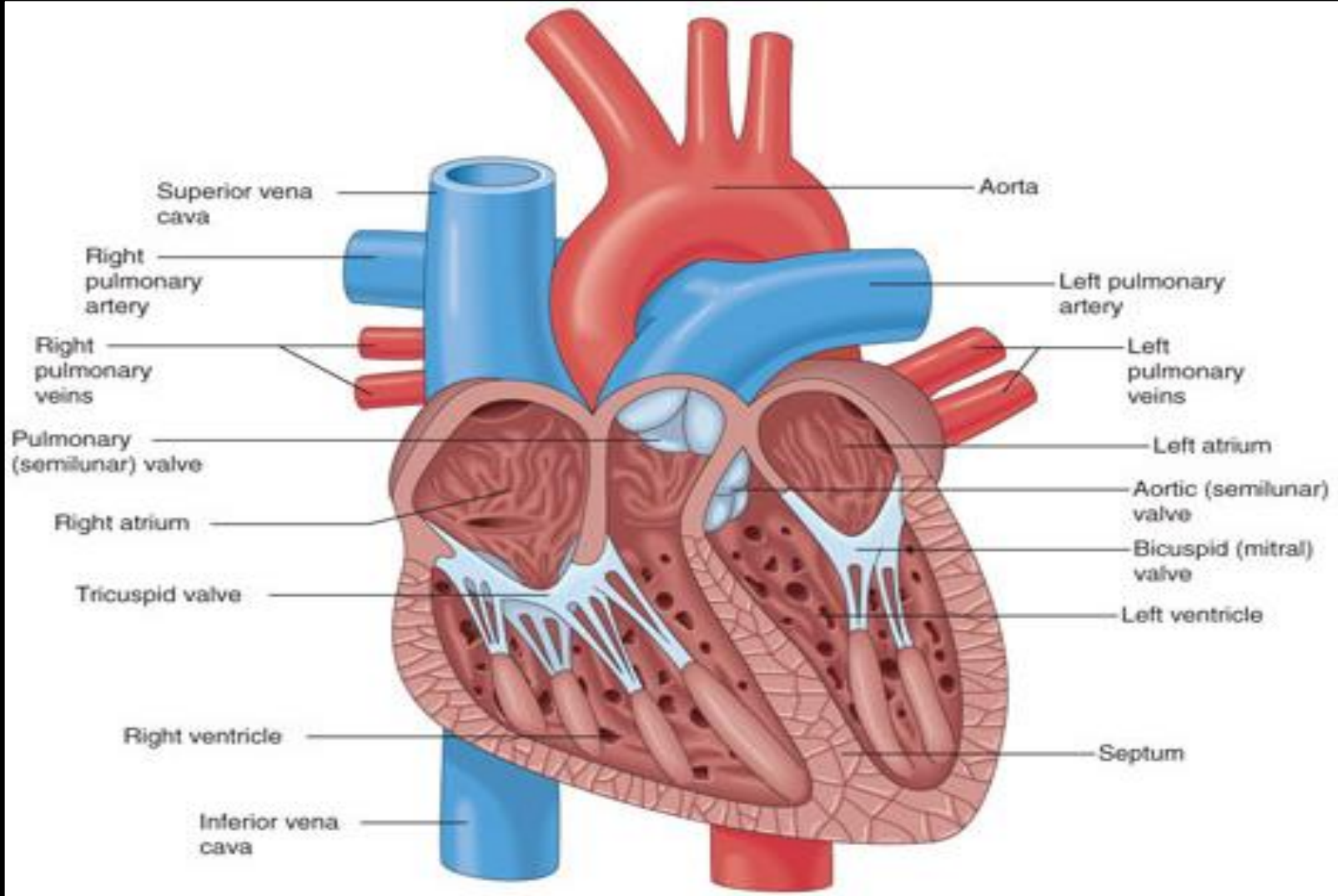
- **Upper chambers: right and left atria**
- **Lower chambers: right and left ventricles**

The atria are smaller in size than the ventricles and the walls of the atria are thinner and less muscular than the ventricles.

The right ventricle is smaller and less muscular than the left ventricle of the heart.

Chambers separated internally by septum

The ventricular septum, as the name suggests, separates the right ventricle from the left ventricle of the heart, and the atrial septum, as the name suggests, separates the right atrium from the left atrium of the heart.



Atrium

The right atrium receives deoxygenated from the body and enter the heart by the superior vena cava and the inferior vena cava.

The left atrium holds richly oxygenated blood that flows directly into the left atrium from the right and the left pulmonary veins from the lung.

Ventricle

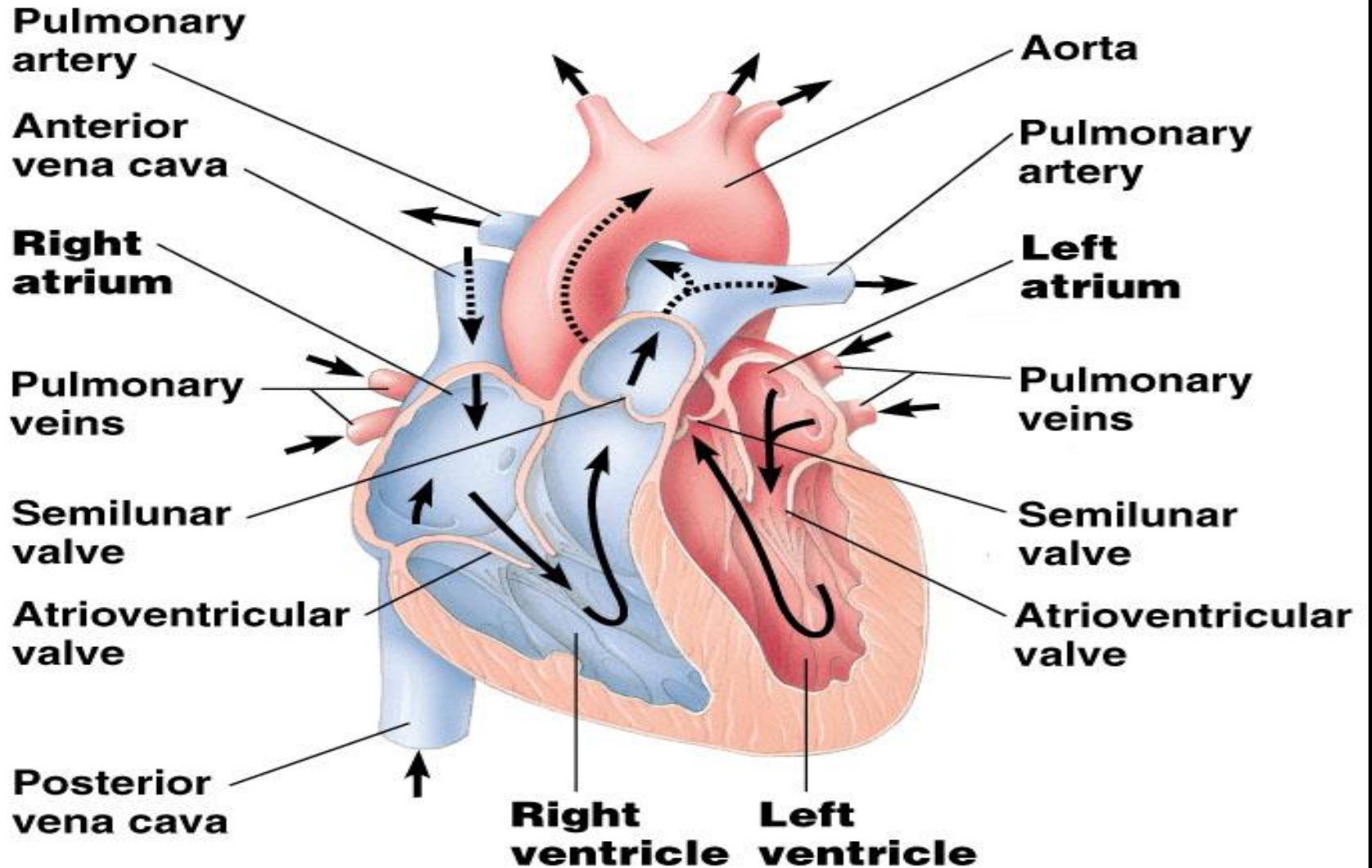
The right ventricle receives deoxygenated blood from the right atria and it then pumps it from the heart to the lungs.

The left ventricle receives oxygenated blood from the left atria and it then pumps it from the heart to the rest of the body through the aorta.

The cardiac cycle:

- 1. Two atria contract while ventricles relax**
- 2. Two ventricles contract while atria relax**
- 3. The cardiac cycle begins again**

The contraction of the heart that is referred to as systole and the relaxation of the heart muscle for rest which is referred to as diastole.



A blood pressure of 120/80 means that systole, is 120; diastole is 80. The normal blood pressure for an adult is 120/80.

When the blood pressure is higher than 120/80, the person has hypertension.

When the blood pressure is lower than 120/80, the person has hypotension.

The Valves of the Heart

The four valves of the heart are:

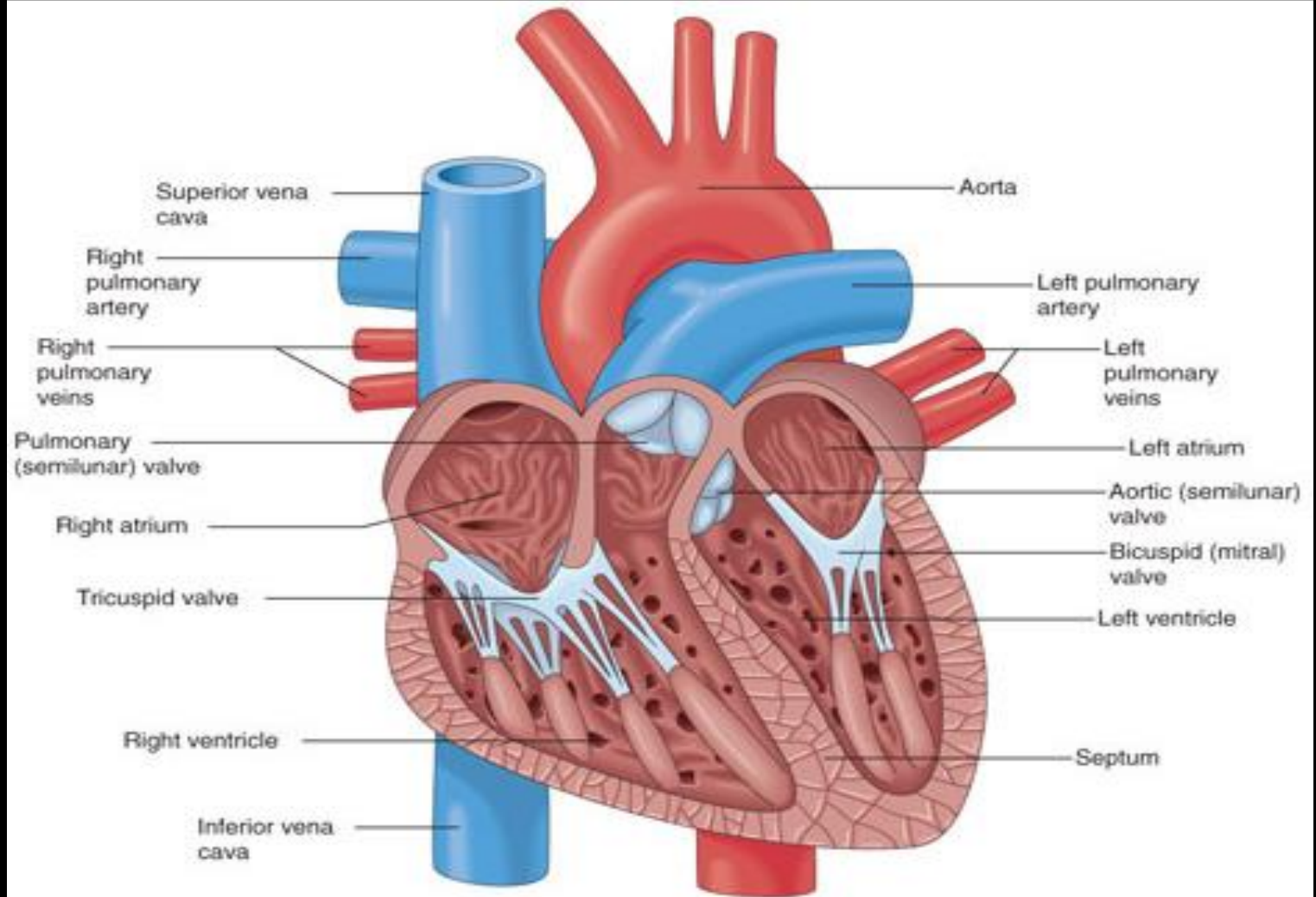
Bicuspid or mitral valve

Tricuspid valve

Pulmonary valve

Aortic valve

- **Atrioventricular**
 - **Tricuspid** (three cusps)
 - Between right atrium and right ventricle
 - **Bicuspid** (two cusps)
 - Between left atrium and left ventricle
- **Semilunar**
 - **Pulmonary**
 - Right ventricle
 - Pulmonary trunk exits the heart
 - **Aortic**
 - Left ventricle
 - Ascending aorta leaves the heart

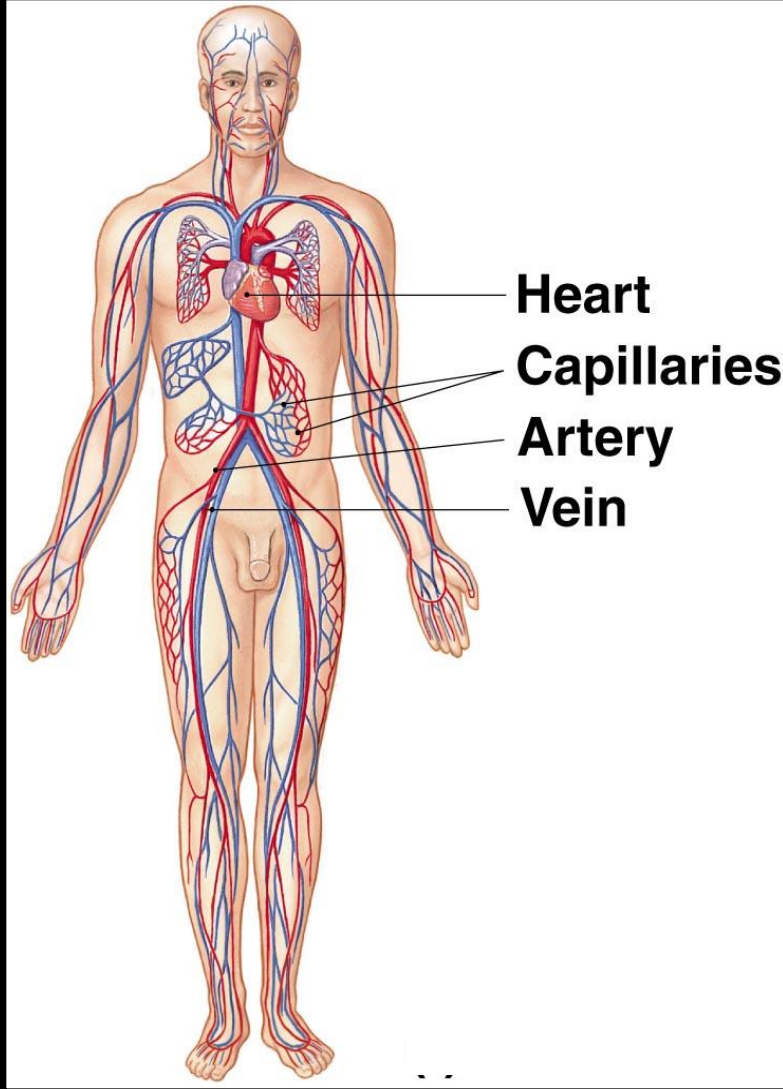


Pathway of Blood Through the Heart and Lungs

- Right atrium → **tricuspid valve** → right ventricle
- Right ventricle → **pulmonary semilunar valve** → pulmonary arteries → lungs
- Lungs → pulmonary veins → left atrium
- Left atrium → **bicuspid valve** → left ventricle
- Left ventricle → **aortic semilunar valve** → aorta
- Aorta → systemic circulation

Cardiovascular system

- ▶ **The cardiovascular system is transport system of body**
- ▶ **It comprises blood, heart and blood vessels.**
- ▶ **The system supplies nutrients to and remove waste products from various tissue of body.**



Heart

Capillaries

Artery

Vein

FUNCTION OF CARDIOVASCULAR SYSTEM

- ▶ **Transport nutrients, hormones**
- ▶ **Remove waste products**
- ▶ **Gaseous exchange**
- ▶ **Immunity**
- ▶ **Blood vessels transport blood**
 - **Carries oxygen and carbon dioxide**
 - **Also carries nutrients and wastes**
- ▶ **Heart pumps blood through blood vessels**

BLOOD VESSELS

- **Blood Vessels -A closed network of tubes**
- **These includes:**
 - **Arteries**
 - **Capillaries**
 - **Veins**

ARTERIES

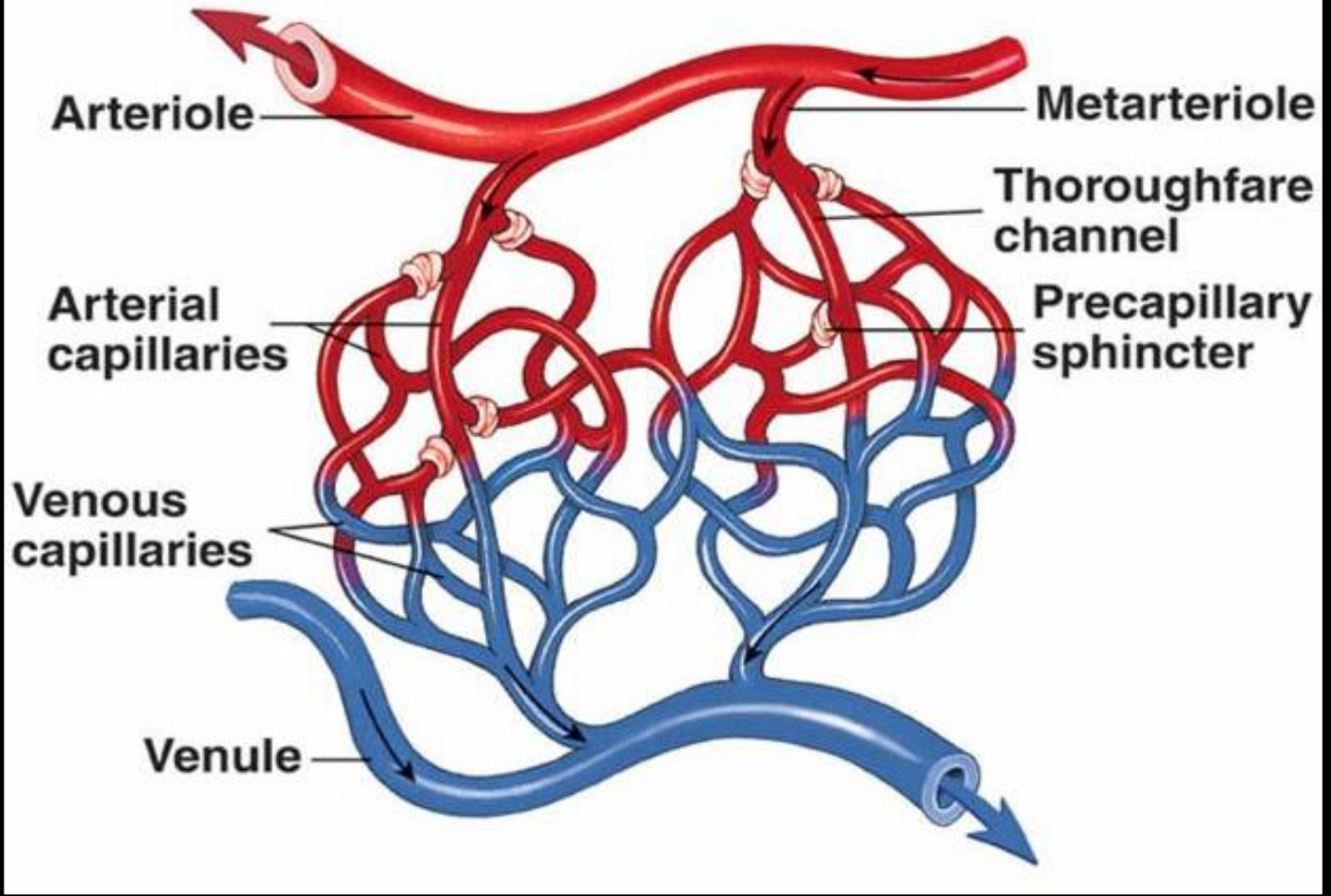
- ▶ **Blood vessels that carry blood away from the heart are called arteries.**
- ▶ **They are the thickest blood vessels and they carry blood high in oxygen known as oxygenated blood (oxygen rich blood).**

CAPILLARIES

- **The smallest blood vessels are capillaries and they connect the arteries and veins.**
- **This is where the exchange of nutrients and gases occurs.**

VEINS

- **Blood vessels that carry blood back to the heart are called veins.**
- **They have one-way valves which prevent blood from flowing backwards.**
- **They carry blood that is high in carbon dioxide known as deoxygenated blood (oxygen poor blood).**



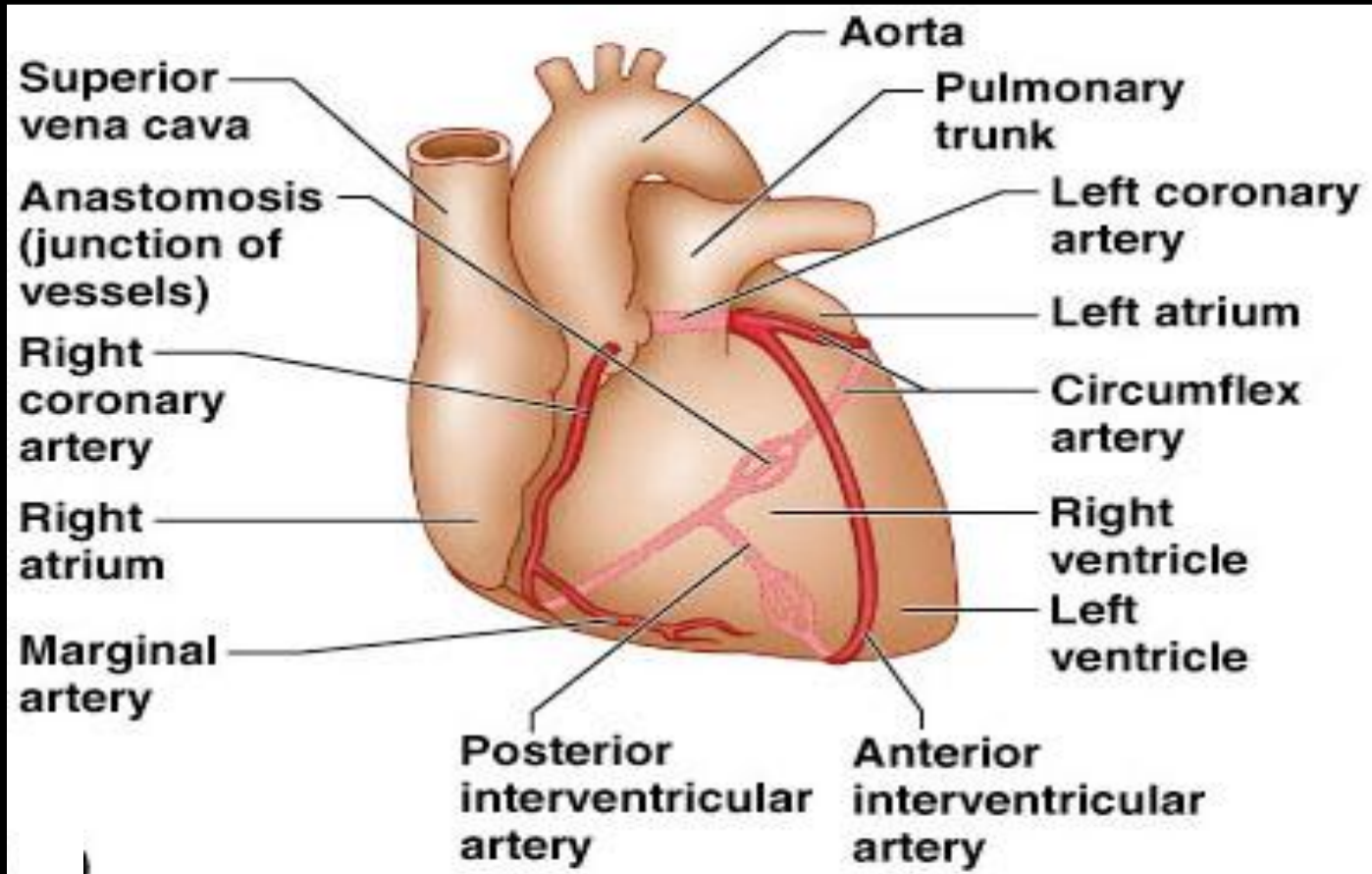
CIRCULATION

Coronary circulation – the circulation of blood within the heart.

Pulmonary circulation – the flow of blood between the heart and lungs.

Systemic circulation – the flow of blood between the heart and the cells of the body.

CORONARY CIRCULATION



SYSTEMIC AND PULMONARY CIRCULATION

