Anatomy and Physiology

Bachelor of Physical Education (B.P.Ed.)

Course Material for Students circulation

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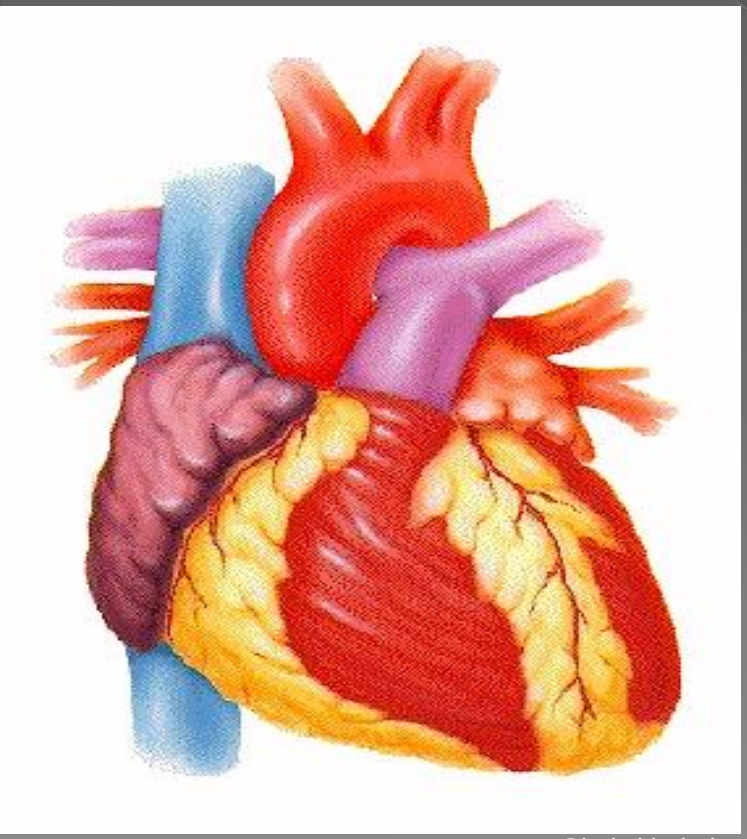
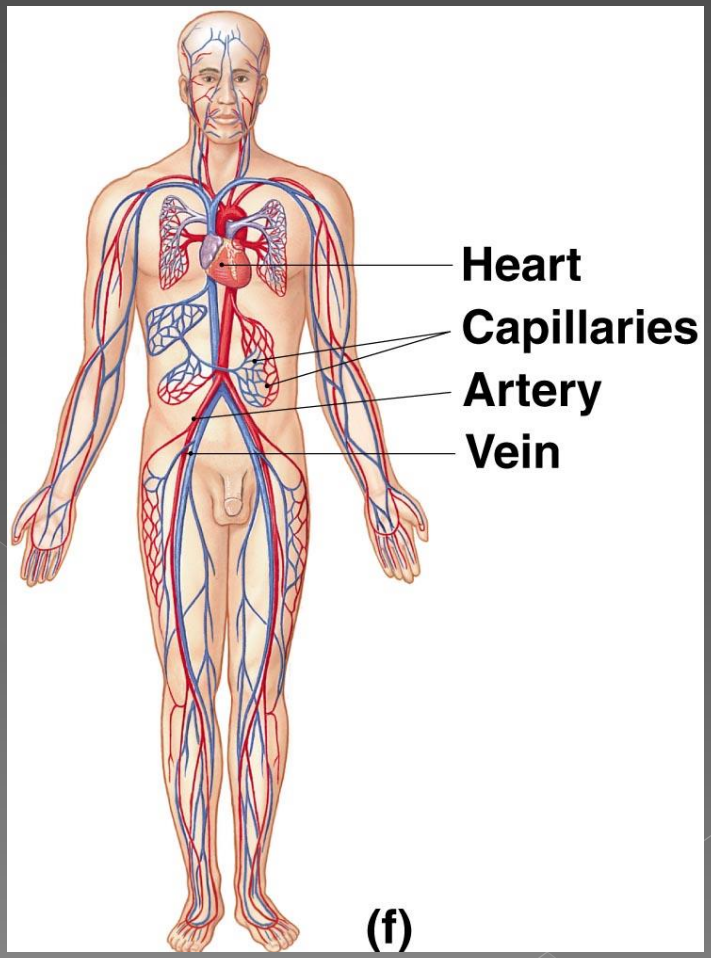
Introduction to the Human Cardiovascular System



INTRODUCTION

- 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.
- The conveying media is liquid in form of blood which flows in close tubular system.



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

COMPONENTS OF CARDIOVASCULAR SYSTEM

- BLOOD
- HEART
- BLOOD VESSELS

BLOOD

- The Blood: Blood cells & Plasma
- Blood cells

1- Erythrocytes - Red Blood Cells
2- Leucocytes
3- Thrombocytes

- Plasma is fluid portion

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

HEART

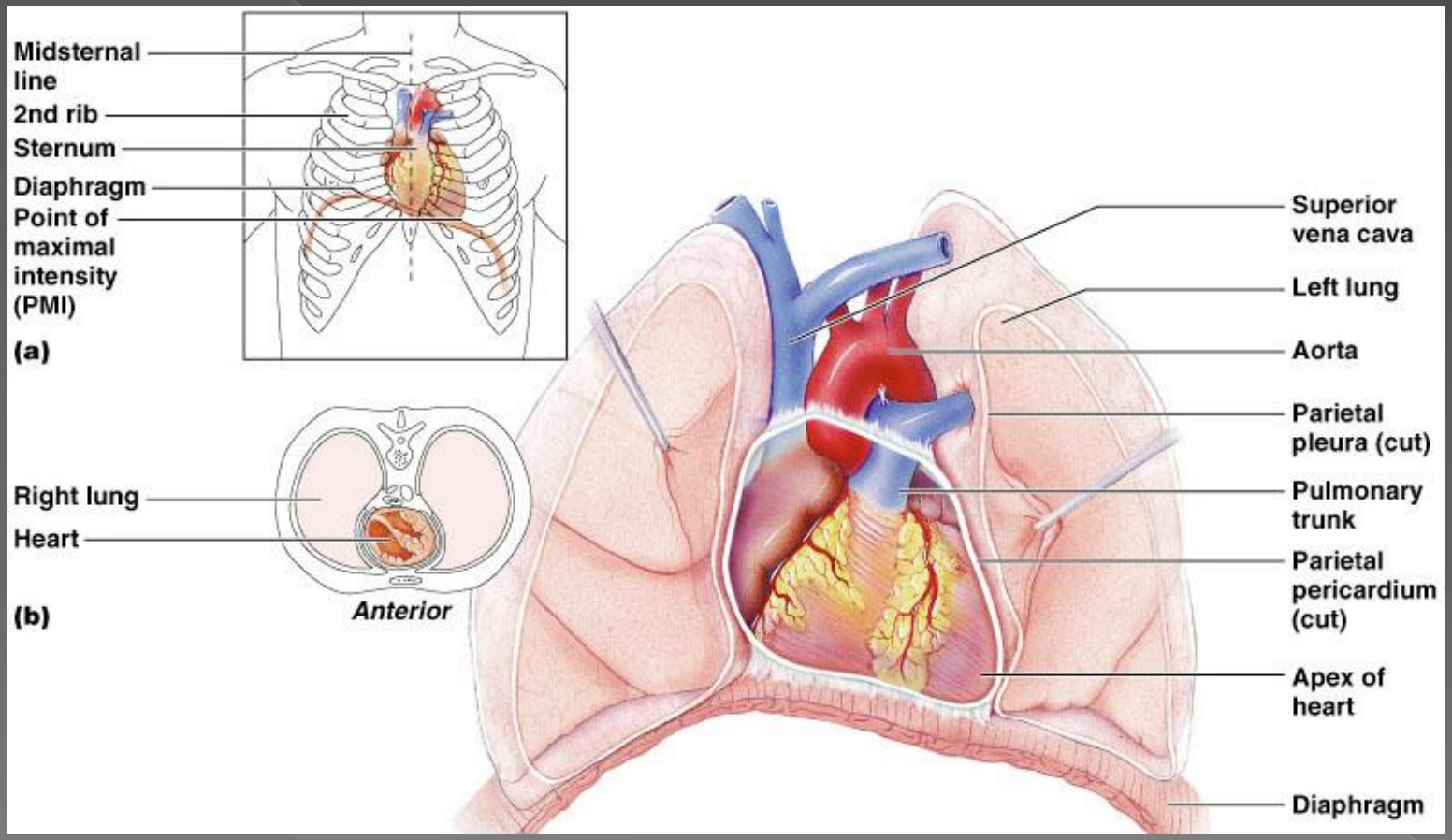
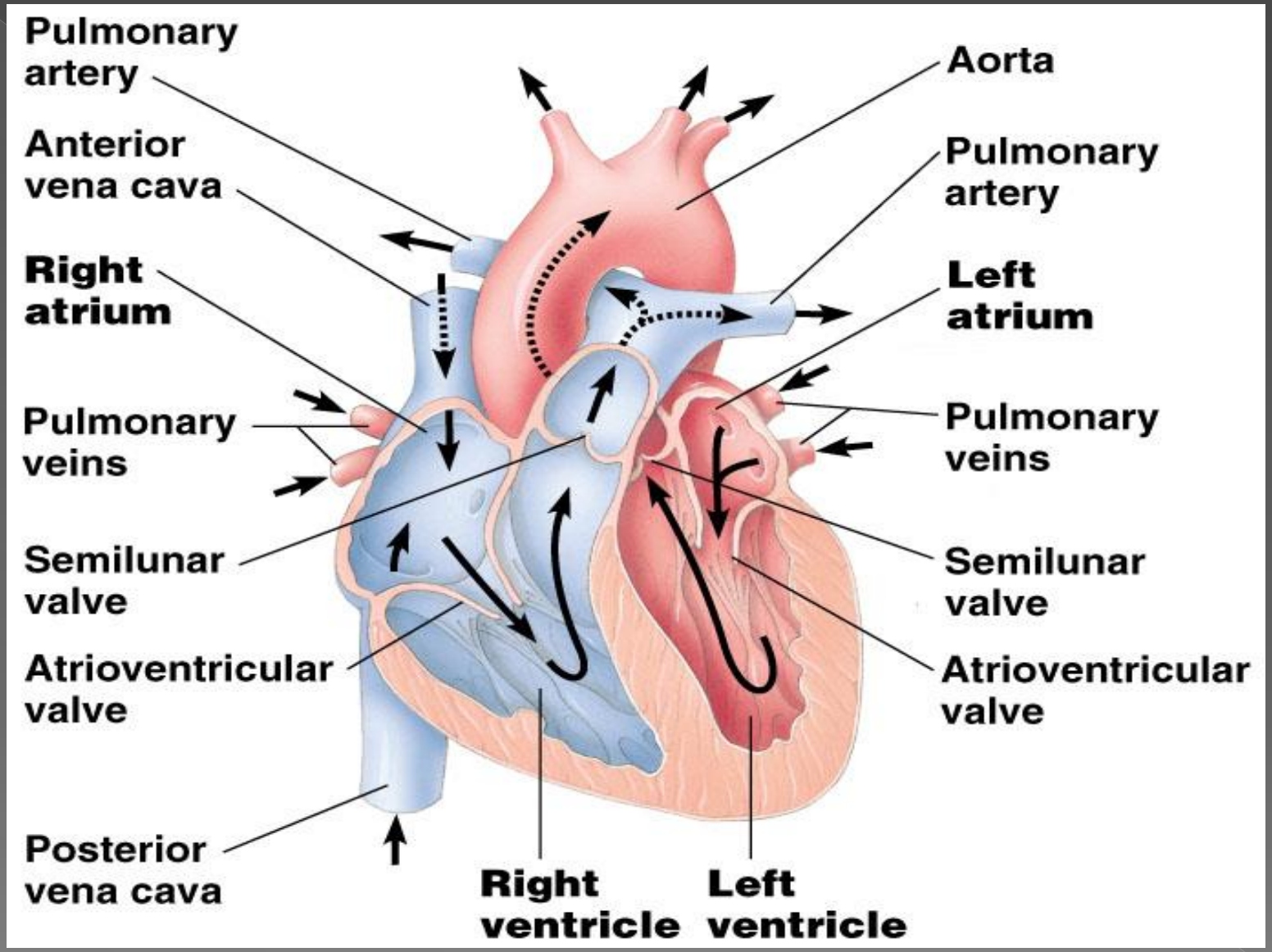


Figure 18.1


Pulmonary artery
Anterior vena cava
Right atrium
Pulmonary veins
Semilunar valve
Atrioventricular valve
Posterior vena cava
Right ventricle
Left ventricle
Aorta
Pulmonary artery
Left atrium
Pulmonary veins
Semilunar valve
Atrioventricular valve

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

BLOOD VESSELS

- **Blood Vessels -A closed network of tubes**

- **These includes:**
  - **Arteries**
  - **Capillaries**
  - **Veins**

BLOOD VESSELS

-Arteries(Distributing channel)

- Thick walled tubes
- Elastic Fibers
- Circular Smooth Muscle

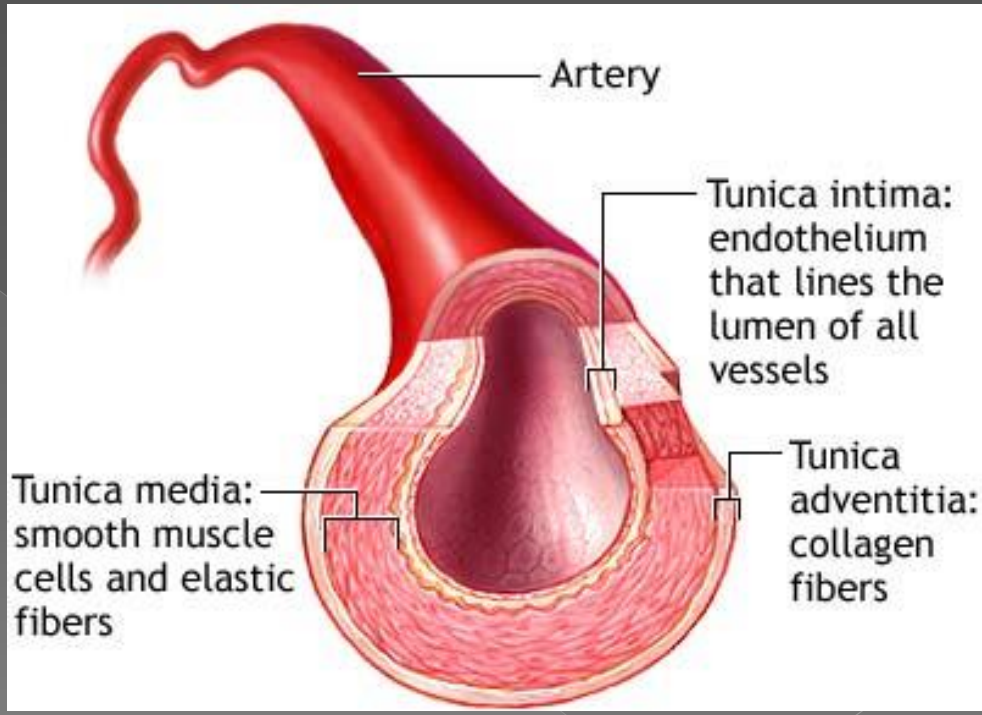
›Capillaries (microscopic vessels)

- One cell thick
- Serves the Respiratory System

›Veins (draining channel)

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).



ARTERIES

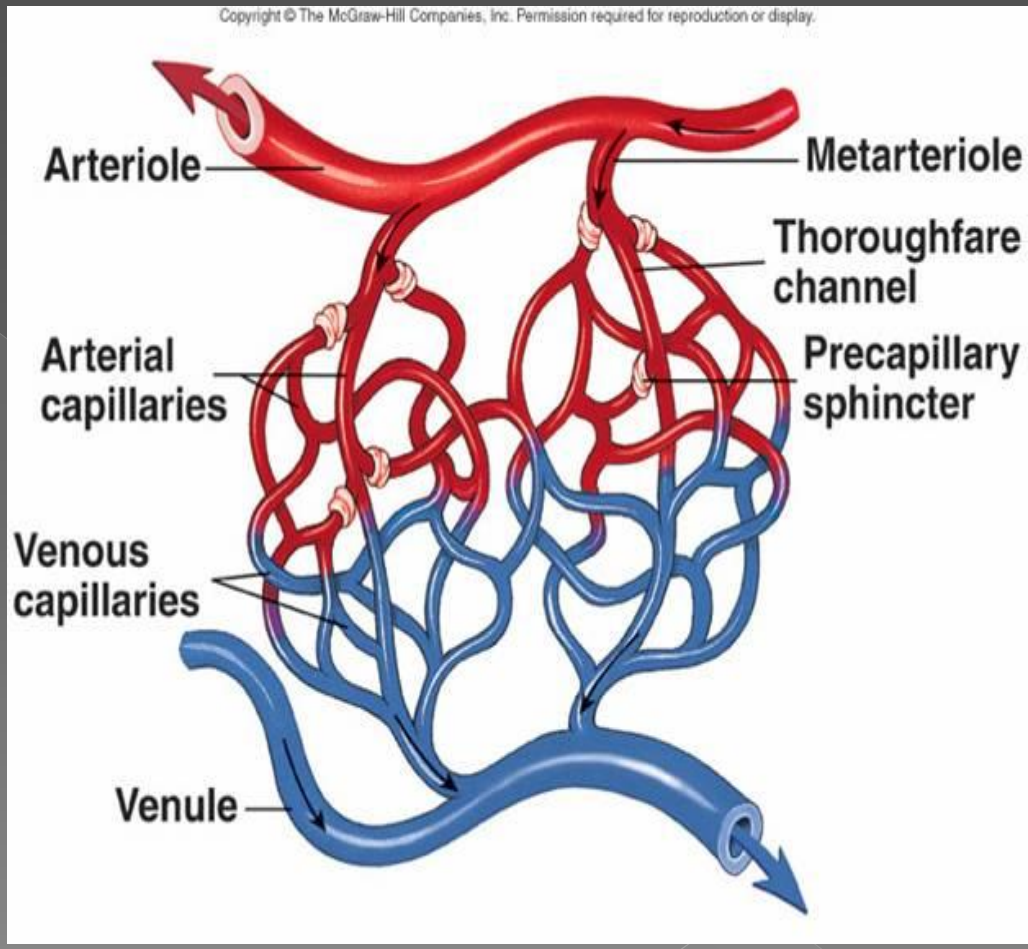
- Accompanied by vein and nerves
- Lumen is small
- No valves
- Repeated branching

CLASSIFICATION OF ARTEIES

- Elastic- e.g. (Aorta & its Major branches)
- Muscular -e.g.(Renal, Testicular, Radial, Tibial etc.)
- Arterioles (<0.1 mm)-
  - Terminal arterioles
  - Meta-arterioles
  - Thoroughfare channel/ preferred

CAPILLARIES (5-8 micron)

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

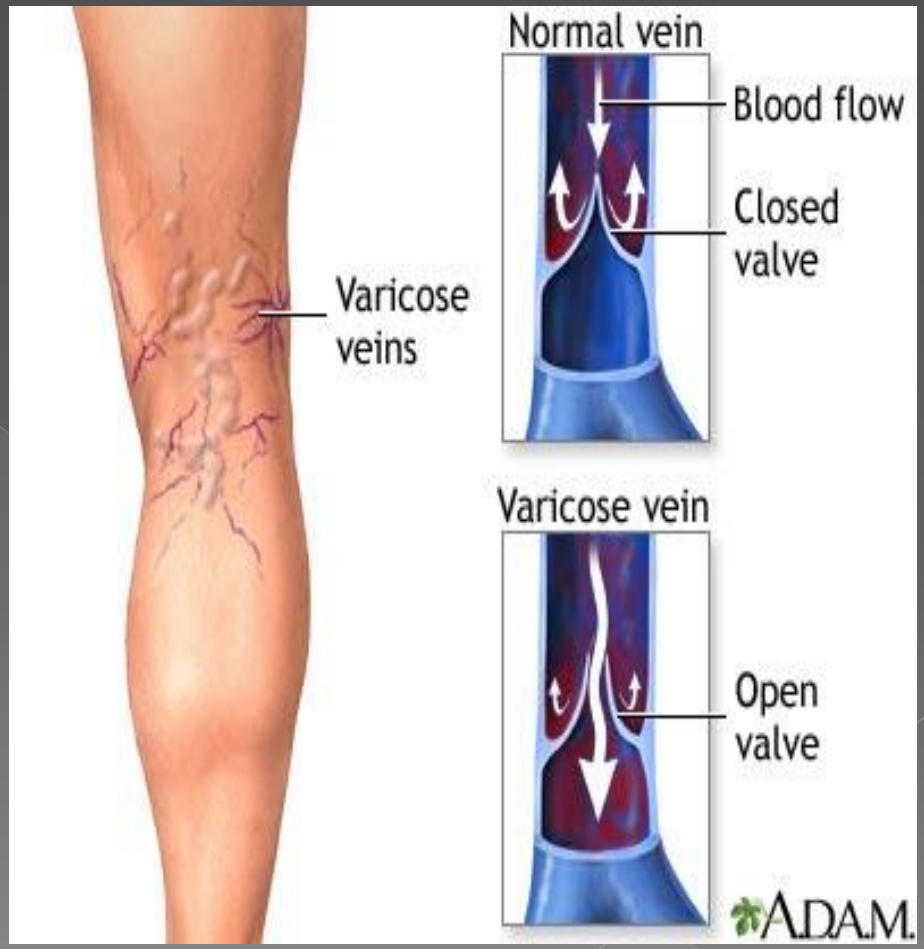


BODY CONTAINS TWO KINDS OF CAPILLARIES

- CONTINUOUS-SKIN, LUNG, SMOOTH MUSCLE, CONNECTIVE TISSUES
- FENESTRATED- PANCREAS,ENDOCRINE GLANDS, SMALL INTESTINE,CHOROID PLEXUS,CILLIARY PROCESS etc.

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).



VEINS

- Thin Walled
- Large irregular lumen
- Have valves
- Dead space around
- Types:
  - Large
  - Medium
  - Small

VEINS

- Veins without valves:
  - SVC & IVC
  - Hepatic, Renal
  - Uterine, Ovarian not Testicular
  - Facial
  - Pulmonary
  - Umbilical
  - Emissary
  - Portal Veins <2mm

CIRCULATION

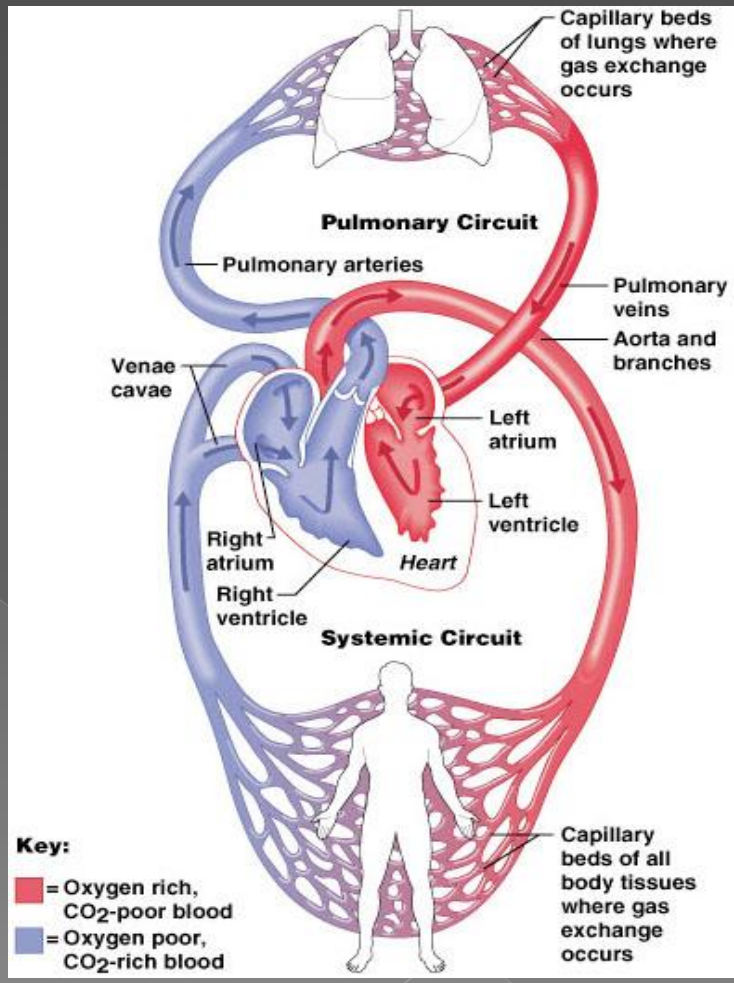
- Coronary circulation – the circulation of blood within the heart.
- Pulmonary circulation – the flow of blood between the heart and lungs.
- Systemic circulation – the flow of blood between the heart and the cells of the body.
- Fetal Circulation

SYSTEMIC AND PULMONARY CIRCULATION

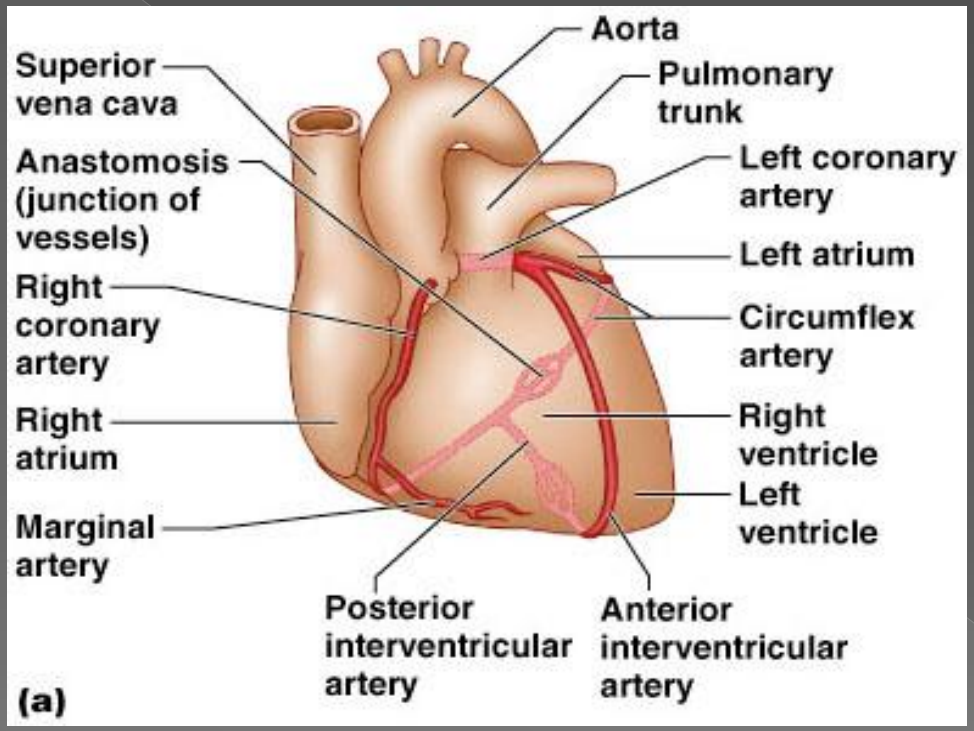
Pulmonary circulation

The flow of blood between the heart and lungs.

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

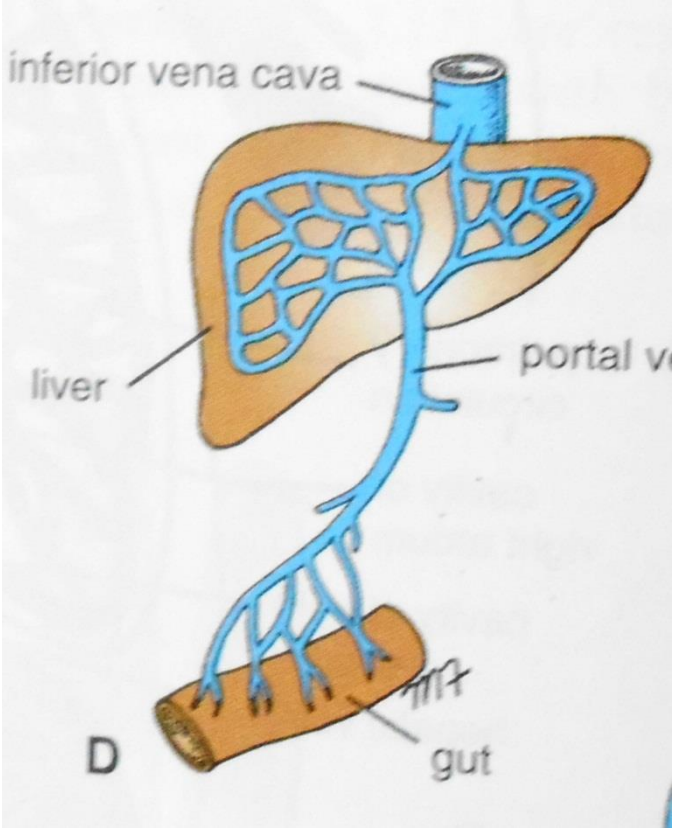


CORONARY CIRCULATION: ARTERIAL SUPPLY



PORTAL CIRCULATION

- **Portal circulation - the flow of blood between tow set of capillaries before draining in systemic veins.**




Thank you