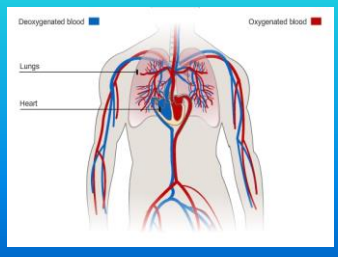
TRANSPORT SYSTEMS



WHY ARE THEY NEEDED?

Complex, multicellular organisms such as humans require a transport system

= a system of tubes & vessels to move wastes & nutrients **efficiently** & **quickly** enough to **sustain life**

- regulates **body temperature**

WHAT IS TRANSPORTED?

- **nutrients (glucose, amino acids, fatty acids, minerals & vitamins) water, hormones, antibodies gases ($C0_2$, 0_2), wastes**

WHY ARE THEY TRANSPORTED?

- maintain a state of **homeostasis**

GENERAL COMPONENTS OF A TRANSPORT SYSTEM

a) transport medium
= **fluid**
- blood

b) transport vessels
= **tubes involved**
- arteries, veins & capillaries

c) pumping organ
= **heart**
- muscle contraction

THE CIRCULATORY SYSTEM

Humans have a **closed** circulatory system
= blood is pumped by the **heart** & always contained in **tubes & vessels.**

Types of Blood Vessels:

a) Arteries
: **thick walled** (3 layers)
: small diameter for blood flow
: **elastic** = withstand pressure
: carry blood **away** from the heart

b) Capillaries
: walls are a **single cell layer thick**
: responsible for **exchange** of gas, nutrients & waste between the blood & body cells

c) Veins
: **thin walls**, less smooth muscle
: less elastic
: larger diameter for blood flow
: carry blood back **to** the heart
: contain **valves** to prevent **backflow**
: the valves in combination with the movement of skeletal muscles aid in returning blood to the heart

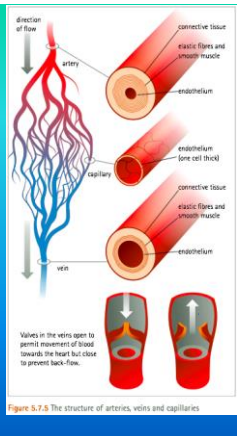


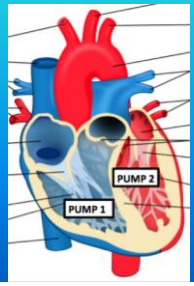
Figure 5.7.5 The structure of arteries, veins and capillaries

THE HEART

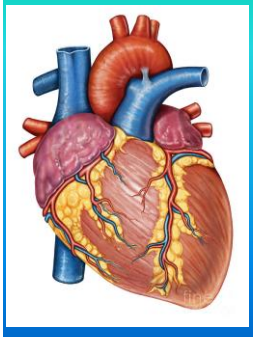
The human heart is a **double pump**

= 2 pumps running simultaneously beside one another

- The right side pumps **deoxygenated** blood to the lungs for gas exchange
  = **Pulmonary Circulation**
- The left side pumps **oxygenated** blood to the body for nutrient / waste / gas exchange
  = **Systemic Circulation**



Heart Structure and Function

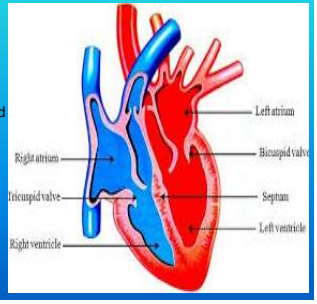


- A four chambered, muscular organ located in the thoracic cavity
- Made of **Cardiac** muscle
- Surrounded by a tough membrane called the **Pericardium** that protects it
- Responsible for the one-way movement of blood through vessels using **muscular contractions**

Heart Structure and Function (cont)

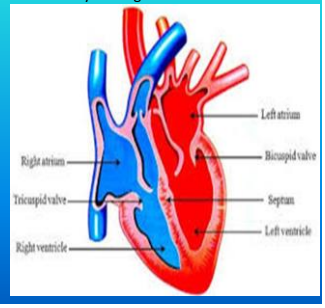
a) Atria (left & right)
- thin-walled **collection chambers** of the heart
  → left: collects **oxygenated** blood,
  → right: collects **deoxygenated** blood

b) Ventricles (left & right)
- muscular **pumping chambers** of the heart
  → left: pumps **oxygenated** blood,
  → right: pumps **deoxygenated** blood

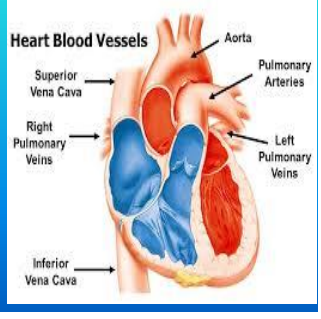


c) Valves (A.V. & Semilunar)
- prevent **backflow of blood**
  → Atrioventricular
  = located between each atrium & ventricle
  → Semilunar
  = located between each ventricle & the artery leading off of it

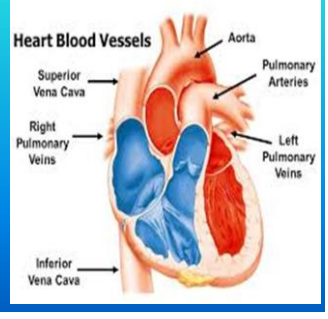
d) Septum
- wall of muscle **separating the two ventricles**
  = prevents mixing of oxygenated & deoxygenated blood



e) Arteries
- carry blood **AWAY** from the heart
- Pulmonary Arteries (left & right)
  = carry **de-oxygenated** blood from the **heart (r.v.) to lungs**
  ***only arteries that carry de-oxygenated blood
- Aorta
  = the largest artery in the body
- carries **oxygenated** blood from the **heart (l.v.) to body**

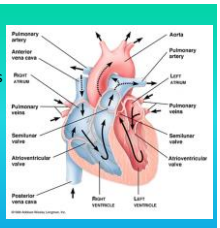


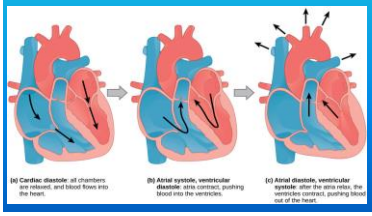
f) Veins
- carry blood back **TO** the heart
- Pulmonary Veins (left & right)
  = carry **oxygenated** blood from **lungs to heart (l.a.)**
- Vena Cava
  = carries **de-oxygenated** blood back to **heart (r.a.)**
  - superior vena cava:
    - comes from head
  - inferior vena cava:
    - comes from the rest of the body



CARDIAC CYCLE

= **Pumping action** of the heart
- Is the "Lub Dub" sound you hear as your heart beats
- Divided into 2 Stages for each heartbeat:
  - **Diastole** - When the heart is at rest (Dub)
  - **Systole** – When the heart contracts (Lub)
- monitoring the cardiac cycle:
  - **Pulse** – rate of the cardiac cycle
  - **Blood Pressure** – force of the cardiac cycle





- Cardiac Output
= amount of blood pumped by the heart in 1 minute
- Depends upon:
  Heart Rate (beats per min)
  Stroke Volume (amount per beat)

CIRCULATION

There are two types of circulation that happen in humans :

a) Pulmonary Circulation
= circulation of blood between the **heart & lungs**
- adds **oxygen** & removes **carbon dioxide** from the blood

b) Systemic Circulation
= circulation of blood between the **heart & the rest of the body**.
- allows **gas and nutrient/waste** exchange between the blood & body cells