

# The Circulatory & Respiratory Systems

Virtual Science University

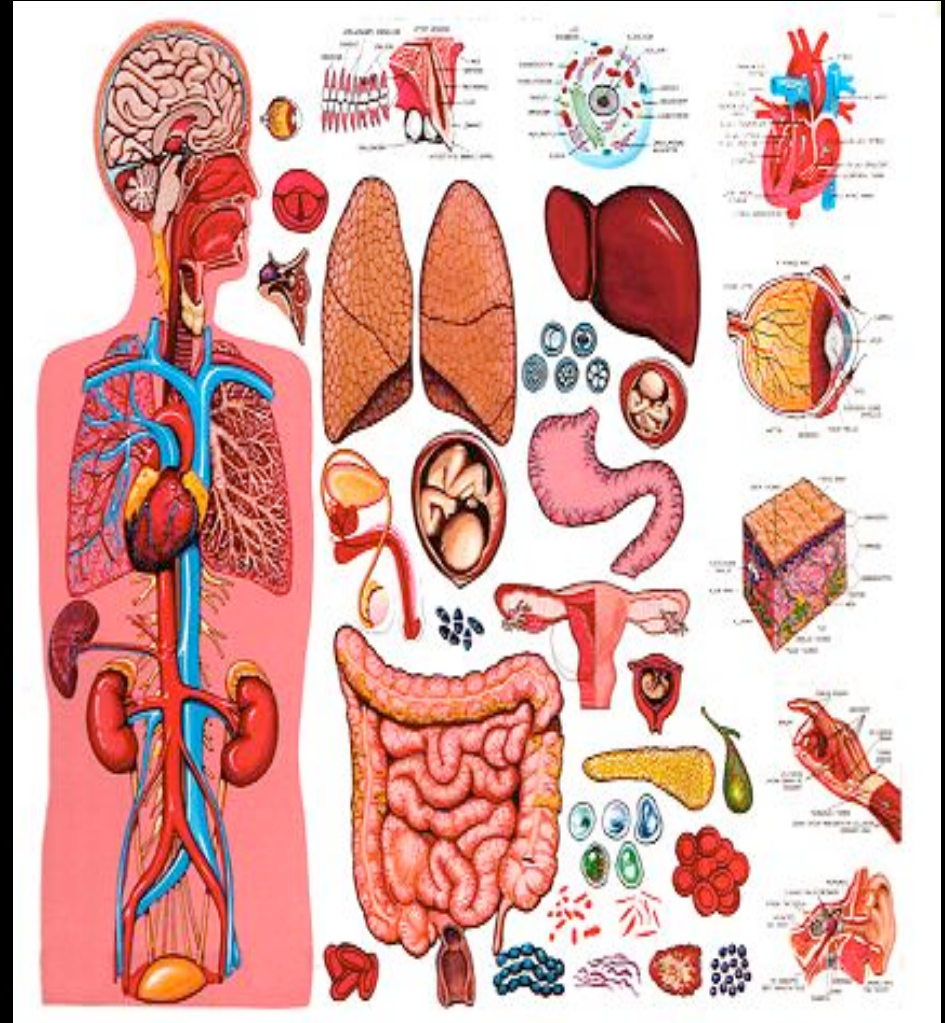
# The Circulatory & Respiratory Systems

**Texas TEK B.10(A)** The student will interpret the function of systems in organisms (humans) including the Circulatory and Respiratory Systems.

**Texas TEK B.10(B)** The student will compare the interrelationships of Circulatory and Respiratory Systems to each other and to the body as a whole.

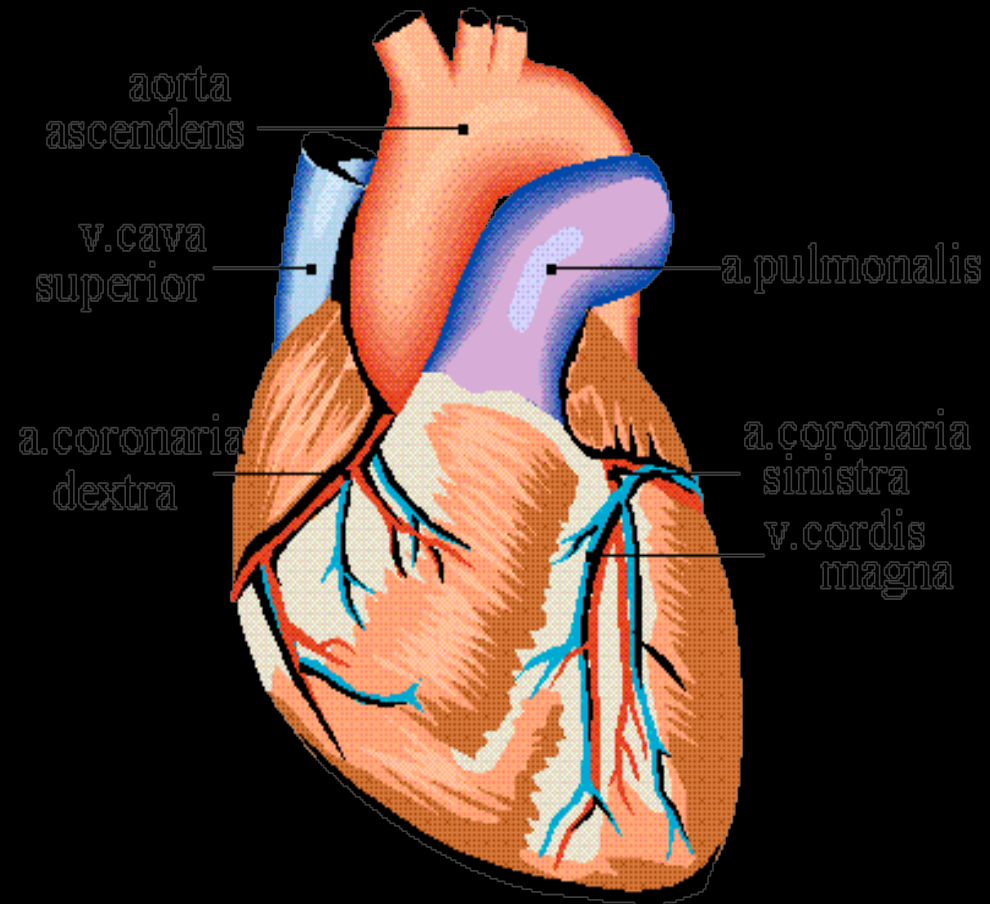
# Introduction to Systems

- The human body is like a complex organization that has an important job to get done on a tight deadline.
- In order to get everything done perfectly and on time, it has to use a system.
- Actually, the human body uses many systems that work side by side.



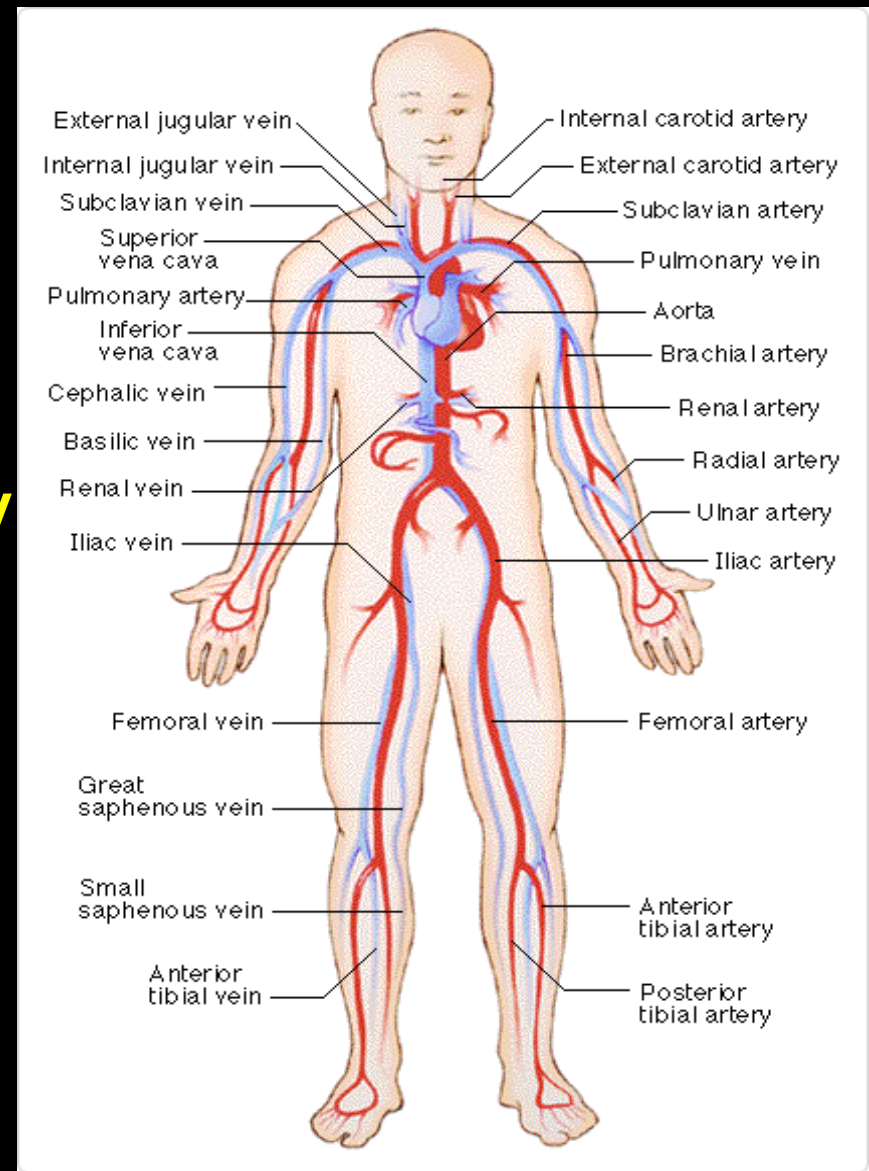
# Introduction to Systems

- Some of the body's systems are directly connected to the heart, while others are not.
- Of course, the heart is like the **president** of the organization.
- Even if it is not directly involved in the system, it still plays a part.



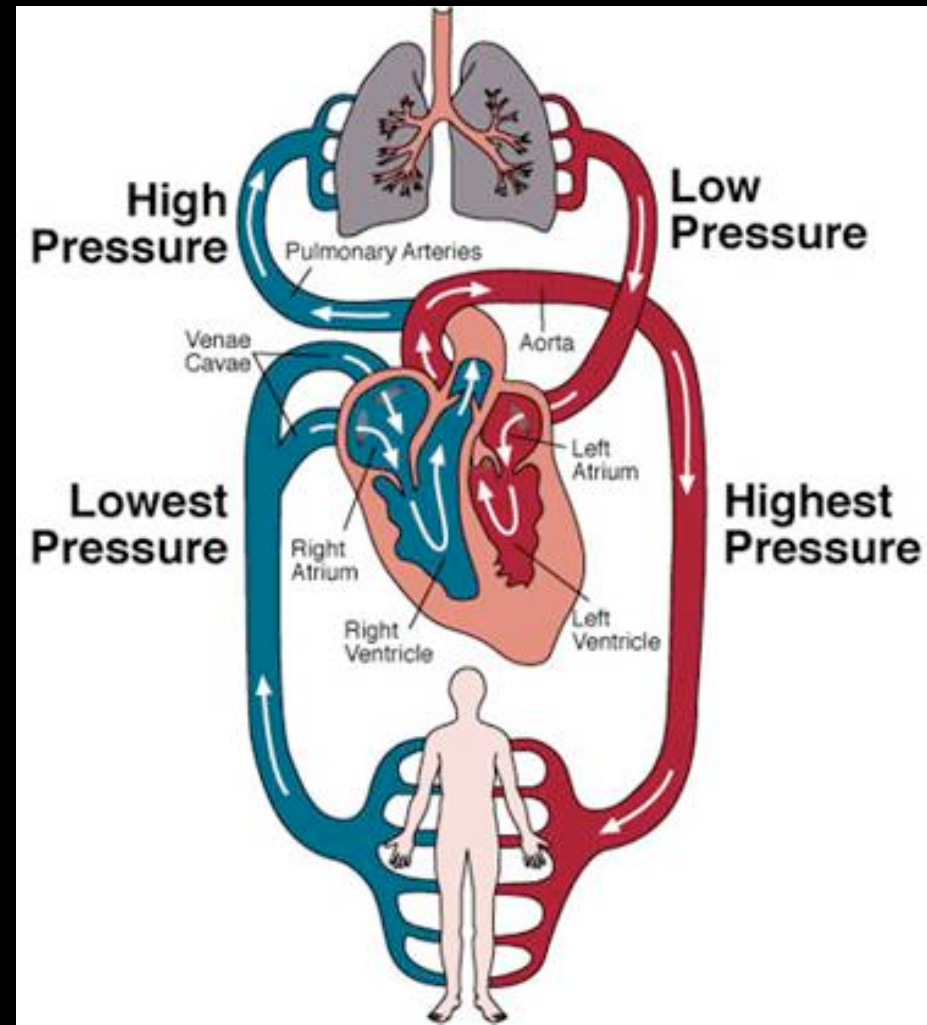
# Introduction to Systems

- The heart actively participates in the **circulatory system**, while it just keeps an eye on the **respiratory system (lungs)** & **excretory system (liver & kidneys)**.



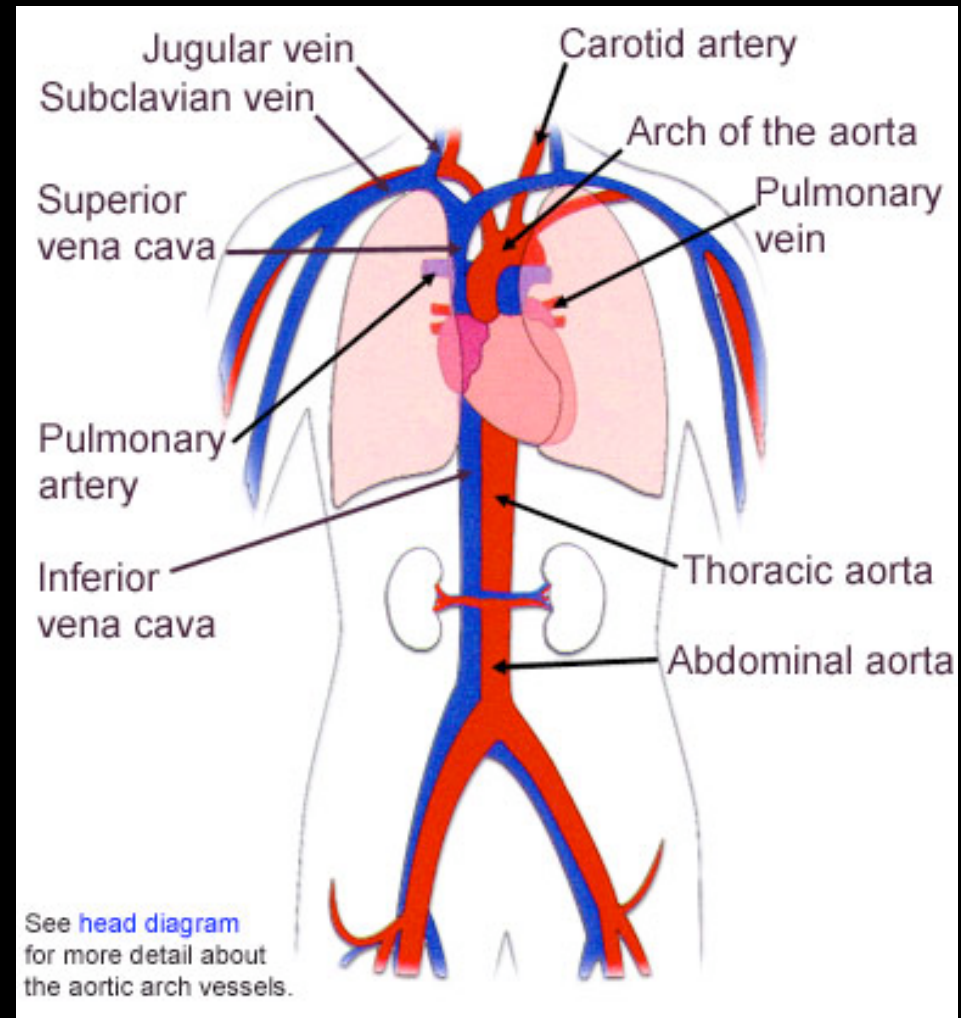
# Circulatory System

- On average, your body has about **5 liters of blood** continually traveling through it by way of the circulatory system.
- The **heart, the lungs**, and the **blood vessels** work together to form the circle part of the **circulatory system**.
- The **pumping** of the heart **forces the blood** on its journey.



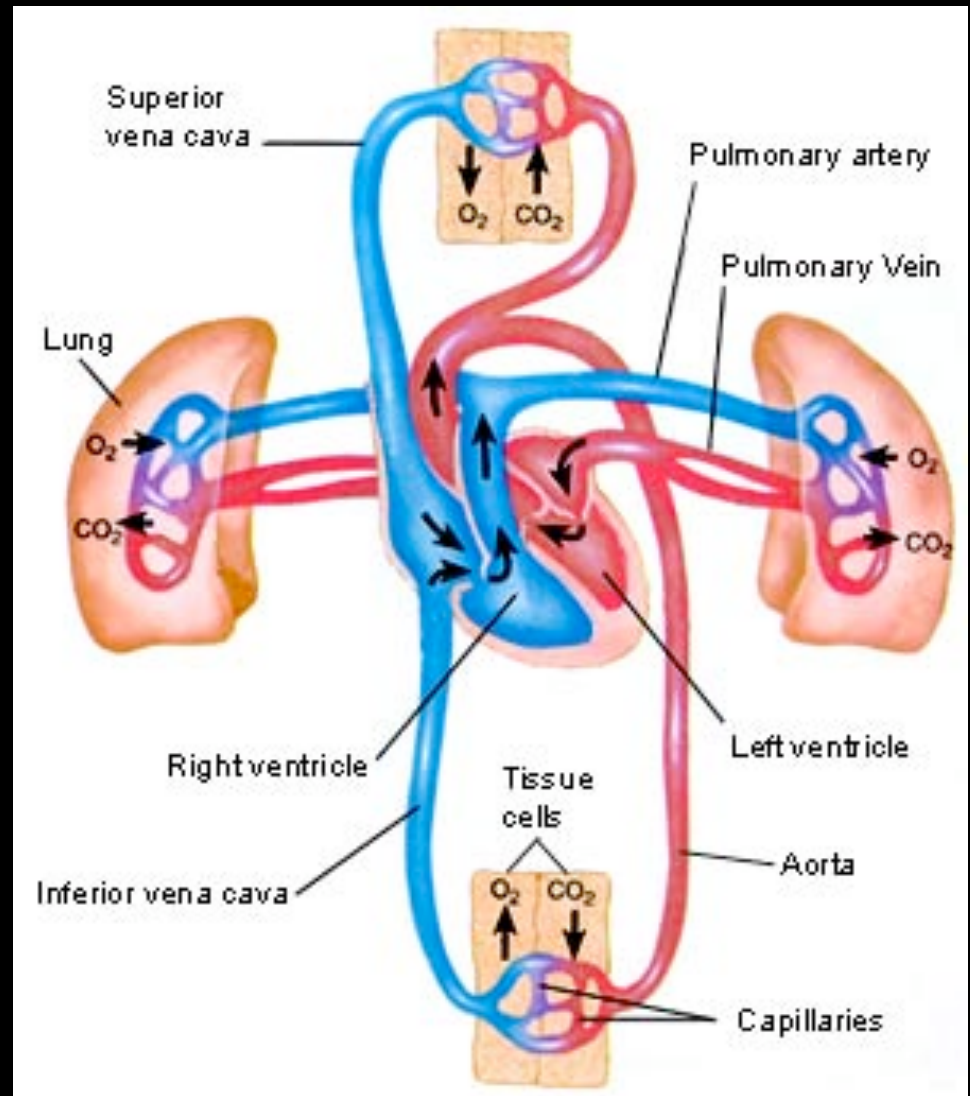
# Circulatory System

- The body's circulatory system really has three distinct parts:
  - **pulmonary circulation**
    - the lungs (pulmonary)
  - **coronary circulation**
    - the heart (coronary)
  - **systemic circulation**
    - the rest of the system (systemic).
- Each part must be working independently in order for all of them to work together.



# Pulmonary Circulation

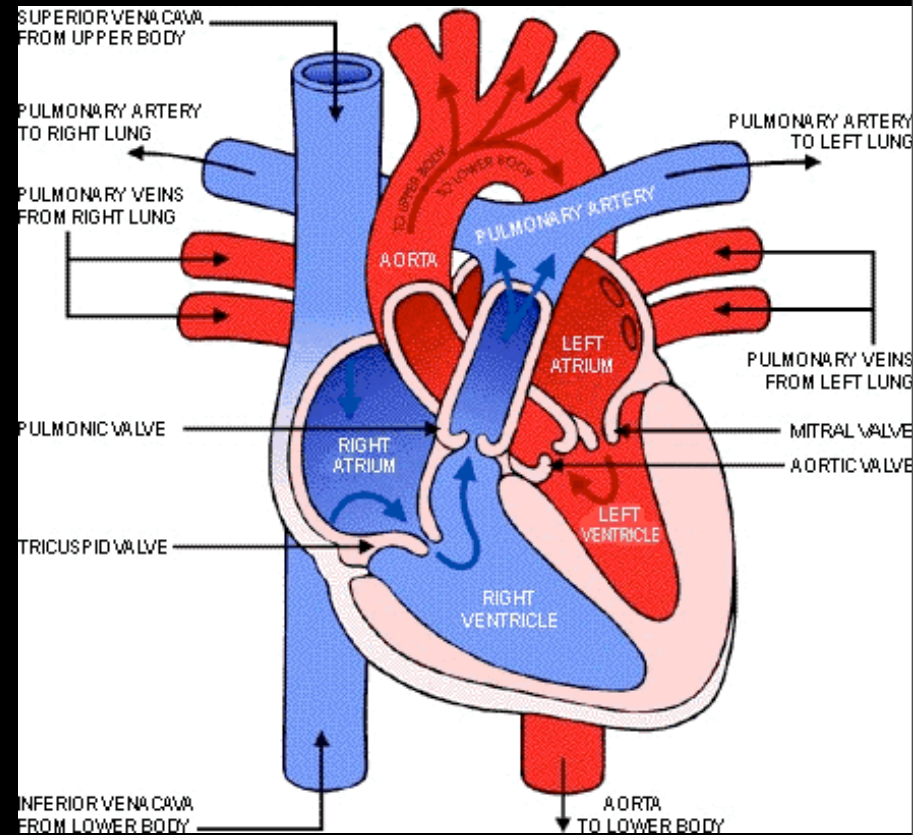
- Pulmonary circulation is the movement of **blood from the heart, to the lungs, and back to the heart again.**
- This is just one phase of the overall circulatory system.





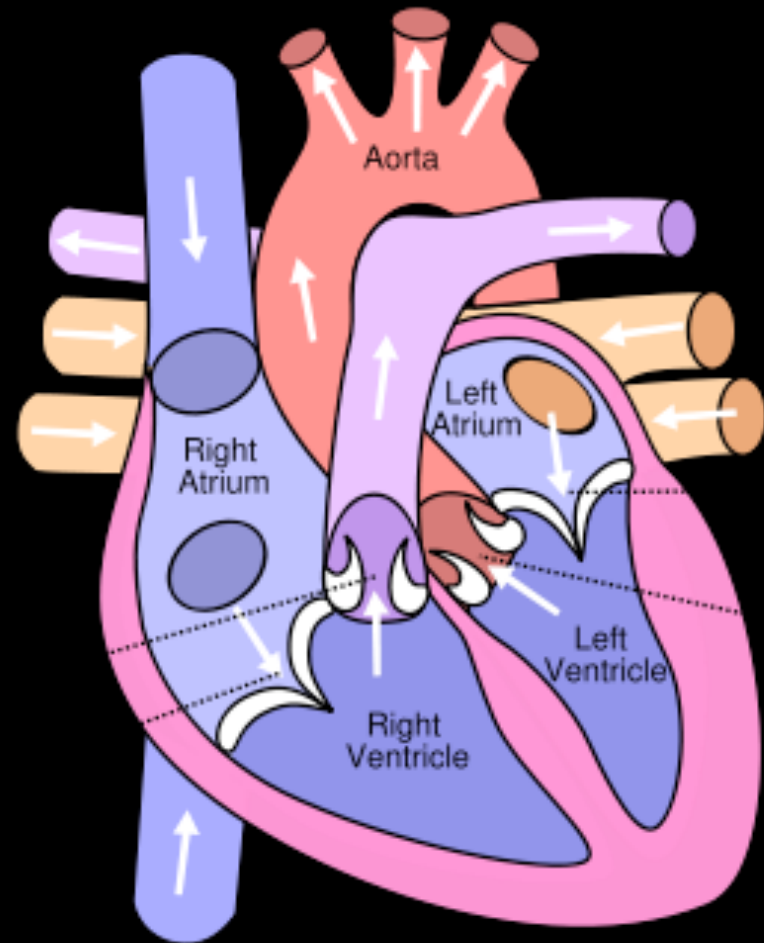
# Key Points

- The Heart has 4 chambers
  - Left side of the heart has **oxygenated blood (red)**
    - One Atrium on the left
    - One Ventricle on the left
  - Right side of the heart has **deoxygenated blood (blue)**
    - One Atrium on the right
    - One Ventricle on the left



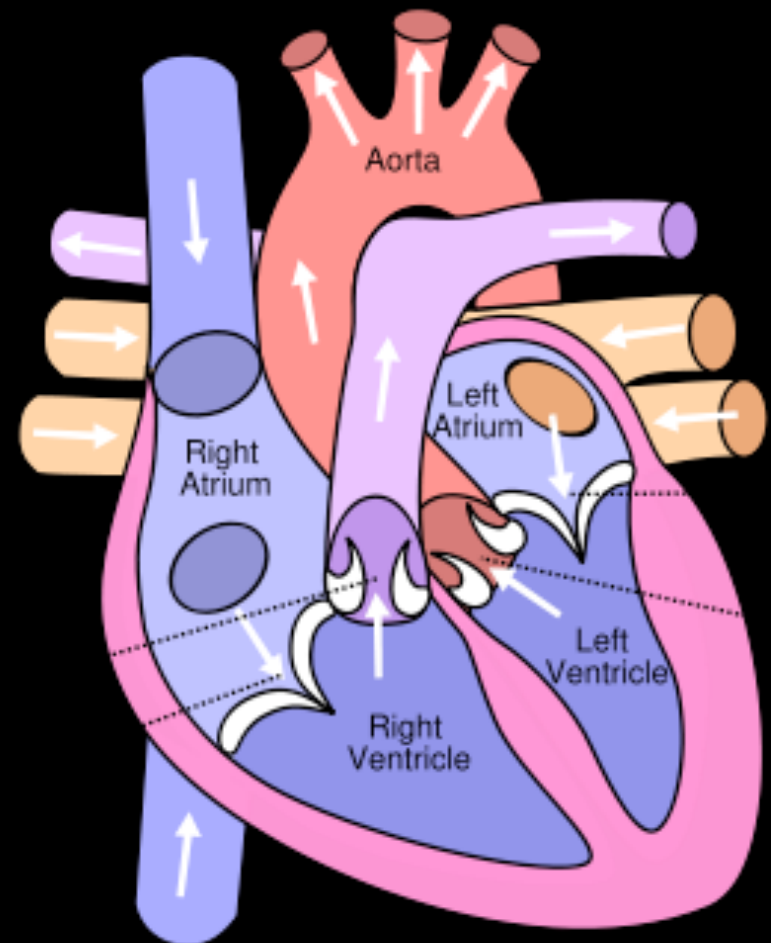
# Cardio-pulmonary Circulation

- The **veins** bring **waste-rich blood, low in oxygen (deoxygenated)** back to the heart, entering the **right atrium** throughout two large veins called **vena cava**.
  - **Superior vena cava**
    - Drains the head and upper part of body
  - **Inferior vena cava**
    - Drains lower part of body



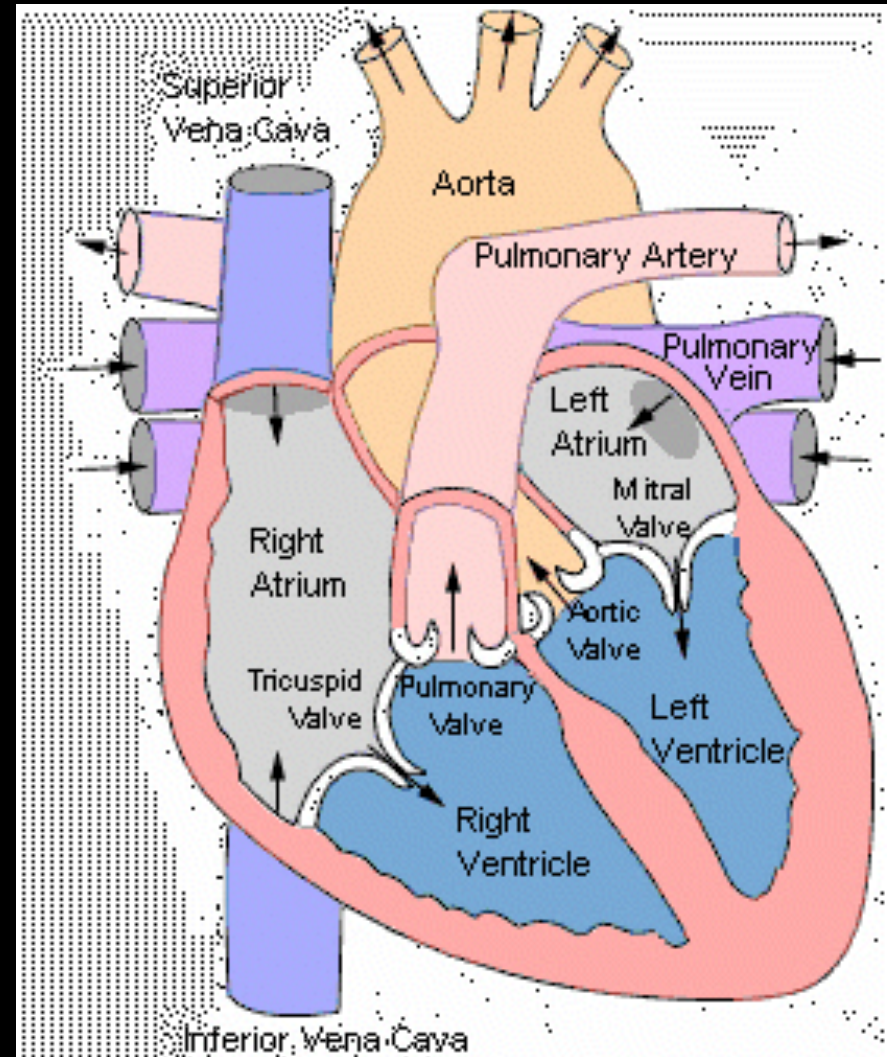
# Cardio-pulmonary Circulation

- The **right atrium** fills with the **waste-rich blood** and then contracts, pushing the blood through a one-way **tricuspid valve** into the **right ventricle**.



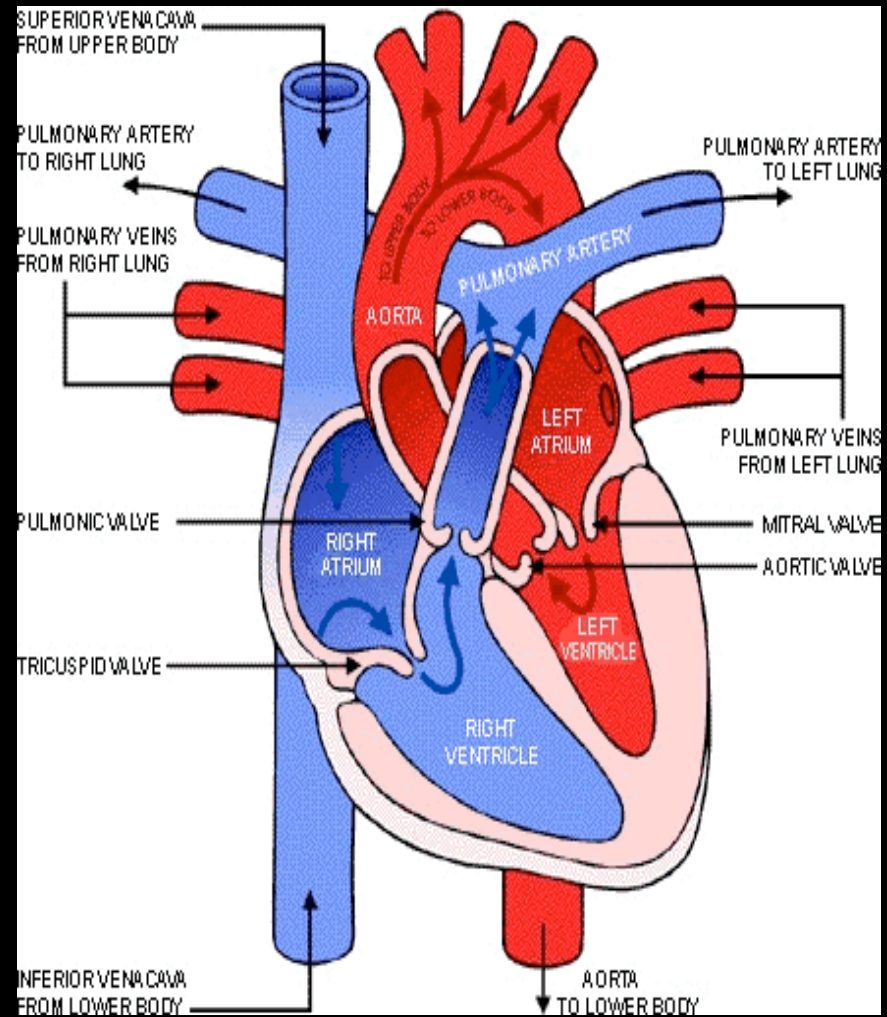
# Cardio-pulmonary Circulation

- The **right ventricle** fills and then contracts, pushing the **deoxygenated blood** into the **pulmonary artery** which leads to the lungs.
- In the lung capillaries, the exchange of carbon dioxide and oxygen takes place.
- The **pulmonary vein** carries **oxygenated blood** back to the heart.



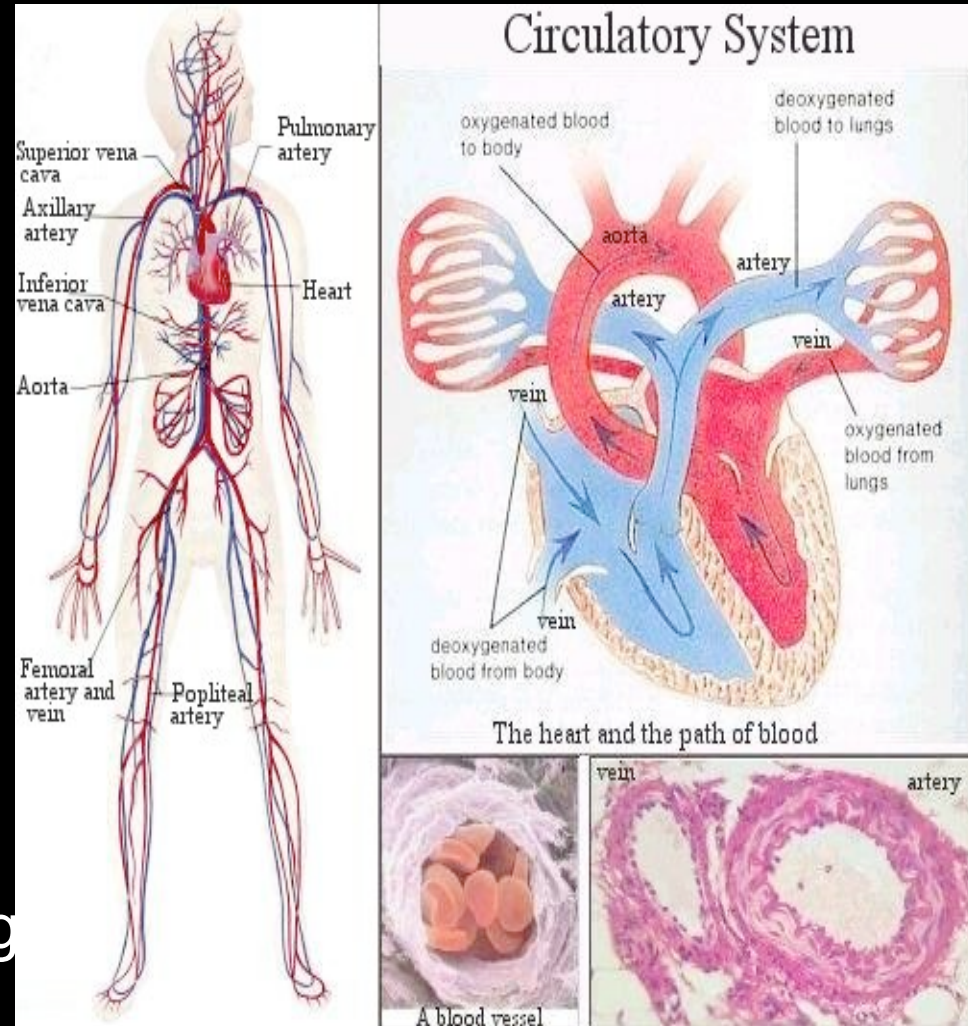
# Cardio-pulmonary Circulation

- The fresh, **oxygen-rich blood** enters the **pulmonary veins** and then returns to the heart, re-entering through the **left atrium**.
- The **oxygen-rich blood** then passes through a one-way valve (mitral) into the **left ventricle** where it will exit the heart through the main artery, called the **aorta**.
- The **left ventricle's contraction** forces the blood into the **aorta** and the blood begins its journey throughout the body.



# Cardio-pulmonary Circulation

- The **one-way valves** are important for **preventing any backward flow** of blood.
- The circulatory system is a **network of one-way streets**.
- Some Heart Defects
  - Blood can flow the **wrong way**, the blood **gases (oxygen and carbon dioxide) might mix**, causing a serious threat to your body.



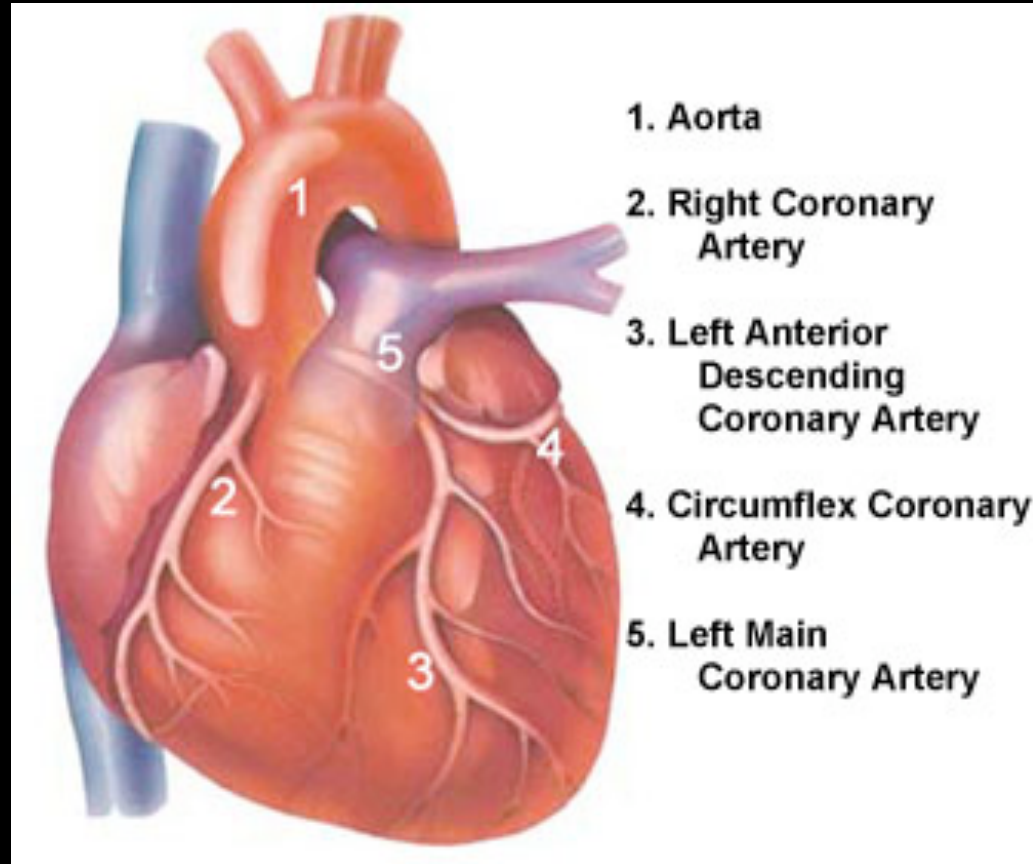
# Cardio-pulmonary Circulation

- You can use a stethoscope to hear pulmonary circulation.
- The two sounds you hear, "lub" and "dub" are the ventricles contracting and the valves closing.



# Coronary Circulation

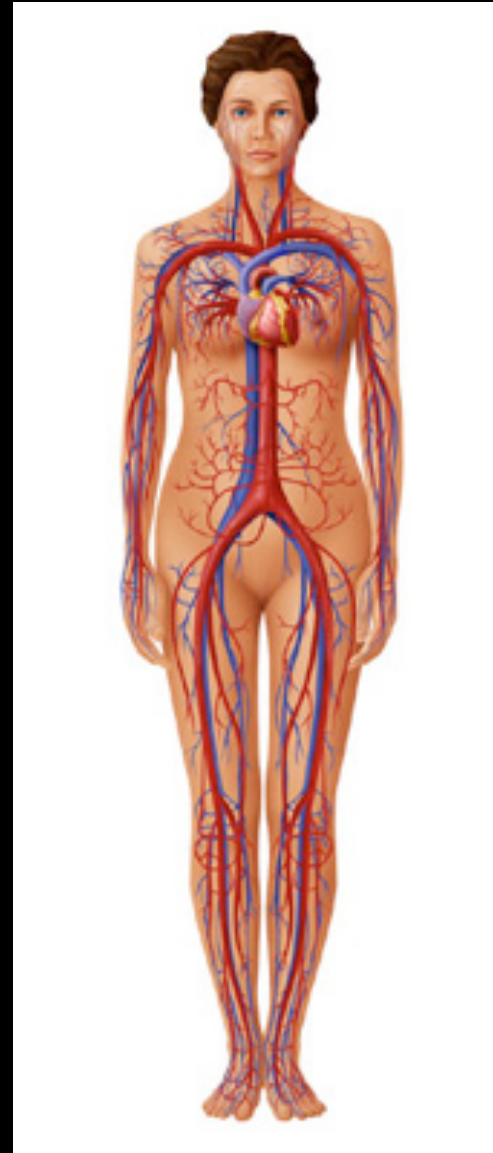
- While the circulatory system is busy providing **oxygen and nourishment to every cell of the body**, let's not forget that the **heart**, which works hardest of all, needs **nourishment, too**.
- **Coronary circulation** refers to the movement of blood through the tissues of the heart.
- Blood from the aorta passes through a **right coronary artery** and **left coronary artery**
  - Initially **Left Main Coronary** then splits into
    - **Circumflex**
      - **Left side of the heart**
    - **Left Anterior Descending (LAD)**





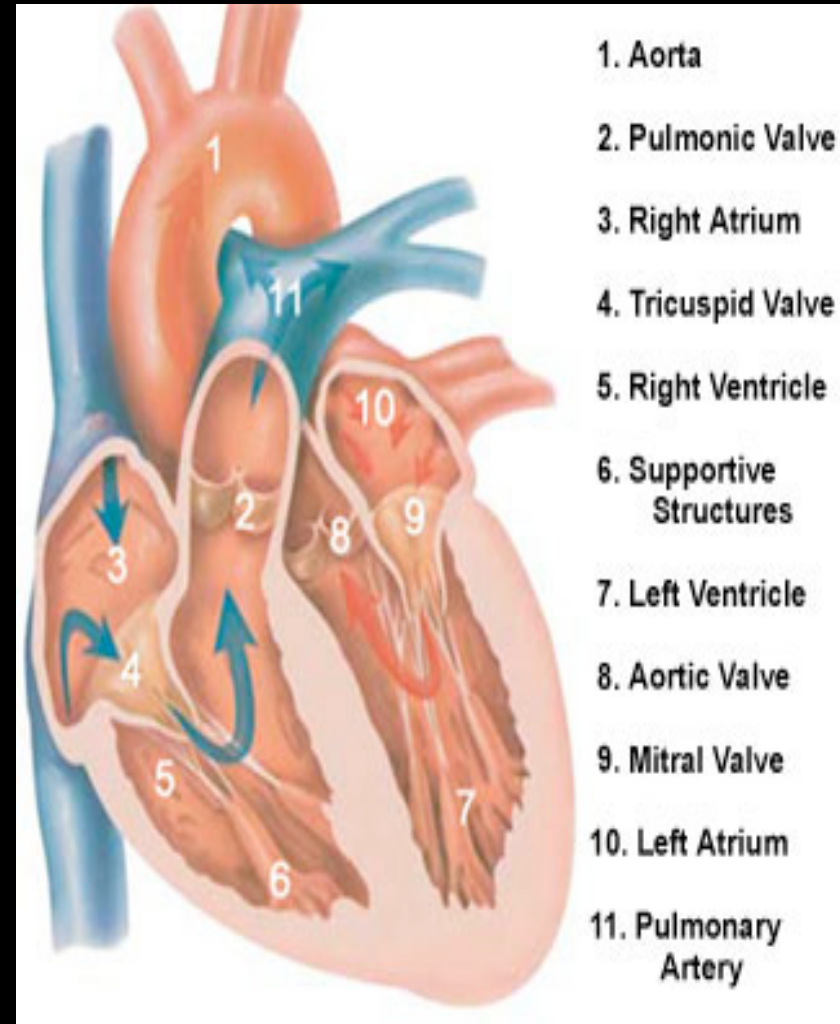
# Systemic Circulation

- Systemic circulation supplies oxygen & nourishment to all of the tissue our body, with the exception of the heart and lungs because they have their own systems.
- Systemic circulation is a major part of the overall circulatory system.
- The blood vessels (arteries, veins, and capillaries) are responsible for the delivery of oxygen and nutrients to the tissue.



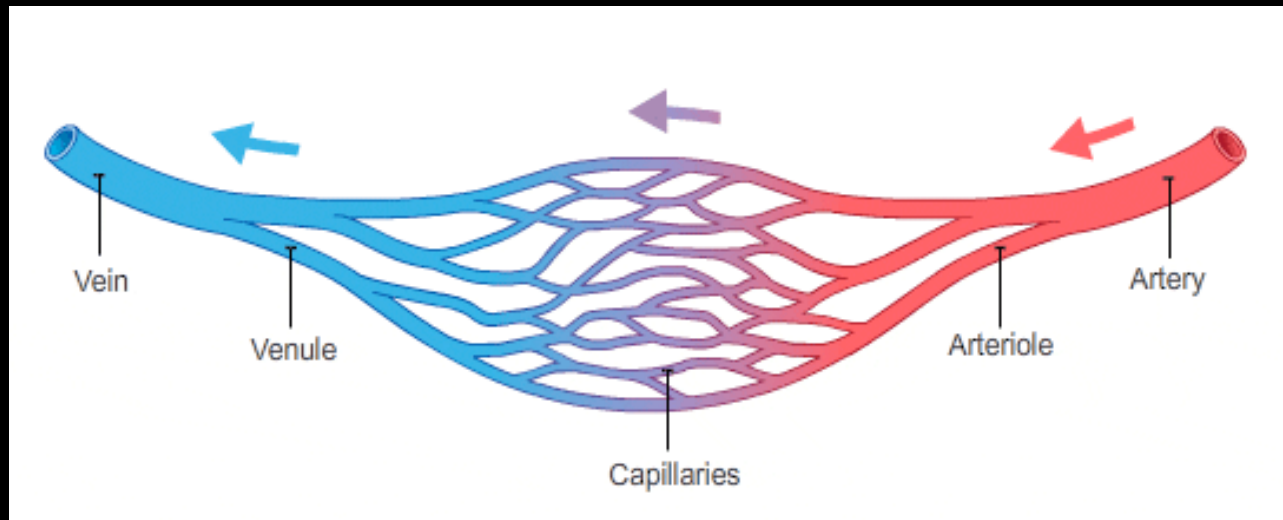
# Systemic Circulation

- **Oxygen-rich blood** enters the blood vessels through the heart's main artery called the **aorta**.
- The forceful **contraction** of the heart's **left ventricle** **forces the blood into the aorta** which then branches into many smaller arteries which run **throughout the body**.
- The inside layer of an artery is very smooth, allowing the blood to flow quickly.



# Systemic Circulation

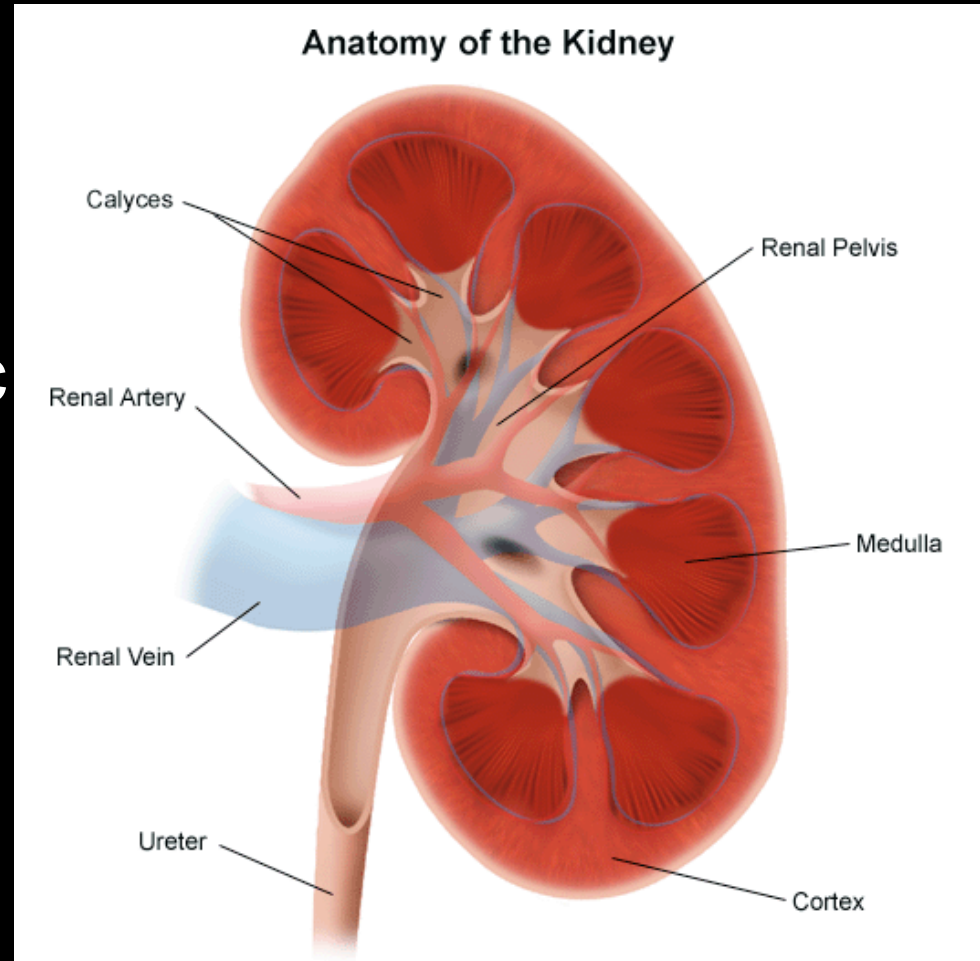
- The outside layer of an artery is very strong muscular wall allowing the blood to flow forcefully.
- The **oxygen-rich blood** enters the **capillaries** where the oxygen and nutrients are released.
- The waste products are collected and the **waste-rich blood** flows into the **veins** in order to circulate back to the heart where **pulmonary circulation** will allow the exchange of gases in the lungs.



# Systemic Circulation

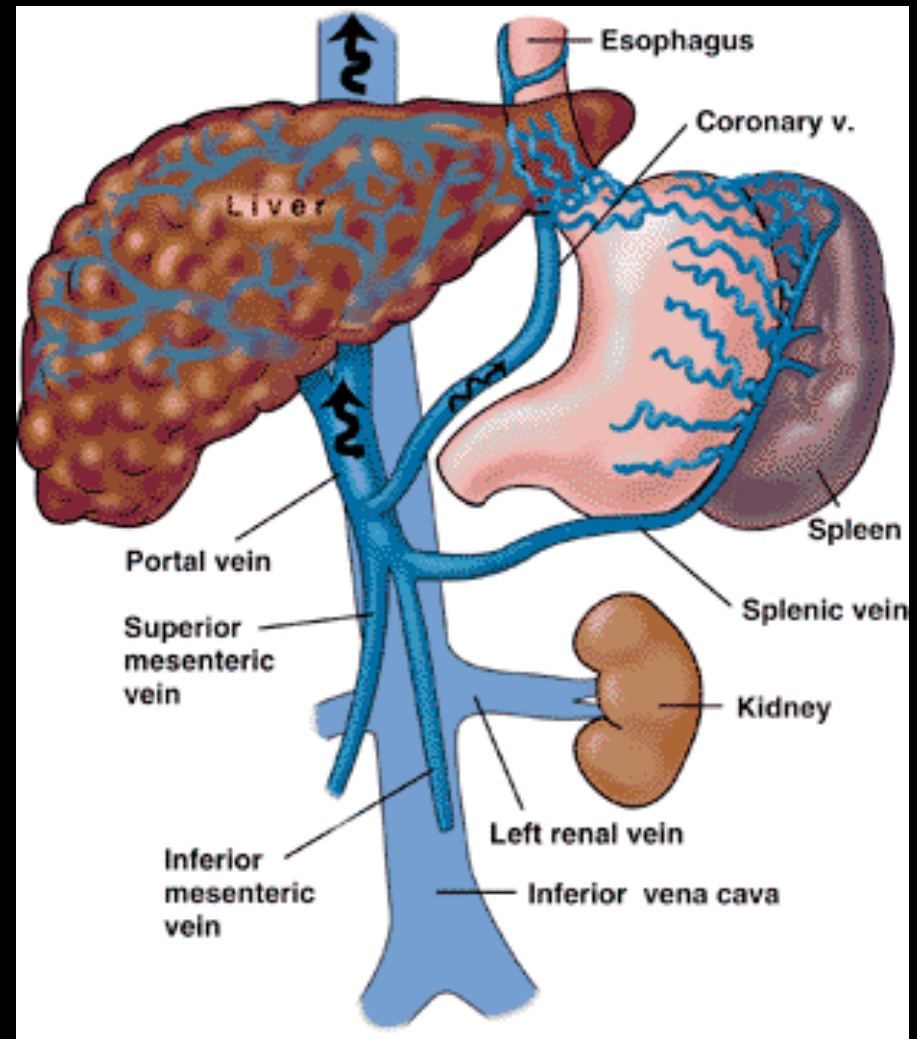
## Renal (Kidney)

- During systemic circulation, blood passes through the kidneys.
- This phase of systemic circulation is known as **renal circulation**.
- During this phase, the kidneys filter much of the waste from the blood.



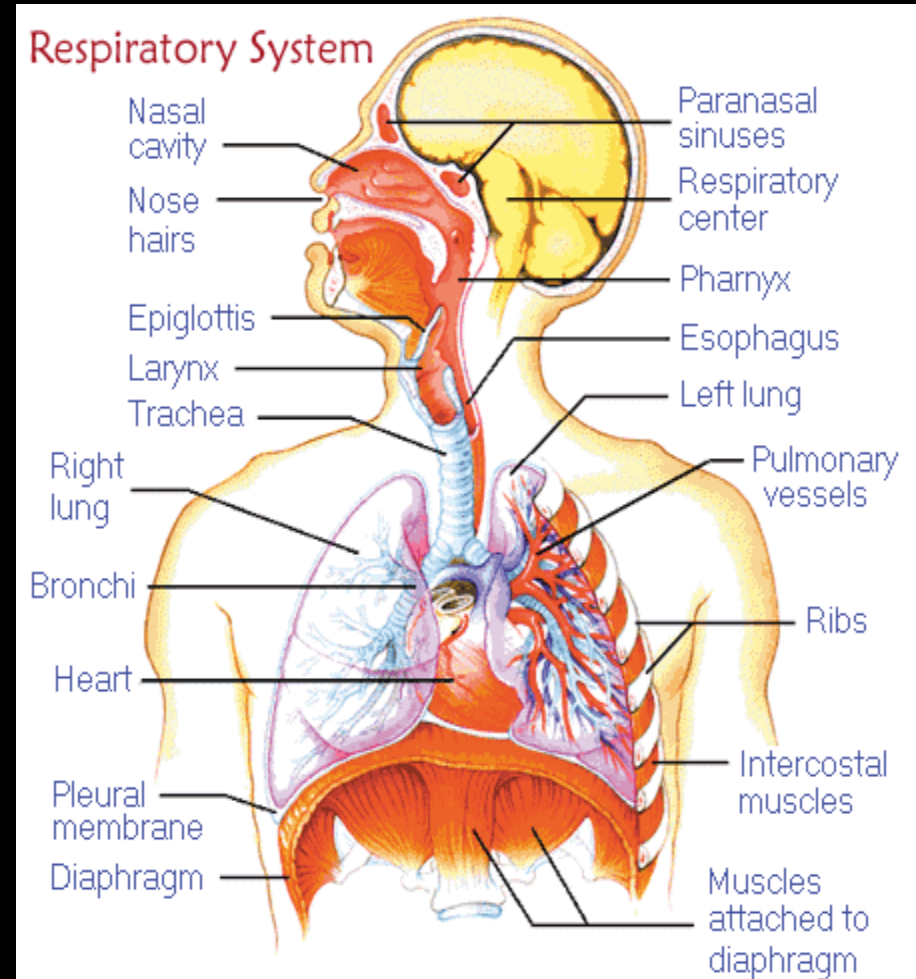
# Portal (Liver) Systemic Circulation

- Blood also passes through the **small intestine** during systemic circulation.
- This phase is known as **portal circulation**.
- During this phase, the blood from the small intestine collects in the **portal vein** which **passes through the liver**.
- The liver filters sugars from the blood, storing them for later.



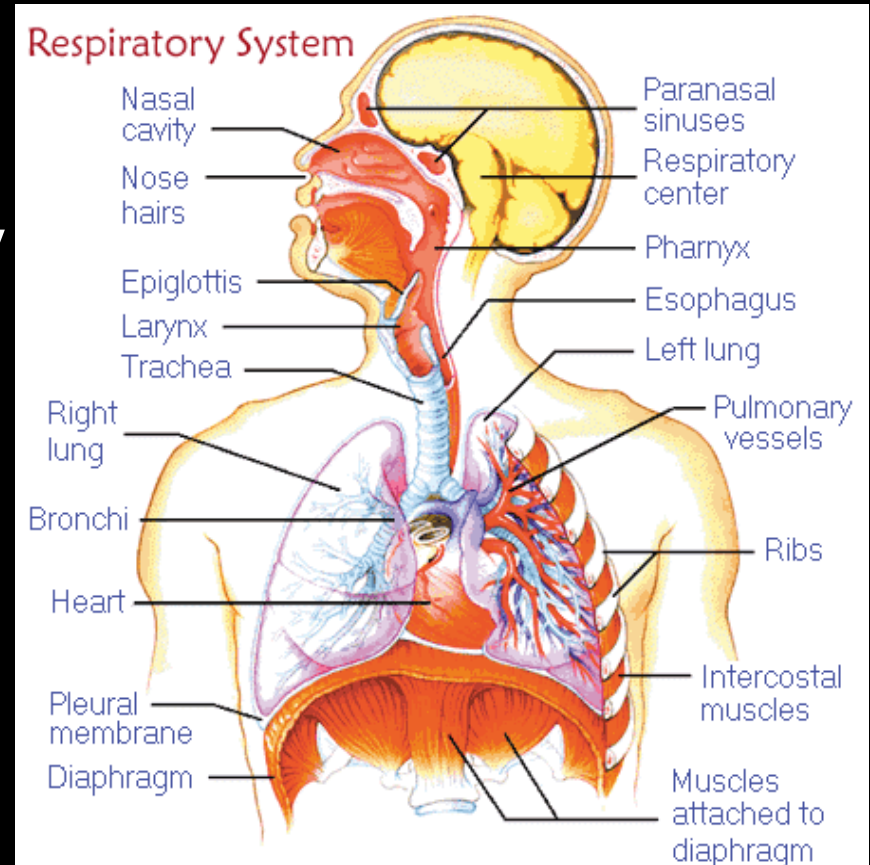
# Respiratory System

- The primary function of the **respiratory system** is to **supply the blood with oxygen** in order for the **blood to deliver oxygen to all parts of the body**.
- The respiratory system does this through **breathing**.
- When we breathe, we **inhale oxygen and exhale carbon dioxide**.
- This **exchange of gases** is the respiratory system's means of **getting oxygen to the blood**.



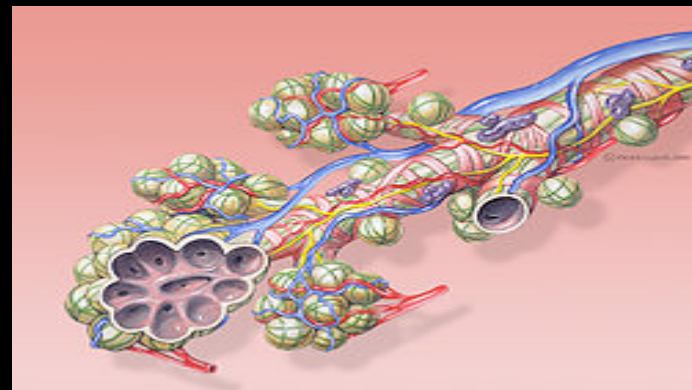
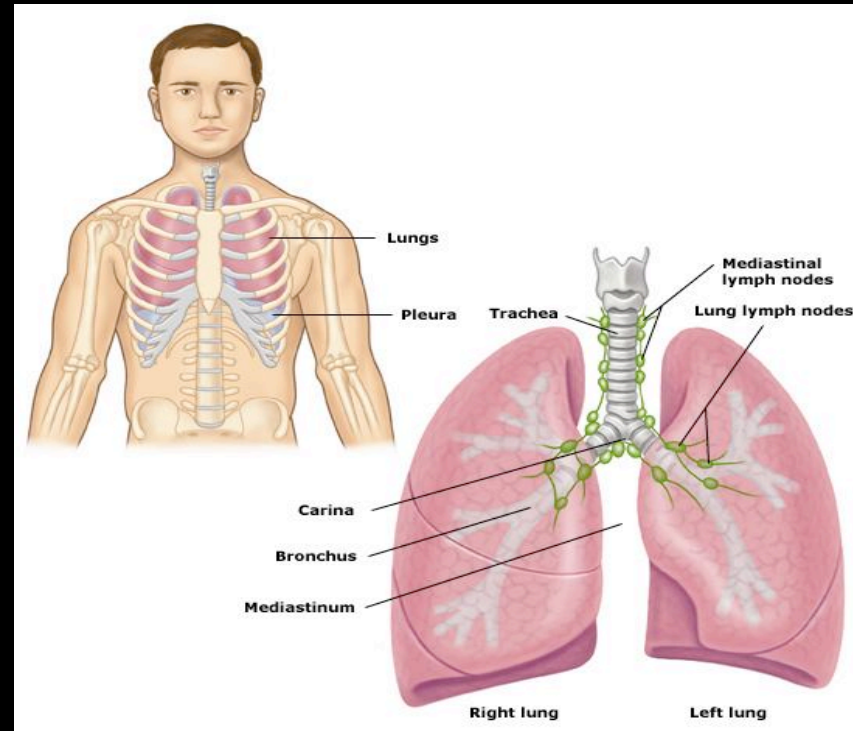
# Respiratory System

- Respiration is achieved through the **mouth, nose, trachea, lungs, and diaphragm**.
- Oxygen enters the respiratory system through the mouth and the nose.
- The oxygen then passes through the **larynx** (where speech sounds are produced) and the **trachea** which is a tube that enters the chest cavity.
- In the chest cavity, the **trachea splits** into two smaller tubes called the **bronchi**.



# Respiratory System

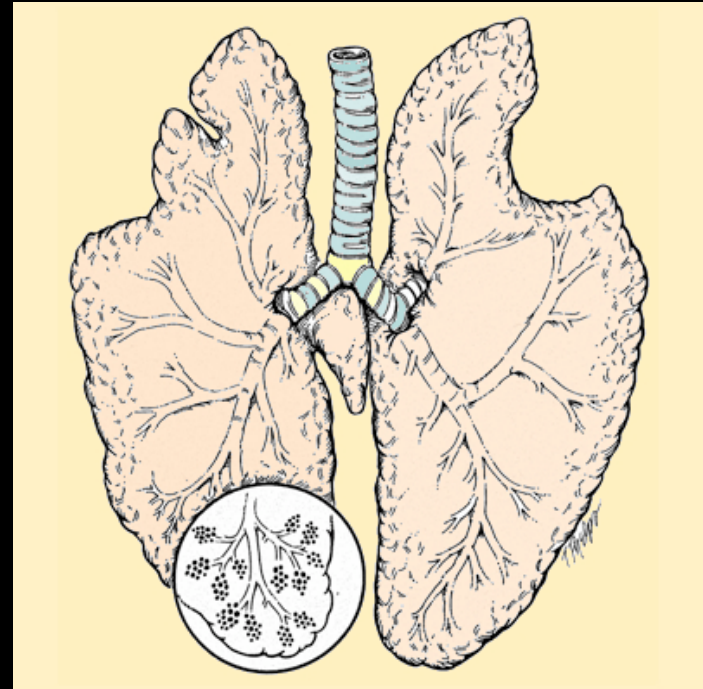
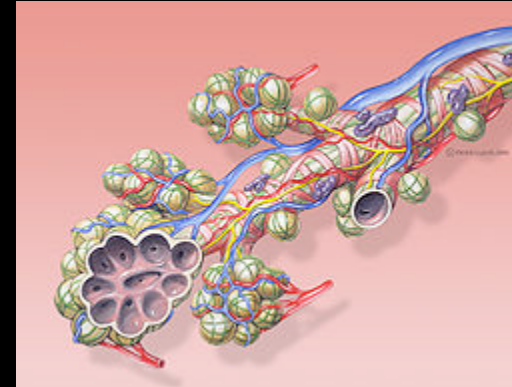
- Each **bronchus** then divides again forming the **bronchial tubes**.
- The **bronchial tubes** lead directly into the lungs where they divide into many smaller tubes which connect to tiny air sacs called **alveoli**.





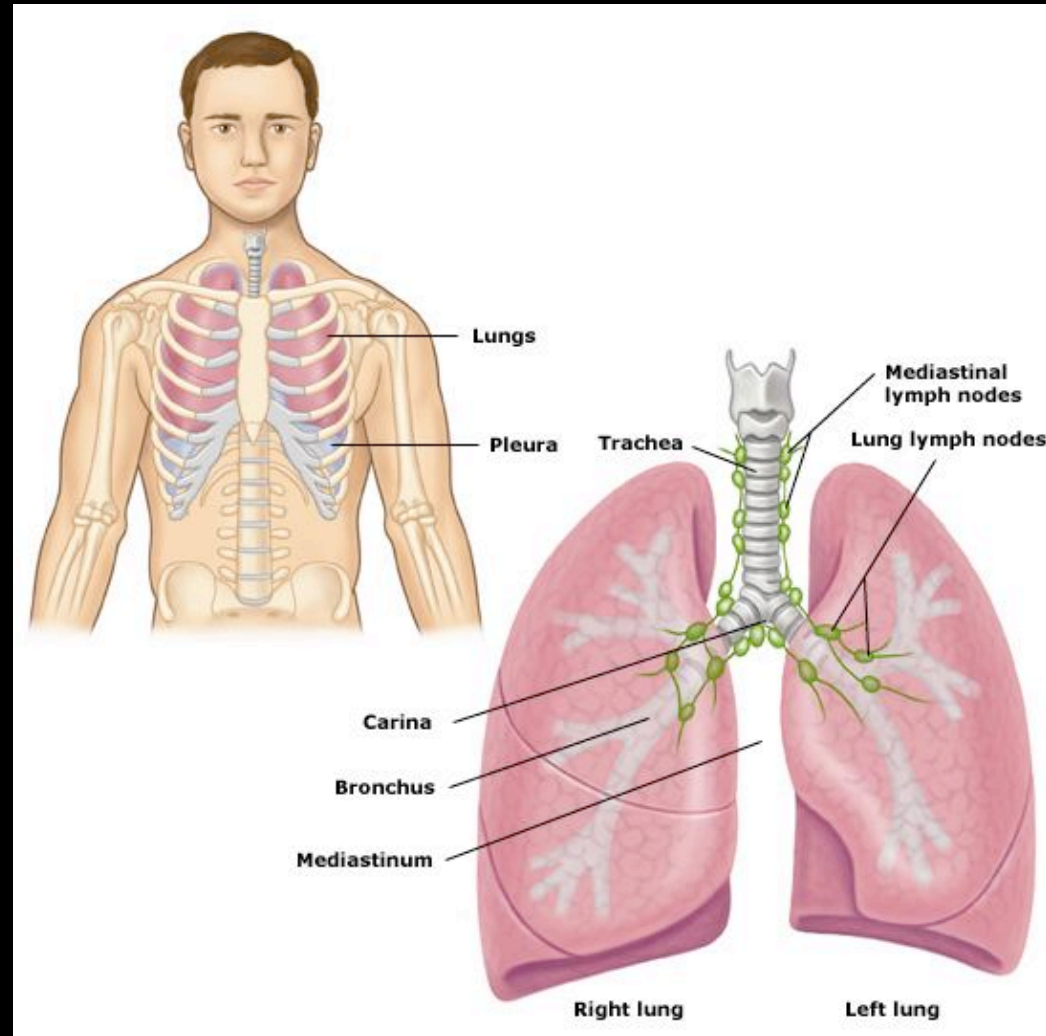
# Respiratory System

- The average adult's lungs contain about **600 million** of these spongy, air-filled sacs (**alveoli**) that are surrounded by **capillaries**.
- The inhaled oxygen passes into the alveoli and then **diffuses through the capillaries** into the arterial blood.



# Respiratory System

- Meanwhile, the **waste-rich blood** from the **veins** releases its **carbon dioxide** into the **alveoli**.
- The **carbon dioxide** follows the same path out of the lungs when you **exhale**.



# Contact Information

[www.VirtualScienceUniversity.com](http://www.VirtualScienceUniversity.com)

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