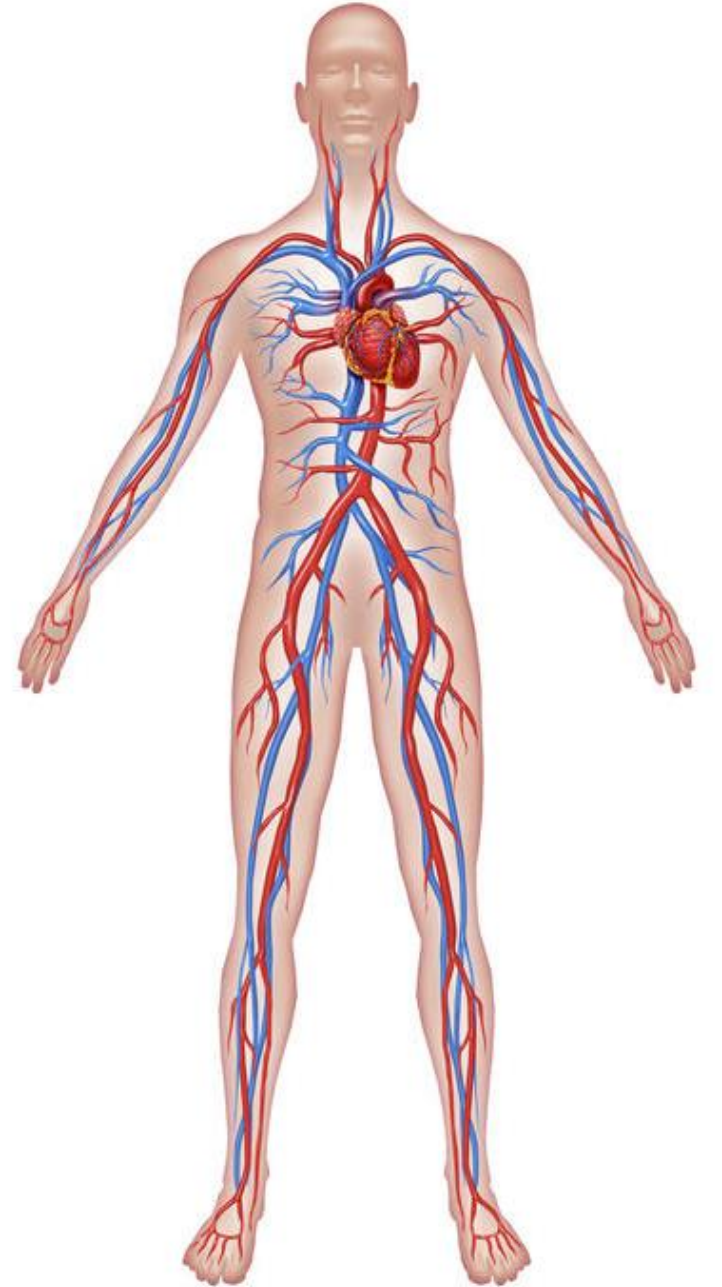


# The Circulatory System

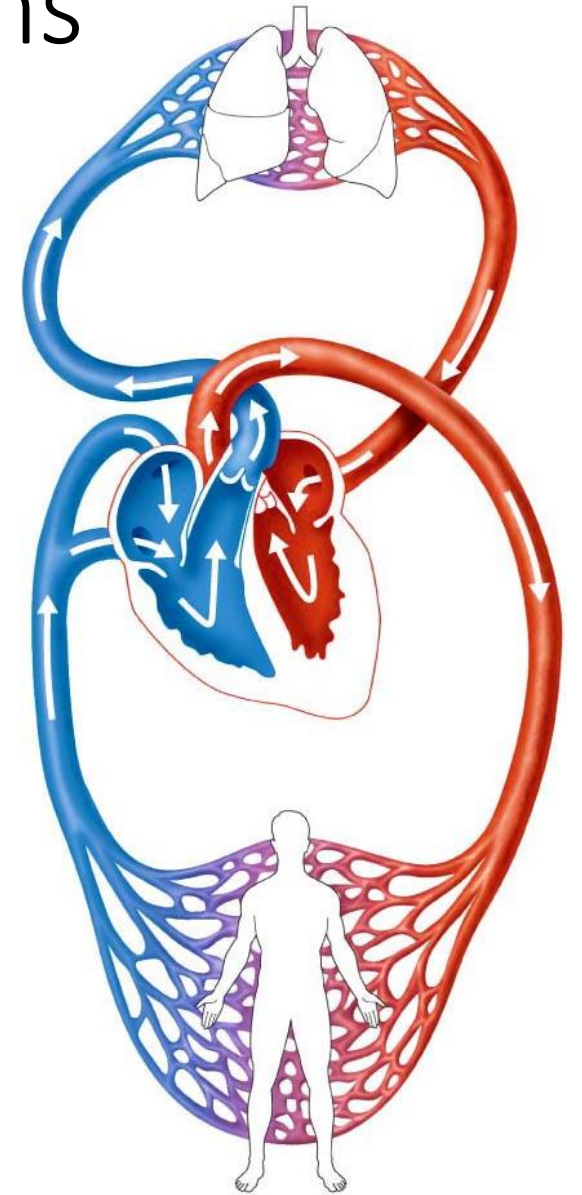
Lesson 16



# The Circulatory & Respiratory Systems

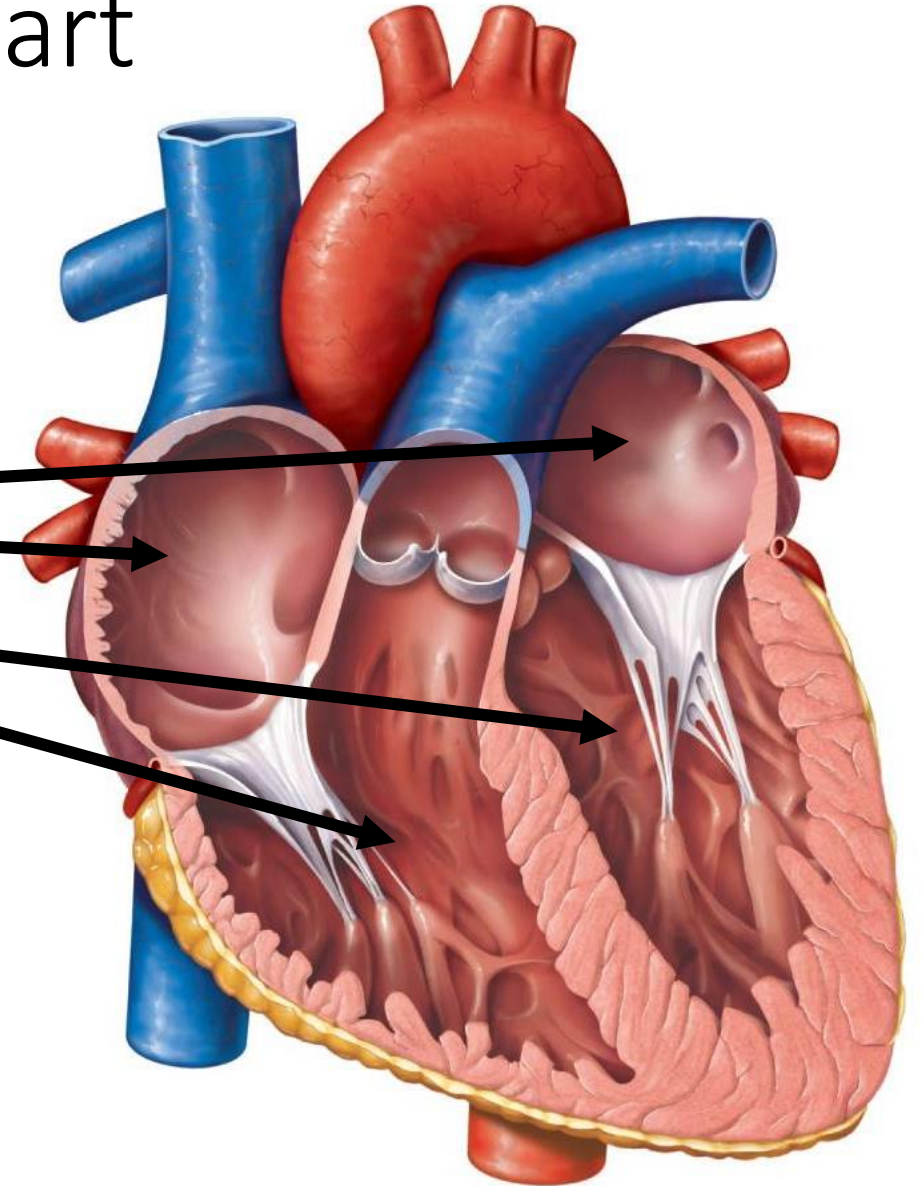
## The Circulatory System:

- Consists of the **heart**, **arteries**, **capillaries**, and **veins**
- **Arteries** carry blood away from the heart
- **Veins** carry blood to the heart
- In the **capillaries**, oxygen is released into your body and carbon dioxide is collected

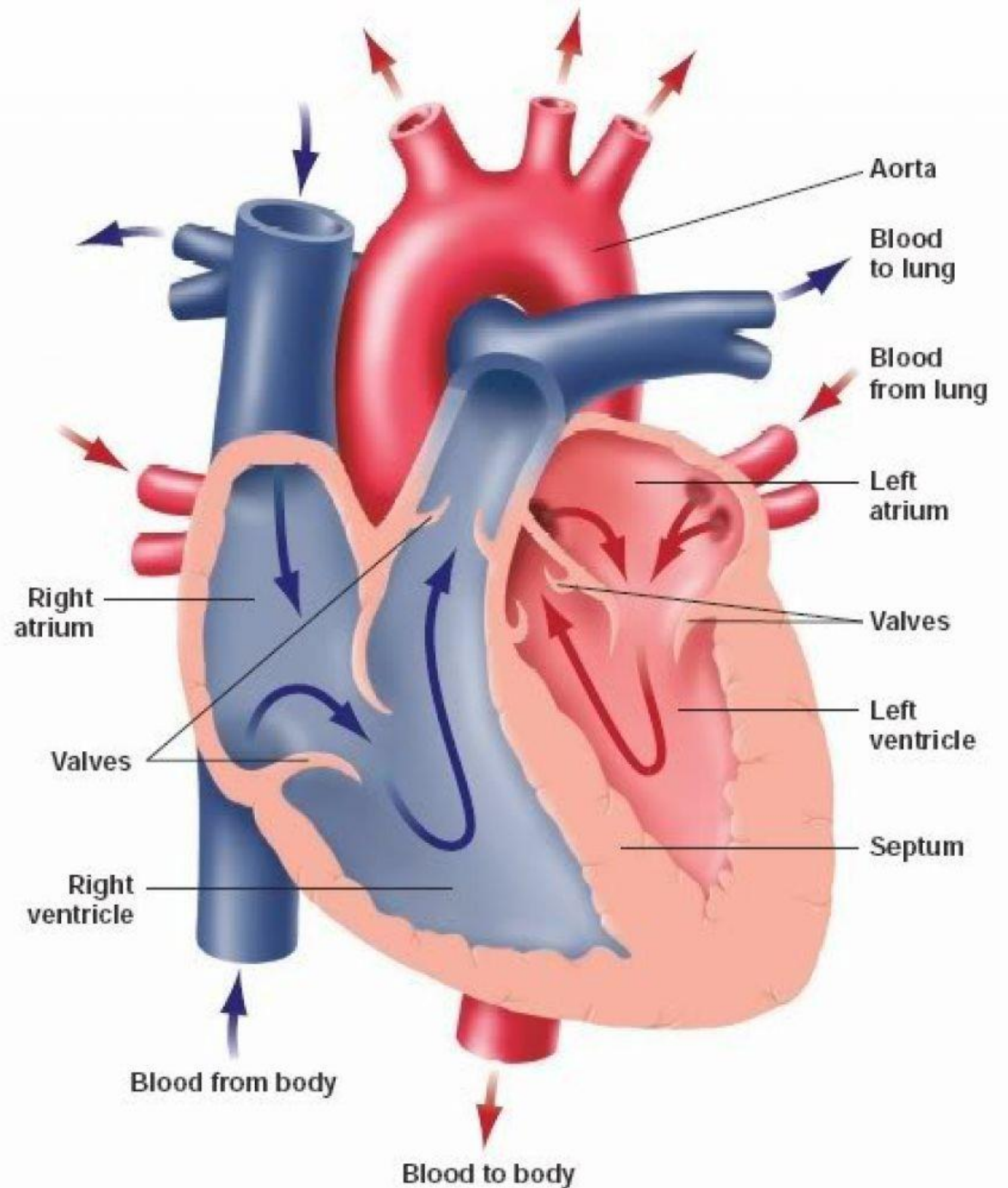


# Taking a closer look at the heart

- The **heart** is a muscular organ that pumps blood throughout the body
- There are four chambers:
  - Two upper atrium chambers
  - Two lower ventricle chambers
- **Atria** → allow blood to move from the body into the heart
- **Ventricles** → pump blood out of the heart



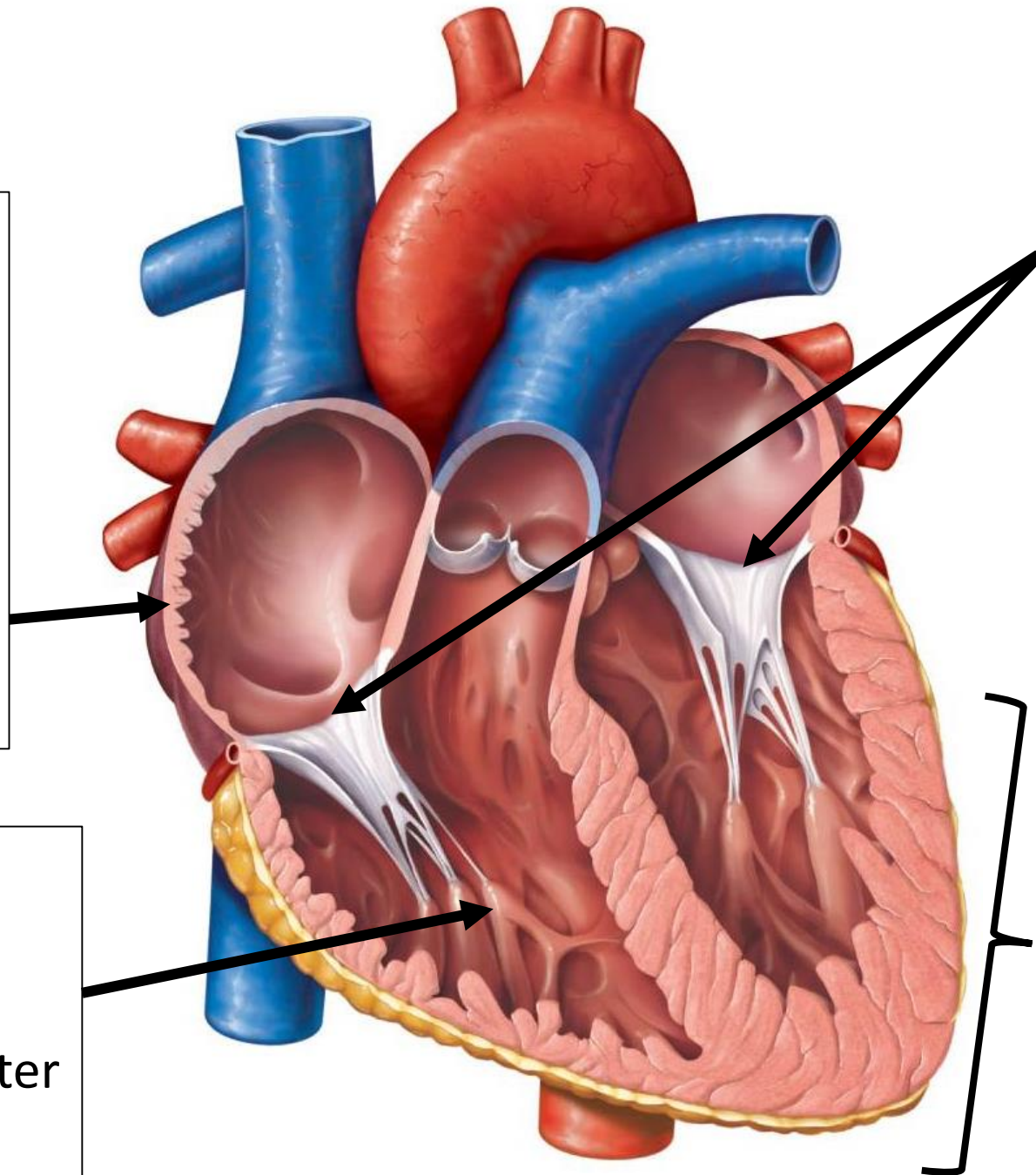
- It may seem backward that the atria are labelled “right” and “left” on the diagram
- But imagine the heart as it is positioned in your body
- The right atrium refers to the right side of *your* body, not the right side of the diagram





- Walls of the **atria** are much thinner b/c they only have to pump blood a short distance into the ventricles

- Right **ventricle** pumps blood to your lungs
  - A much shorter distance

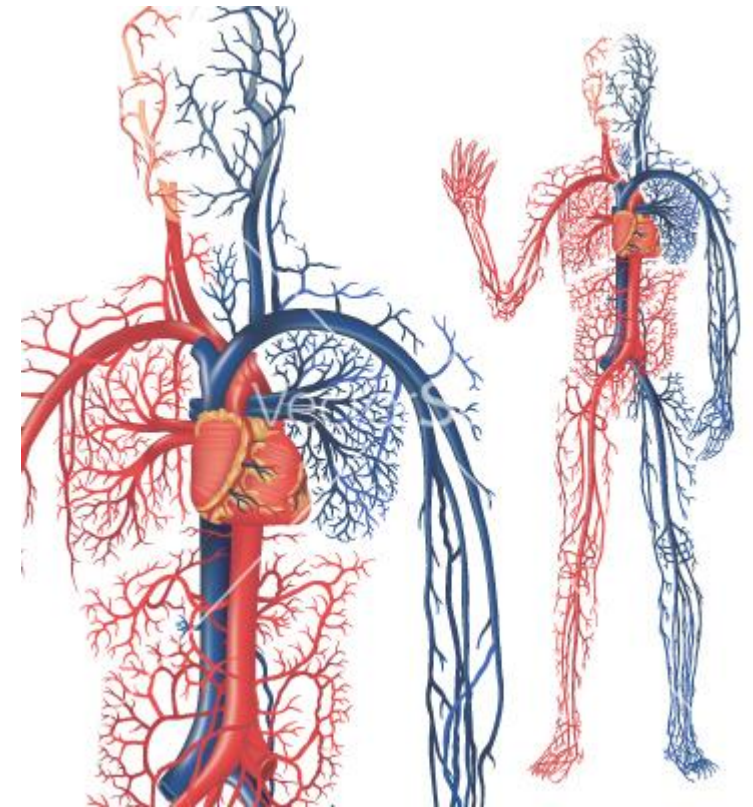


- Btwn the chambers are **valves**
- **Valves** allow blood to flow in only one direction
- The “lub dub” sound you hear through a stethoscope is the opening and closing of the valves

- Left **ventricle** muscle is larger than the right
  - Left **ventricle** pumps blood out to your body

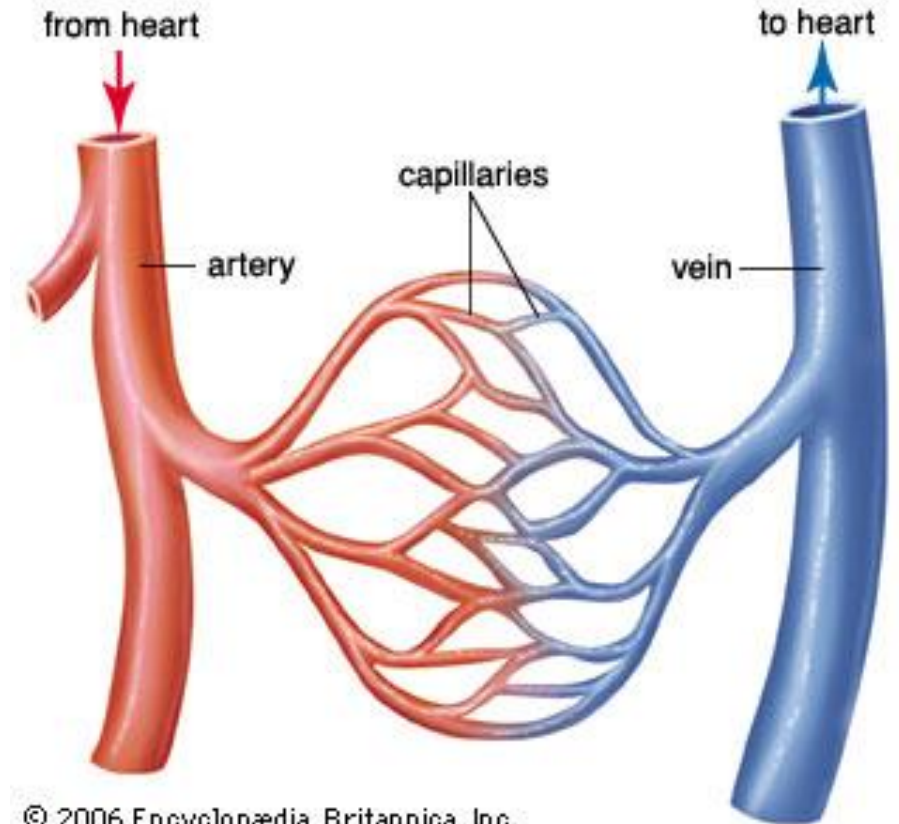
# The Circulatory System

- Like an enormous highway system that moves blood throughout your body
  - **Blood vessels** are like the roads
- Blood moves through the blood vessels from your heart to all parts of your body and back again
- All blood vessels lined up end to end would be about 100 000 km in length = 2.5 times around Earth at the equator



# Types of Blood Vessels

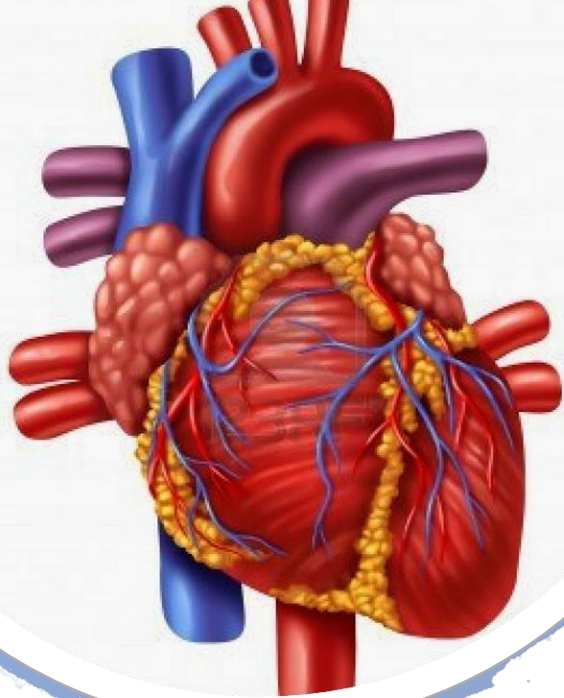
- Three types of blood vessels carry blood from your heart throughout your body
  - **Arteries**
    - Branch apart forming smaller **arterioles**
  - **Capillaries**
  - **Veins**
    - Tiny branched **venules** converge into veins



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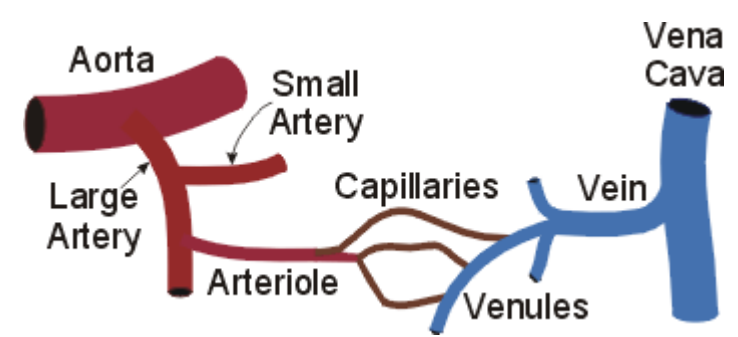
Heart → arteries → arterioles → capillaries → venules → veins → heart



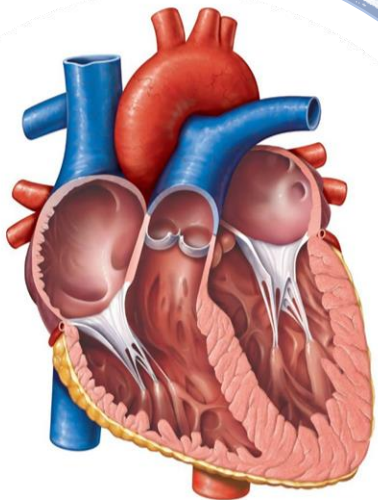
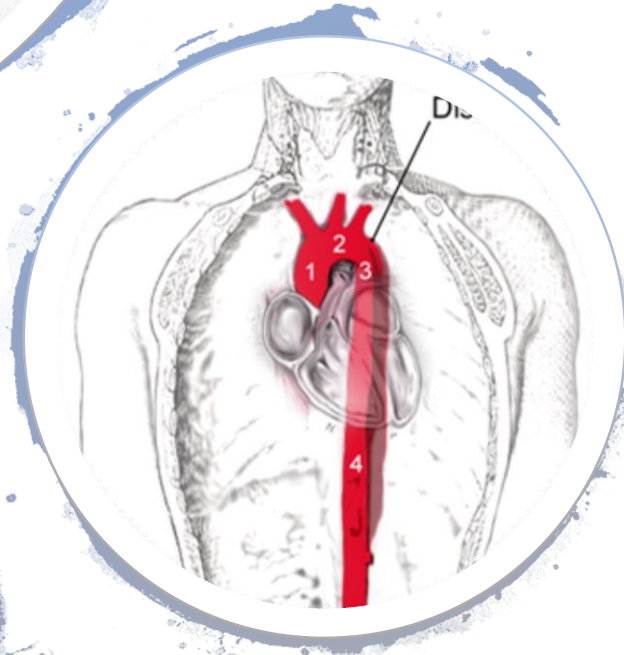


# Arteries

## Types of Blood Vessels



- Thick-walled and elastic
- Carry blood **away** from the heart
- Most carry bright red, oxygenated (oxygen-containing) blood
- Blood flowing through arteries are pressurized from being pumped from the heart
- **Aorta** is the largest artery in the body
  - 25 mm in width
- As blood moves farther away from your heart, the arteries branch into smaller and smaller arteries
  - **Arterioles** = smallest arteries; 0.5 mm diameter

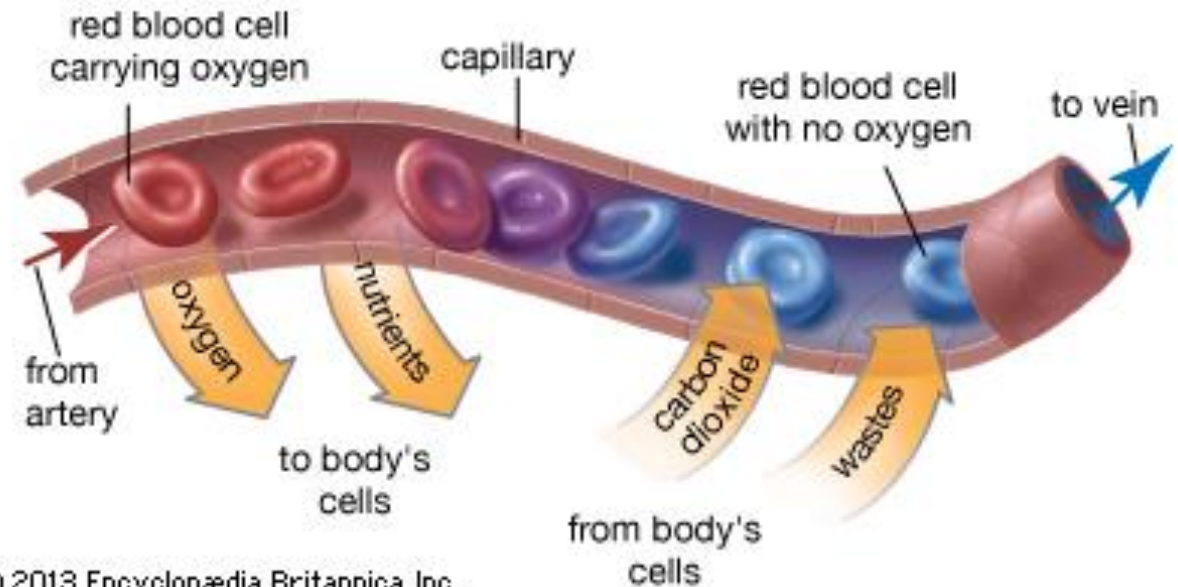
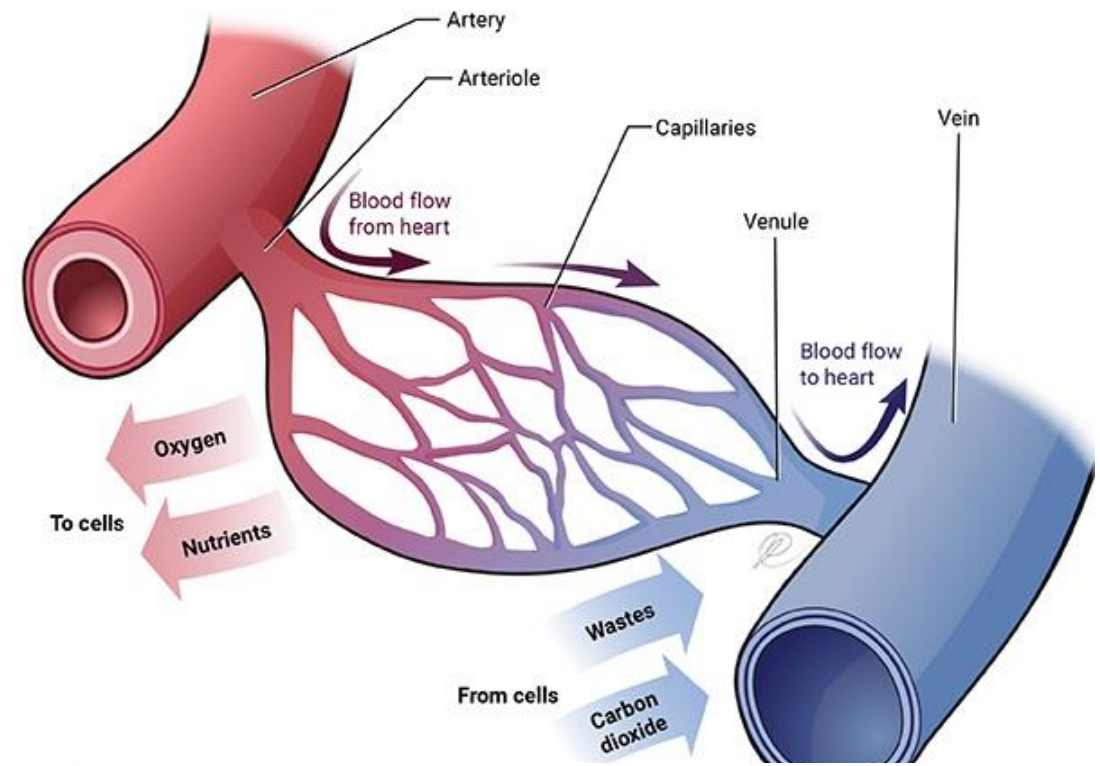




# Capillaries

## Types of Blood Vessels

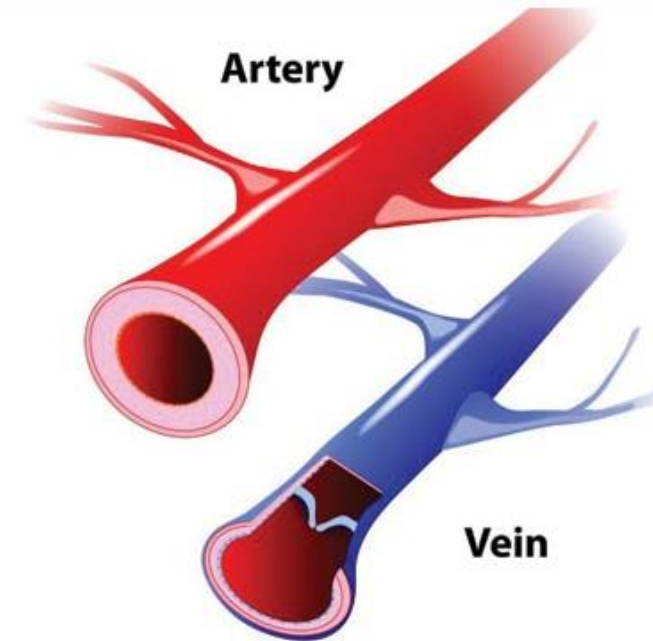
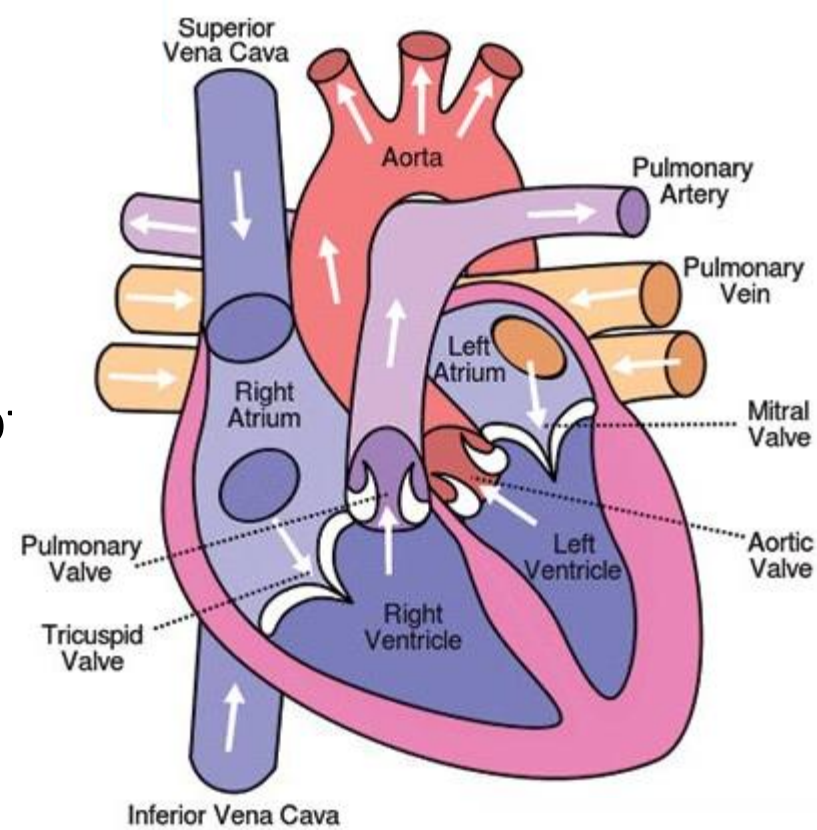
- A network of tiny blood vessels that act like a highway interchange
- Oxygen, nutrients, and glucose diffuse through the very thin walls into the fluid that surrounds tissue cells
- In exchange, carbon dioxide and other waste materials diffuse out of tissue cells and into the capillaries



# Veins

## Types of Blood Vessels

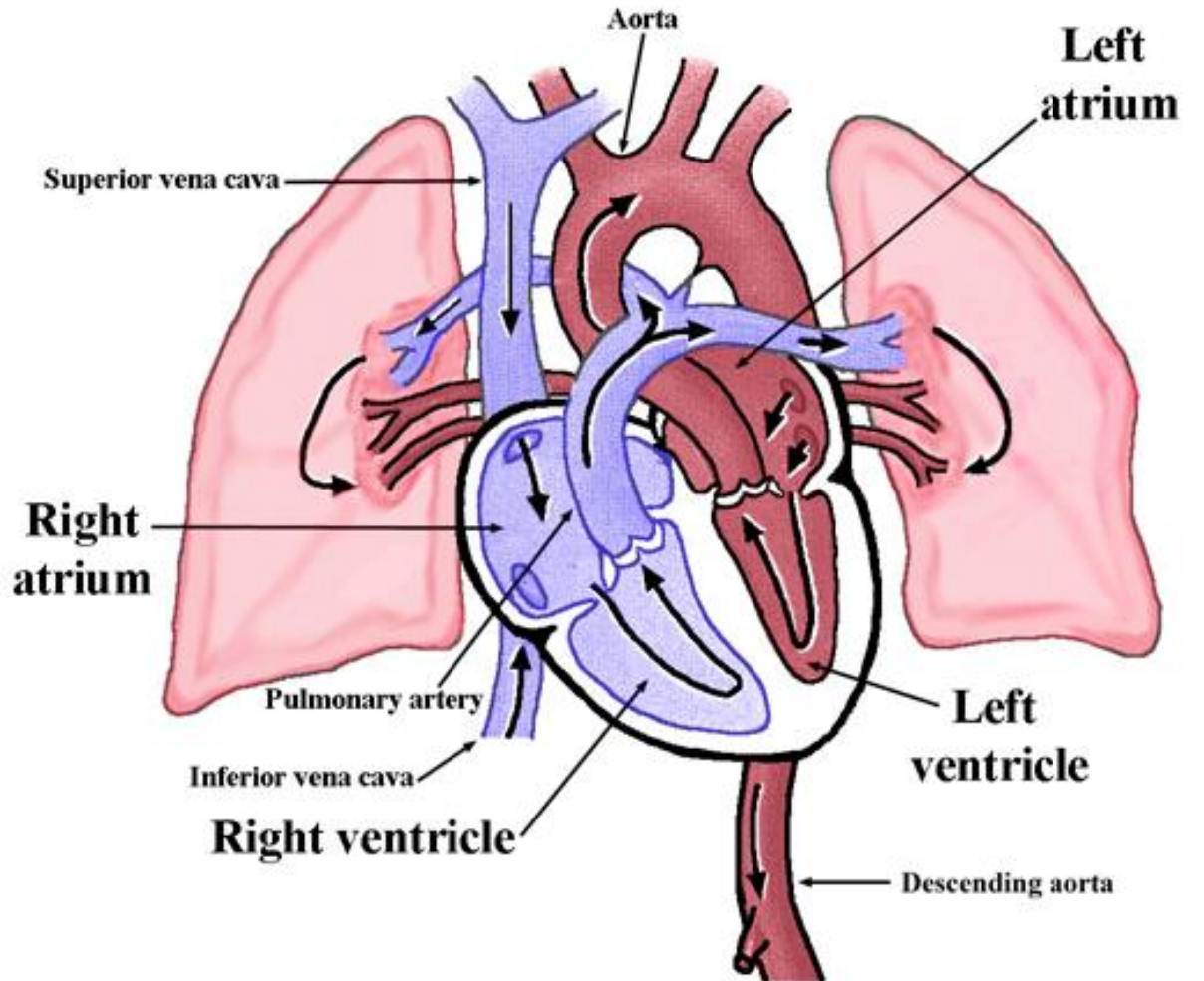
- Often have valves that prevent the backflow of blood as it travels to the heart
- Have thinner walls b/c blood travelling to the heart is not under pressure like the blood in arteries
- After leaving the capillaries, blood no longer contains oxygen
  - Deoxygenated blood
- Deoxygenated blood is carried back to the heart through tiny **venules** and into your **veins**
- Blood from the head and body enter the enter through the **superior vena cava** and the **inferior vena cava**



# Veins

## Types of Blood Vessels

- Deoxygenated blood is thicker than oxygenated blood and is much darker in colour
- The colour blue is used to show deoxygenated blood in veins
- Once deoxygenated blood reaches the heart, it is pumped into the lungs where it becomes oxygenated again

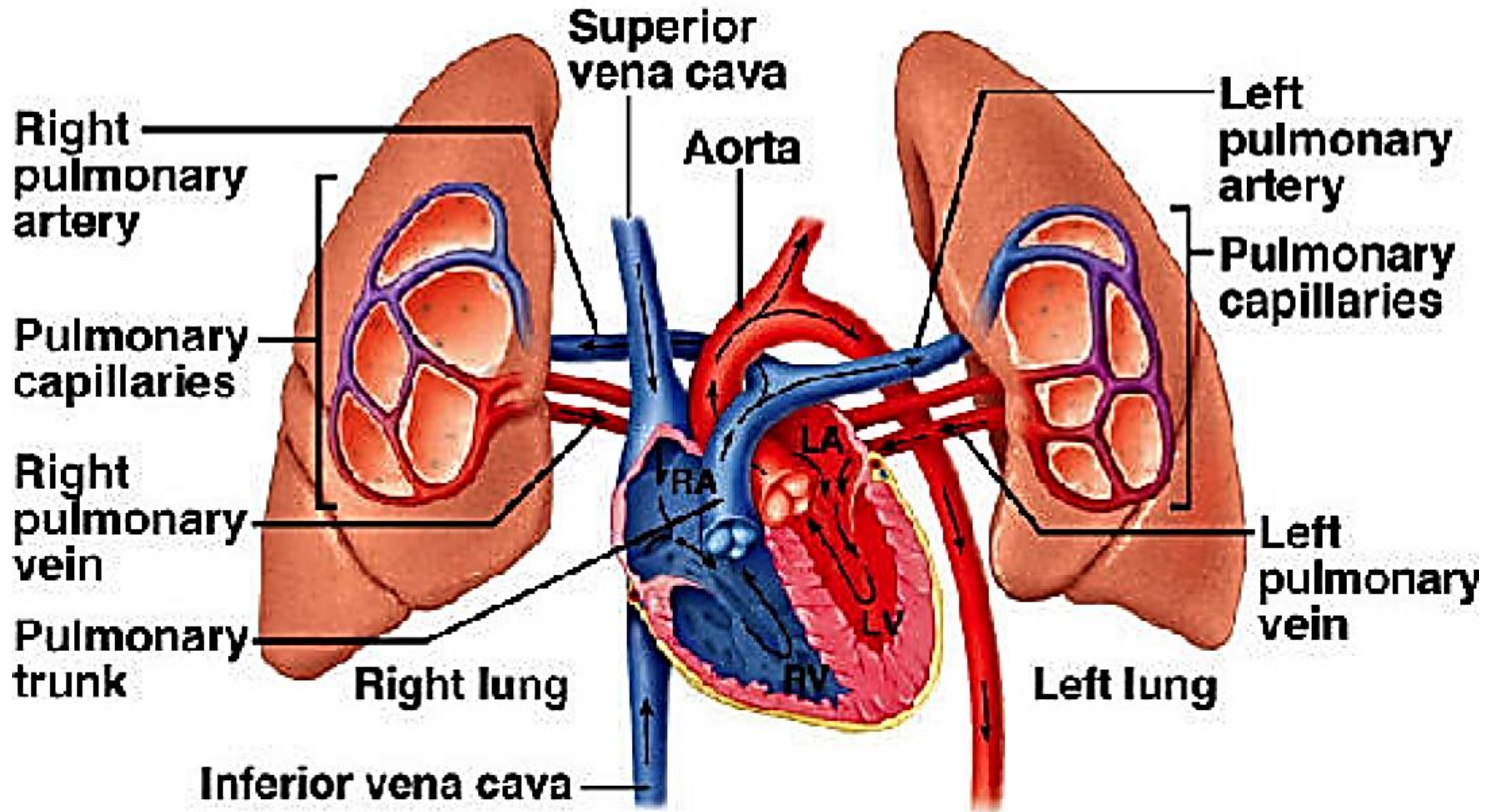


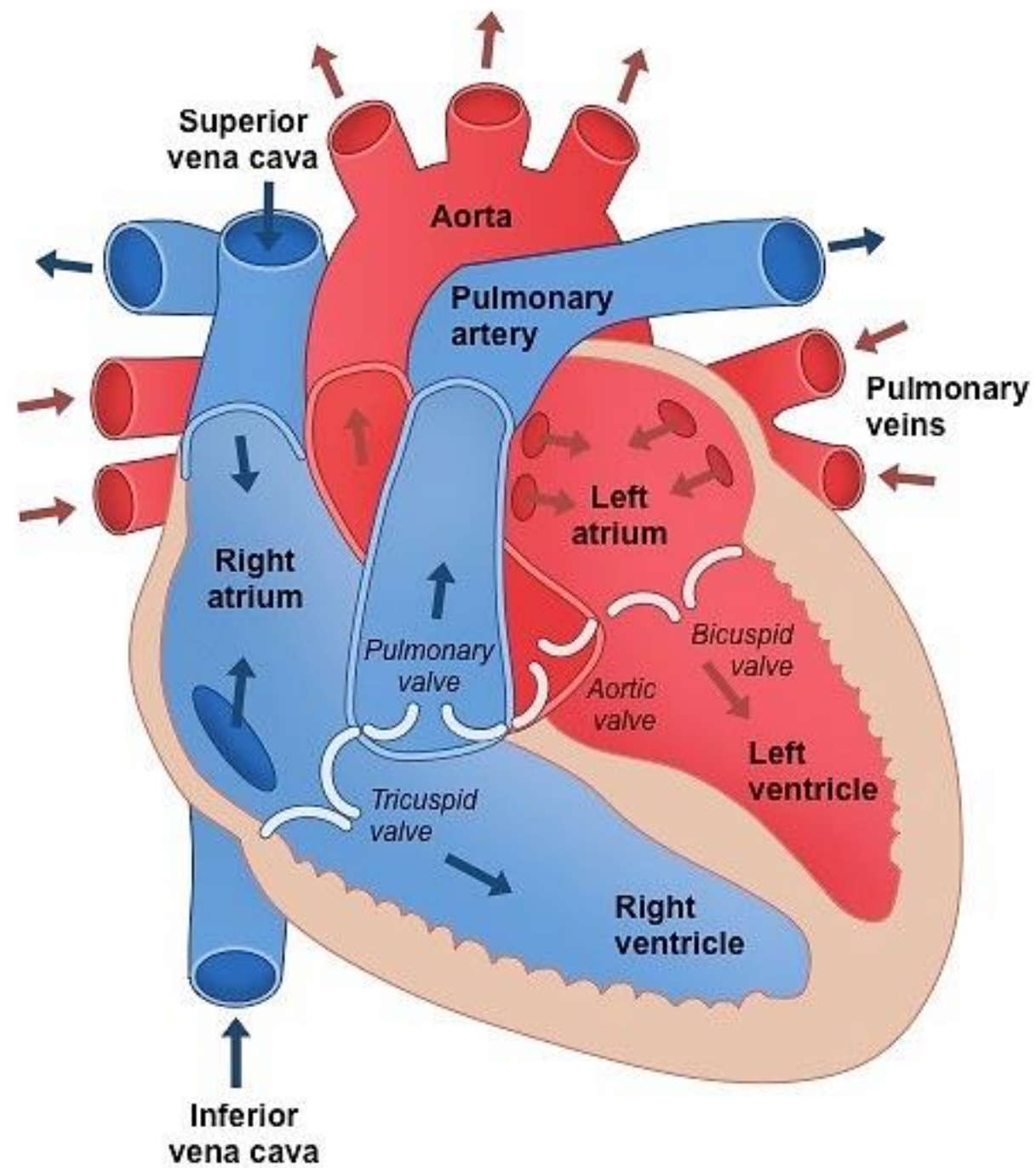


**Pulmonary arteries** = only arteries that carry deoxygenated blood

**Pulmonary veins** = only veins that carry oxygenated blood (to the left side of the heart)

Blood on the right side of the heart is deoxygenated (blue)

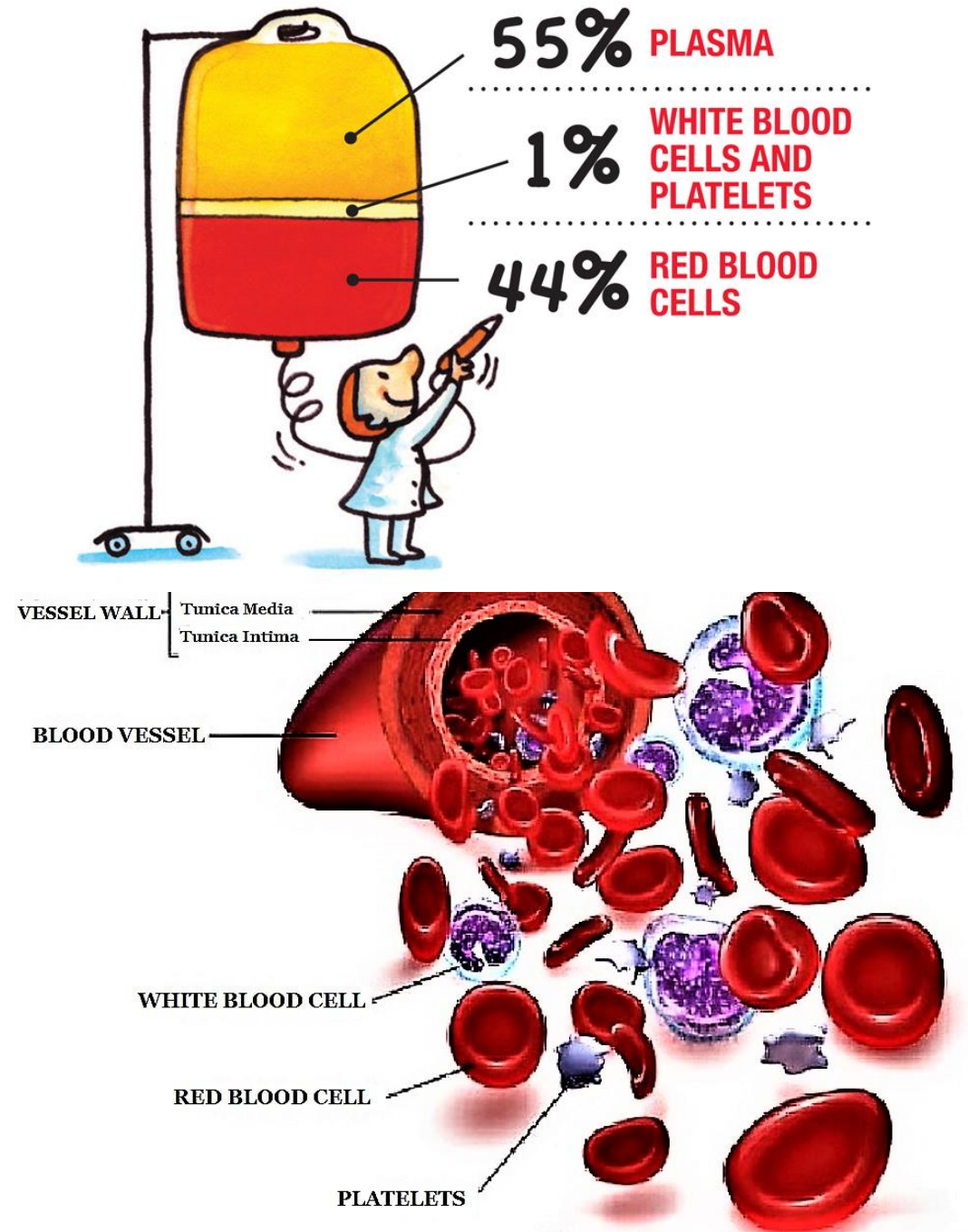






# The Components of Blood

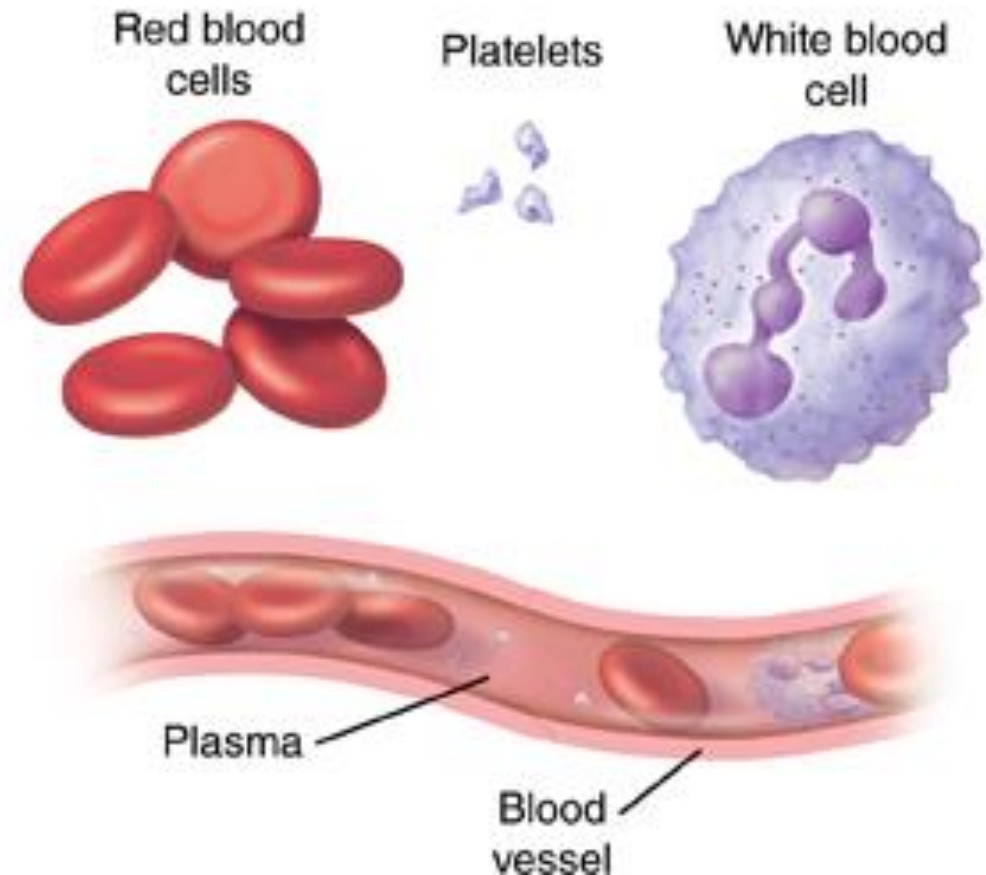
- Blood performs several essential functions necessary for our health
  - Transports oxygen, nutrients, and water to our cells
  - Carries carbon dioxide and wastes away from our cells
  - Carries specialized cells to help fight infections and heal wounds
- Human body contains about 5 L of blood
  - Plasma
  - Red blood cells
  - White blood cells
  - Platelets





# The Components of Blood

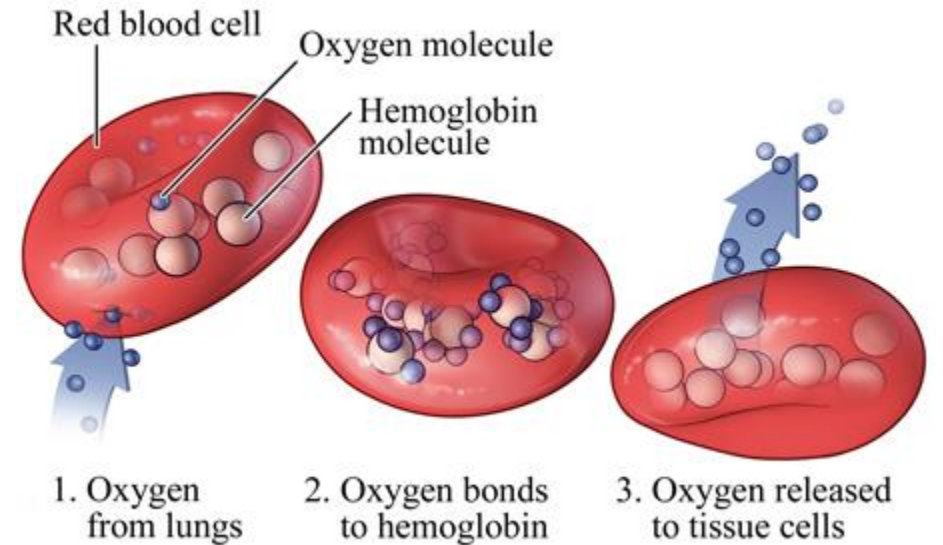
- Human body contains about 5 L of blood
- About 55% is liquid called **plasma**
  - Clear, yellowish fluid that contains proteins, minerals, other substances
- About 45% made up of **red blood cells (RBC)**, **white blood cells (WBC)**, and **platelets**
- Every second, your body produces approx. two million **red blood cells!**



# The Components of Blood

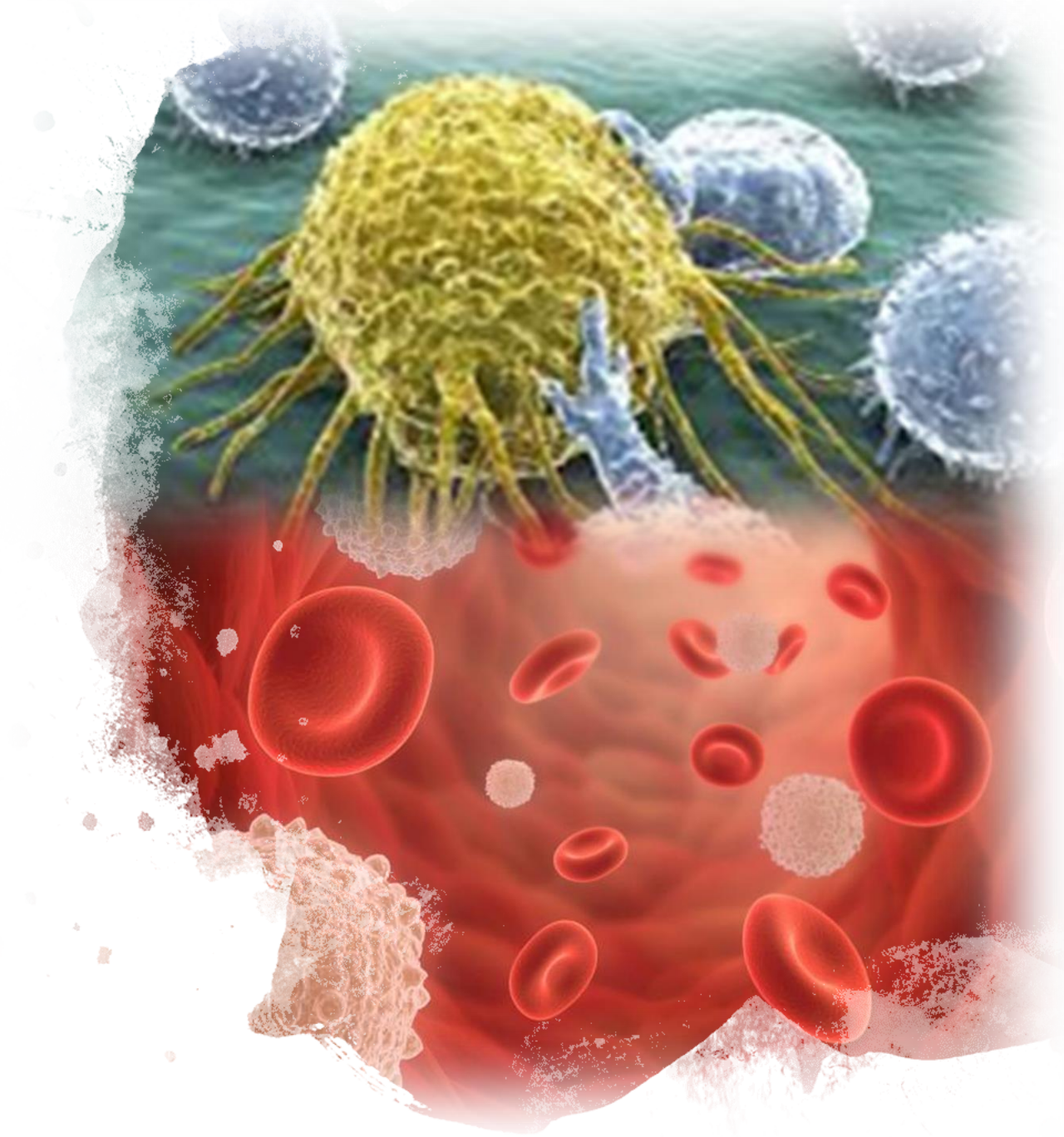
## Red Blood Cells (RBC)

- Carry oxygen from your lungs to the cells of your body
- Carry carbon dioxide from your body cells to your lungs where it is exhaled
- Formed in fatty tissue called bone marrow
  - Found inside bones
- Also produced in the liver and spleen
- Each RBC has a protein molecule of hemoglobin
  - Molecule that carries oxygen to the capillaries and carbon dioxide to the lungs
- 4.5 million in a drop of blood



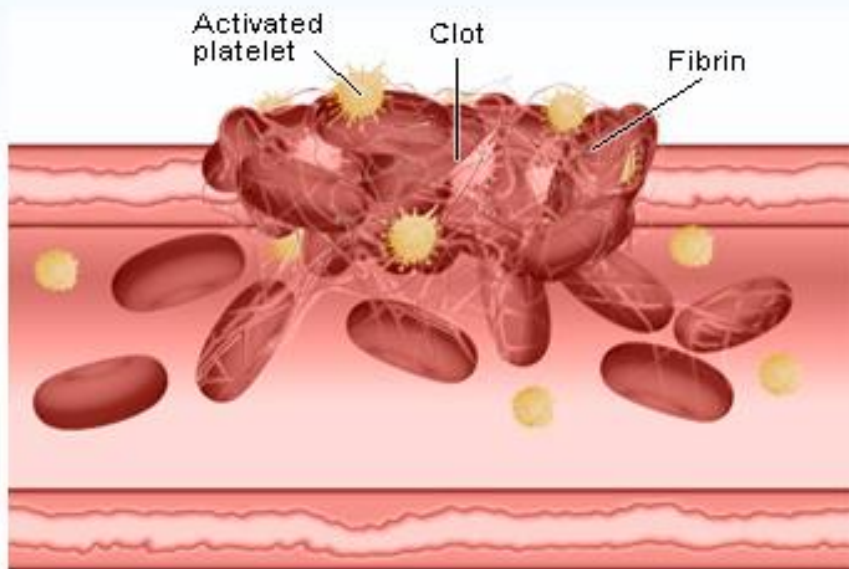
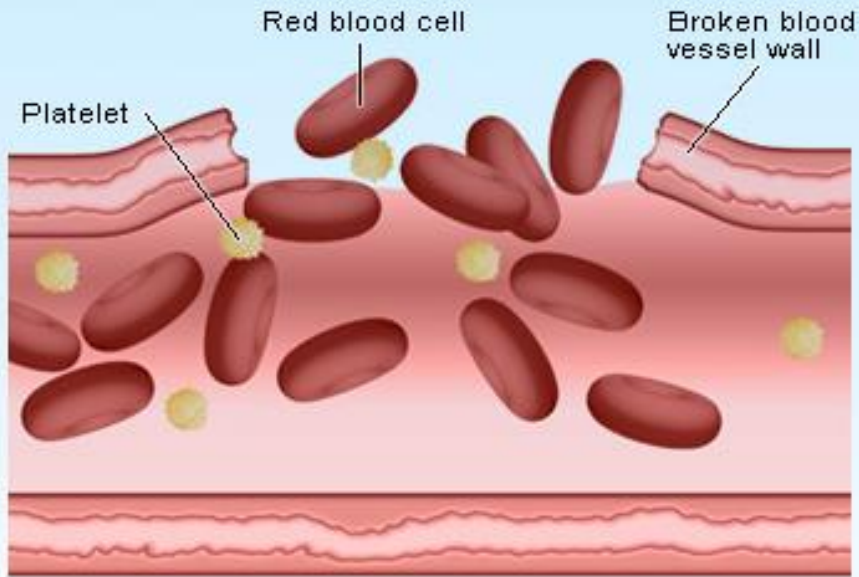
# The Components of Blood

- **White Blood Cells: (WBC)**
  - Fight infection and prevent the growth of cancer
  - Much larger in size than RBC
  - A drop of healthy blood contains about 5000 to 11 000 WBC
  - When you get an infection, the number of WBC increases





# Blood Clot



# The Components of Blood

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## Platelets:

- Important for clotting blood
- When you get a cut, platelets stop the bleeding and seal the wound
  - Thicken the blood so a scab can form over the cut
- About 200 000 to 400 000 in a drop of blood

# Recall

- What are the 4 chambers of the heart?
- What causes the “lub dub” sound your heart makes?
- What are some differences between arteries and veins?
- Do all arteries carry oxygenated blood? Explain.
- What are the components of blood and their functions?

On a separate piece of paper, answer the above questions.