

## Circulatory Systems

- **Cardiovascular System** = Heart, blood vessels, and blood
  - Transports H<sub>2</sub>O, nutrients, waste, O<sub>2</sub>, CO<sub>2</sub>, hormones, and immune cells.
  - Regulates heat, pH, and pressure.
  - Associated with lymphatic system.
- **Lymphatic System** = Lymphatic vessels, lymphatic hearts, & lymph

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## Human Cardiovascular System

Cardio- = heart

Vascular = blood vessels

- **Blood** = fluid connective tissue (transports gases and nutrients)
- **Heart** = muscular organ that “pumps” blood
- **Blood vessels** = carry blood through the body.

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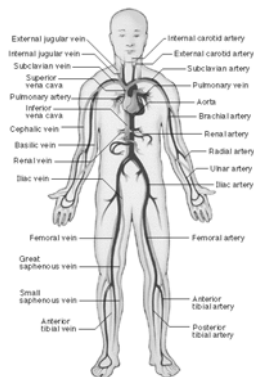
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## Human Cardiovascular



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## Functions of the Cardiovascular System

- Allows **exchange** of gasses (oxygen and carbon dioxide), nutrients, waste, hormones, and heat. Moves chemicals where they need to be.
- Heart – moves blood through blood vessels.
- Blood vessels – channels to transport blood throughout the body.

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## Blood Vessels

- **Artery** = carries blood away from the heart, thick walls.
- **Vein** = carries blood to the heart.
- **Capillaries** = very small vessels that permit exchange of materials in the tissues; found in almost all tissues (where gasses and nutrients diffuse).

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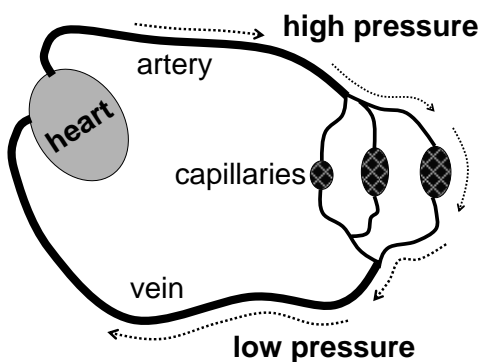
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## Arterial & Venous Systems



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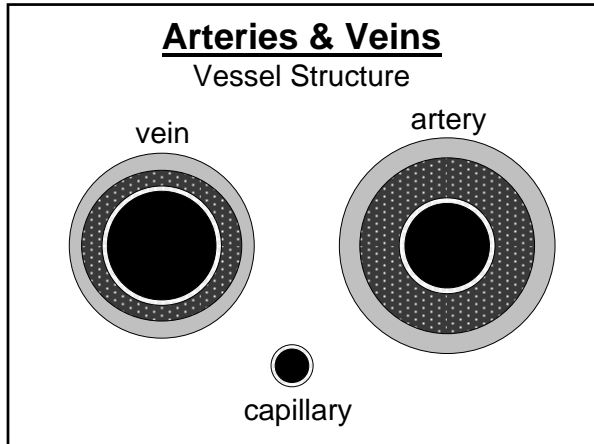
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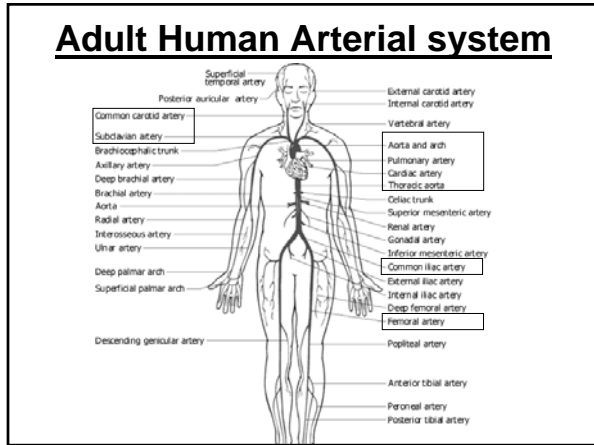
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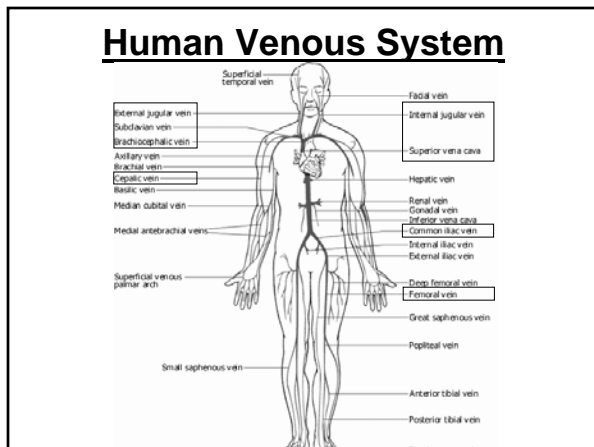
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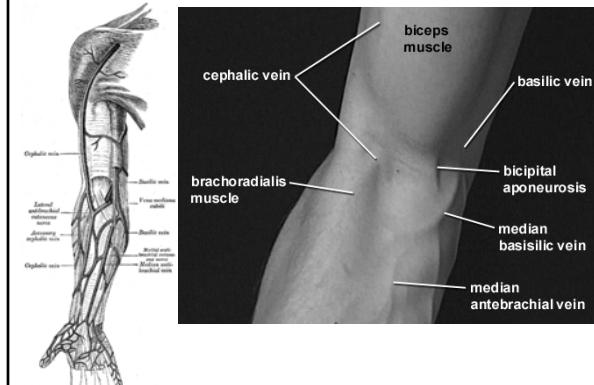
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## Human Venous System



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## Human Heart

- **FOUR** chambers
- **2 atria** (Singular = atrium)
- **2 ventricles**
- **atria** = small; pump blood to ventricles.
- **ventricles** = large and muscular; pump blood out of the heart.
- Valves exist between the atria and the ventricles (prevent backflow).

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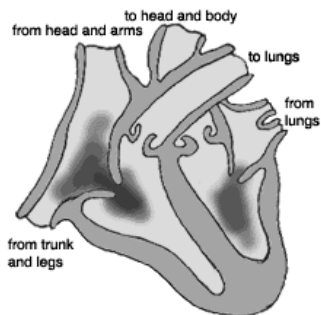
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## Human Heart

### Blood Flow



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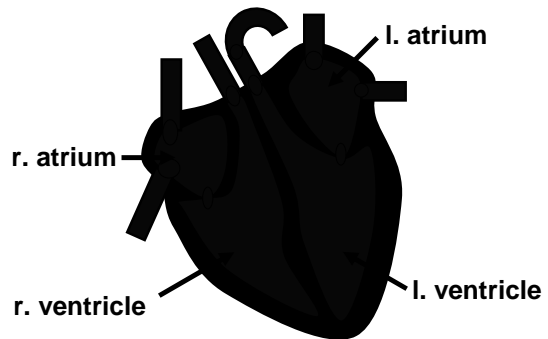
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### Human Heart

Blood Flow



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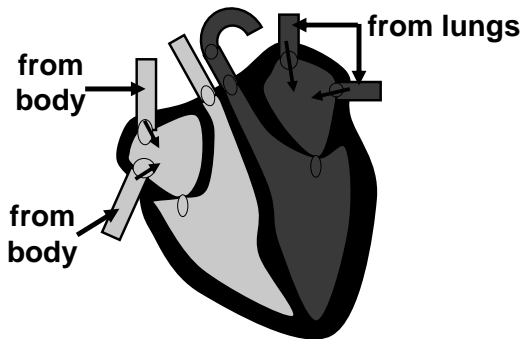
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### Human Heart

Blood Flow



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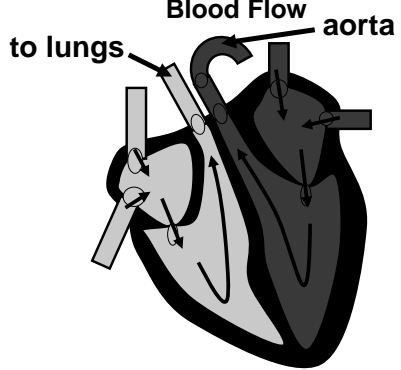
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### Human Heart

Blood Flow



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## Human Heart Blood Flow



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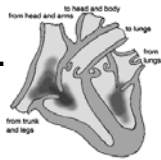
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## Heart Contraction

- **SA (Sinoatrial) node** (pacemaker) = cells (**top of rt. atrium**) give electric signal to contract (set heart rate)
- **AV (Atrioventricular) node** = cells (**top of rt. ventricle**) give electric signal to contract after stimulated by SA node.
- Atria contract first, then ventricles.



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## Human Heart Contraction

- Systole = contraction
- Diastole = relaxation
- Heart rate = number of heart contractions per minute
- Pulse = rhythmic stretching of arteries (Pulse correlates with heart rate)
- ECG (EKG) = records the electrical changes in the heart.

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**Cardiovascular Disease**

- **Hypertension** = high blood pressure (diastolic greater than 90)  
Weakens arterial walls.
- **Aneurysm** = bulging/bursting a vessel.
- **Artherosclerosis** = fatty material accumulates in artery walls.
- **Plaque** = fatty deposit *in* artery wall.  
Make the inner surface irregular.  
Blood clots can form on this surface.

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**Cardiovascular Disease**

- **Embolus** = mobile blood clot.
- **Pulmonary embolism** = blood clot blocks a vessel supplying the lungs. (often fatal)
- **Stroke** = deprivation of oxygen to a part of the brain killing cells.  
A clot blocks a vessel or an aneurysm deprives a region of blood.

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**Cardiovascular Disease**

- **Heart Attack** = deprivation of oxygen by blocking a coronary artery (heart artery) to a part of the heart killing cells. A clot blocks a vessel.
- **Coronary bypass** = arteries removed from the leg are used to route blood around coronary artery blockages.
- **Angioplasty** = a small “balloon” is used to widen a narrow coronary artery and insert a stent.

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## Lymphatic System

- Plasma forced out of capillaries by blood pressure.
- **Edema** = excess plasma (tissues swell, lungs fill)
- Plasma moves into lymphatic vessels and is called **lymph**.
- Lymph vessels return lymph to blood.
- **Lymph nodes** = expanded lymph vessels filled with WBCs.

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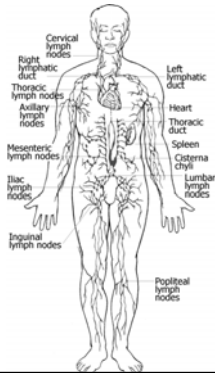
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## Lymphatic System



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