Anatomy of the Cardiovascular System and Blood

Cardiovascular System

The cardiovascular system includes the heart and the network of blood vessels that carry blood to and from the heart.

Heart

The heart circulates oxygenated blood from the lungs through the body and sends carbon dioxide–rich blood from the body tissue to the lungs. It comprises two upper and lower chambers, called atria and ventricles, respectively. The right atrium collects blood from the body through the veins and the right ventricle sends it to the lungs. The left atrium receives blood from the lungs, and the left ventricle pumps it to the body tissue through the arteries. The atria are separated by the atrial septum, and the ventricles are separated by the ventricular septum.

Valves of the Heart

The valves of the heart ensure one-way flow of blood through the heart’s chambers.

Atrioventricular valves

- **Tricuspid valve**: Between the right atrium and right ventricle
- **Mitral valve**: Between the left atrium and left ventricle

Semilunar valves

- **Pulmonary valve**: Between the right ventricle and the pulmonary artery
- **Aortic valve**: Between the left ventricle and aorta
**Layers of the Heart**

The heart is covered with a two-layer sac called the pericardium. Its internal layer secretes serous fluid, enabling movement. It is covered by the epicardium. Its external layer is fibrous.

**Blood Vessels**

Blood vessels are tubes that carry blood throughout the body. Here is a list of different types of blood vessels.

<table>
<thead>
<tr>
<th>Layers</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arteries</td>
<td>Blood vessels that carry oxygen and nutrient-rich blood from the heart.</td>
</tr>
<tr>
<td>Arterioles</td>
<td>The tiniest arteries.</td>
</tr>
<tr>
<td>Veins</td>
<td>Blood vessels that carry blood containing carbon dioxide and wastes from the body tissue to the heart.</td>
</tr>
<tr>
<td>Venules</td>
<td>The smallest veins.</td>
</tr>
<tr>
<td>Capillaries</td>
<td>Microscopic vessels that connect venules and arterioles. Substances in blood are exchanged between the blood and tissue through the capillary walls.</td>
</tr>
</tbody>
</table>

**Notes**

- **Pulmonary artery**: Unlike other arteries, the pulmonary artery carries blood containing carbon dioxide and wastes from the heart to the lungs.

- **Pulmonary vein**: Unlike other veins, the pulmonary vein carries blood containing oxygen and nutrients from the lungs to the heart.
### Blood

Blood maintains internal balance of the body. It also:

- Transports oxygen, nutrients, carbon dioxide, and wastes to and from the body cells
- Protects our body from viruses and other micro-organisms
- Regulates body temperature
- Maintains electrolyte and fluid balance

Blood is composed of plasma and cells. Here is a list of the major components of blood.

<table>
<thead>
<tr>
<th>Component</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Plasma</strong></td>
<td>Straw-colored, clear liquid in which the blood cells are suspended; 90% of the plasma is made of water, and it makes up 55% of blood volume.</td>
</tr>
<tr>
<td><strong>Serum</strong></td>
<td>Fluid part of blood that stays after the blood clots.</td>
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<tr>
<td><strong>Erythrocytes</strong></td>
<td>Red blood cells that carry oxygen, carbon dioxide, nutrients, and wastes. They are formed in bone marrow.</td>
</tr>
<tr>
<td><strong>Leukocytes</strong></td>
<td>White blood cells that fight infections and inflammation. Leukocytes are of five types.</td>
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</tbody>
</table>
Platelets

Formed elements that help blood clot. They are also known as thrombocytes.

Five Types of Leukocytes

- Neutrophil
- Eosinophil
- Basophil
- Lymphocyte
- Monocyte