Overview

CARDIOVASCULAR SYSTEM

“heart”    “vessels”

Made up of heart, blood vessels, and blood
Functions

**Heart** - pump blood

**Vessels** - (veins, arteries, capillaries) circulate blood

**Blood** - transports nutrients, waste, hormones, oxygen, antibodies
How Does It Work?

The **right** side of the system deals with **deoxygenated** blood.

The **left** side of the system deals with **oxygenated** blood.
The Heart

- Hollow organ, about the size of your fist
- Made of muscle to pump blood
- Surrounded by pericardium - fluid filled sac
The Heart

- **Myocardium** - muscle layer of the heart’s wall. Makes the heart “beat”/pump.
General Structure

- **Veins** bring blood to the heart
- **Atria** are the upper 2 chambers
- **Arteries** bring blood away from the heart
- **Ventricles** are the lower 2 chambers
External Structure

- Superior Vena Cava
- Right Pulmonary Artery
- Right Pulmonary Veins
- Right Atrium
- Right Ventricle
- Inferior Vena Cava
- Aorta
- Left Pulmonary Artery
- Left Pulmonary Artery
- Left Pulmonary Veins
- Left Pulmonary Veins
- Left Atrium
- Left Ventricle
- Apex
Internal Structure

- Superior Vena Cava
- Pulmonary Artery
- Aorta
- Septum
- Pulmonary Veins
- Left Atrium
- Aortic Valve
- Mitral Valve
- Tricuspid Valve
- Inferior Vena Cava
- Right Atrium
- Right Ventricle
- Left Ventricle
**Valves**

**Atrioventricular Valves** guard the entrances of ventricles.
- **Tricuspid** valve- between atria and ventricle entrance on the right side. Prevents blood from washing back into the right atrium.
- **Bicuspid** valve (Mitral valve)- between atria and ventricle entrance on the left side. Prevents oxygenated blood from re-entering left atrium.

**Semilunar Valves** guard the exits of the ventricles.
- **Pulmonary** semilunar valve- located between right ventricle exit and pulmonary artery.
- **Aortic** semilunar valve- located between left ventricle exit and the aorta.
Blood Flow

https://www.youtube.com/watch?v=7XaftdE_h60
Blood enters heart through 
- SUPERIOR VENA CAVA
- INFERIOR VENA CAVA

Blood travels to all parts of the body through:
- AORTA

Heart:
- RIGHT ATRIUM
- TRICUSPID VALVE
- RIGHT VENTRICLE
- PULMONARY ARTERY
- LUNG CAPILLARIES
- PULMONARY VEIN

Lung:
- Pulmonary valve

CO₂ is exhaled

O₂ is inhaled
Sinotrial (SA) Node

- At the top of the heart
- Acts as a pacemaker
- Sends impulse for the atria to contract and start pumping blood
Beating Heart

The atria contract at the same time:

1. The heart beat begins when the heart muscles relax and blood flows into the atria.

2. The atria then contract and the valves open to all blood into the ventricles.

blood from the body

blood from the lungs
Beating Heart
The ventricles contract at the same time while the atria are relaxing:

3. The valves close to stop blood from flowing backwards. The ventricles contract forcing blood to leave the heart.

4. At the same time, the atria are relaxing and once again filling with blood. The cycle repeats.
EKG (Electrocardiogram)

- Your heart sends an electrical impulse through it each time it beats.
- An EKG measures those impulses in 2 waves (atria contracting and ventricles contracting)

P wave - Atria contract
QRS wave - Ventricles contract
T wave - Ventricles relax

https://www.youtube.com/watch?v=v3b-YhZmQu8
Arrhythmia

Any change in normal electrical impulses of the heart

- **Tachycardia** - more than 100 beats/ min
- **Fibrillation** - lack of blood flow to heart
- **Bradycardia** - less than 60 beats/ min
Blood Vessels

- **Arteries** - carry blood away from the heart
- **Veins** - carry blood toward the heart
- **Capillaries** - tiny blood vessels that connect arteries and veins.
Pulse

- How fast your heart is beating (beats/min)
- Left ventricle pumps blood out of heart to the arteries
- Causes arteries to expand and then relax after blood has passed through
- You can feel pulse in arteries that are close to surface
Pulse

- Average 70-76 beats per minute in resting person
- Try it!

The radial pulse is felt on the wrist, just under the thumb.
Blood Pressure

Measurement of force exerted on the walls of arteries as the heart pumps blood through the body.

Tells us…
- relative amount of blood being pumped out of the heart
- the ease at which blood flows through your body
Blood Pressure

Measure **systolic** pressure (when heart is contracting) over **diastolic** pressure (when heart is resting).
Tool used to measure blood pressure
Measuring Blood Pressure

- **Pressure in cuff greater than 120 mm Hg**
  - Rubber cuff inflated with air
  - Artery closed

- **Pressure in cuff drops below 120 mm Hg**
  - Sounds audible in stethoscope
  - Systolic

- **Pressure in cuff below 70 mm Hg**
  - Sounds stop
  - Diastolic
## Blood Pressure Ranges

<table>
<thead>
<tr>
<th>Category</th>
<th>Blood Pressure level (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Systolic</td>
</tr>
<tr>
<td>Normal (Low Risk)</td>
<td>Less than 120</td>
</tr>
<tr>
<td>Pre Hypertension (Moderate Risk)</td>
<td>120 - 139</td>
</tr>
<tr>
<td>Stage 1 Hypertension (High Risk)</td>
<td>140 - 159</td>
</tr>
<tr>
<td>Stage 2 Hypertension (Very High Risk)</td>
<td>160 or higher</td>
</tr>
</tbody>
</table>

- **Normal**
  - Systolic 120 or less AND Diastolic 80 or less
- **Pre-High**
  - Systolic between 121-139 OR Diastolic between 81-89
- **High**
  - Systolic 140 or above OR Diastolic 90 or above
Hypertension vs. Hypotension

- **High blood pressure**
  - 140/90 or higher
  - Stress on blood vessels

- **Low blood pressure**
  - 100/60 or below
  - Less strain on blood vessels
  - Could be a sign of not enough blood flow to body