

### CARDIOVASCULAR SYSTEM

system made up of **vessels** that **transport O<sub>2</sub>, CO<sub>2</sub>, nutrients and waste products** through the body

#### CLOSED SYSTEM:

- blood never touches liquid between cells
- exchange through capillaries

### VESSELS

#### ARTERIES

- vessels that bring blood **from the heart to the organs** (usually oxygenated blood with nutrients)

#### VEINS

- vessels that bring blood **from the organs to the heart** (usually not oxygenated)

#### CAPILLARIES

- **small** blood vessels **around the organs**
- **delivery of oxygen and nutrients** to the organs
- **absorb and carry out waste products**

### BLOOD VESSEL ARCHITECTURE

| ARTERIES                  | =              | VEINS                     |
|---------------------------|----------------|---------------------------|
| TUNICA ADVENTITIA=        | external layer | fibrous connective tissue |
| TUNICA MEDIA=             | middle layer   | smooth muscle             |
| TUNICA INTIMA=            | internal layer | endothelium               |
| between layers of tunica= |                | elastic tissue: elastine  |

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|                      |                                 |
|----------------------|---------------------------------|
| bigger smooth muscle | VALVE                           |
|                      | stops the blood from going down |

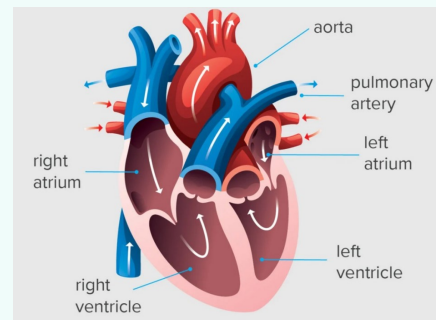
#### CAPILLARIES

|                    |  |
|--------------------|--|
| endothelial cell   | thin for exchange of substances                          |
| smooth muscle cell | small layer  |
| PERICYTE:          | feeds endothelial cells --> like connective tissue cells |

### CIRCULATION SYSTEMS

|                    |                                   |                       |
|--------------------|-----------------------------------|-----------------------|
| SMALL CIRCULATION= | connects the heart and the lungs  | pulmonary circulation |
| BIG CIRCULATION=   | connects the heart and the organs | systemic circulation  |

### HEARTH



### BLOOD CIRCULATION

**RIGHT ATRIUM** gets **not oxygenated** blood from the **SUPERIOR and INFERIOR VENA CAVA**

blood passes **through TRICUSPID VALVE** into the **RIGHT VENTRICLE**, most of the blood passes while the *hearth is relaxed (passive filling)*, then *small contraction for the last drop*

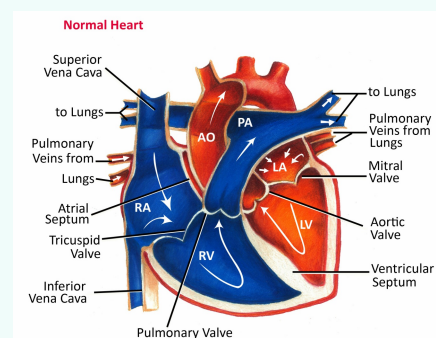
**CONTRACTION** pushes the blood into the **PULMONARY ARTERIES** through the **PULMONARY VALVE** lungs where the blood exchange carbon dioxide for oxygen

**LEFT ATRIUM** gets **oxygenated** blood from the **PULMONARY VEINS**

blood passes **through BICUSPID or MITRAL VALVE** into the **LEFT VENTRICLE**, most of the blood passes while the *hearth is relaxed (passive filling)*, then *small contraction for the last drop*

**CONTRACTION** pushes the blood into the **AORTA** through the **AORTIC VALVE**

### BLOOD CIRCULATION



### WALLS OF THE HEART

three+ one layer

**EPICARDIUM**= thin external membrane **connective tissue**

**MYOCARDIUM**= pumping action, most present **cardiac muscle tissue**

↳ gets nutriment and oxigen from: **CORONARY ARTERIES**

**ENDOCARDIUM**= thin internal layer **endothelium**

**PERICARDIUM**= **protective, fluid-fille sac** that **surrounds** the heart ↳ provides **lubrif-ication**

↳ protect the heart from **infections** ↳ hold the heart in **place** ↳ keep the heart **from expanding**

### CARDIAC CYCLE

**DIASTOLE**= myocardio relaxed, atrium-ventricular valves open, blood circulates in atrio and ventricle, semilunar valves closed

**ATRIAL SISTOLE** = contraction of the atries

**VENTRICULAR SISTOLE** = ventricles starts to contract, pressure grows, atrio-ventricular valves closes, semilunar valves open

### CARDIAC CYCLE AND ELECTROCARDIOGRAM

**PACEMAKER**= **SINOATRIAL NODE**= generates a signal that spreads through the heart

**SISTOLE**= relaxation

**DIASTOLE**= **CONTRACTION**

**ATRIAL SISTOLE**

**P wave**= depolarization of the atrias with the spread of first signal  
atrial contraction→ increase the pressure→ pushes the blood into the ventricle

### CARDIAC CYCLE AND ELECTROCARDIOGRAM (cont)

#### ISOVOLUMETRIC VENTRICULAR CONTRACTION

**QRS complex**= depolarization of the ventricles with the spread of signal

ventricular contraction

ventricle contracts but the blood in the ventricle stays the same

first sound: atrio-ventricular valves shutting valve are closed until the increase in the pressure is bigger than the pressure in the aorta

**EJECTION FASE** rapid ejection: high pressure and first blood

slow ejection: slower pressure and resistance from the vessels

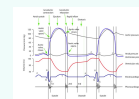
**T wave**= polarization of the ventricle for a new signal

**ISOLVOLUMETRICAL VENTRICLE RELAXATION** ventricle relax

pressure goes down

valve closes and second sound

### CARDIAC CYCLE



### MOST IMPORTANT FUNCTIONS

**respiratory sistem**= get rid of CO2 and capture O2

**digestive system**= bring nutrition to all the organs

**kidneys and urinary system**= filtration of waste (nitrogenous substances)

**temperature control**= vasodilatation to cool down

### CAUSES OF HEART AND CARDIOVASCULAR DISEASES

|                       |  |
|-----------------------|--|
| excessive smoking and | consumption of alcohol   |
| diabetes              | cholesterol too high   |
| overweight            | hypertension   |
| genes                 | stress   |
| atherosclerosis=      | build up in vessels of platelets: they think fat is like an injury that has to be closed |
| blood clot=           | vessels closed by a group of red cells   |
| trauma or injury      |  |

### DISEASES

|                          |                    |
|--------------------------|--------------------|
| heart disease            | vascular disorders |
| congenital heart defects |                    |
| strokes                  |                    |

### STROKES (ictus)

|                      |  |
|----------------------|--|
| TIA=                 | symptoms only last for a short amount of time, temporary blocage |
| ischaemic stroke=    | blockage cutting off the blood supply to the brain               |
| haemorrhagic stroke= | bleeding in or around the brain                                  |

### HEART DISEASE

|                     |  |
|---------------------|--|
| cardiac failure=    | heart fails to circulate blood properly      |
| heart attack=       | one of the coronary arteries becomes blocked |
| cardiac arrest=     | heart doesn't work                           |
| cardiac arrhythmia= | problem with the rate or rhythm of heartbeat |

### VASCULAR DISORDERS

|                  |  |
|------------------|--|
| aneurysm=        | weak or expanded part of an artery   |
| atherosclerosis= | buildup of fats, cholesterol and other substances in and on the artery walls |
| thrombosis=      | blood clots block veins or arteries  |

