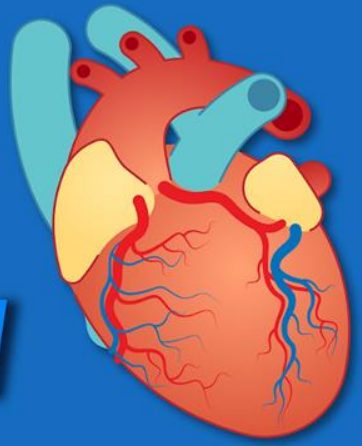
BODY FLUIDS & CIRCULATION - L4



ZOOLOGY

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Other Toppers from Classroom Programs*

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Anuska Mandal
5 Year Classroom Program

Gujarat-Male

706/720 AIR 16
Jay Dipak Rajyaguru
2 Year Classroom Program


705/720 AIR 19
Anmol Garg
2 Year Classroom Program


705/720 AIR 20
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705/720 AIR 21
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Haryana

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Nisha
4 Year Classroom Program

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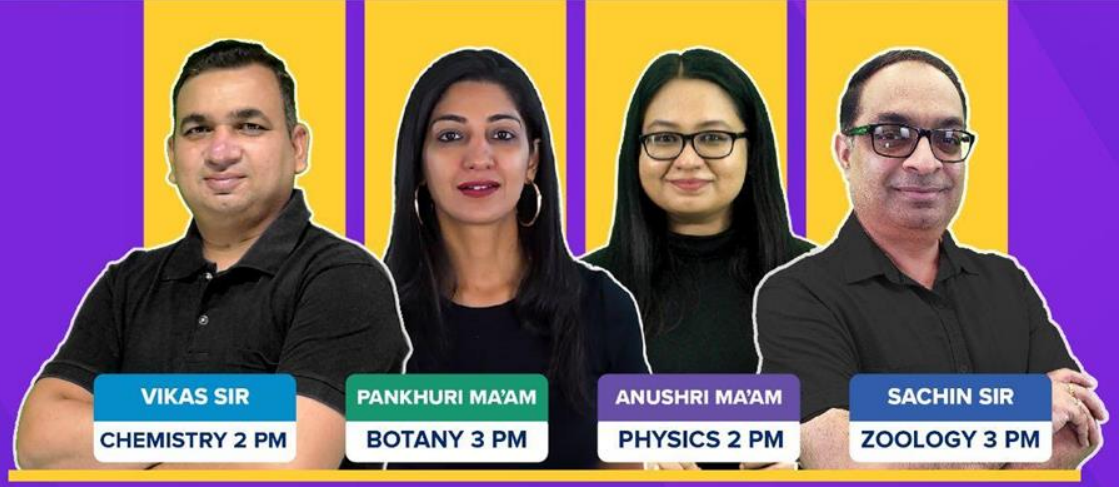

12TH CLASS | TUESDAY, THURSDAY
11TH CLASS | MONDAY, WEDNESDAY, FRIDAY

3 PM | 4 PM | 5 PM | 6 PM

MISSION MBBS

VIKAS SIR

CHEMISTRY | 3:00 PM

ANUSHRI MA'AM

PHYSICS | 4:00 PM

SACHIN SIR

ZOOLOGY | 5:00 PM

PANKHURI MA'AM

BOTANY | 5:00, 6:00 PM

PUSHPENDU SIR

ZOOLOGY | 6:00 PM

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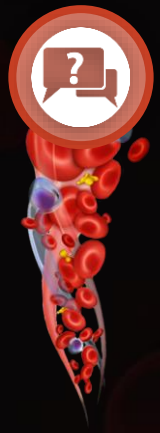
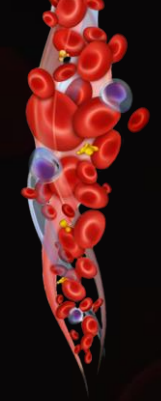


Can you think of a time when you were very aware of your heartbeat?

Functions of the Heart

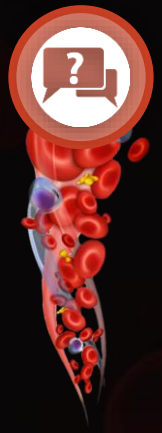
- To pump blood to all parts of the body

Why should blood be transported to all parts of the body ?



Functions of the Heart

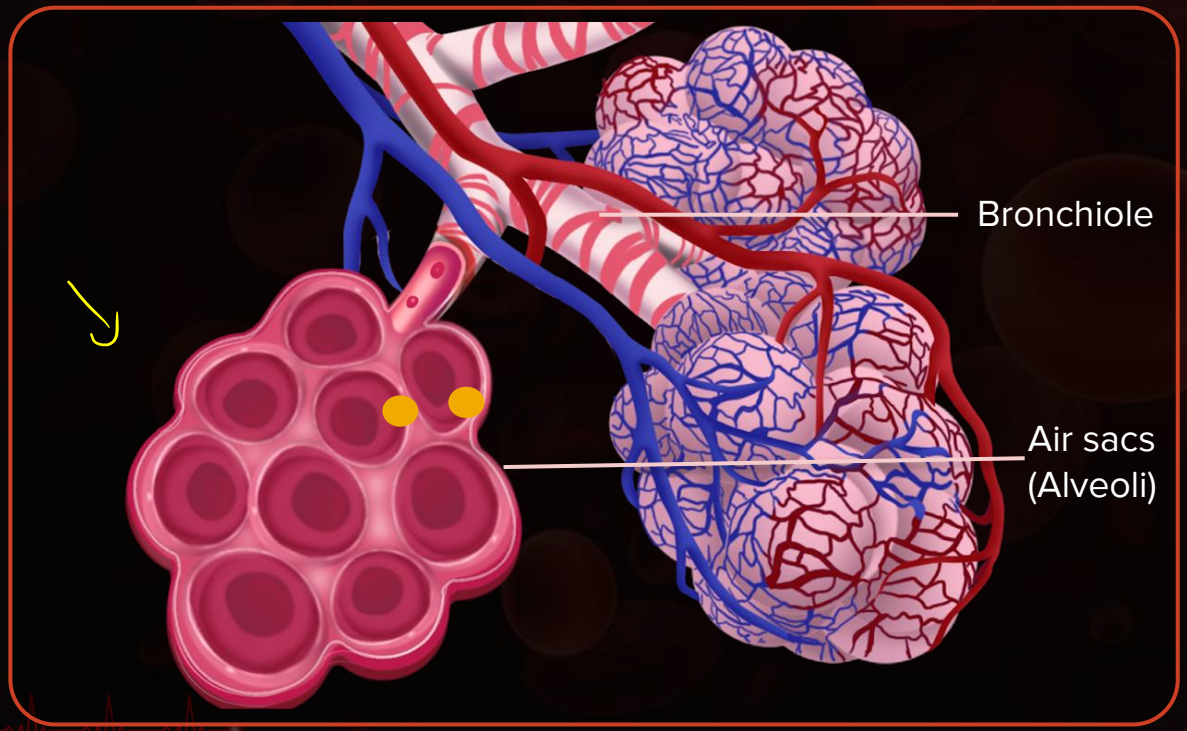
- Blood carries oxygen to all cells which is essential for **respiration** and to **remove carbon dioxide** from the blood



How does the blood get oxygenated ?

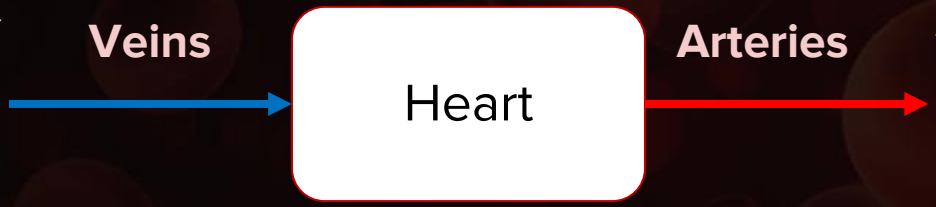
Alveoli

- Blood vessels surround the alveoli

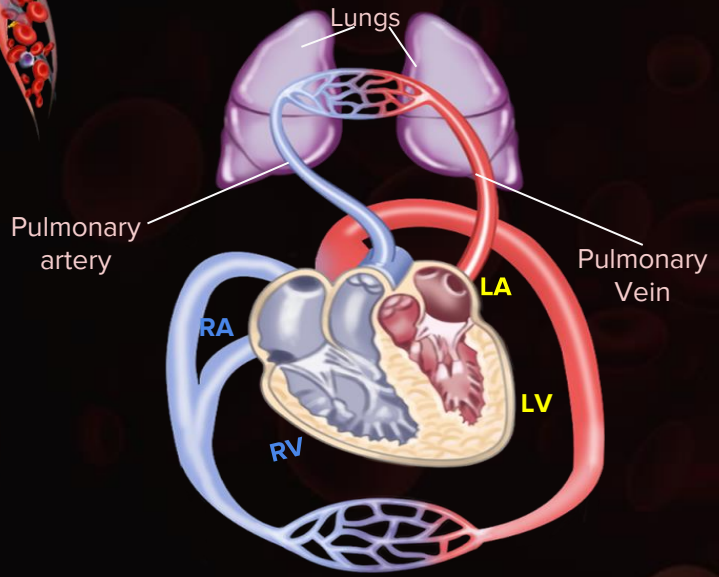


Arteries and Veins

- Arteries carry oxygenated blood away from the heart (except Pulmonary artery).
- Veins carry deoxygenated blood towards the heart (except Pulmonary Vein).



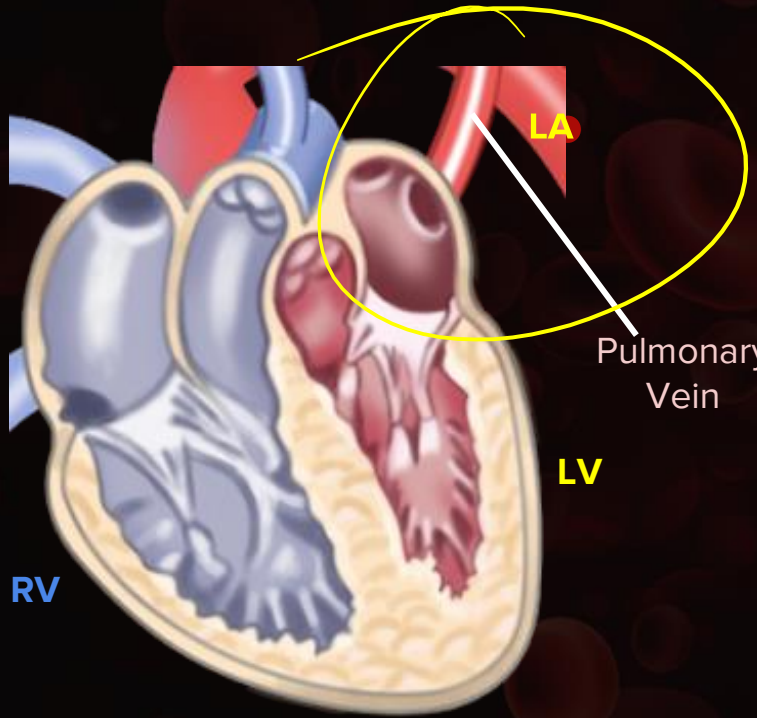
Pulmonary Circulation



Deoxygenated blood ⇢ Lungs ⇢ Oxygenated blood

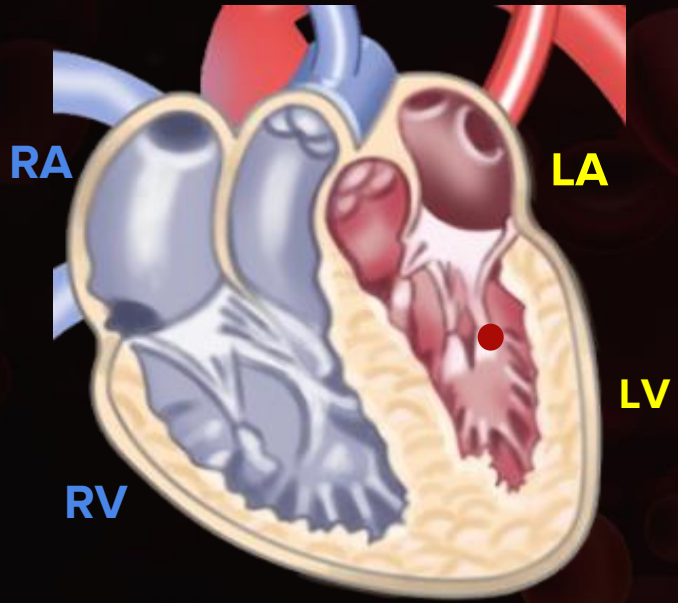
Lungs → Heart : Oxygenated blood (Pulmonary vein)

Pulmonary Circulation



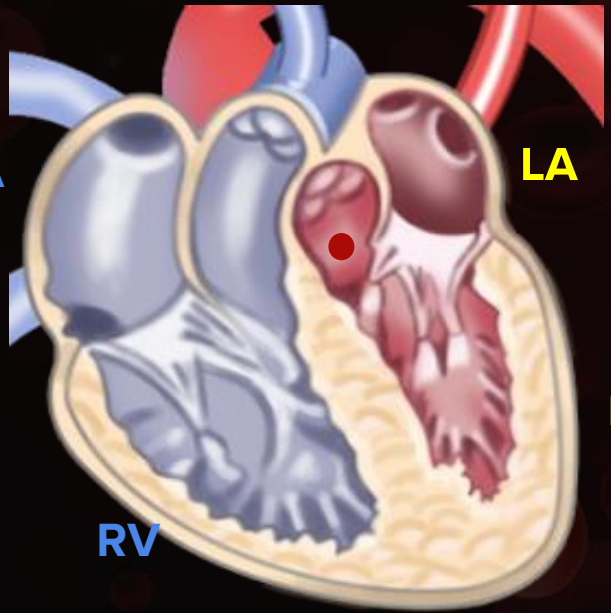
Pulmonary Vein → (Oxygenated blood) → Left Atrium

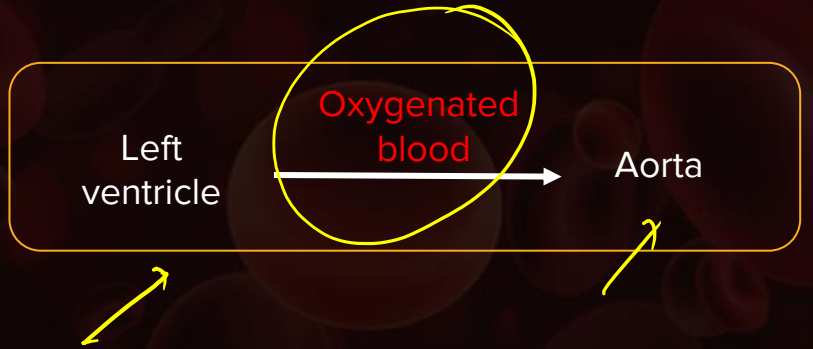
Pulmonary Circulation



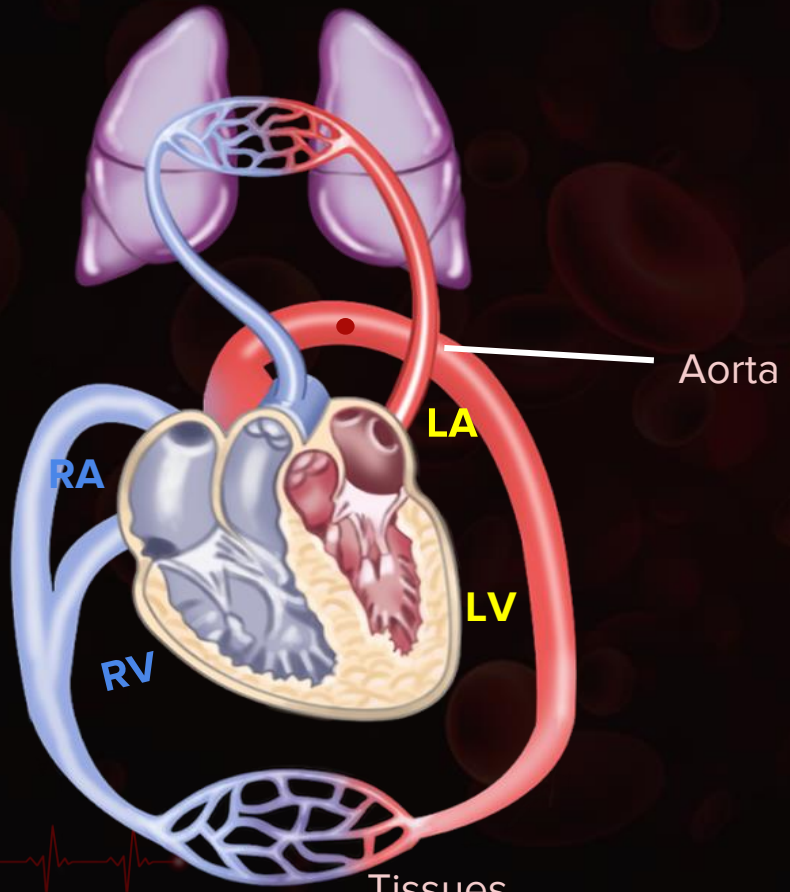
Left atrium → Oxygenated blood → Left ventricle

Pulmonary Circulation





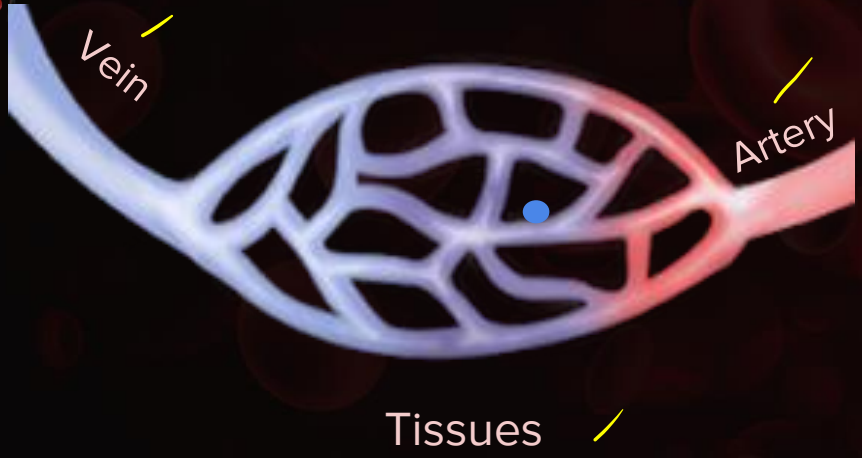
Pulmonary Circulation

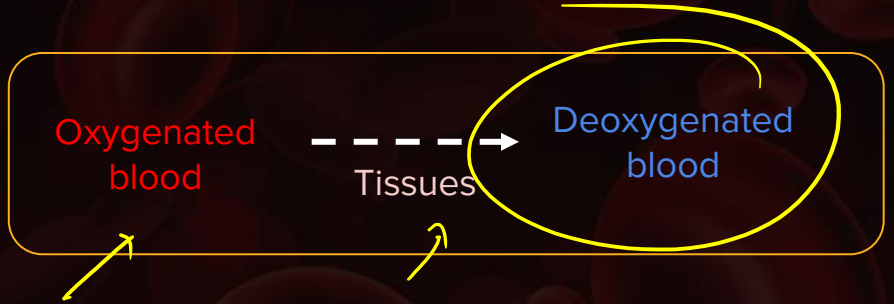


Heart → Oxygenated blood → Tissues

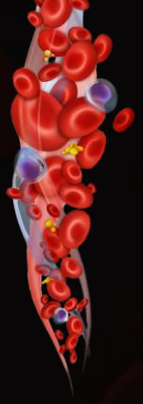
Aorta (Arteries)

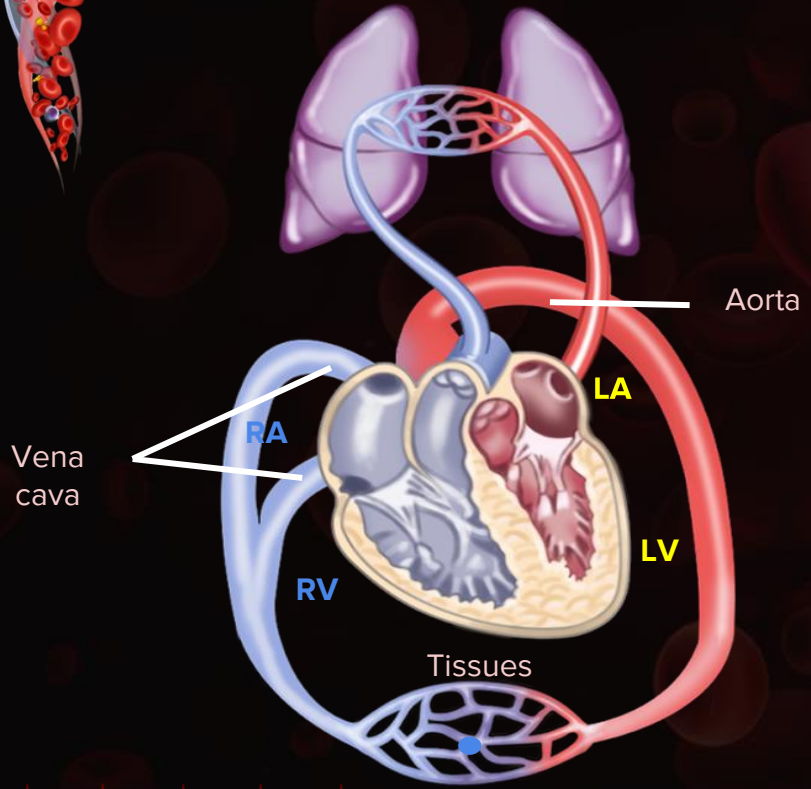
Pulmonary Circulation

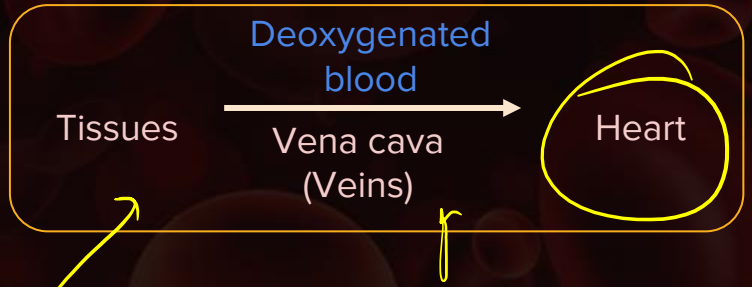




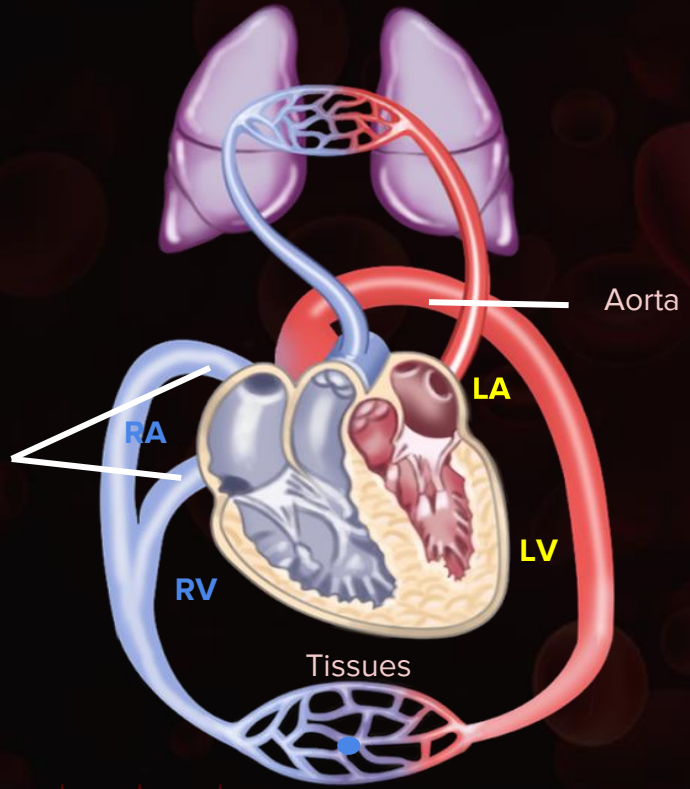
Pulmonary Circulation



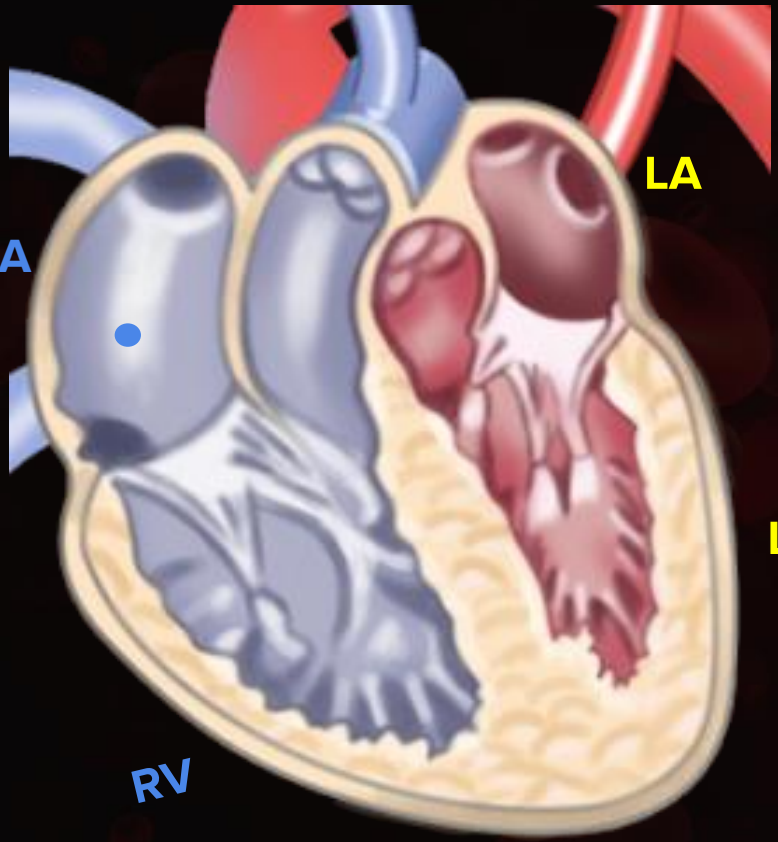




Pulmonary Circulation

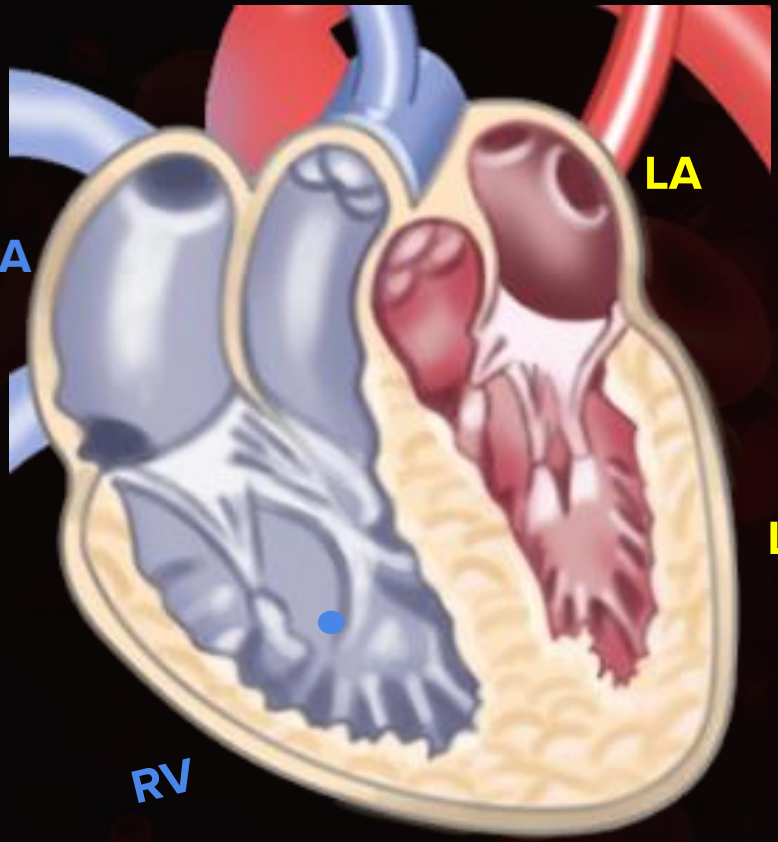


Vena cava → (Deoxygenated blood) → Right atrium



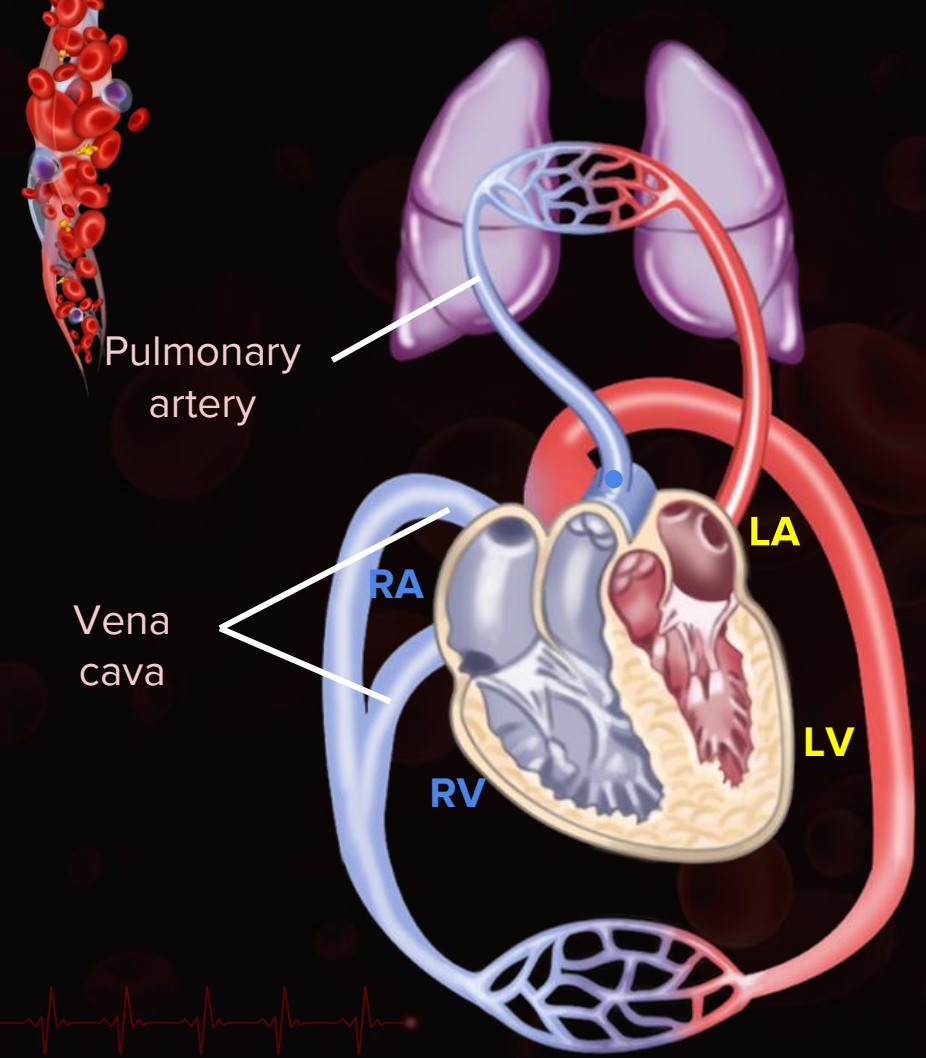
Deoxygenated blood

Right atrium → Right ventricle



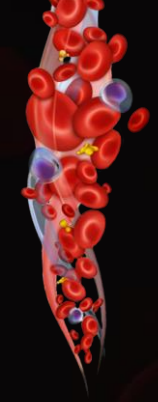
Deoxygenated blood

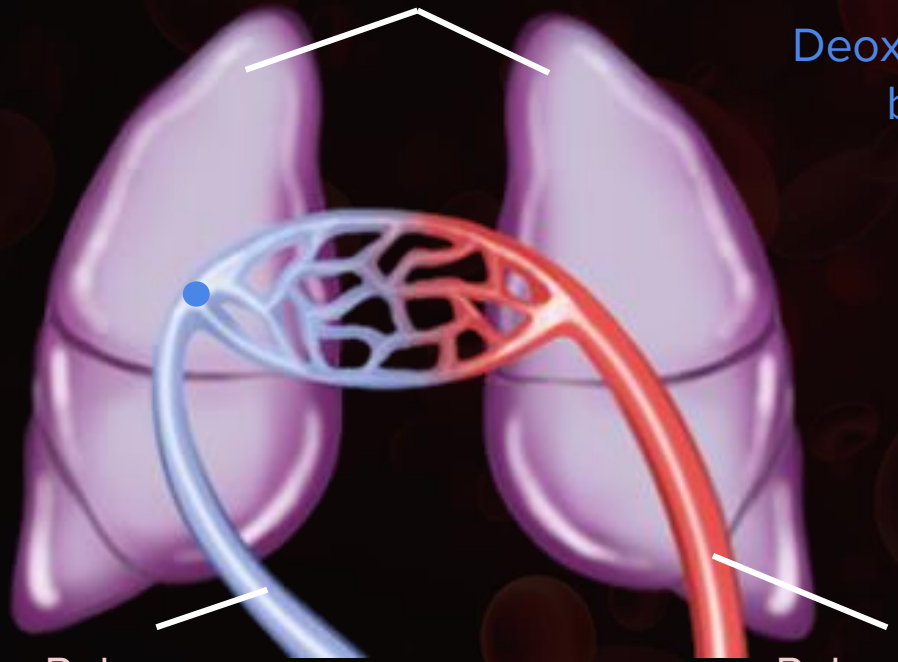
Right ventricle → Pulmonary artery



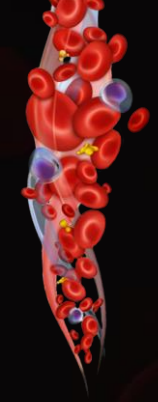
Heart → Lungs: Deoxygenated blood

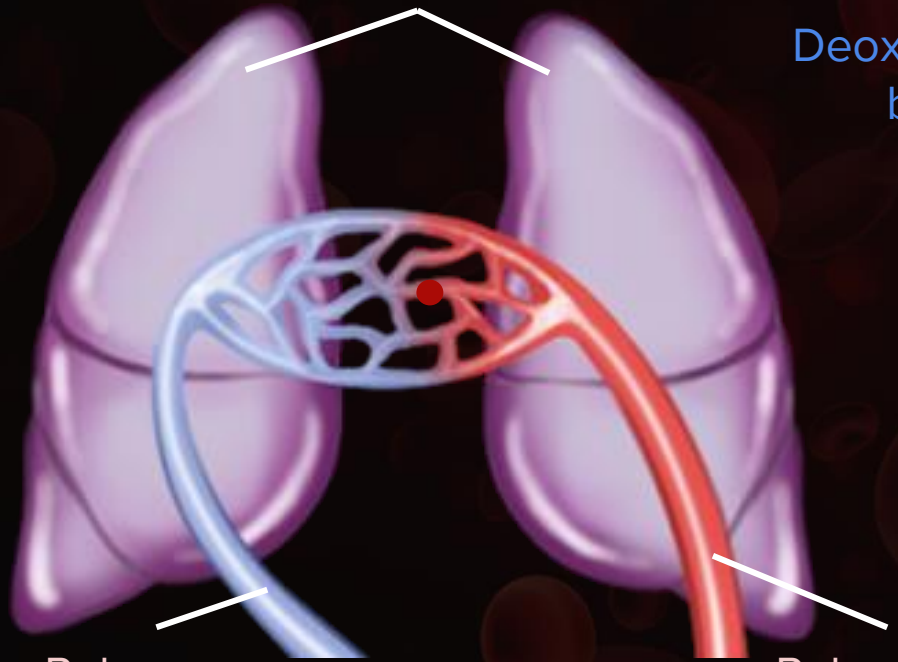
Lungs → Heart: Pulmonary artery



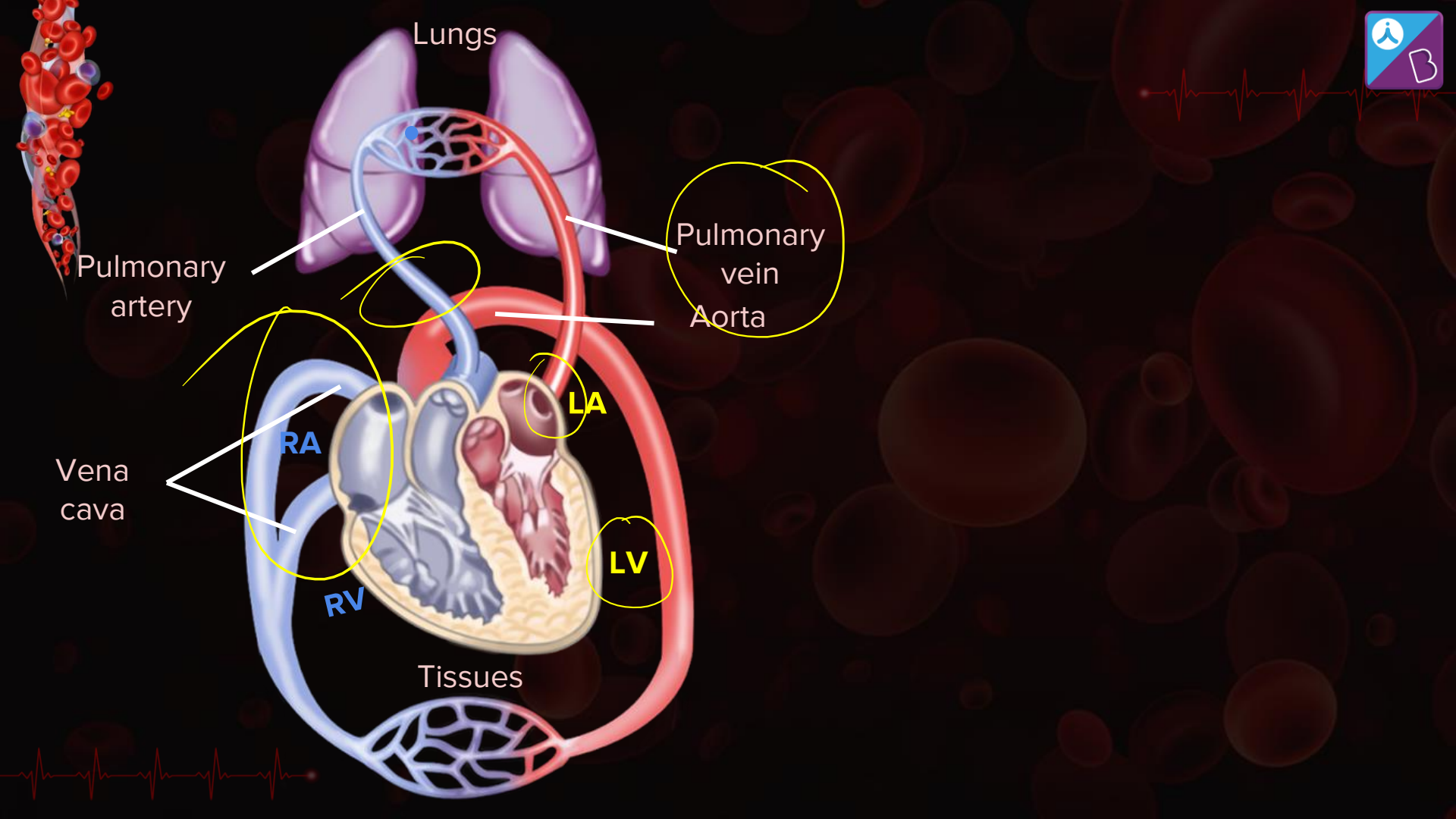


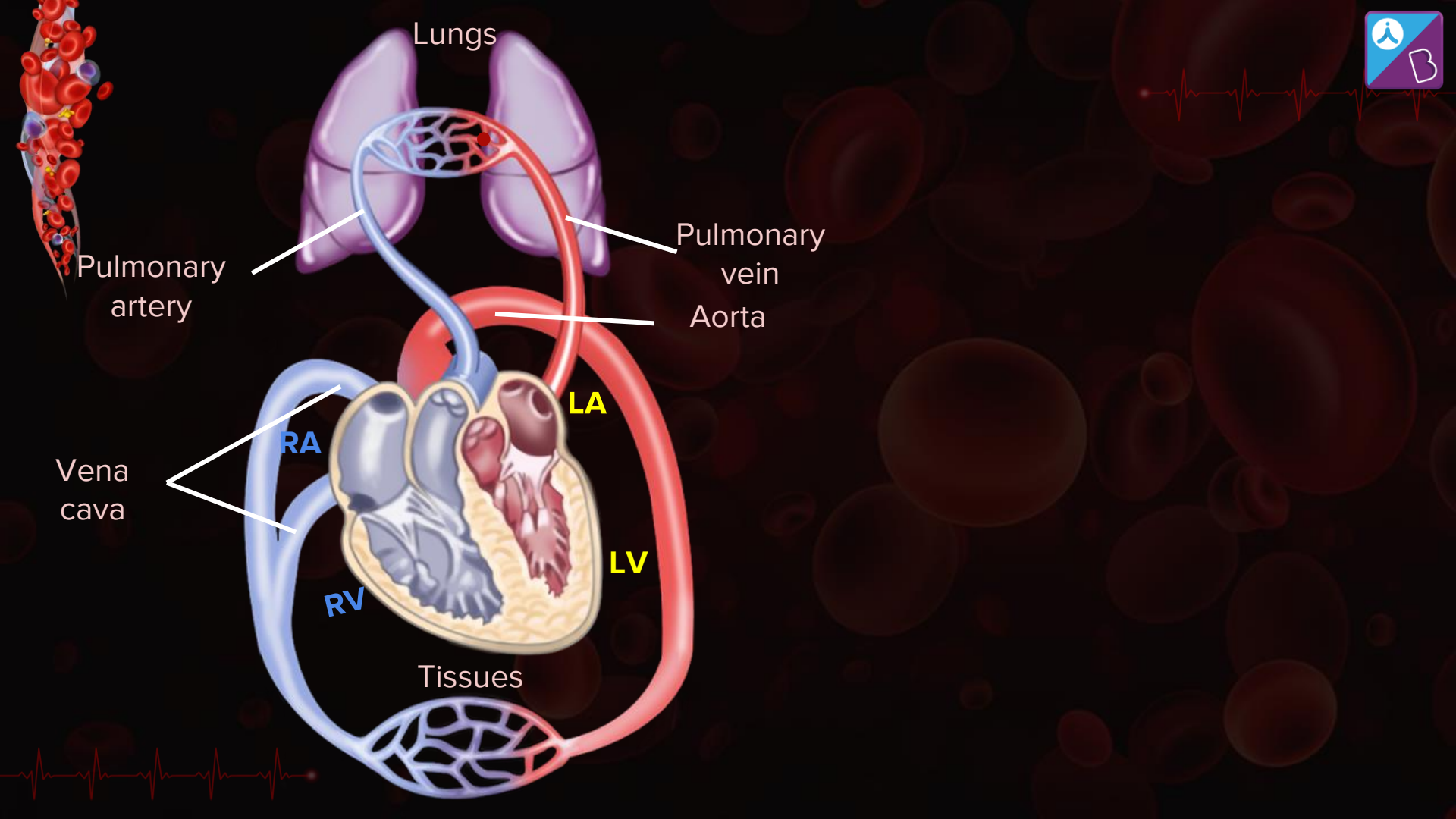
Deoxygenated blood ---- Lungs ----> Oxygenated blood

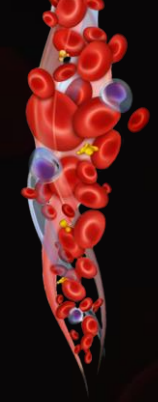


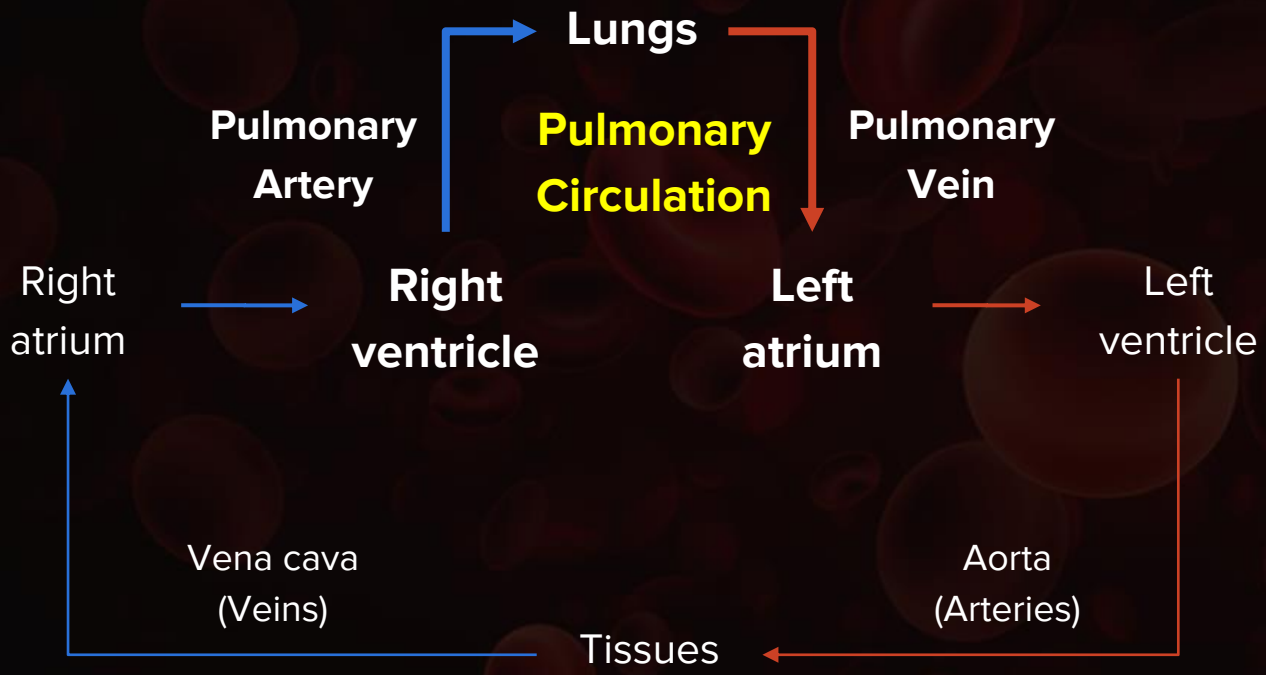


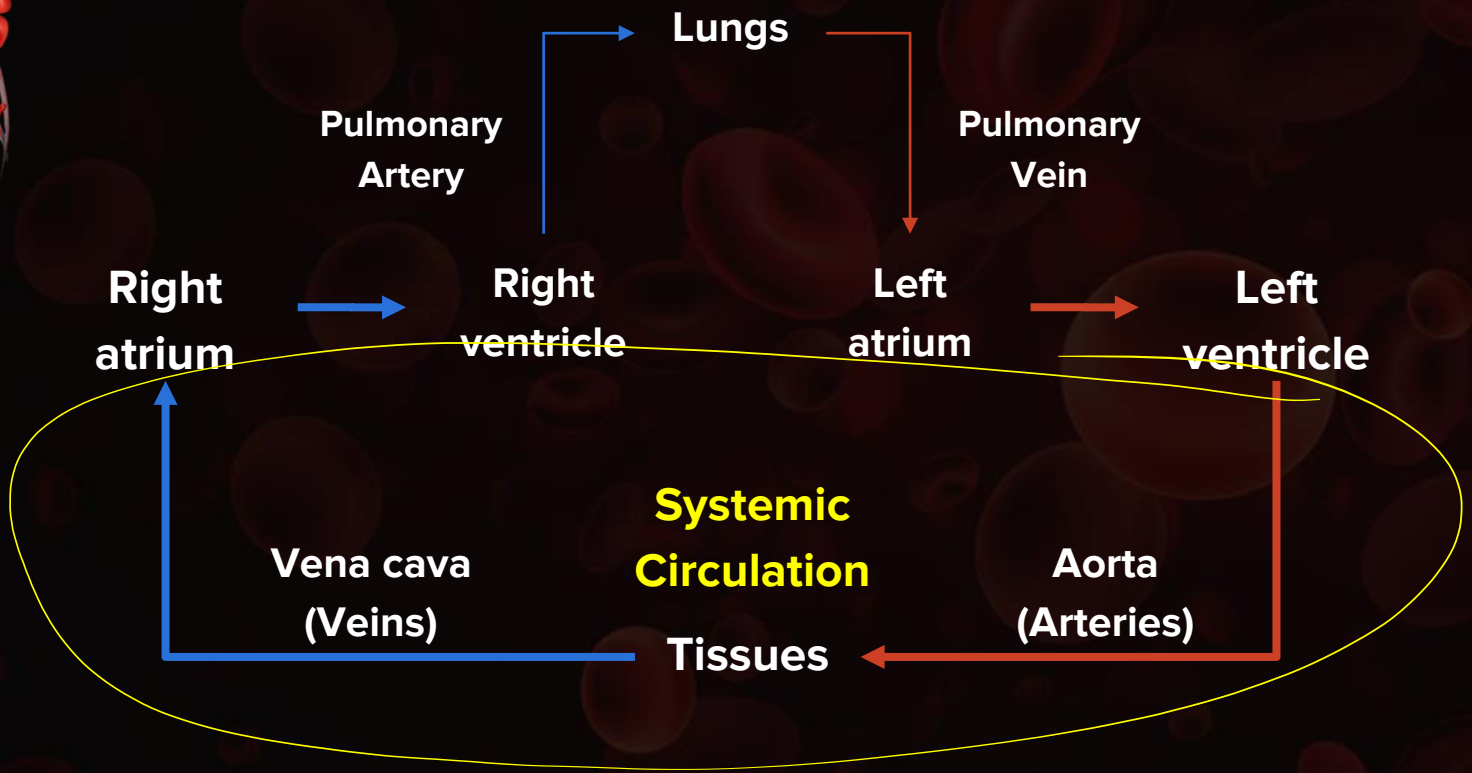
Deoxygenated blood → Lungs → Oxygenated blood


Lungs
Pulmonary artery
Pulmonary vein
Aorta
Vena cava
RA
LA
RV
LV
Tissues


Lungs
Pulmonary artery
Pulmonary vein
Aorta
Vena cava
RA
LA
RV
LV
Tissues

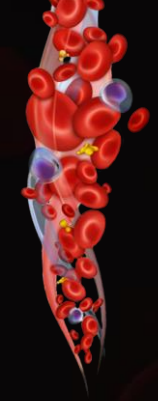


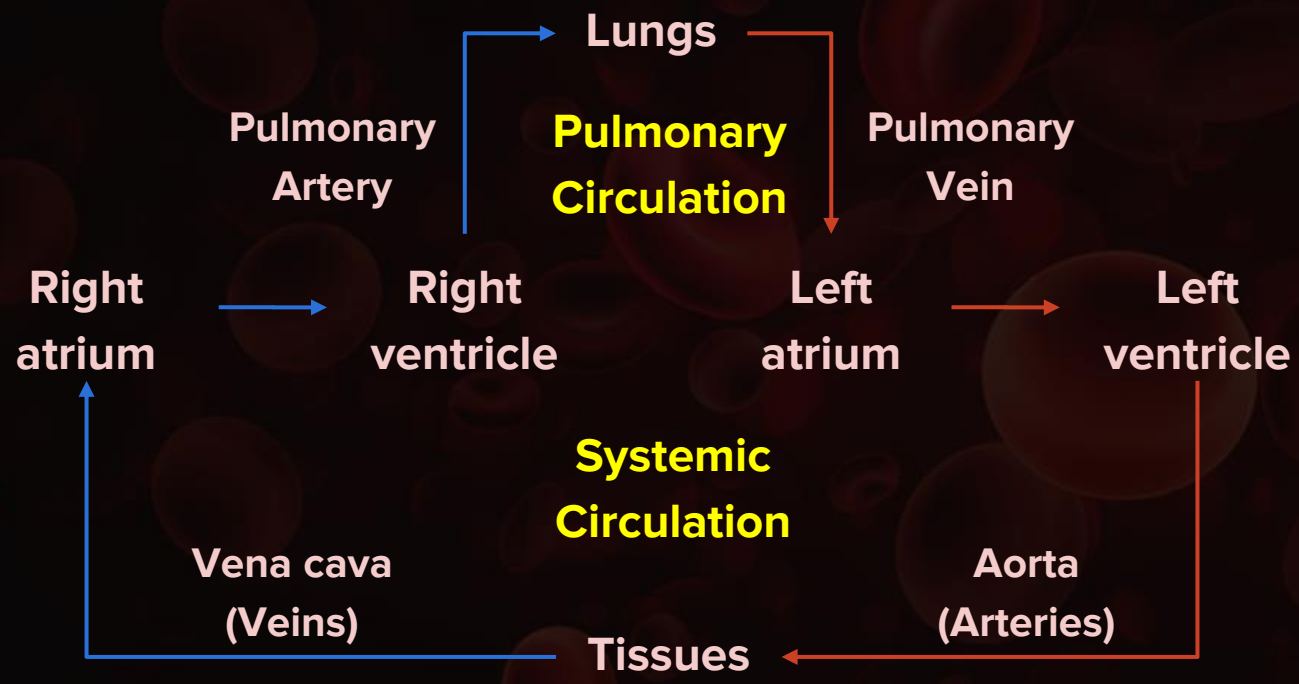

Lungs
Pulmonary Artery
Pulmonary Circulation
Pulmonary Vein
Right atrium
Right ventricle
Left atrium
Left ventricle
Vena cava (Veins)
Aorta (Arteries)
Tissues


Lungs
Pulmonary Artery
Pulmonary Vein
Right atrium
Right ventricle
Left atrium
Left ventricle
Systemic Circulation
Vena cava (Veins)
Aorta (Arteries)
Tissues

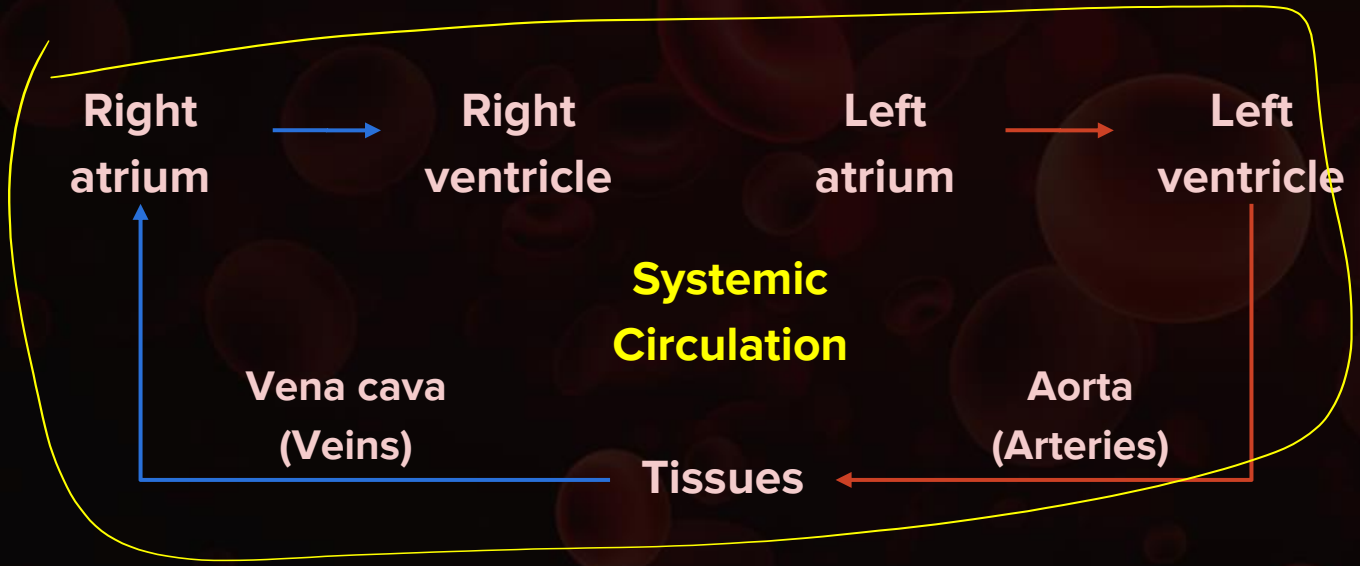
Double Circulation

Double Circulation





Systemic Circulation

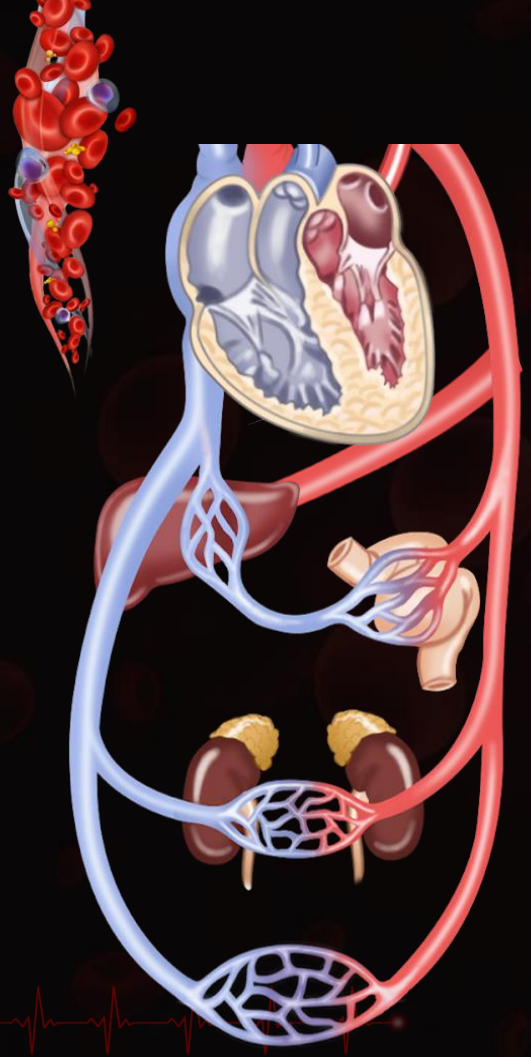


Systemic Circulation

Heart → Oxygenated blood → Tissues

Aorta
(Arteries, Arterioles & Capillaries)

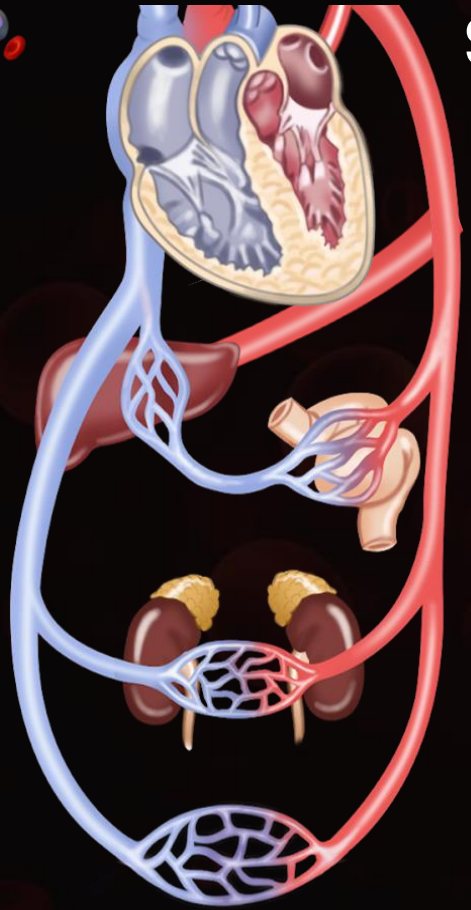
Systemic Circulation



Heart → Oxygenated blood → Tissues

Aorta
(Arteries, Arterioles & Capillaries)

Systemic Circulation

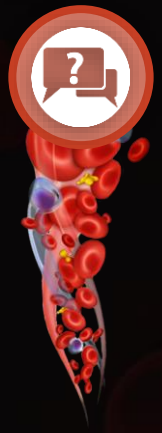


Heart → Tissues: Oxygenated blood

Aorta
(Arteries, Arterioles, Capillaries)

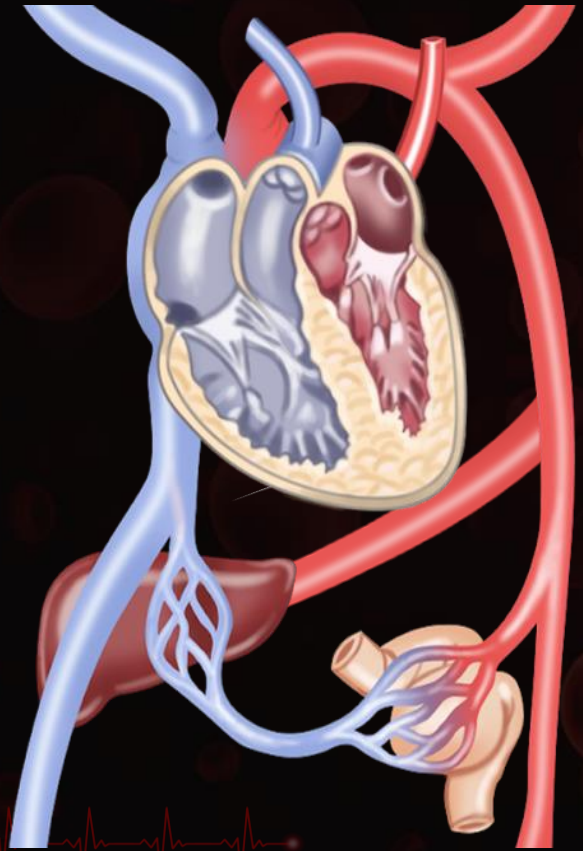
Tissues → Heart: Deoxygenated blood

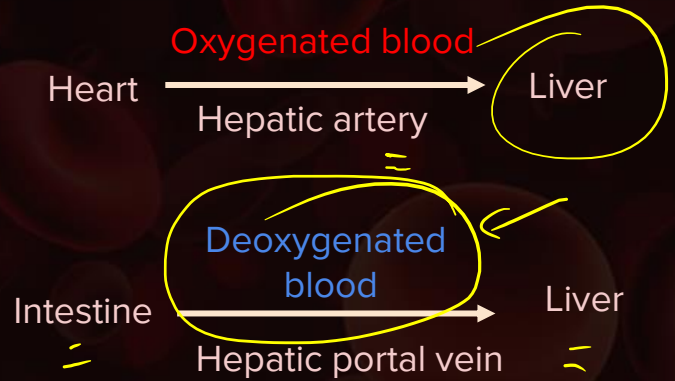
Vena cava
(Capillaries, Venules, Veins)



Why does the Liver receive blood from two different sources ?

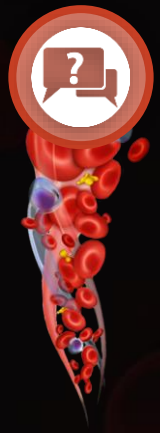
Hepatic Portal Vein



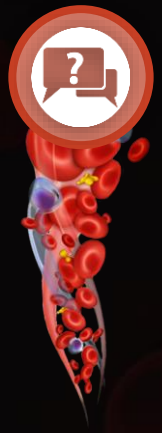


Hepatic Portal System

A unique vascular (circulatory) connection between the **digestive tract** and the **liver** is called Hepatic Portal System.



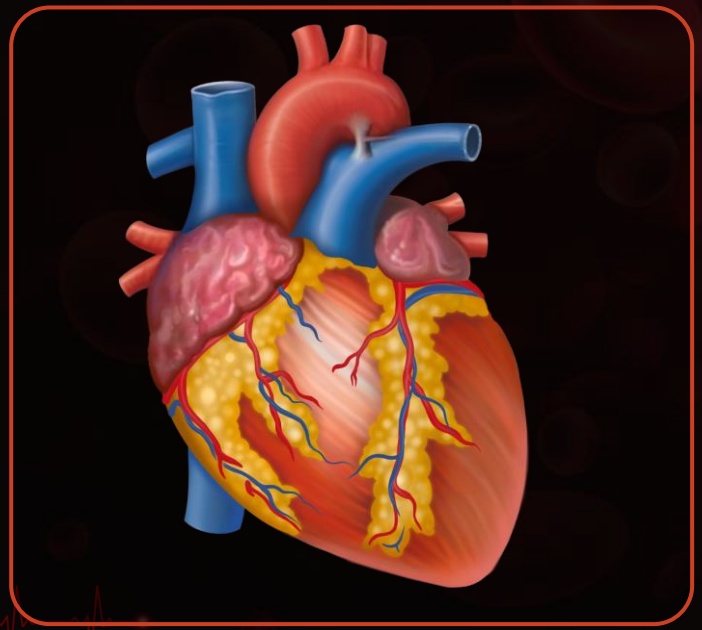
Here’s another question.

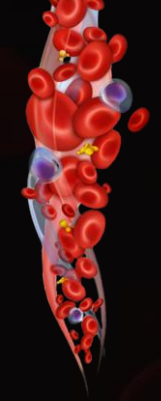


The Heart pumps blood but does it also need blood?

Coronary Circulation

- **Coronary arteries** supplies oxygenated blood to the heart muscle
- **Cardiac veins** drain away the deoxygenated blood from the heart muscle

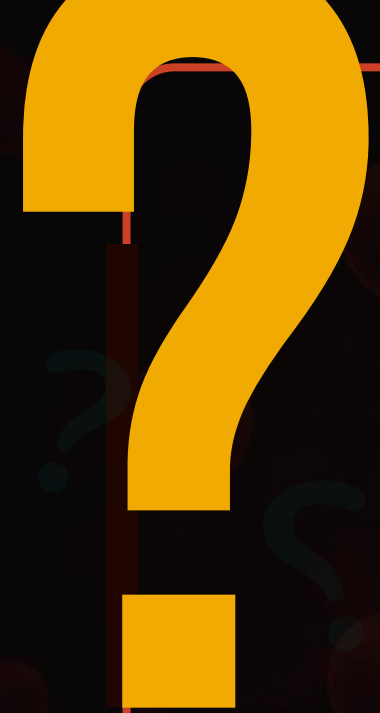




Systemic Circulation

Functions

- Provides
  - Nutrients
  - Oxygen
  - Other essential substances to the tissues.
- Removes
  - Carbon dioxide
  - Other harmful substances from the tissues for elimination from the body.



Question Time !!

Which of the following blood vessel receives blood from the left ventricle ?

a) Pulmonary vein

b) Pulmonary artery

c) Aorta

d) Inferior vena cava

Which of the following blood vessel receives blood from the left ventricle ?

a) Pulmonary vein

b) Pulmonary artery

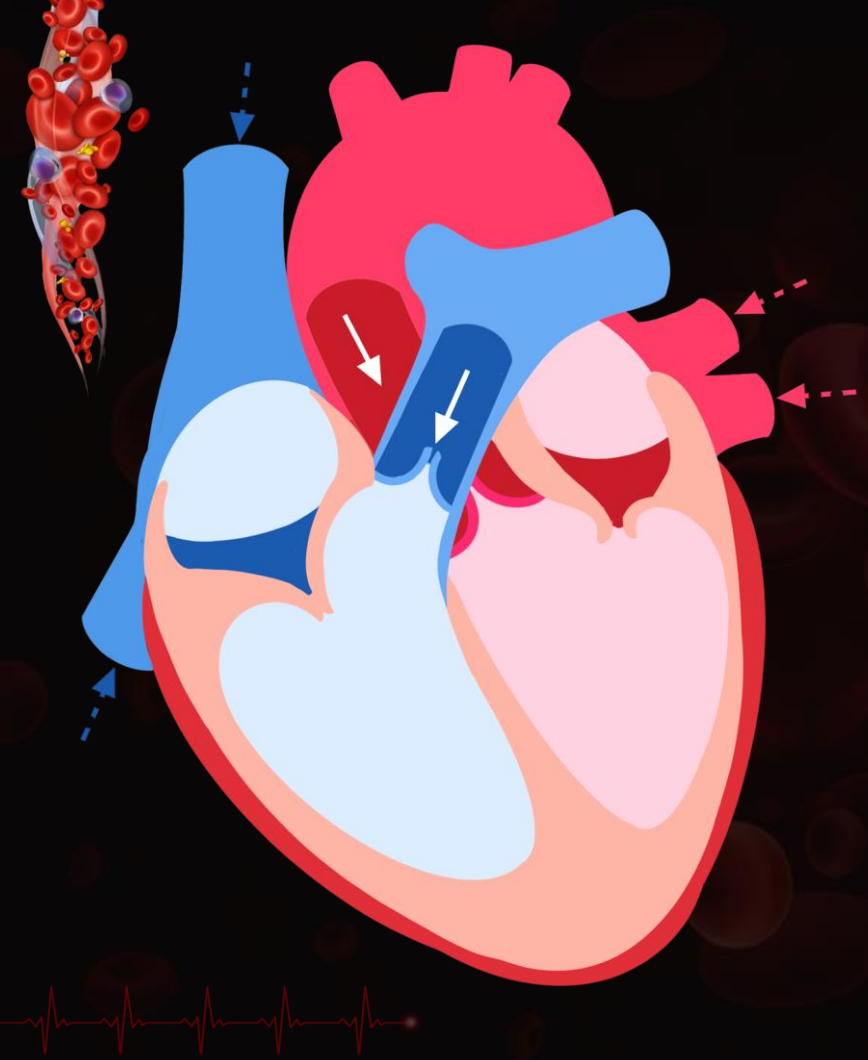
c) Aorta

d) Inferior vena cava

Let us hear the heart beat ...

Contraction and Relaxation of heart chambers

Contraction (Systole) and Relaxation (Diastole) of heart chambers



Stage 1
Early Joint Diastole

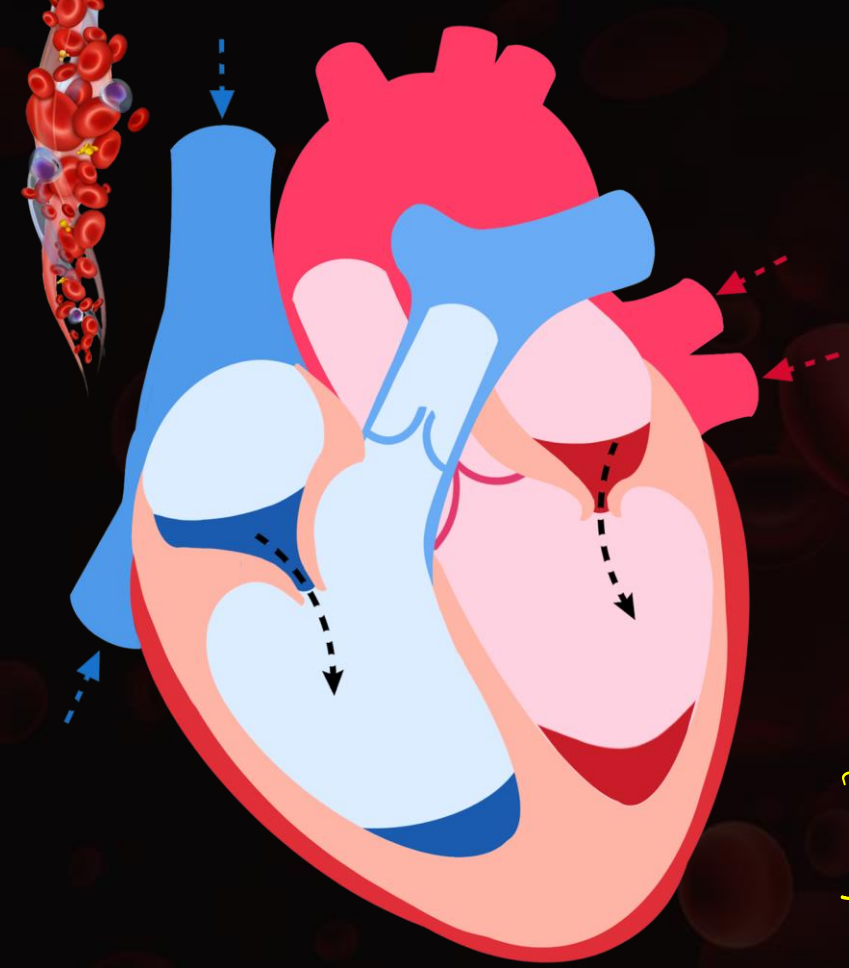
Ventricles
Diastole (Relaxed)

Atria
Diastole (Relaxed)

Atrioventricular valves
Closed

Semilunar valves
Closed

What happens?
Blood enters the atria through the veins.



Stage 1

Late Joint Diastole

Ventricles
Diastole (Relaxed)

Atria
Diastole (Relaxed)

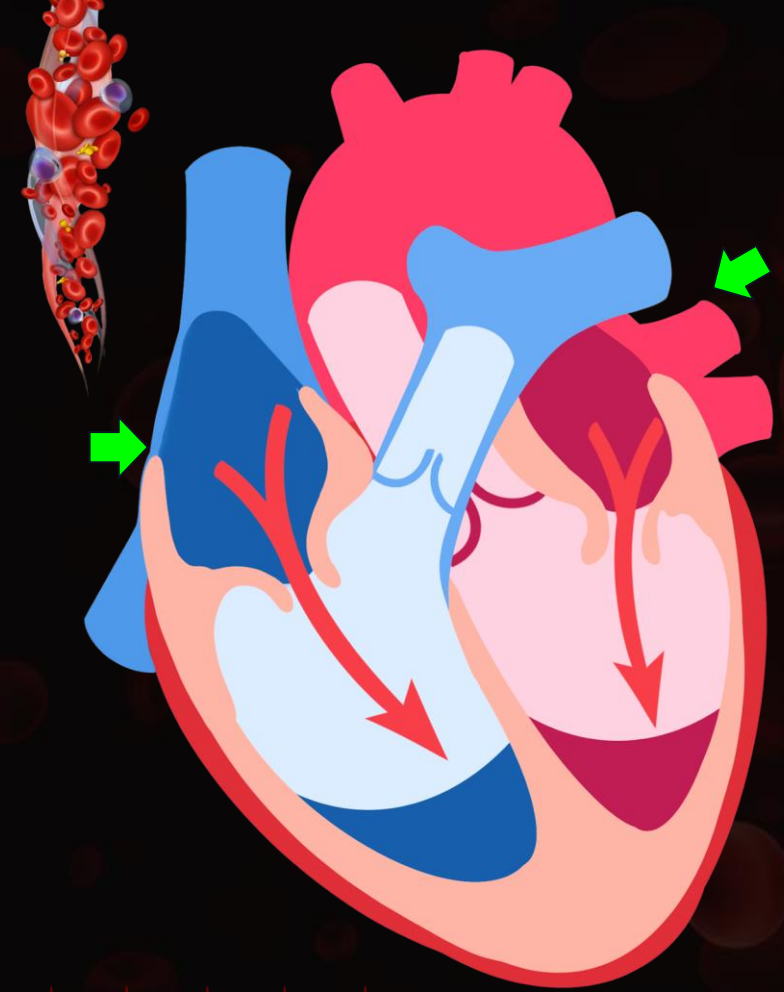
Atrioventricular valves
Open

Semilunar valves
Closed

What happens?
A-V valves open.

Some blood enters the ventricles.

70% of ventricles filled.



Stage 2
Atrial Systole

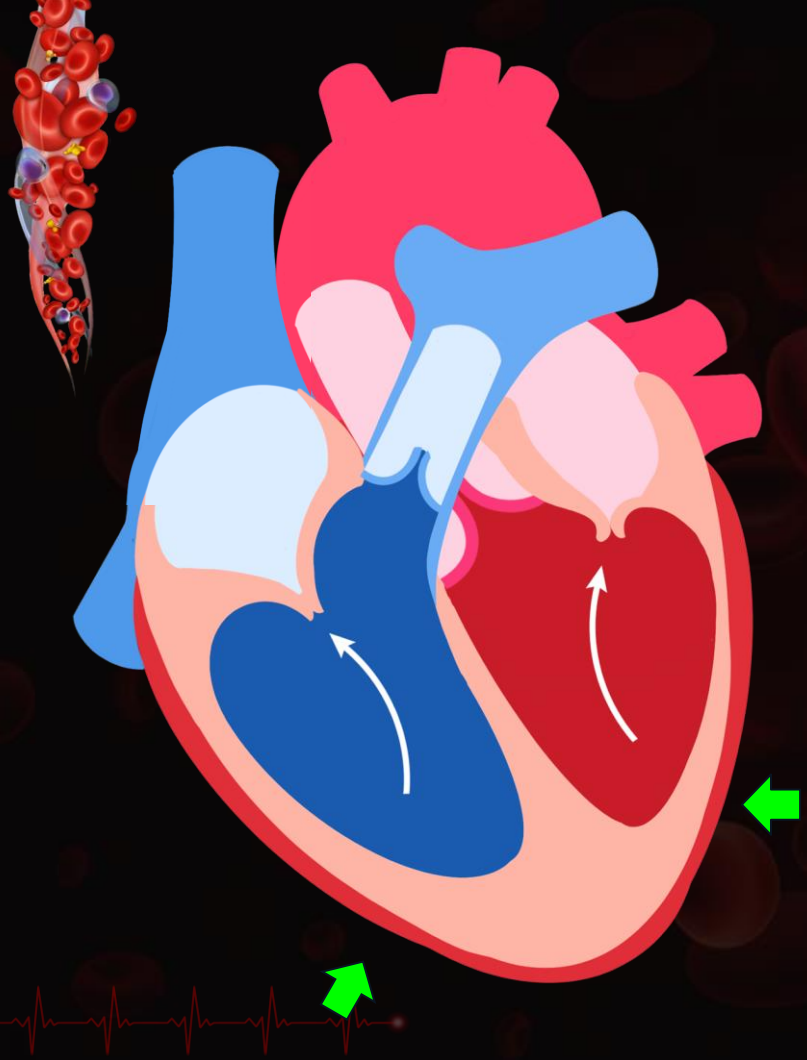
Ventricles
Diastole (Relaxed)

Atria
Systole (Contract)

Atrioventricular valves
Open

Semilunar valves
Closed

What happens?
Rest of the blood pumped from the atria to the ventricles.



Stage 3
Early Ventricular Systole

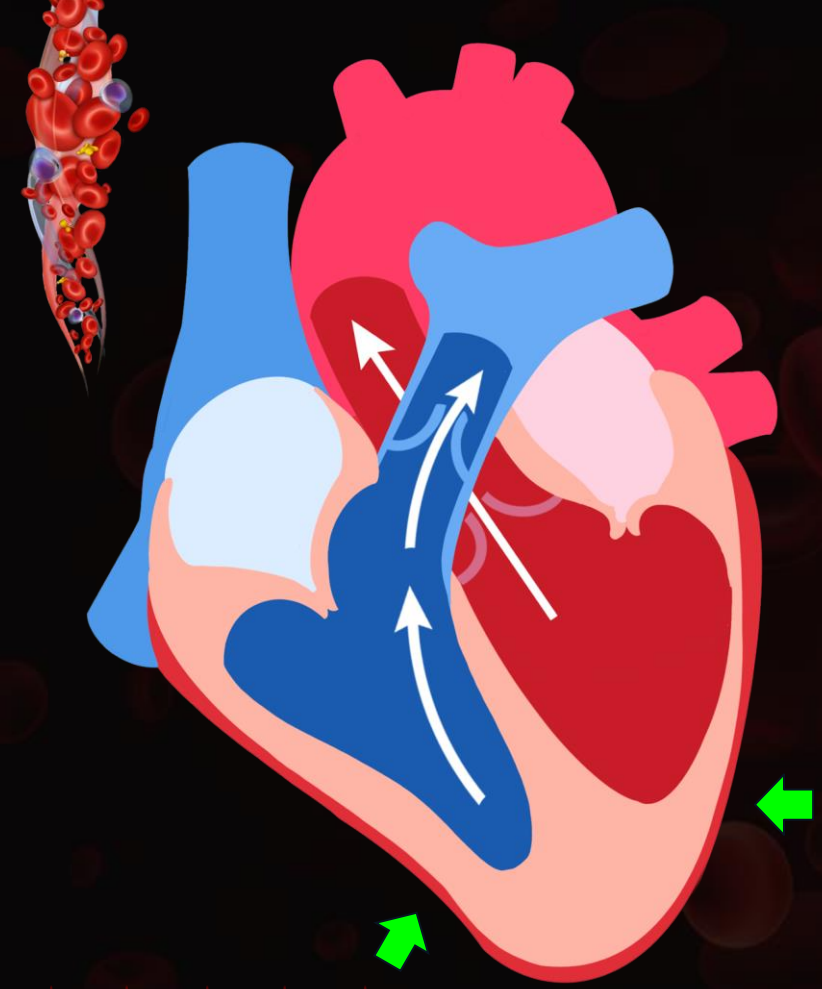
Ventricles
Systole (Contract)

Atria
Diastole (Relaxed)

Atrioventricular valves
Closed

Semilunar valves
Closed

What happens?
Ventricular contraction causes the A-V valves to close.



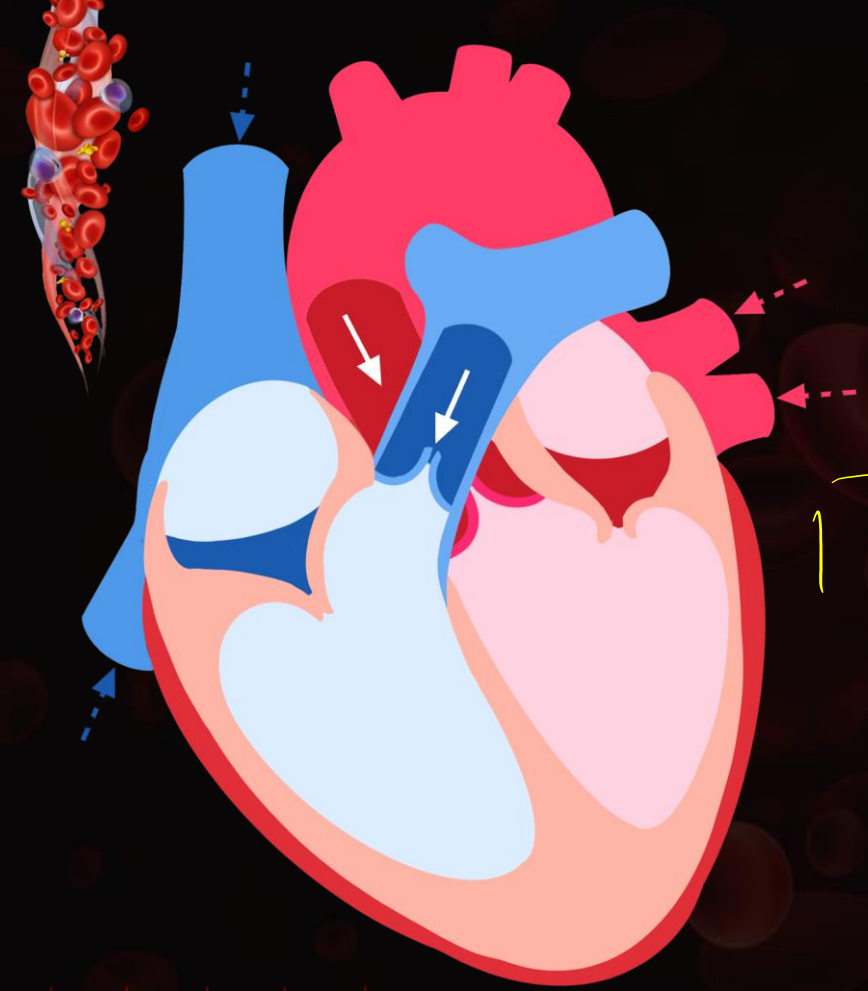
Stage 3
Late Ventricular Systole

Ventricles	Atria
Systole (Contract)	Diastole (Relaxed)
Atrioventricular valves	**Semilunar valves**
Closed	Open

What happens?

Ventricular contraction causes the semilunar valves to open.

Blood is pumped into the arteries.



Stage 1
Early Joint Diastole

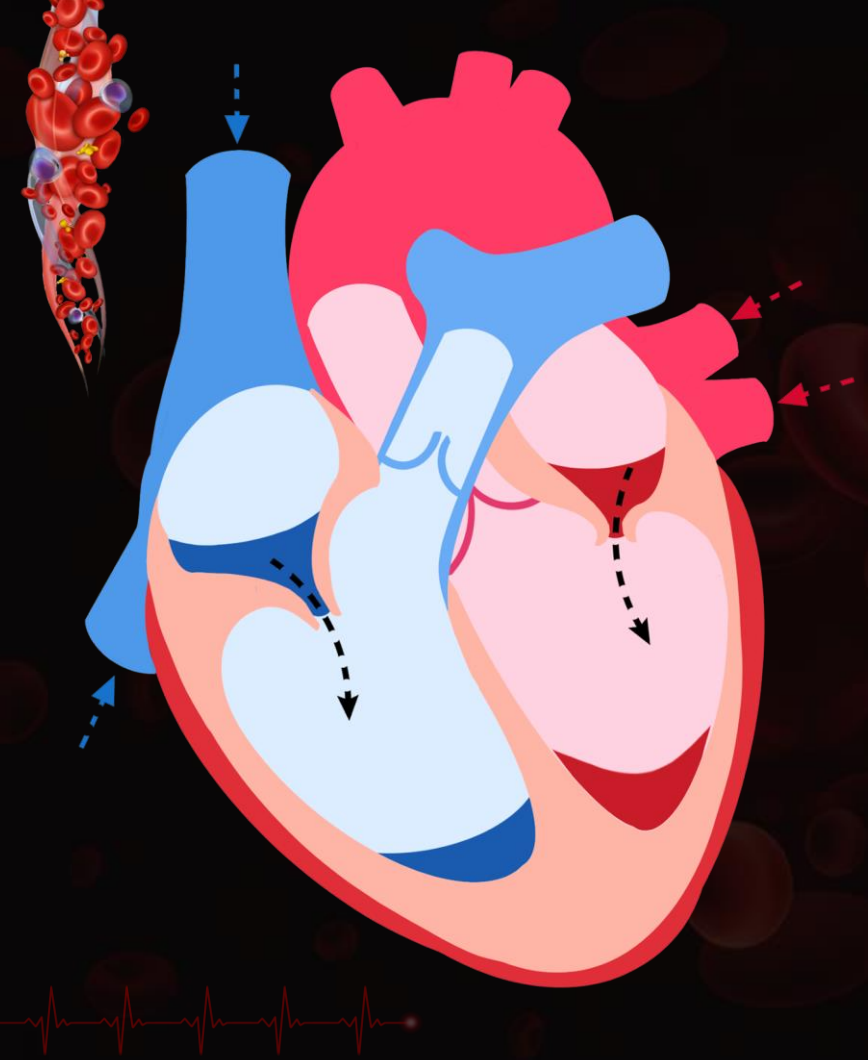
Ventricles
Diastole (Relaxed)

Atria
Diastole (Relaxed)

Atrioventricular valves
Closed

Semilunar valves
Closed

What happens?
Blood enters the atria through the veins.



Stage 1
Late Joint Diastole

Ventricles
Diastole (Relaxed)

Atria
Diastole (Relaxed)

Atrioventricular valves
Open

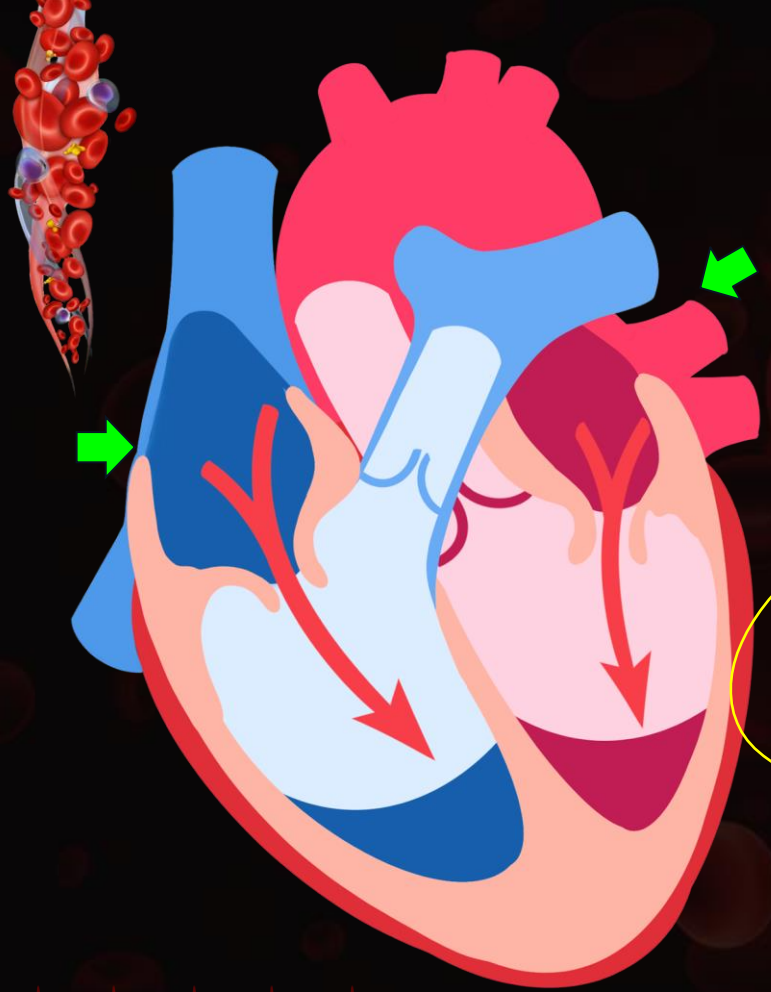
Semilunar valves
Closed

What happens?

A-V valves open.

Some blood enters the ventricles.

70% of ventricles filled.



Stage 2

Atrial Systole

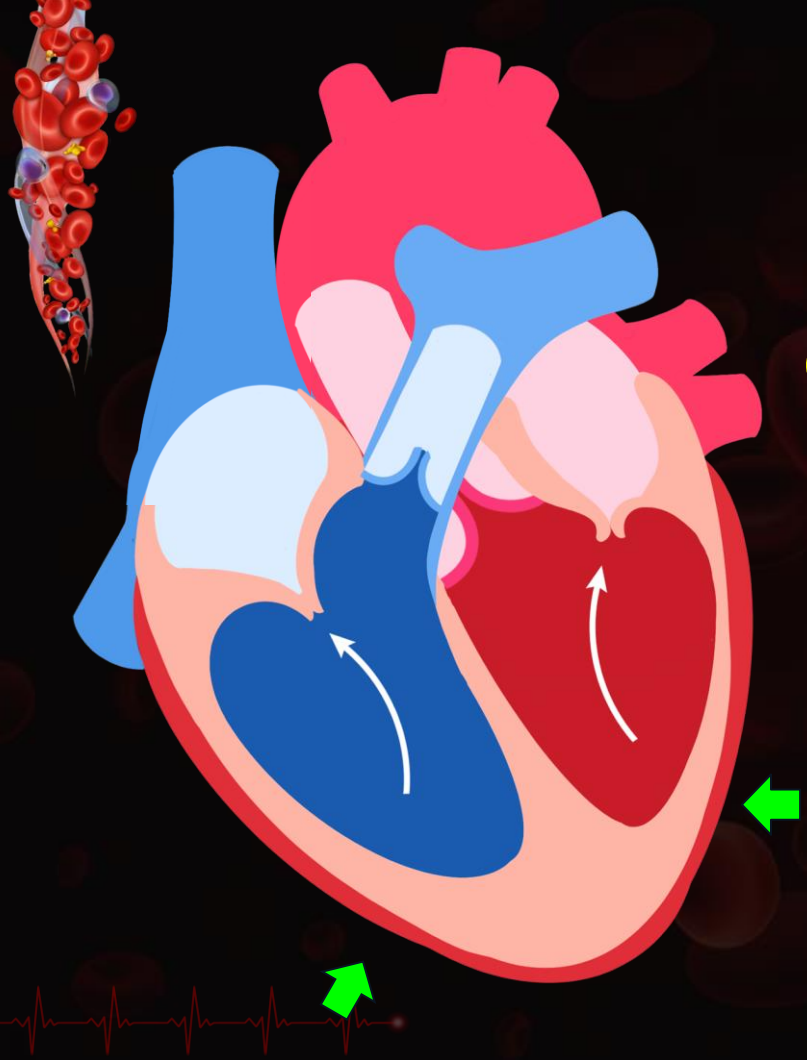
Ventricles
Diastole (Relaxed)

Atria
Systole (Contract)

Atrioventricular valves
Open

Semilunar valves
Closed

What happens?
Rest of blood pumped from the atria to the ventricles.



Stage 3
Early Ventricular Systole

Ventricles
Systole (Contract)

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Atrioventricular valves
Closed

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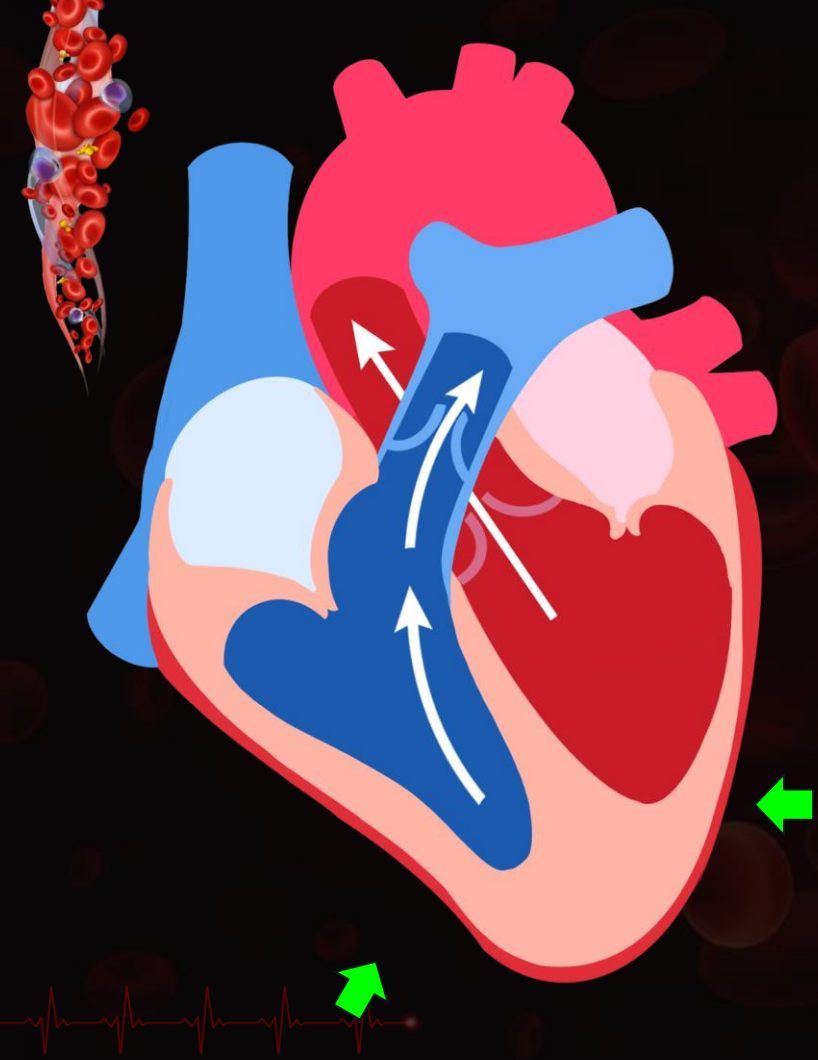
What happens?
Ventricular contraction causes the A-V valves to close.



Stage 3
Late Ventricular Systole

Ventricles
Systole (Contract)

Atria
Diastole (Relaxed)

Atrioventricular valves
Closed

Semilunar valves
Open

What happens?
Ventricular contraction causes the semilunar valves to open.

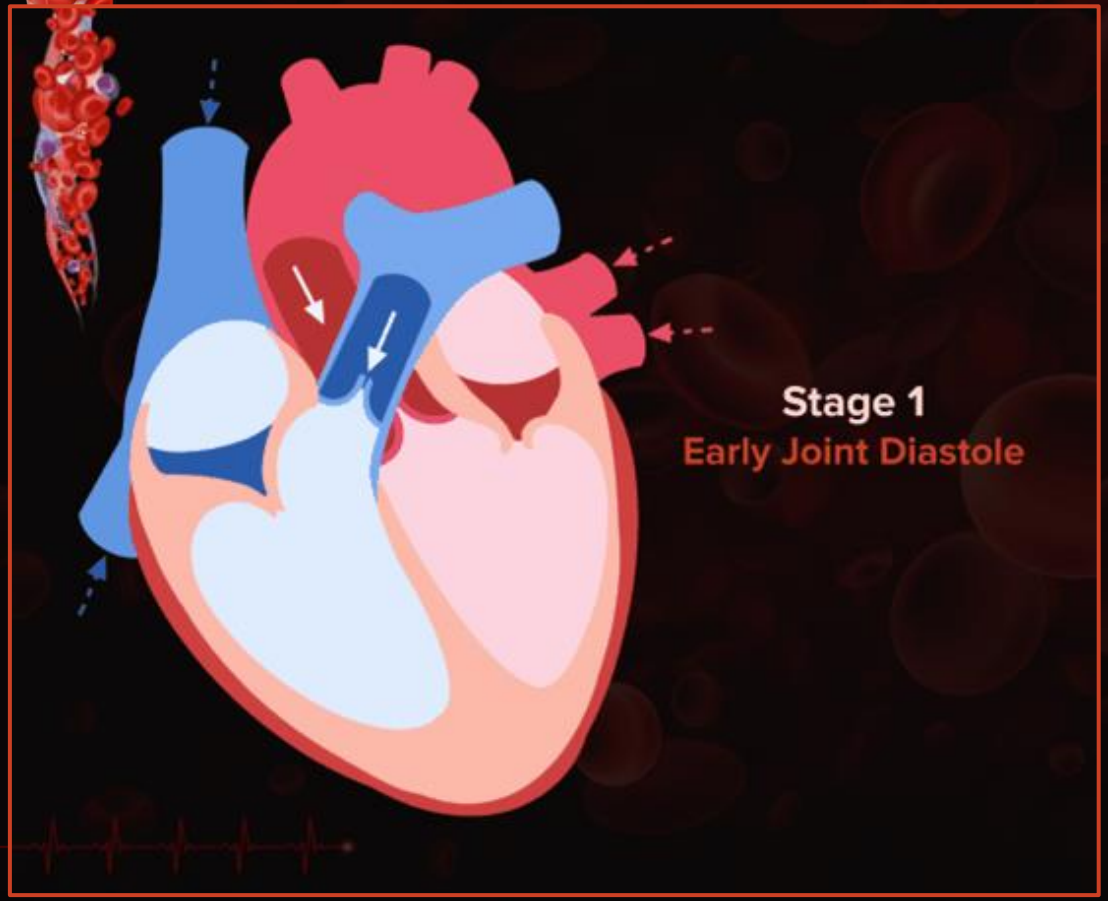
Blood is pumped into the arteries.

Cardiac Cycle

Cardiac Cycle

- Comprises a complete relaxation and contraction of both the atria and ventricles.
- Comprises of 3 stages
  - **Joint diastole**
  - **Atrial systole**
  - **Ventricular systole**

Cardiac Cycle

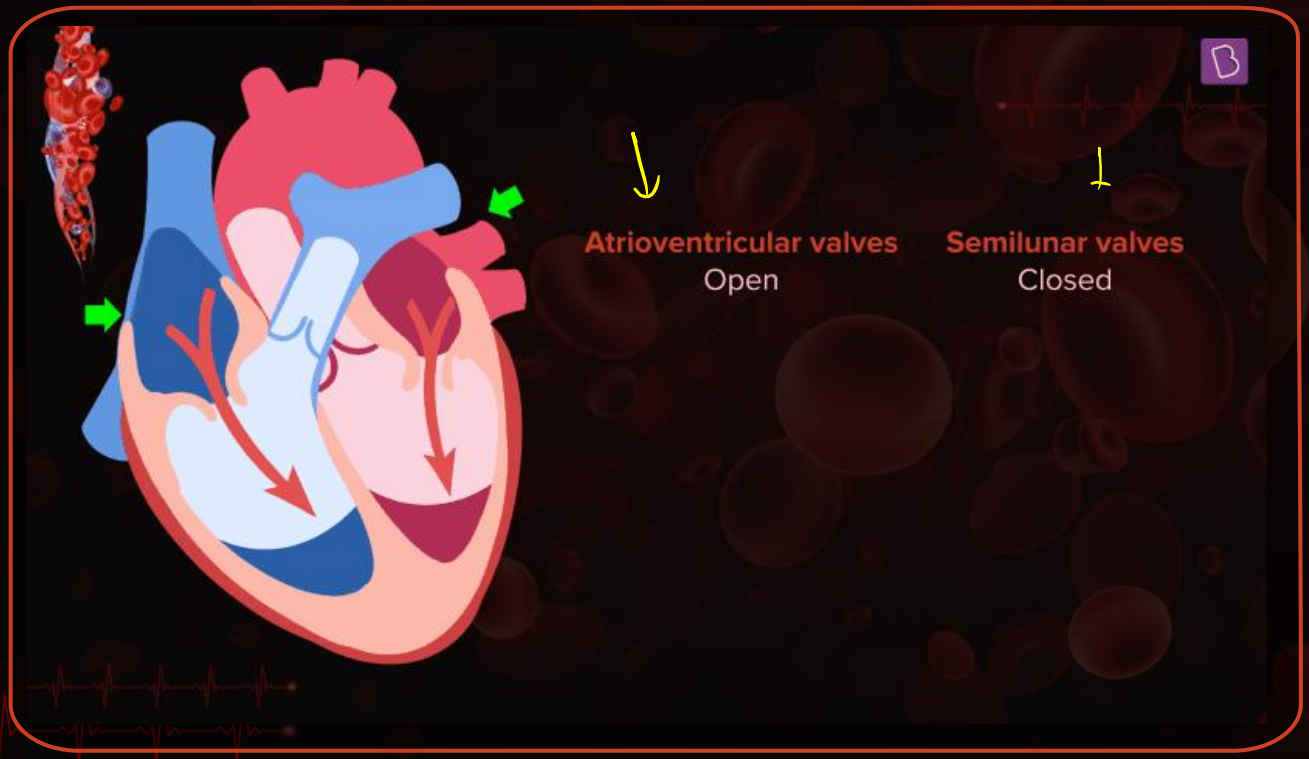


Heart beats rhythmically

What causes the heart sounds ?

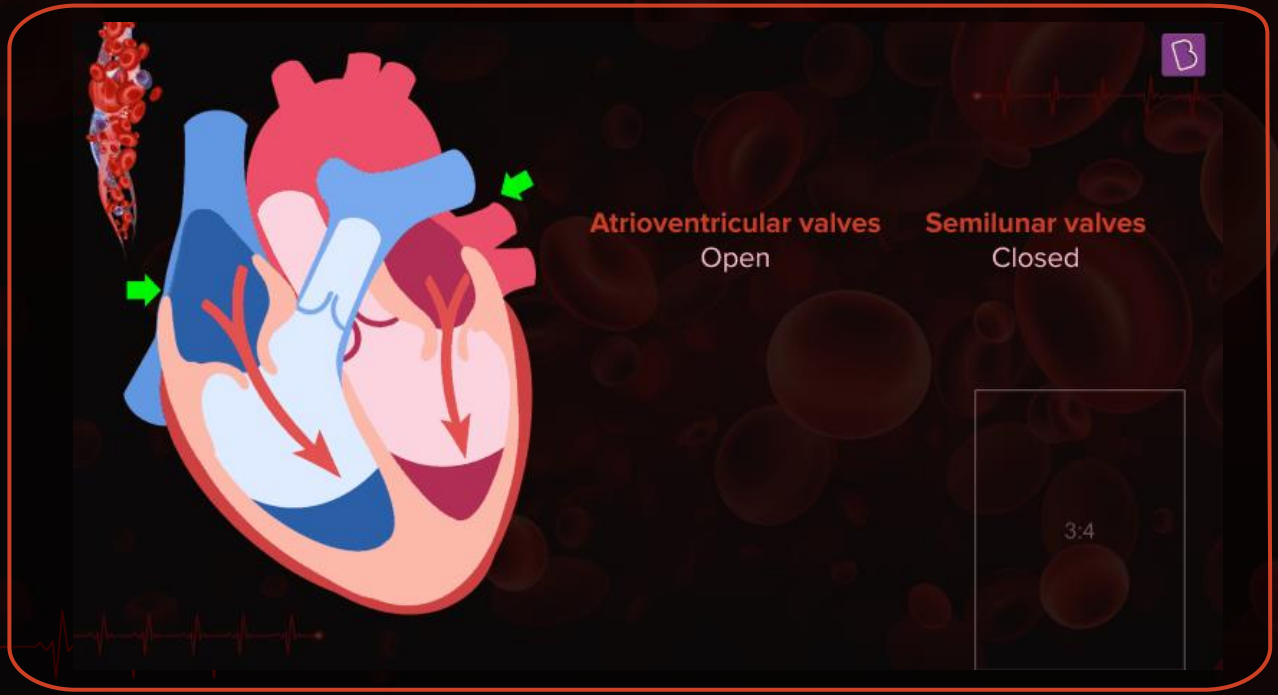
Heart Sounds

- Due to the **closure of valves in the heart.**



Heart Sounds

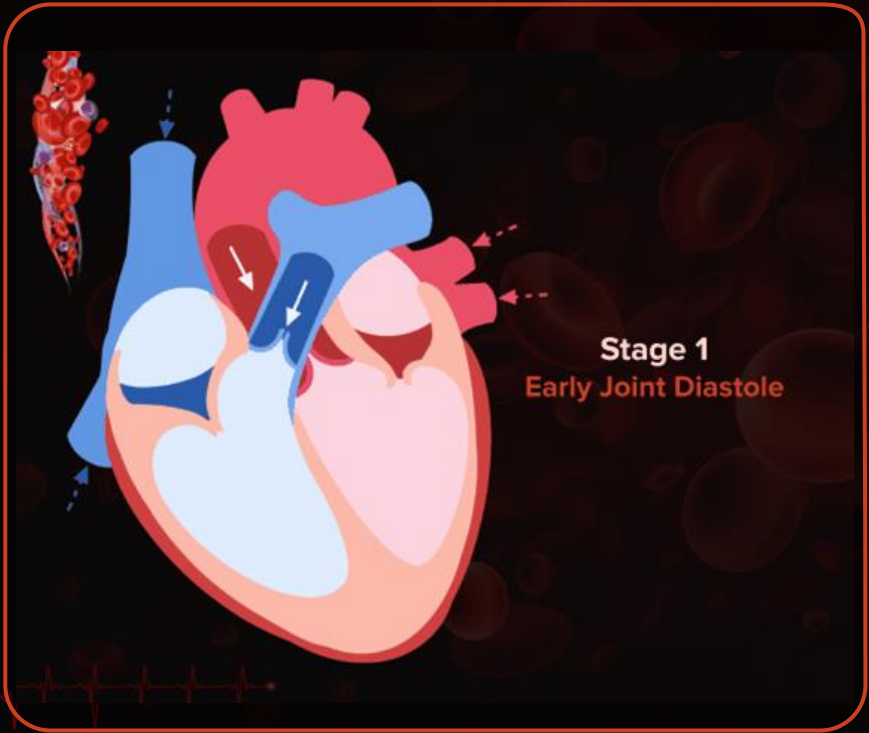
- During each cardiac cycle **2 sounds** are produced.
- The **closing of atrioventricular valves** – first sound - **lub**
- The **closing of semilunar valves** – second sound - **dub**

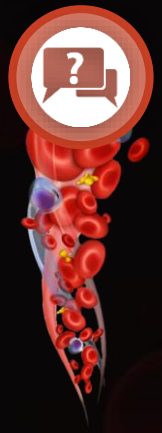


What is the duration of one cardiac cycle ?

Cardiac Cycle

- Duration of one cardiac cycle is **0.8 seconds**.
- A heart beats **72 times** in **1 minute.**

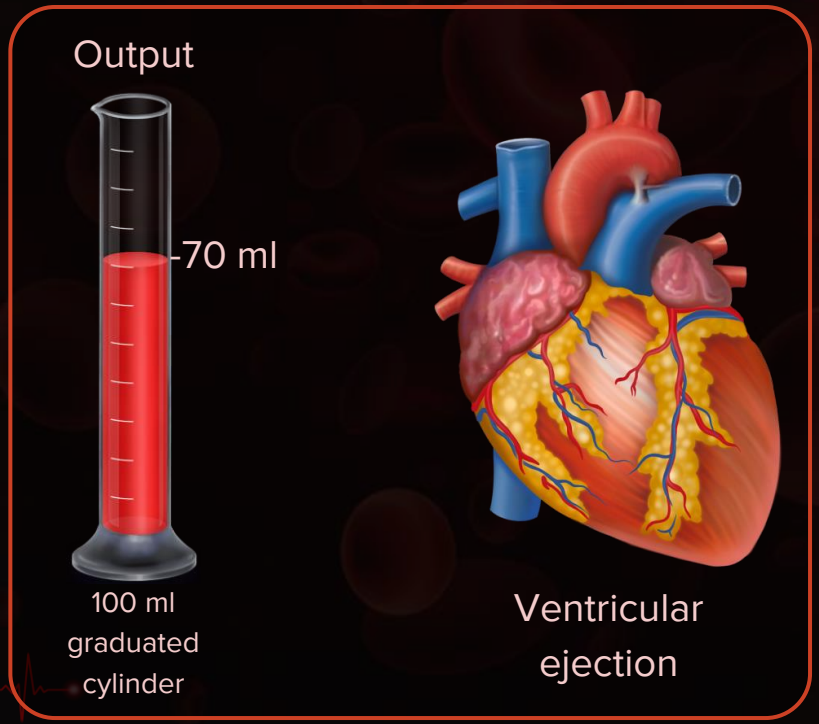




How much blood is pumped by the ventricles during each cardiac cycle ?

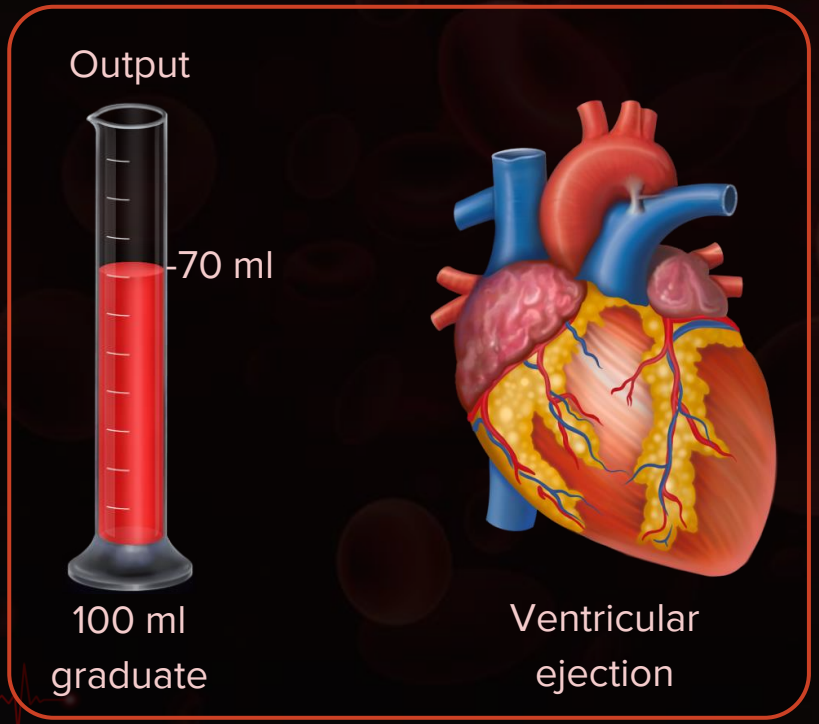
Cardiac Cycle

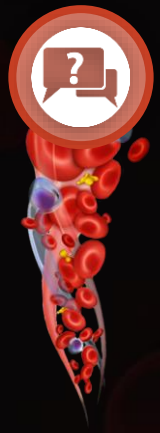
- Each ventricle pumps out approximately **70 mL of blood.**



Cardiac Cycle

- Each ventricle pumps out approximately 70mL of blood – **stroke volume.**





How much blood is pumped in 1 minute ?

Blood Pumped by Heart in 1 minute

Heart rate * Stroke volume

72 * 70 = 5040

Approximately 5000 mL or **5 litres/ per minute**

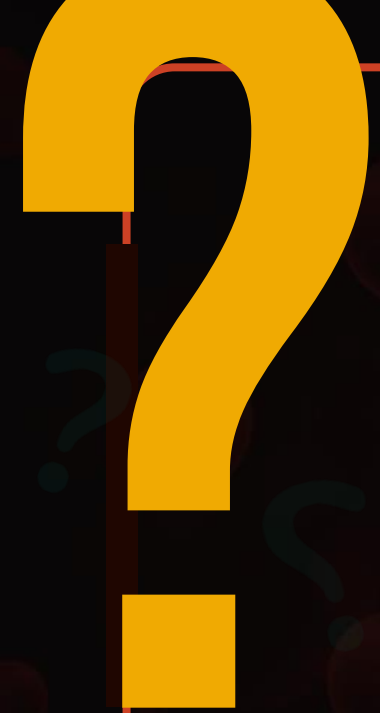
Cardiac Output

Heart rate * Stroke volume

72 * 70 = 5040

Approximately 5000mL or **5 Litres/ per minute**

- Can be defined as the **volume of blood pumped out by each ventricle per minute.**



Question Time !!

Cardiac output for 2 minutes is

a) 5 ml

b) 500 ml

c) 5000 ml

d) 10,000 ml

Cardiac output for 2 minutes is

a) 5 ml

b) 500 ml

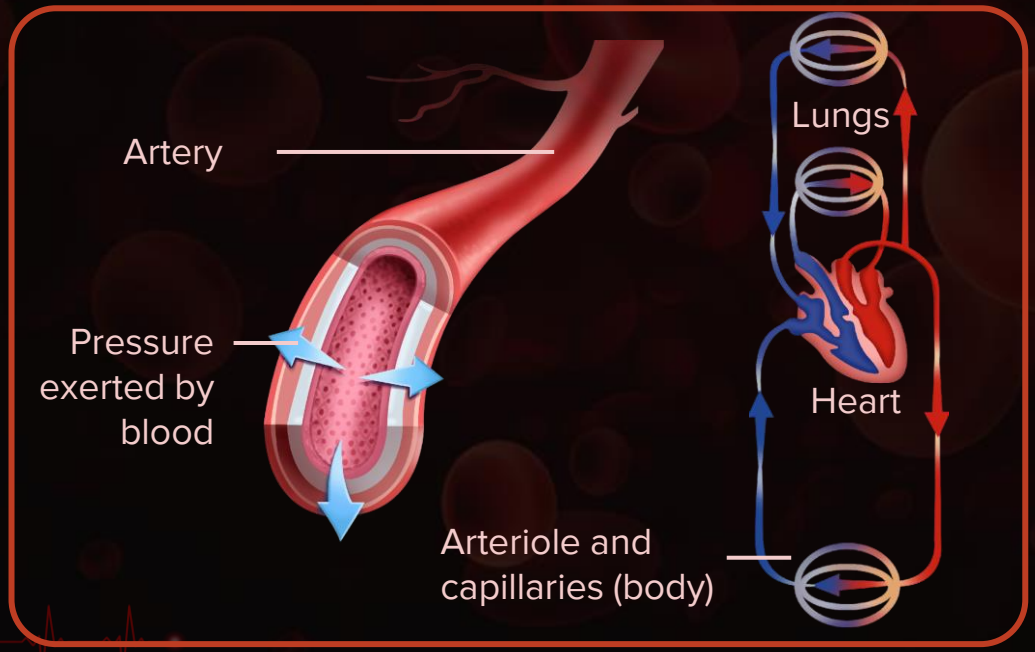
c) 5000 ml

d) 10,000 ml

Blood Pressure

Blood Pressure

- Force exerted by blood against the walls of blood vessels
- Drives flow of blood from the heart through arteries



Blood Pressure

- Sphygmomanometer: Device used to measure blood pressure
- Normal blood pressure levels: 120 mm Hg/80 mm Hg

Blood Pressure

Blood Pressure: Hypertension

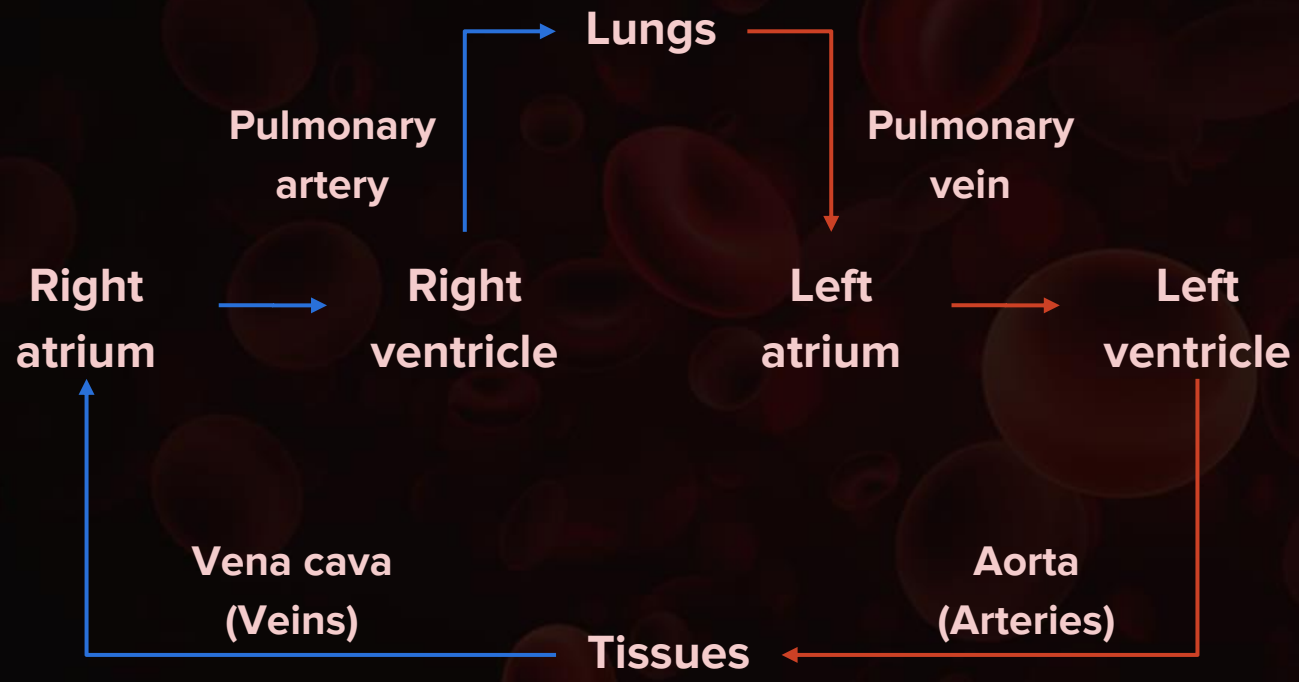
- Also called **high blood pressure**
- Beyond **140 mm Hg** (systolic) and **90 mm Hg** (diastolic)

- Harms:
  - Heart
  - Brain
  - Kidney
  - Eyes

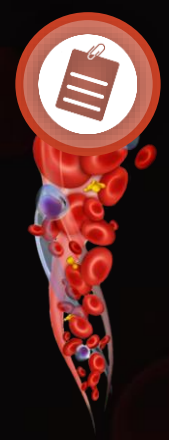
- Causes:
  - Increased cholesterol level
  - Stress
  - Smoking
  - Kidney disorder

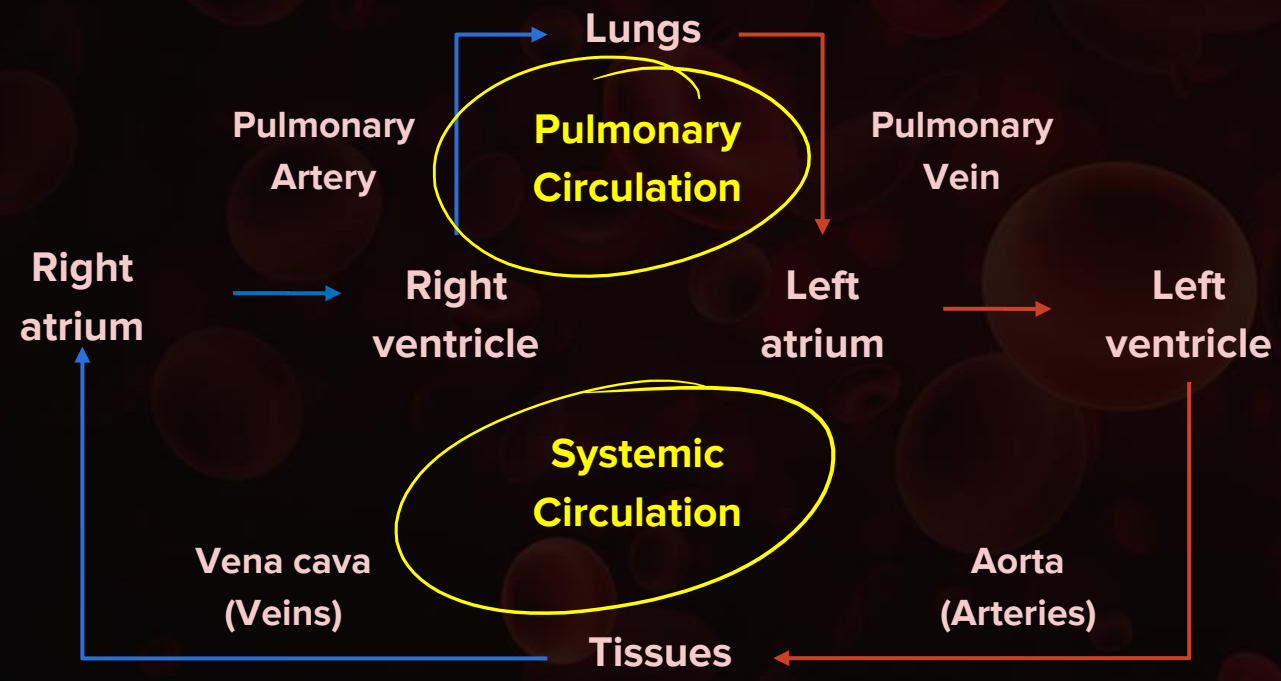
Revise!!

Circulation

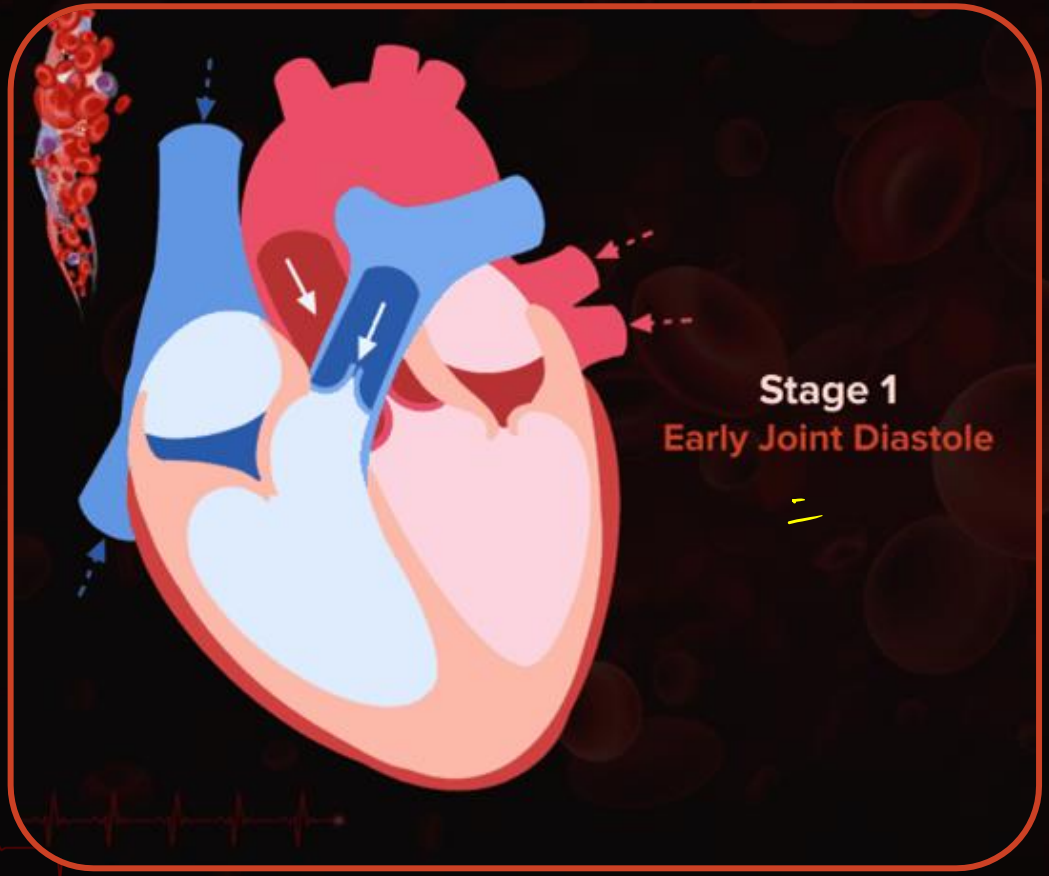


Double Circulation





Cardiac Cycle



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Blood Pressure

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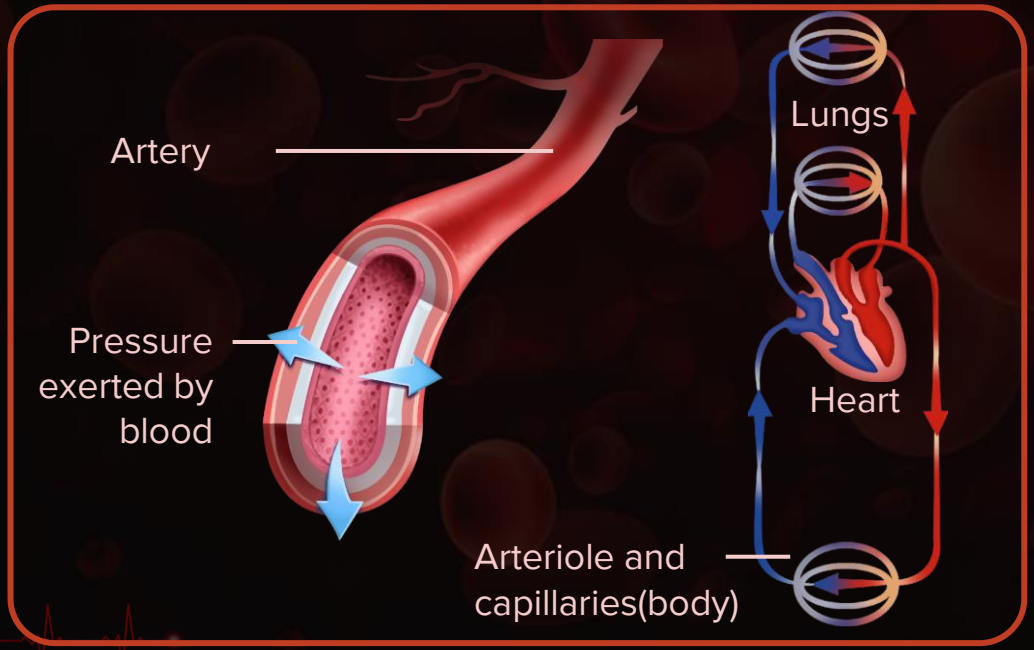

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Keep Learning..!