YAKEEN NEET 2.0

2026

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Body Fluid and Circulation

Zoology | Lecture -09

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Topics to be covered

Hepatic Portal

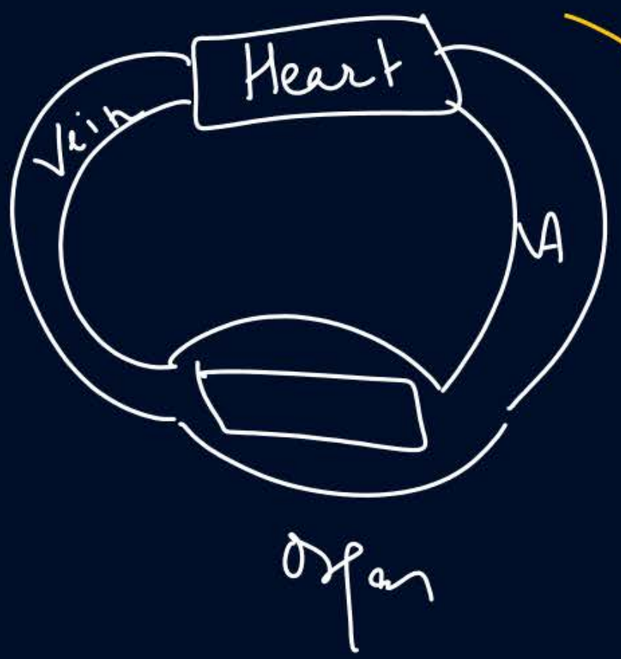
1. Regulation of cardiac activity, disorders, TAPASYA

#Saumyaexpress

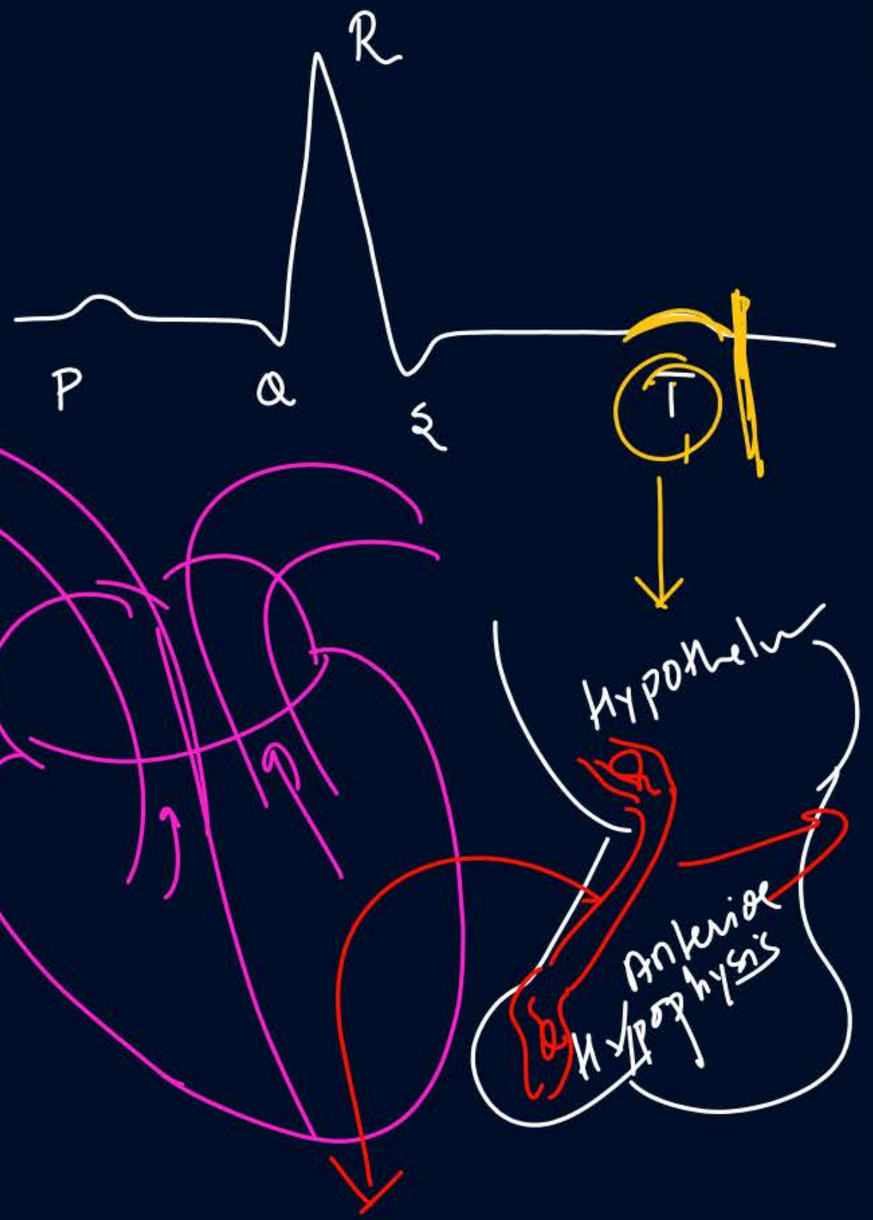
Aorta → C. artery

QRS

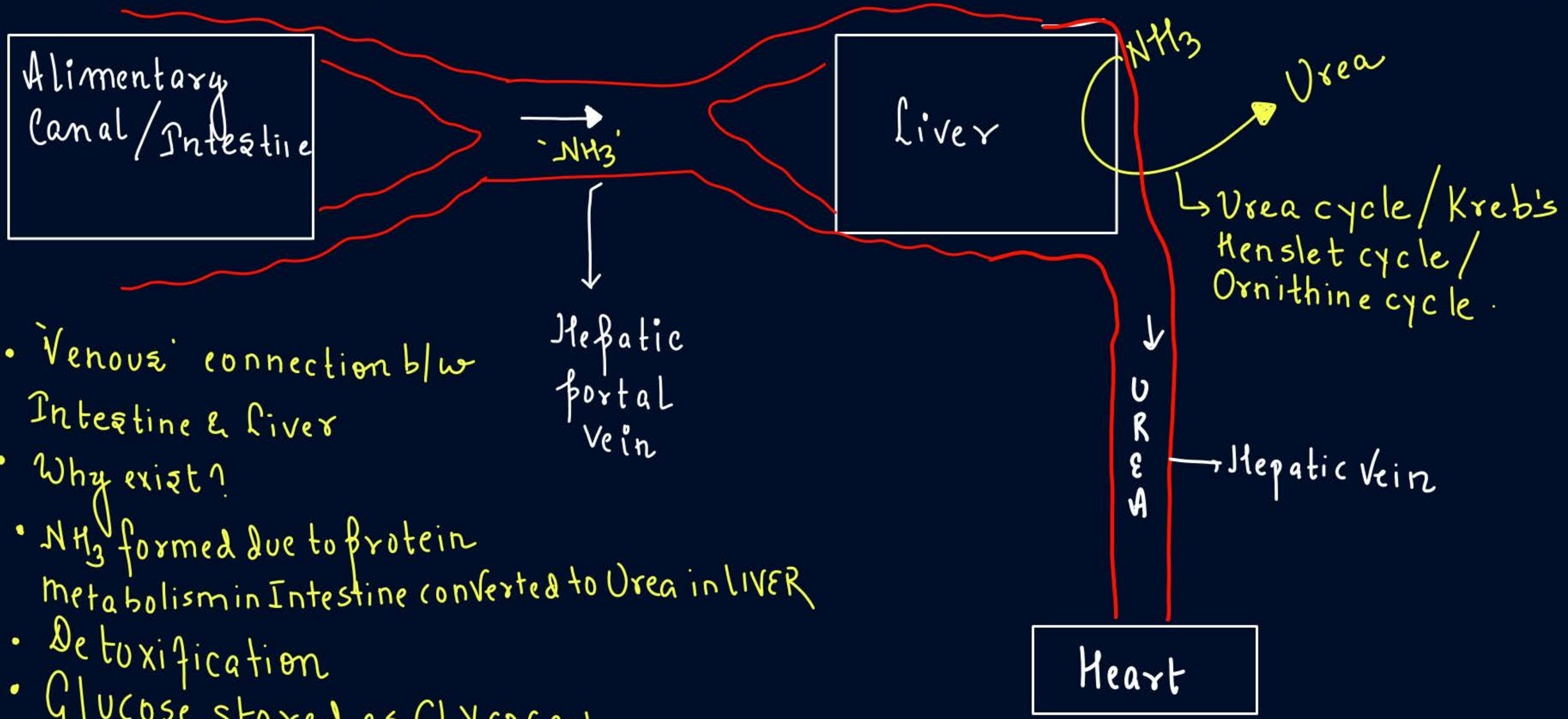
ECG → Electrocardiogram → graphical



End of systole



ii) Hepatic Portal System:



- 'Venous' connection b/w Intestine & Liver
- Why exist?
  - NH_3 formed due to protein metabolism in Intestine converted to Urea in LIVER
  - Detoxification
  - Glucose stored as GLYCOGEN

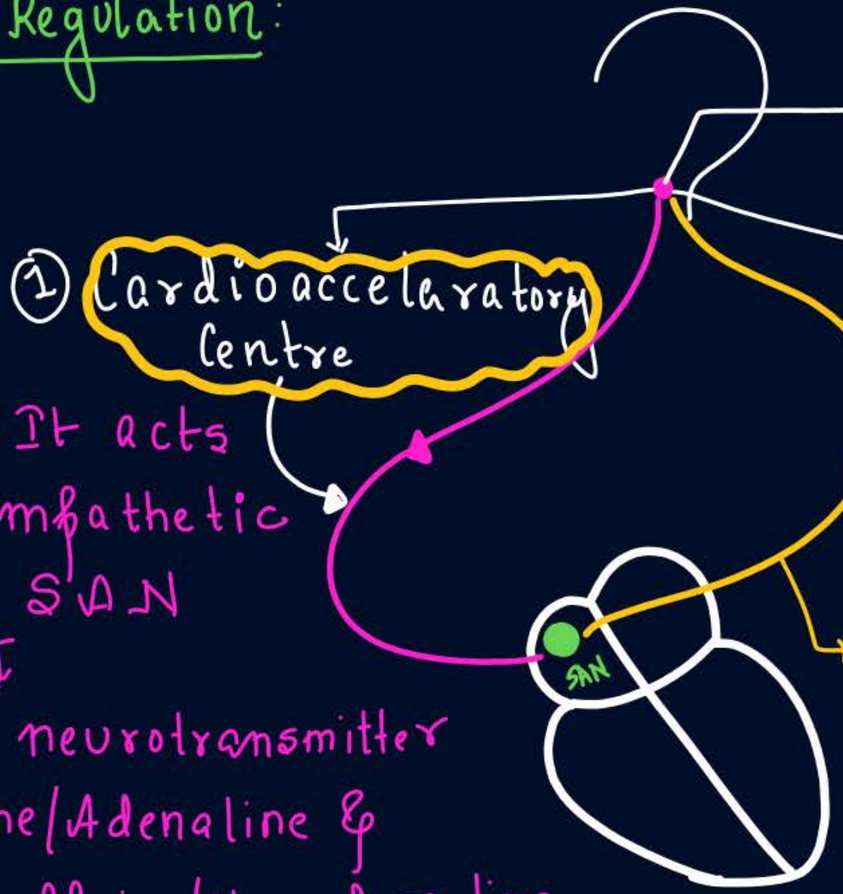
Regulation of Cardiac Activity:

- **Human Heart**: MYOGENIC

Heartbeat initiated on its own & most of the activity of Heart is INTRINSICALLY (within) regulated.

Nervous system may ↑ or ↓ Heart rate

Nervous Regulation:



'Medulla' of Hind Brain: has 2 centres

↑ or ↓ Heart rate via ANS: Autonomic Nervous System

① Cardioaccelaratory centre

Cardioinhibitory centre

It acts via Sympathetic N.S on SAN

↓

releases neurotransmitter Epinephrine/Adenaline & Norepinephrine/Noradrenaline

↓

↑ HEARTRATE, ↑ Strength of Ventricular CONTRACTION, ↑ CO

This is 'VAGUS NERVE' (अतिरिक्त ज्ञान)

It acts via parasympathatic N.S (part of ANS) on SAN

↓

release Acetyl choline

↓

↓ HR, ↓ CO, ↓ Ventricular contraction

Note : Adrenal medullary Hormones

↓

EPINEPHRINE, NOR-EPINEPHRINE

↓

Together: Catecholamines

↓

When released: Blood: HR↑, CO↑

hepatic portal system. The hepatic portal vein carries blood from intestine to the liver before it is delivered to the systemic circulation. A special coronary system of blood vessels is present in our body exclusively for the circulation of blood to and from the cardiac musculature.

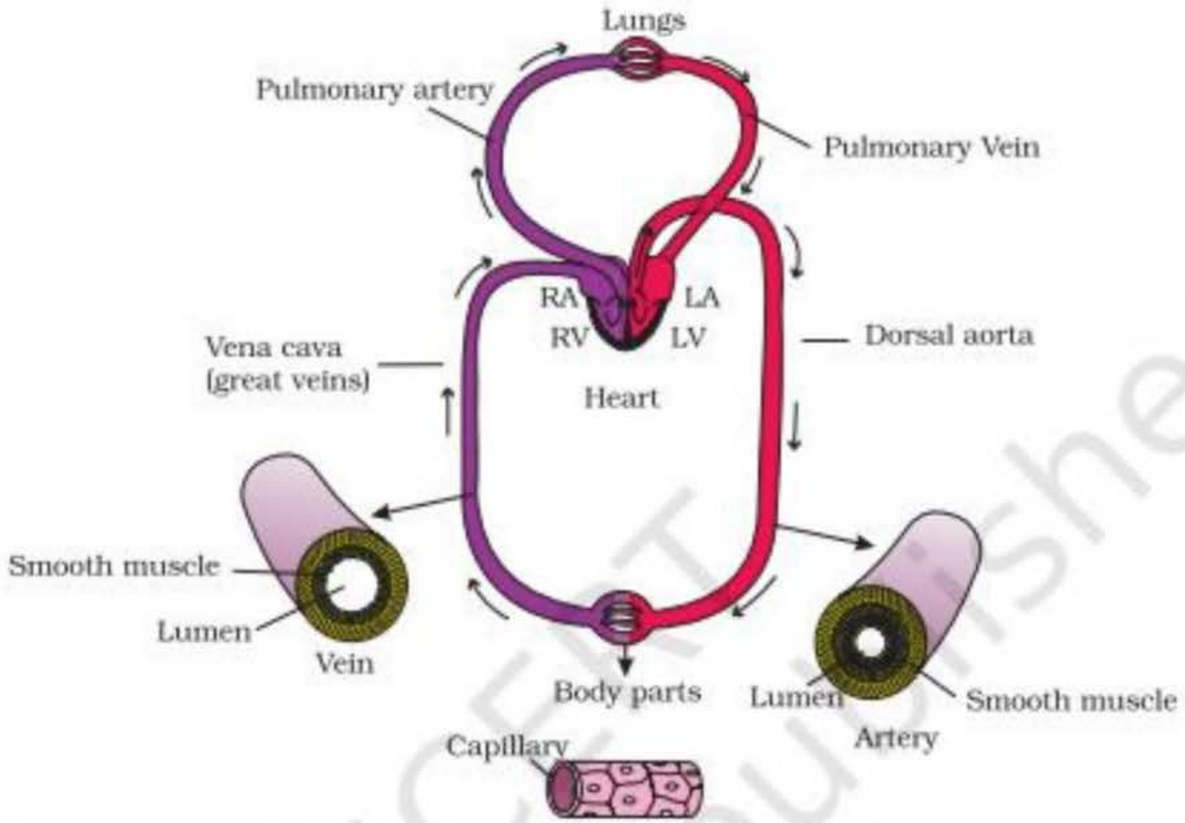


Figure 15.4 Schematic plan of blood circulation in human

15.5 Regulation of Cardiac Activity

Normal activities of the heart are regulated intrinsically, i.e., auto regulated by specialised muscles (nodal tissue), hence the heart is called myogenic. A special neural centre in the medulla oblangata can moderate the cardiac function through autonomic nervous system (ANS). Neural signals through the sympathetic nerves (part of ANS) can increase the rate of heart beat, the strength of ventricular contraction and thereby the cardiac output. On the other hand, parasympathetic neural signals (another component of ANS) decrease the rate of heart beat, speed of conduction of action potential and thereby the cardiac output. Adrenal medullary hormones can also increase the cardiac output.

Disorders of Circulatory system:

1) Hypertension / High Blood Pressure: 'Sphygmomanometer': Device to measure B.P'

- ↑ B.P could be due to poor lifestyle, stress, genetic, ↑ salt intake etc.

Normal B.P = $\frac{120}{80}$ mm Hg

- 120 → Systolic Pressure: The pressure in the Arteries when Ventricles are systoling
- 80 → Diastolic Pressure: The pressore of Blood in Arteries when Ventricle in Diastole

Hypertension: $\frac{140}{90}$ (repeated values of this is High B.P)

* It can lead to various Heart problems & also affect the vital organs: KIDNEY & BRAIN.

15.6 Disorders of Circulatory System

High Blood Pressure (Hypertension): Hypertension is the term for blood pressure that is higher than normal (120/80). In this measurement 120 mm Hg (millimetres of mercury pressure) is the systolic, or pumping, pressure and 80 mm Hg is the diastolic, or resting, pressure. If repeated checks of blood pressure of an individual is 140/90 (140 over 90) or

higher, it shows hypertension. High blood pressure leads to heart diseases and also affects vital organs like brain and kidney.

Coronary Artery Disease (CAD): Coronary Artery Disease, often referred to as **atherosclerosis**, affects the vessels that supply blood to the heart muscle. It is caused by deposits of calcium, fat, cholesterol and fibrous tissues, which makes the lumen of arteries narrower.

Angina: It is also called 'angina pectoris'. A symptom of acute chest pain appears when no enough oxygen is reaching the heart muscle. Angina can occur in men and women of any age but it is more common among the middle-aged and elderly. It occurs due to conditions that affect the blood flow.

Heart Failure: Heart failure means the state of heart when it is not pumping blood effectively enough to meet the needs of the body. It is sometimes called congestive heart failure because congestion of the lungs is one of the main symptoms of this disease. Heart failure is not the same as cardiac arrest (when the heart stops beating) or a heart attack (when the heart muscle is suddenly damaged by an inadequate blood supply).

② CAD : Coronary Artery Disease.

- Due to Poor lifestyle, smoking etc, fat, Cholesterol, Ca^{2+}, fibre, etc can deposit in the Coronary Artery.

↓

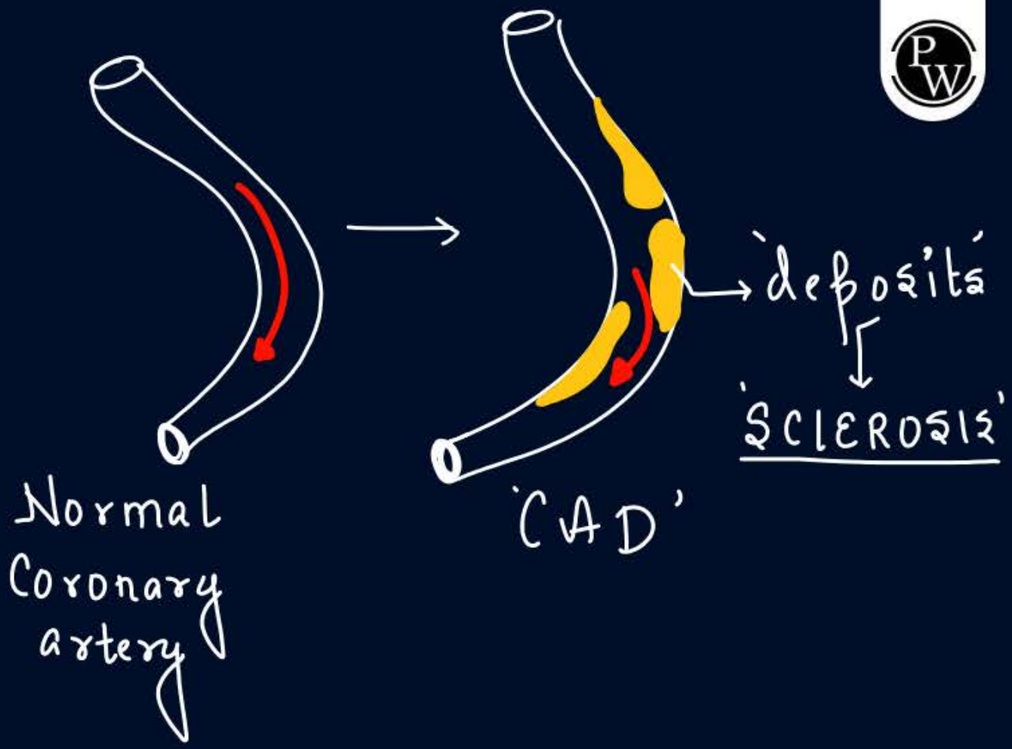
Lumen becomes Narrow

↓

Blood flow (eventually O_2) is Less to Heart muscle

↓

K/a CAD / 'ATHEROSCLEROSIS'



(3) **Angina Pectoris** : 'ACUTE CHEST PAIN'

- It may occur due to the conditions that affects the blood flow to heart
- 'Acute chest pain' : Develops when enough O_2 is not reaching Heart muscle.
- Can occur in Men / Women of any age but more common in middle / elderly aged people.

(4) **Heart Attack / Myocardial infarction**: When Heart muscles are not receiving enough Blood & they start to die

(5) **Cardiac arrest**: Complete stoppage of Heart Beat.

- Multiple Heart attacks may cause this.

⑥ **Heart failure**: When heart is not pumping enough blood to meet the demand of Body.

* Also k/a `CONGESTIVE HEART FAILURE'

↓

WHY??

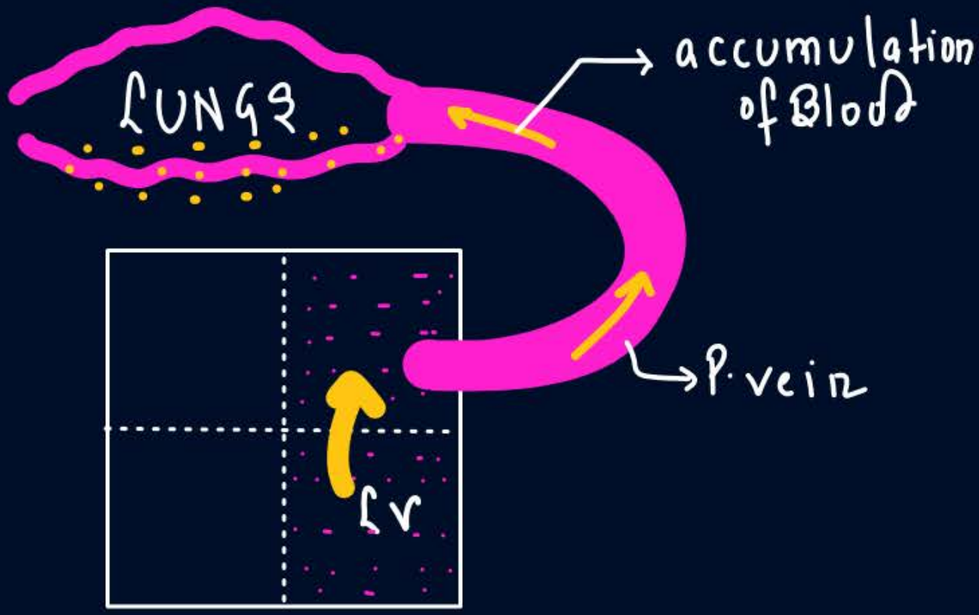
↓

`Congestion of Lungs' is most commonly seen here

↓

So if Blood is not pumped, it is obviously accumulated in LA, P. vein & eventually around lungs

↳ `CONGESTION of LUNGS'.



THANK YOU