# YAKEEN NEET 2.0

## 2026

17.1.2025

BODY FLUIDS AND CIRCULATIONS

ZOOLOGY | Lecture – 4


By- SAMAPTI MAM

# Topics to be covered

1. Lymph, Circulatory pathways (Heart)
2.
3.
4.

# MY TELEGRAM

# #Landsteiner

| | Antigen | Ab |
|---|---|---|
| A | A | anti B |
| B | B | anti A |
| AB | A, B | NiL |
| O | NiL | anti A, anti B |

Donar

B
A
A
O

anti B

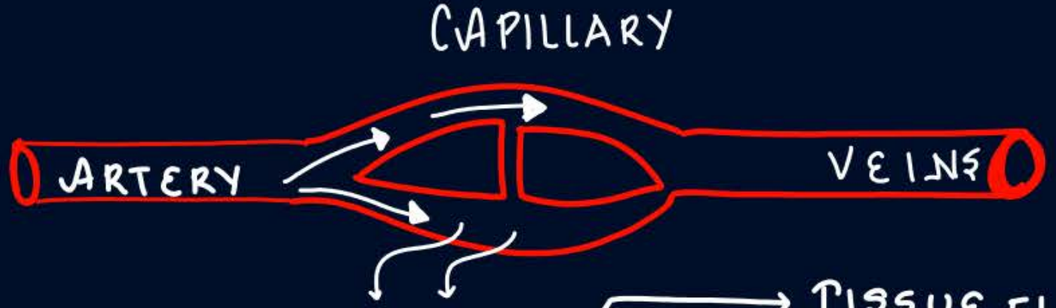
D
Antigen

R
Antibody

✓ X

# Lymph (Tissue Fluid):

- Tissue fluid formed by filteration of Blood ; accumulated around tissue spaces.




→ TISSUE FLUID / INTERSTITIAL FLUID :

- Similar mineral distribution like Plasma except some Large Protein.

★ Lymph = Blood − (RBC + Platelets + Larger Protein)

- Act as a MIDDLE MEN for transport of gases, nutrients, wastes b/w Blood & Tissue.
- It is Colorless, has specialised Lymphocyte (immune response)
- It is an imp. carrier for some hormone, nutrients etc.

- Tissue fluid / Lymph circulates Back to Blood as it moves via Lymphatic system

↓

Lymphatic capillary

↓

Lymphatic vessel

↓

Lymph Nodes → filter the microorganism present in Lymph

(अतिरिक्त Gyaan)

↓

Lymphatic duct

↓

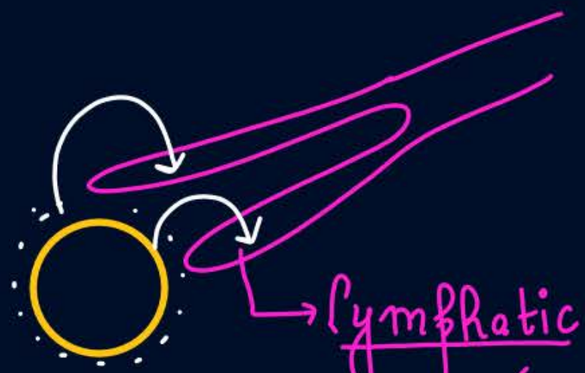
Subclavian vein

↓

Superior Venacava

↓

Heart



Lymphatic capillary

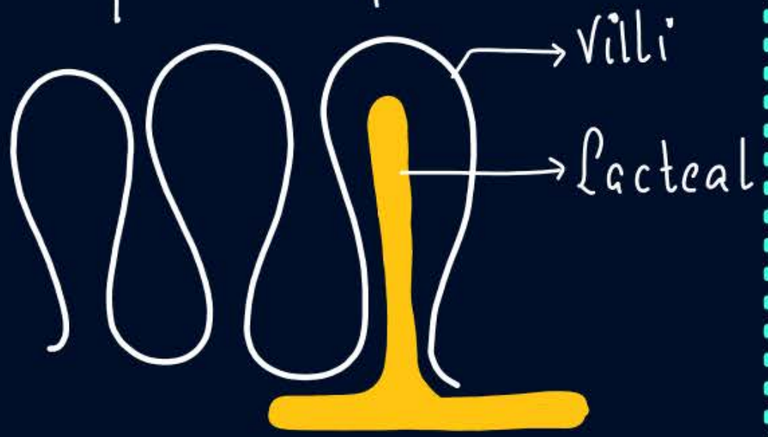
(Blind tube)

↓

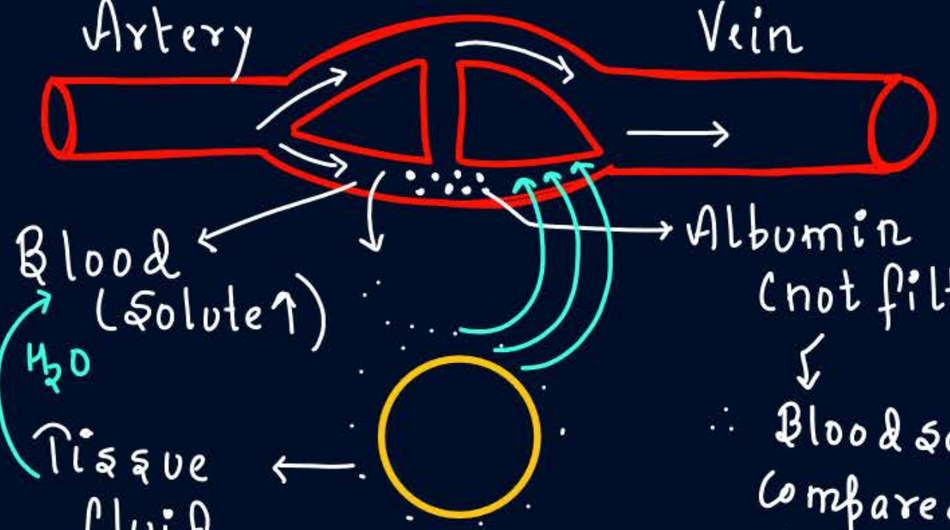
one open end

**Lacteal:** Lymphatic capillaries; Small intestine

↳ fat absorption.




**Albumins:**




Albumin (not filteration)

↓

∴ Blood solute ↑ Compared to tissue fluid

↓

Most of tissue fluid (except ≃ 10:1) move Back to Capillary. (OSMOSIS)

## 15.2 Lymph (Tissue Fluid)

As the blood passes through the capillaries in tissues, some water along with many small water soluble substances move out into the spaces between the cells of tissues leaving the larger proteins and most of the formed elements in the blood vessels. This fluid released out is called the interstitial fluid or tissue fluid. It has the same mineral distribution as that in plasma. Exchange of nutrients, gases, etc., between the blood and the cells always occur through this fluid. An elaborate network of vessels called the lymphatic system collects this fluid and drains it back to the major veins. The fluid present in the lymphatic system is called the lymph. Lymph is a colourless fluid containing specialised lymphocytes which are responsible for the immune responses of the body. Lymph is also an important carrier for nutrients, hormones, etc. Fats are absorbed through lymph in the lacteals present in the intestinal villi.

intestine → R. capillaries

# Circulatory Pathways:

## Circulatory system

### ① OPEN C.S

- Blood vessels are poorely developed & dumps the Blood into 'open spaces' SINUSES'
- Capillary (-)

ANTHE: Echinodermata
Tunicate (Urochordata)
Arthropoda
Hemichordate
Non cephalopod Mollusca (usually for Mollusca)

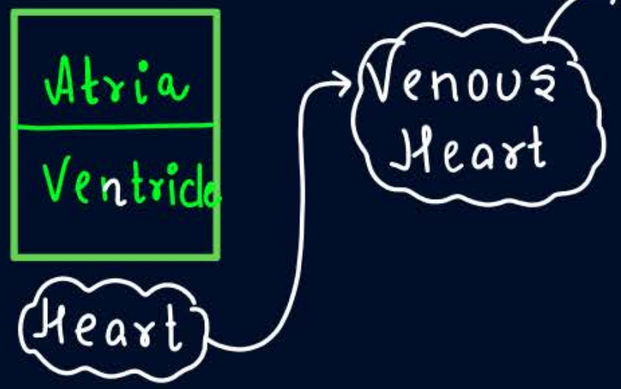
### ② CLOSED C.S

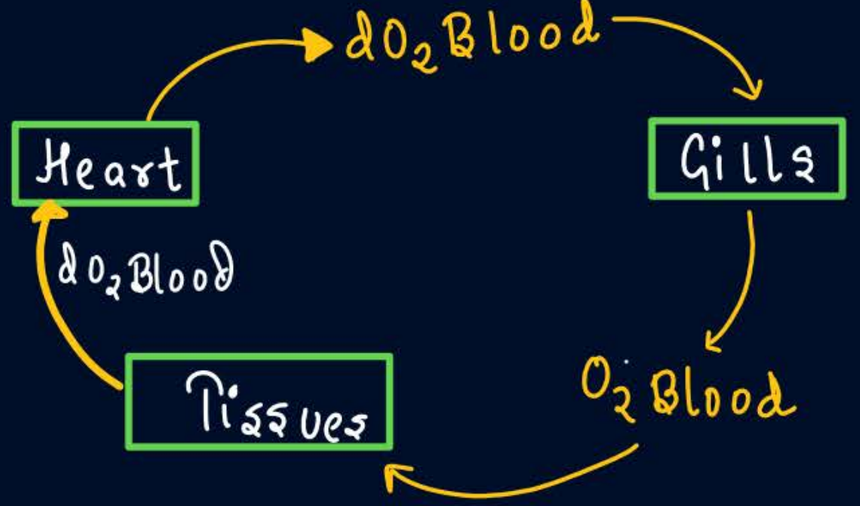
- Higher Vertebrates requires PRECISED blood flow via Closed Network of Blood vessel.
- Capillary present

eg: Cephalopod Mollusca

- Heart; CIRCULATION:

① 2 chambered; SINGLE CIRCULATION eg: Fish
( 1 Atria, 1 Ventricle)

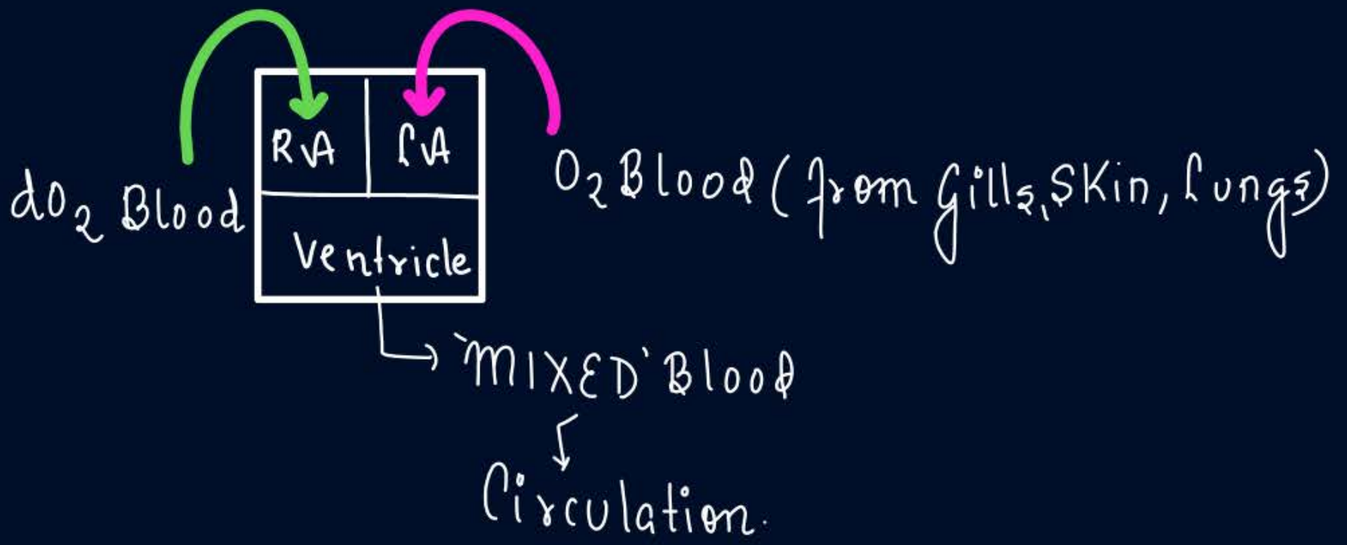


② 3 chambered ; MIXED CIRCULATION / INCOMPLETE DOUBLE CIRCULATION.

eg: Amphibian, ( In NCERT; FROG: SINGLE Circulation ; Summary)
Reptiles (except Crocodile: 4 chambered)

→ 2 Atria, 1 Ventricle



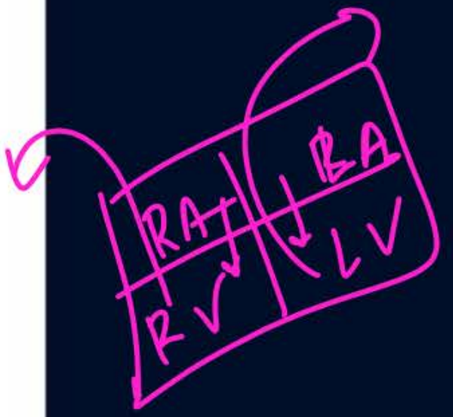

③ 4 Chambered ; DOUBLE CIRCULATION:

eg: Birds, Mammals

## 15.3 Circulatory Pathways

The circulatory patterns are of two types – open or closed. **Open circulatory system** is present in arthropods and molluscs in which blood pumped by the heart passes through large vessels into open spaces or body cavities called sinuses. Annelids and chordates have a **closed circulatory system** in which the blood pumped by the heart is always circulated through a closed network of blood vessels. This pattern is considered to be more advantageous as the flow of fluid can be more precisely regulated.

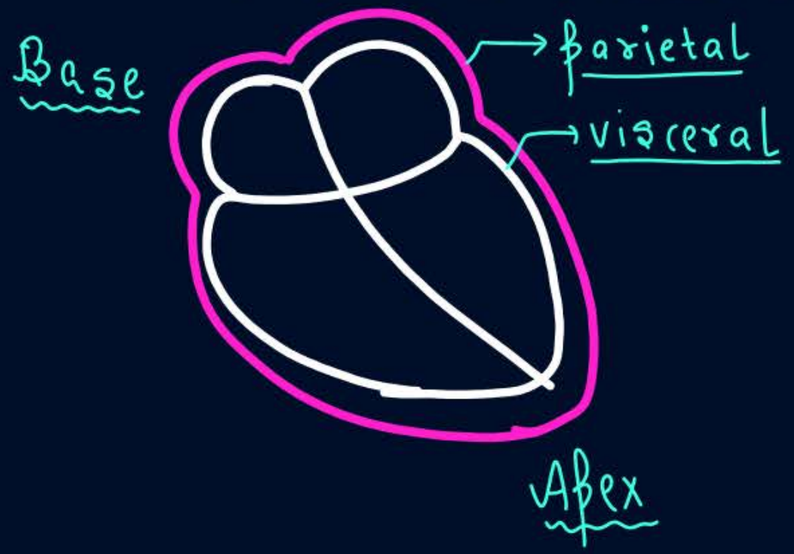
All vertebrates possess a muscular chambered heart. Fishes have a 2-chambered heart with an atrium and a ventricle. Amphibians and the reptiles (except crocodiles) have a 3-chambered heart with two atria and a single ventricle, whereas crocodiles, birds and mammals possess a 4-chambered heart with two atria and two ventricles. In fishes the heart pumps out deoxygenated blood which is oxygenated by the gills and supplied to the body parts from where deoxygenated blood is returned to the heart (single circulation). In amphibians and reptiles, the left atrium receives oxygenated blood from the gills/lungs/skin and the right atrium gets the deoxygenated blood from other body parts. However, they get mixed up in the single ventricle which pumps out mixed blood (incomplete double circulation). In birds and mammals, oxygenated and deoxygenated blood received by the left and right atria respectively passes on to the ventricles of the same sides. The ventricles pump it out without any mixing up, i.e., two separate circulatory pathways are present in these organisms, hence, these animals have double circulation. Let us study the human circulatory system.



# Human Circulatory system:

## ① Heart:

- Mesodermal
- Size of Clenched (Closed) fist
- Located b/w lungs (Slightly tilted toward Left)
- Muscular; 4 chambered
- Covered with double membranous: 'PERICARDIUM'

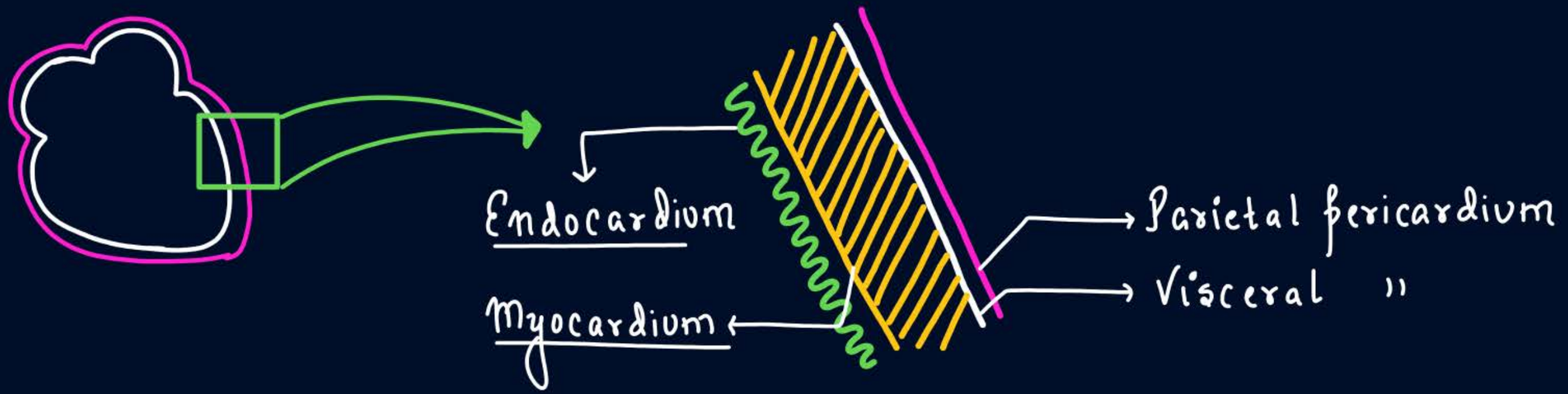



'PERICARDIUM'

- Outer → parietal pericardium
- inner visceral pericardium

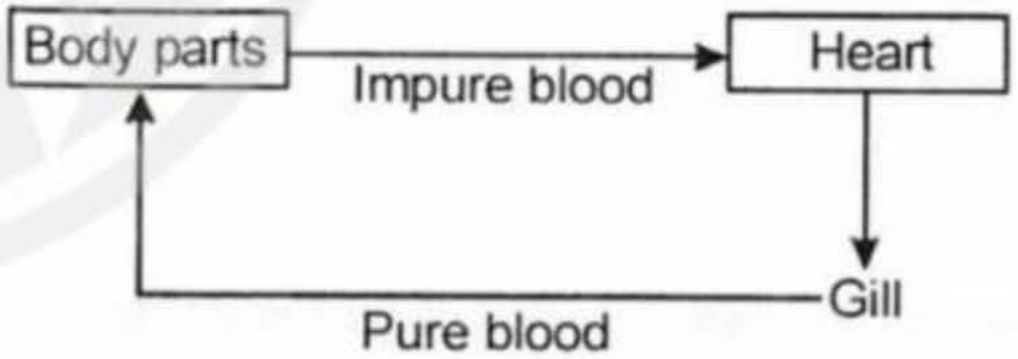
b/w Has 'PERICARDIAL FLUID' → reduces friction

# Wall of Heart:



Neer- catalyst

In fishes the blood circulation is represented as;




The above flow of blood indicates it is a;

(A) double circulation.

(B) single circulation.

(C) incomplete single circulation.

(D) incomplete double circulation.

Q-1

?

**Statement-I:** In open type of circulatory system, there are no blood capillaries and the blood flows in the body cavity.

**Statement-II:** The open type of circulatory system is common in arthropods and molluscs.

(A) Both Statement I and Statement II are correct.

(B) Statement I is correct, but Statement II is incorrect.

(C) Statement I is incorrect, but Statement II is correct.

(D) Both Statement I and Statement II are incorrect.

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

**Assertion A:** Mixing of oxygenated and deoxygenated blood occurs in reptilian and amphibian hearts.

**Reason R:** In reptiles and amphibians, there is incomplete partitioning of the auricle.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is NOT the correct explanation of A.

Q-3

(1)

Assertion: Lymph is a colourless fluid containing specialised lymphocytes which are responsible for the immune responses of the body

Reason: Exchange of nutrients, gases etc. between the blood and the cells always occur through this fluid

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is a correct explanation of Assertion (A).

(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not a correct explanation of Assertion (A).

(C) Assertion (A) is true and Reason (R) is false.

(D) Assertion (A) and Reason (R) both are false.

Q4

2

Lymph collected from limbs never reaches the blood without passing through at least one lymph node. This is for

(A) Filtration of micro-organisms

(B) Absorption of glucose

(C) Absorption of fatty acids

(D) Separation of waste materials

Atria / Auricle

Q-5

(A)

Examination of blood of a person suspected of having anemia, shows large, immature, nucleated erythrocytes without haemoglobin. Supplementing his diet with which of the following is likely to alleviate his symptoms?

(1) Thiamine

(2) Folic acid and cobalamine

(3) Riboflavin

(4) Iron compounds

AIPMT (2006)

Q 6

(2)

# Homework

- REVISE CLAASNOTES / ZOOLOGY MED EASY

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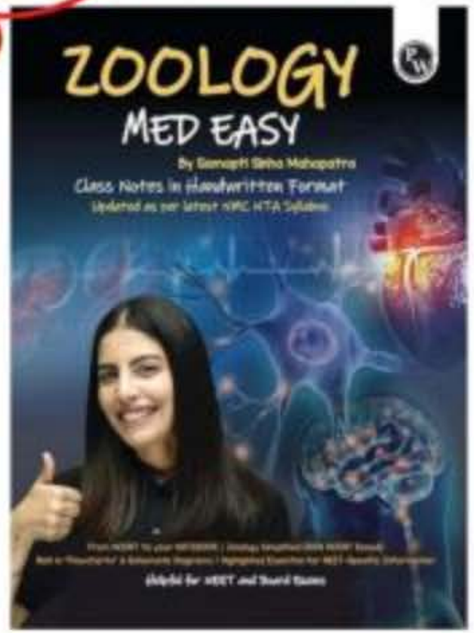

# THANK YOU