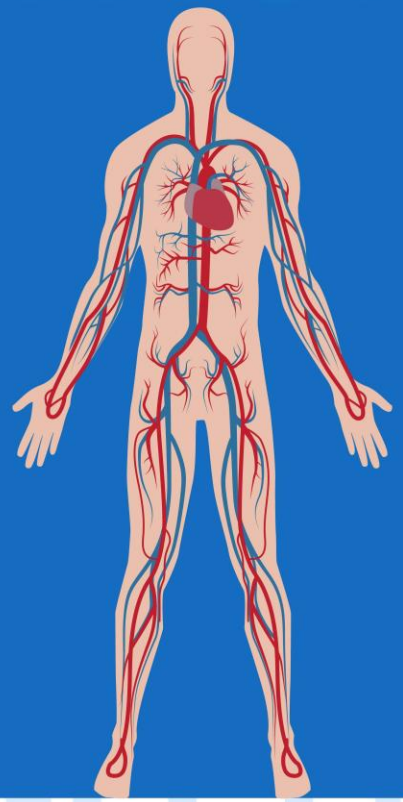
BODY FLUIDS & CIRCULATION - L 1



ZOOLOGY

PUSHPENDU SIR

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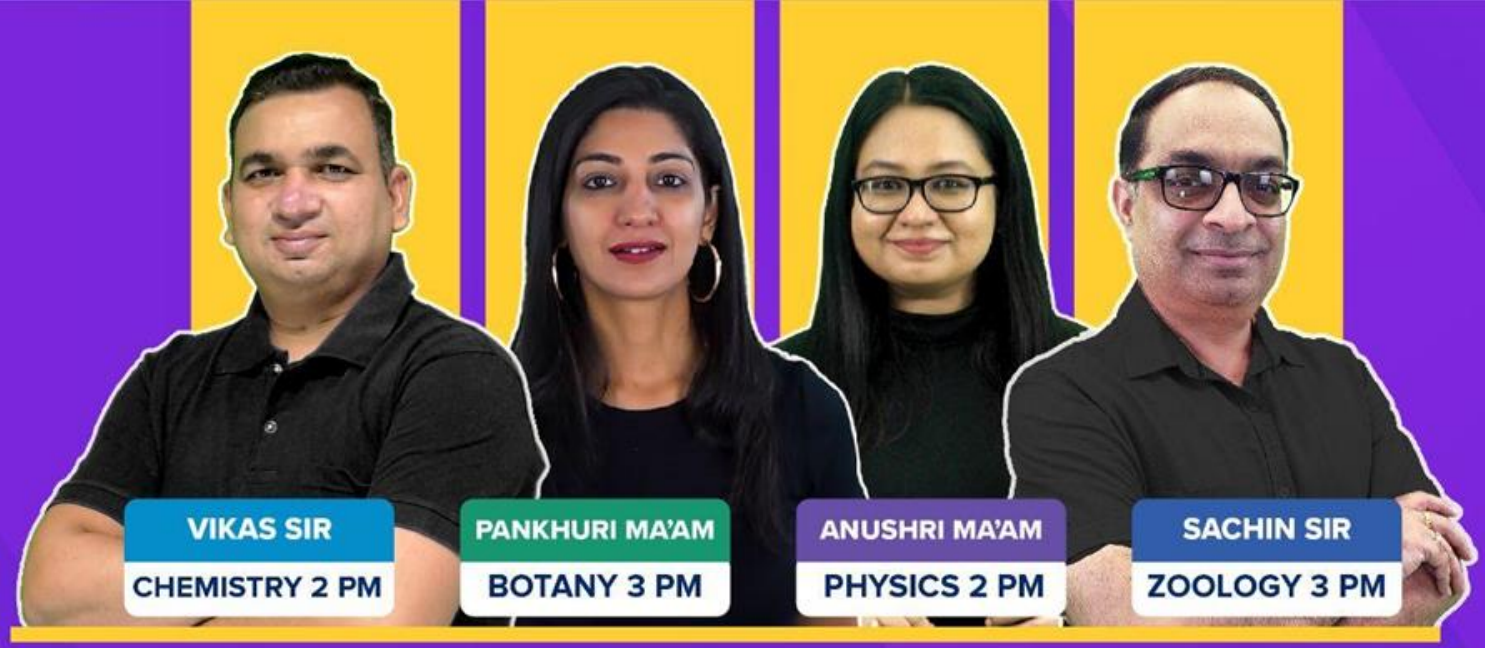
DROPPERS BATCH

FROM 1st AUGUST



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1 AIR

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2 Year Classroom Program

715/720

KARNATAKA TOPPER

3 AIR

Hrishikesh N Gangule
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710/720

GUJARAT TOPPER

9 AIR

Zeel Vyas
4 Year Classroom Program

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JAMMU & KASHMIR TOPPER

10 AIR

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2 Year Classroom Program

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68097 Classroom, 12821 Distance & Digital

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in Top 10 AIR (All India Rank)	in Top 50 AIR (All India Rank)	in Top 100 AIR (All India Rank)	State Toppers

*Until Counting

Other Toppers from Classroom Programs*

West Bengal

710/720 AIR 11

Sayantani Chatterjee
2 Year Classroom Program

710/720 AIR 14

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

Saahir Nawal Bajaj
2 Year Classroom Program

Maharashtra-Female

705/720 AIR 21

Vaidehi Jha
3 Year Classroom Program

705/720 AIR 22

Debankita Bera
2 Year Classroom Program

Goa

705/720 AIR 24

Anushka Kulkarni
2 Year Classroom Program

705/720 AIR 26

Avilash Bhaduri
Test Series Program

Madhya Pradesh

705/720 AIR 29

Sanika Agrawal
2 Year Classroom Program

Tamil Nadu

705/720 AIR 30

Thridev Vinayaka S
2 Year Classroom Program

705/720 AIR 35

Aksh Suryavanshi
3 Year Classroom Program

Haryana

705/720 AIR 38

Nisha
4 Year Classroom Program

Odisha

705/720 AIR 39

Priya Somadutta Nayak
3 Year Classroom Program

Rajasthan-Male

705/720 AIR 40

Shivam Gupta
1 Year Classroom Program

Haryana-Male

700/720 AIR 49

Akshat
3 Year Classroom Program

Scan the code to check all the ranks & hear what the toppers have to say

(*Including state toppers in female category)

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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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Who can Appear for the Test ?

Class 12th passed students

The Circulatory System

Ever Shopped Online?

Delivery Networks!

Delivery Networks!

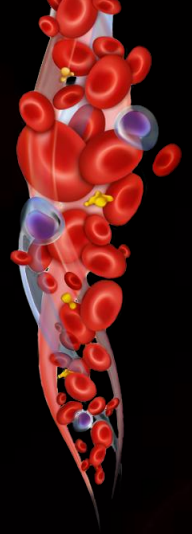
Retailer

Customer

Warehouse

Retailer

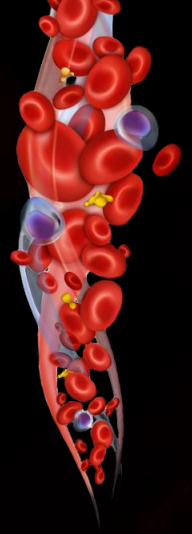
Manufacturer



Delivery network for the body

=

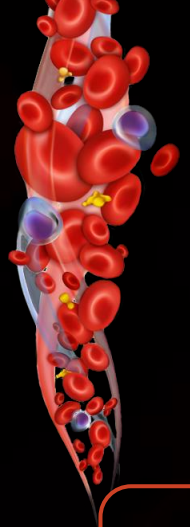
The Circulatory System



The Circulatory System

- Circulation of **blood** or **fluid**
- Transports:
  - Nutrients
  - Gases
  - Hormones

The Circulatory System



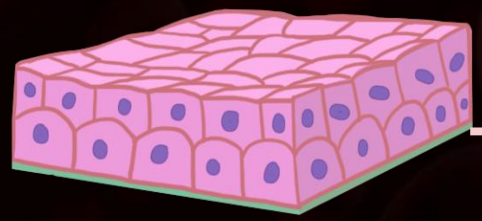
Lungs

Oxygen

Carbon dioxide

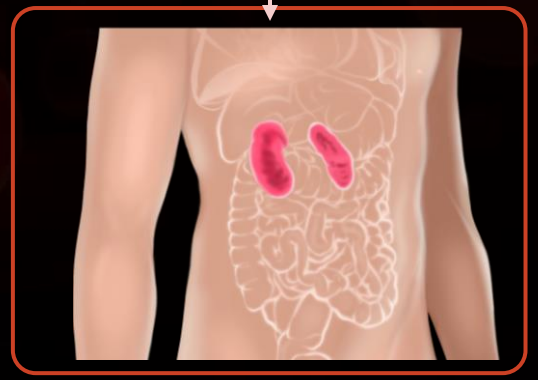
Intestines

Nutrients

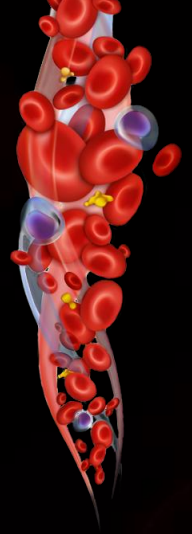


Tissues

Wastes



Kidneys

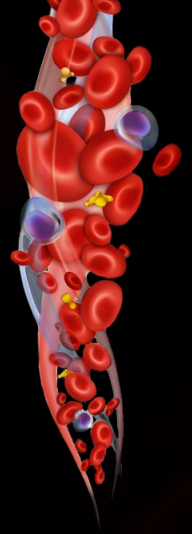


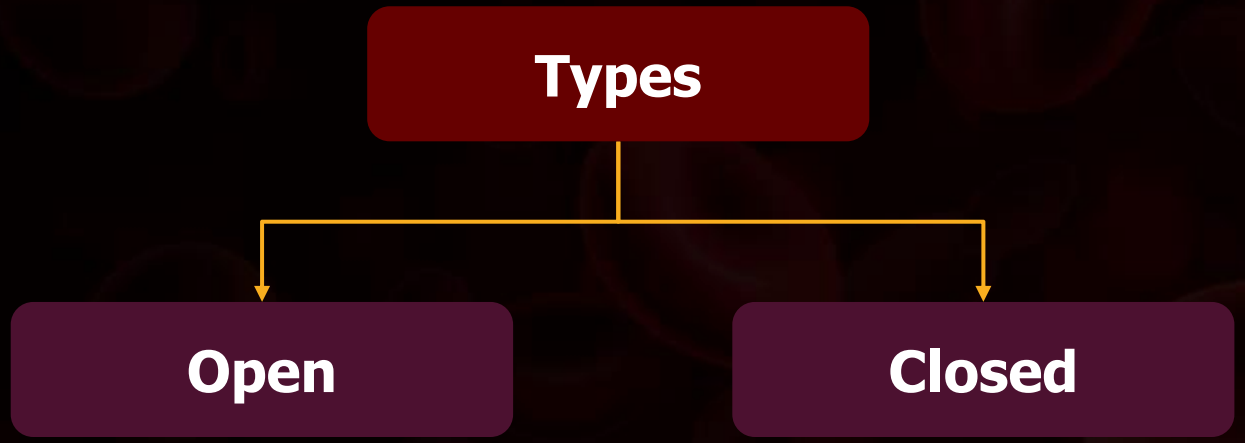
The Circulatory System

- It is also known as the **cardiovascular system**.

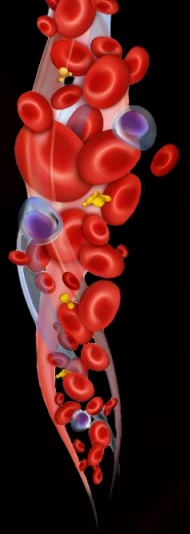
- It is responsible for the transportation of **nutrients**, **gases** and **hormones** all throughout the body of the animal.

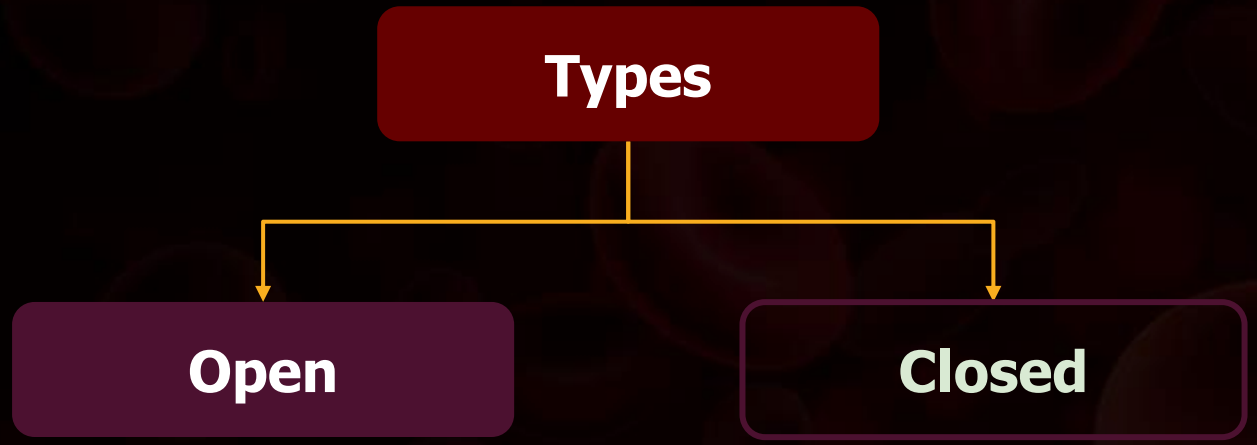
The Circulatory System





The Circulatory System

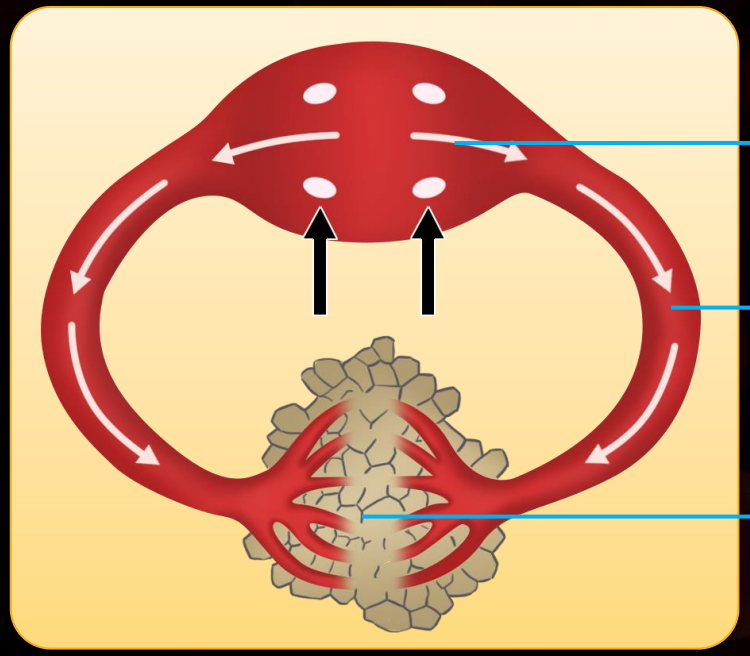




The Circulatory System

Open Circulatory System

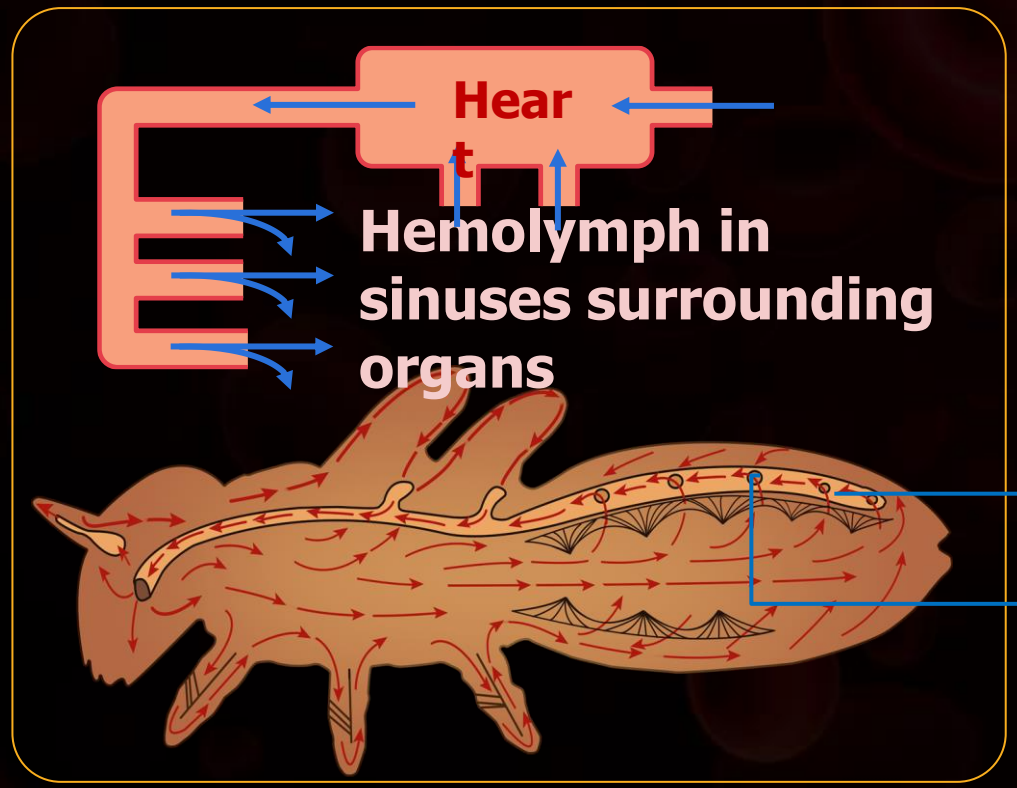
- Fluid called **haemolymph** is pumped by **heart** through vessels into **open spaces** or **body cavities**



The Circulatory System

Open Circulatory System

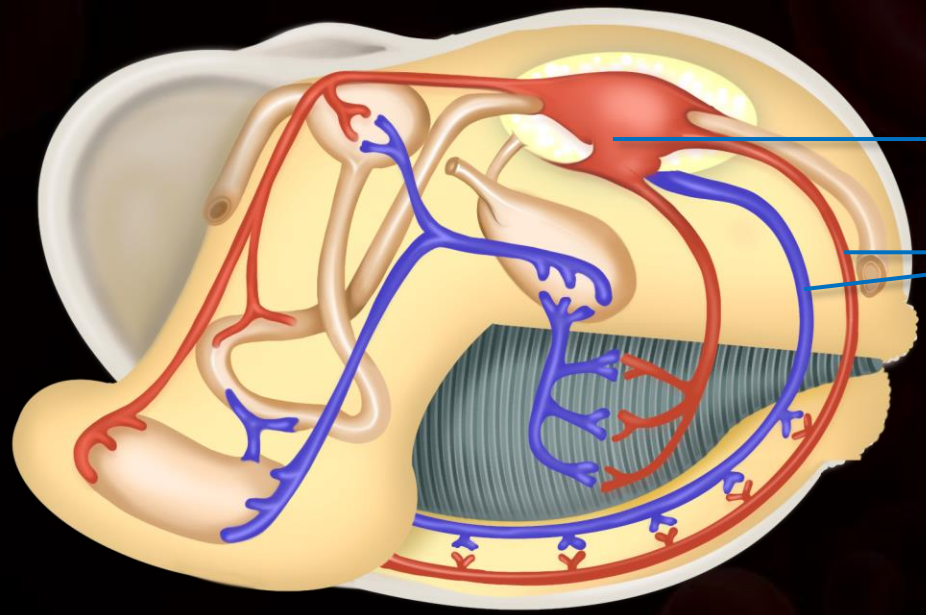
Examples - All Arthropods



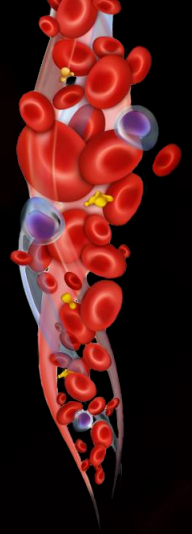
The Circulatory System

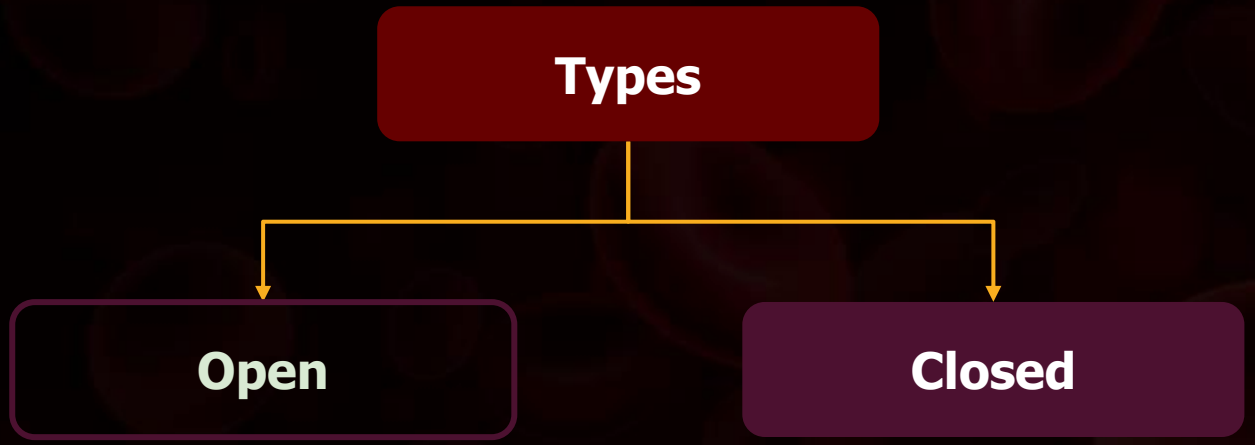
Open Circulatory System

Examples - Molluscs like clam



The Circulatory System

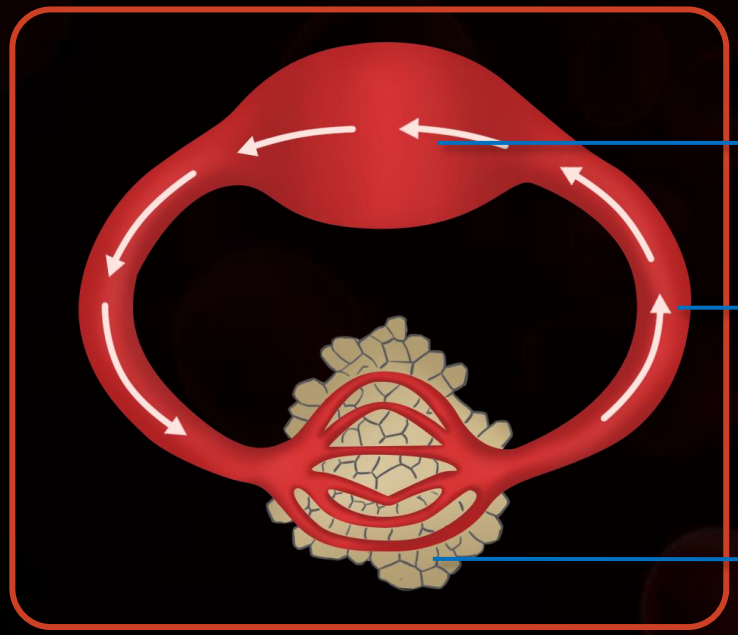




The Circulatory System

Closed Circulatory System

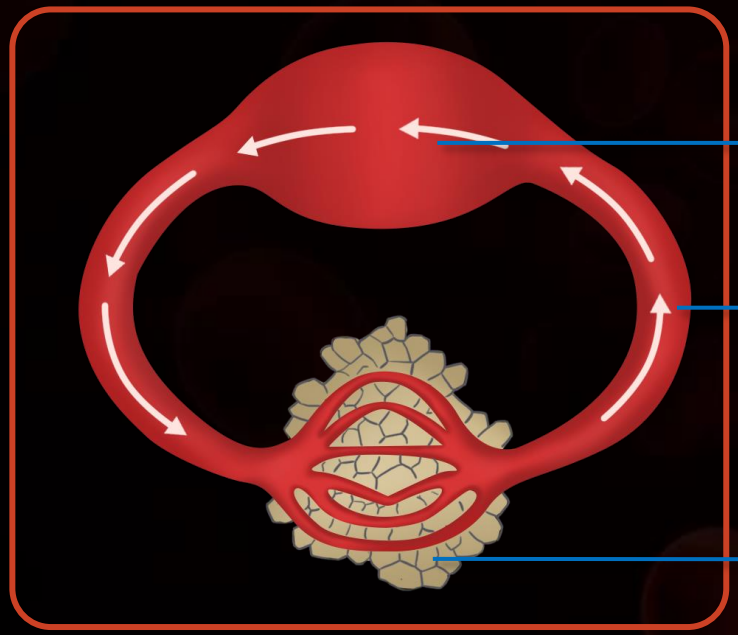
- Blood pumped by the **heart** is always circulated through a **closed network of blood vessels**



The Circulatory System

Closed Circulatory System

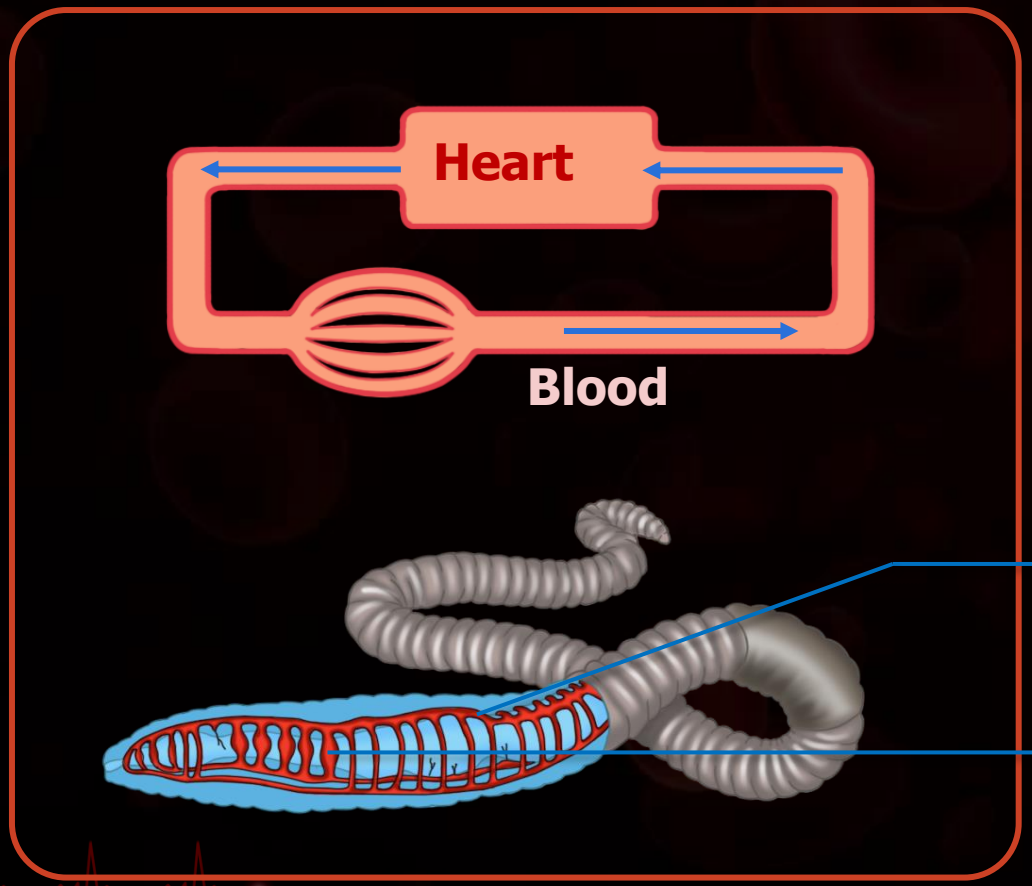
- **Advantage** - Flow of the fluid can be regulated



The Circulatory System

Closed Circulatory System

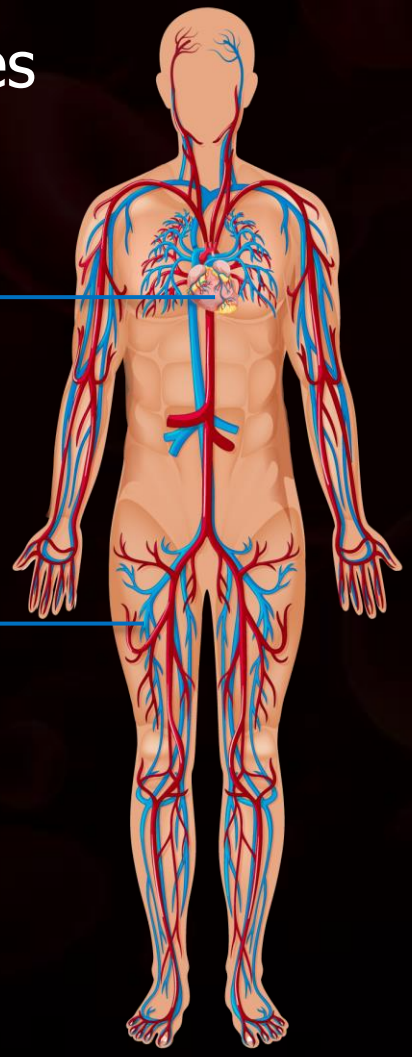
Examples - Annelids



The Circulatory System

Closed Circulatory System

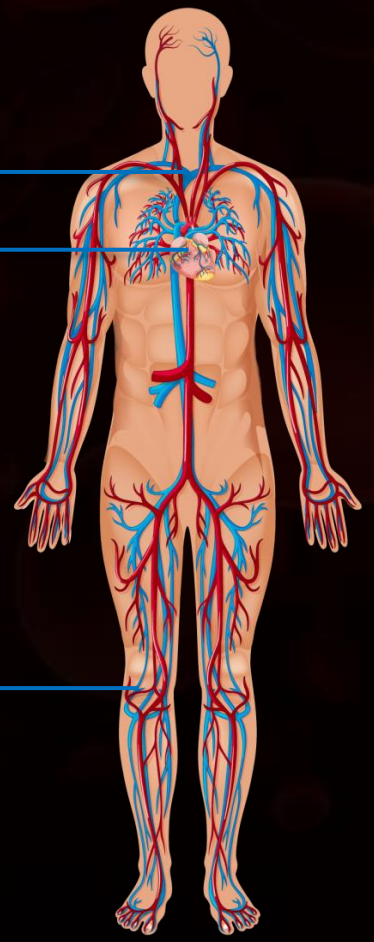
Examples - Chordates



The Human Circulatory System

Human Circulatory System

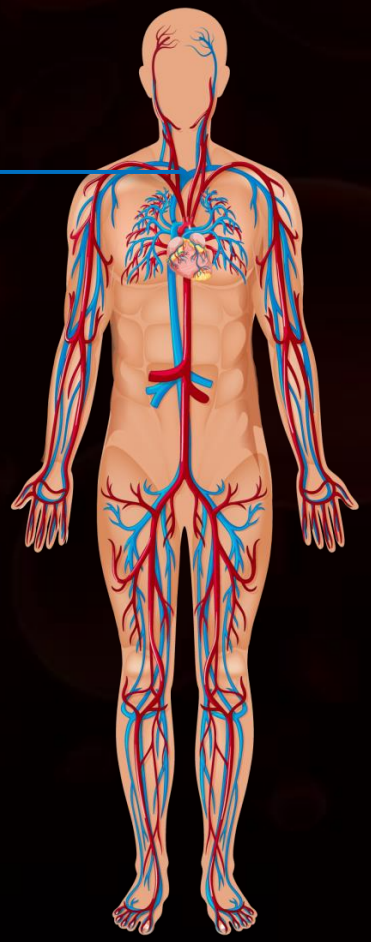
- **Circulating Fluid**
- **Heart**
- **Blood vessels**

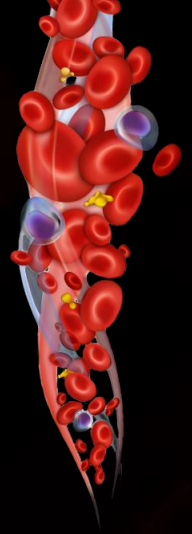


The Human Circulatory System

Human Circulatory System

- **Circulating Fluid**
- **Heart**
- **Blood vessels**





The Human Circulatory System

Human Circulatory System - Circulating fluid

Circulating Fluid

Blood

- Fluid connective tissue
- Transports oxygen, nutrients, antibodies, etc.

Lymph

- Colourless fluid
- Carries immune cells, nutrients, etc.

Story Time!

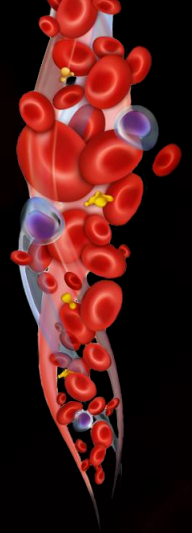
But why did doctor ask for a blood test?

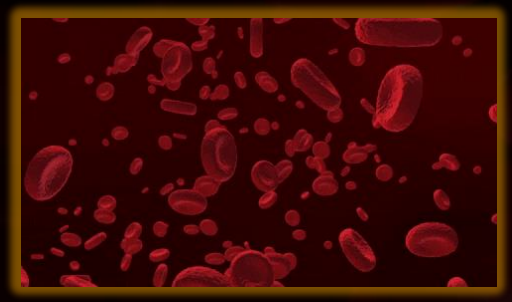
Blood – Sickness Indicator

Blood test

Blood

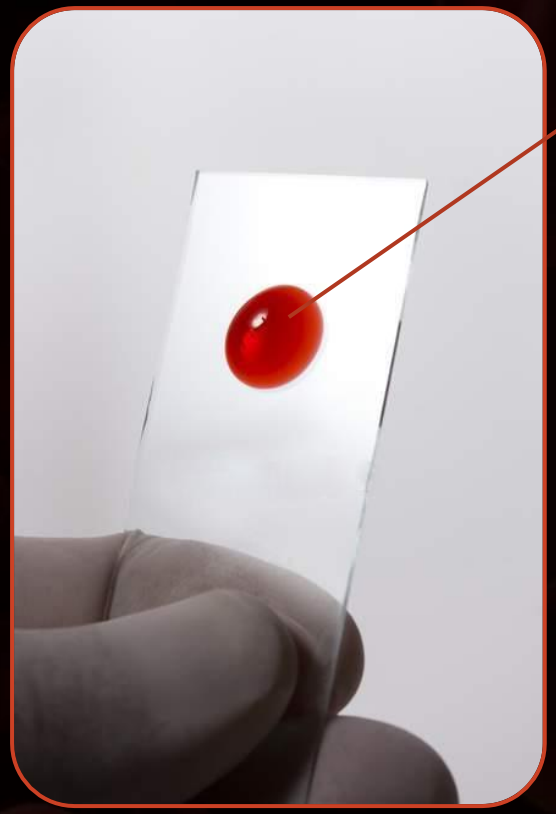
Blood





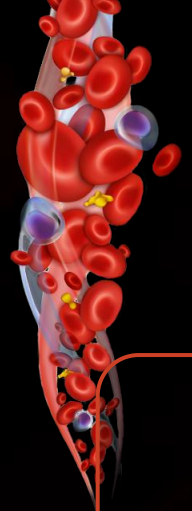
Blood

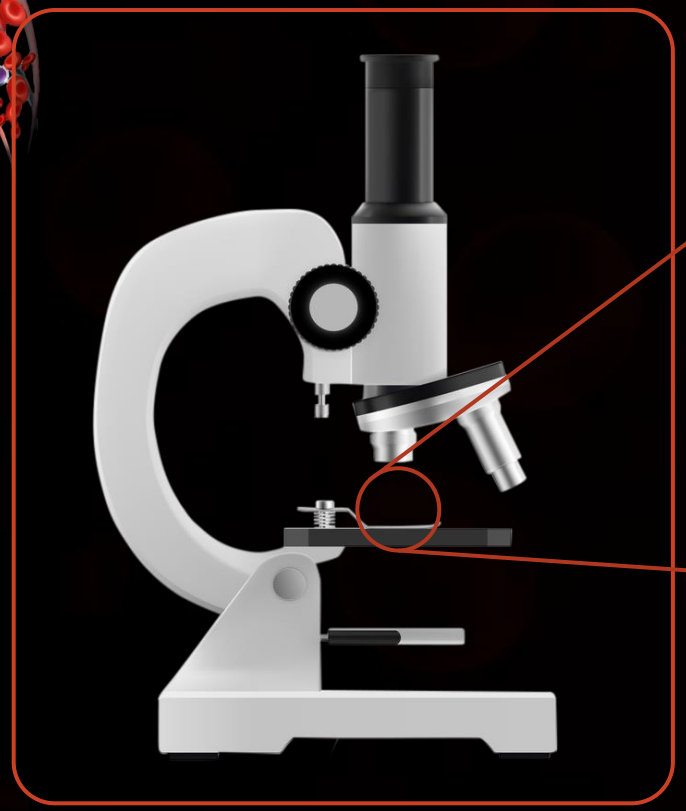
Microscope



Glass Slide

Blood





Microscope

Cells

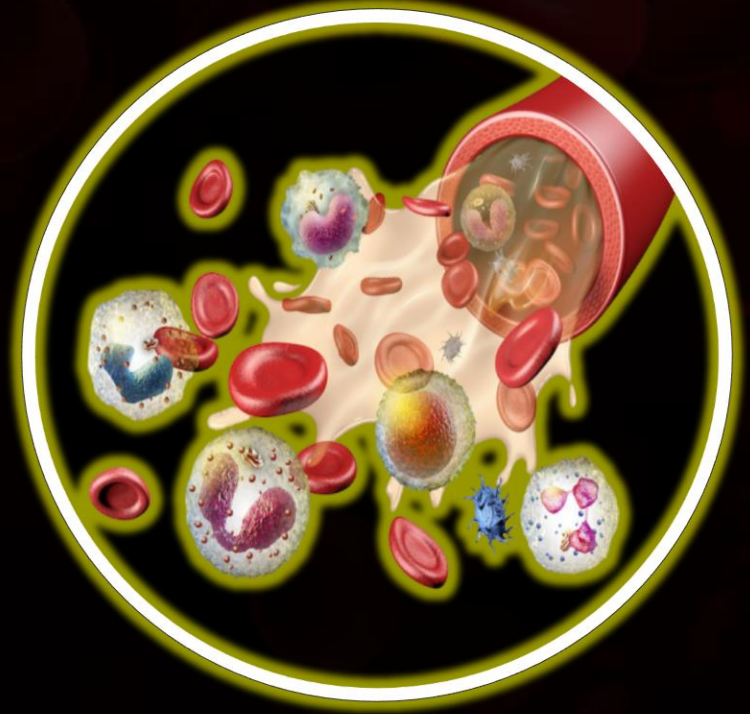
Fluid matrix

Microscopic view

Recall ! Blood – Specialised Connective Tissue

Fluid Connectiv Tissue

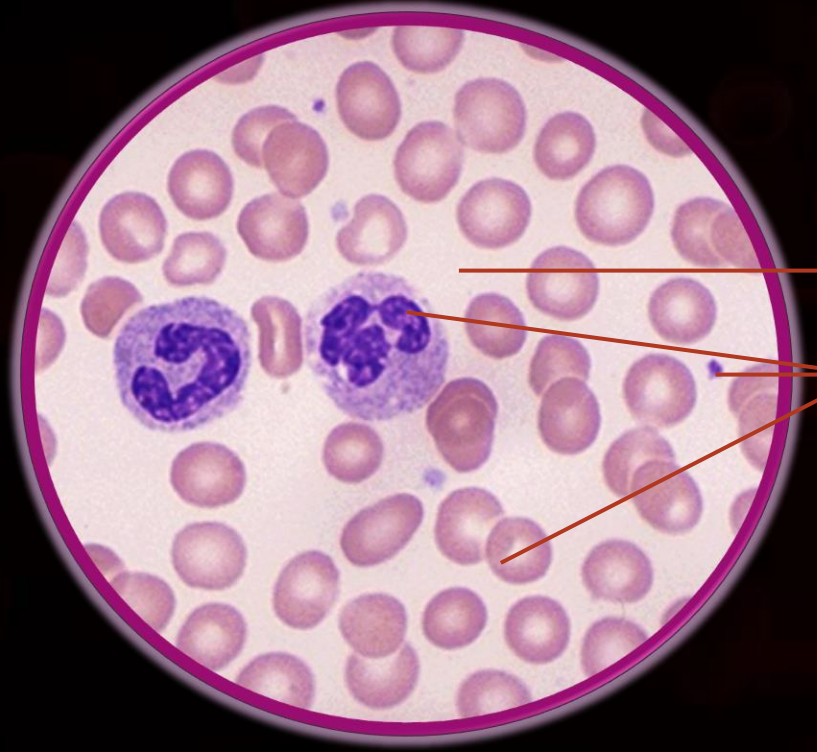
- Fluid matrix
- Links and supports other tissues
- Has cells and matrix



Blood – Fluid connective tissue

Components of Blood

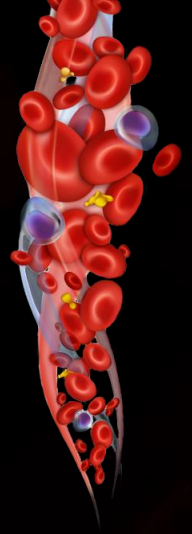
Components of Blood



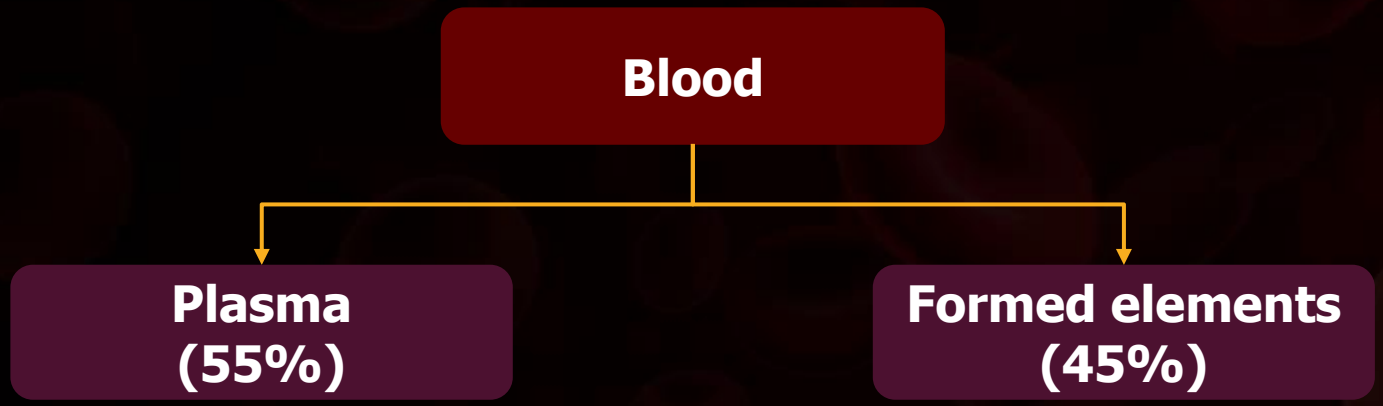
Blood

Matrix → Plasma

Cells → Formed Elements



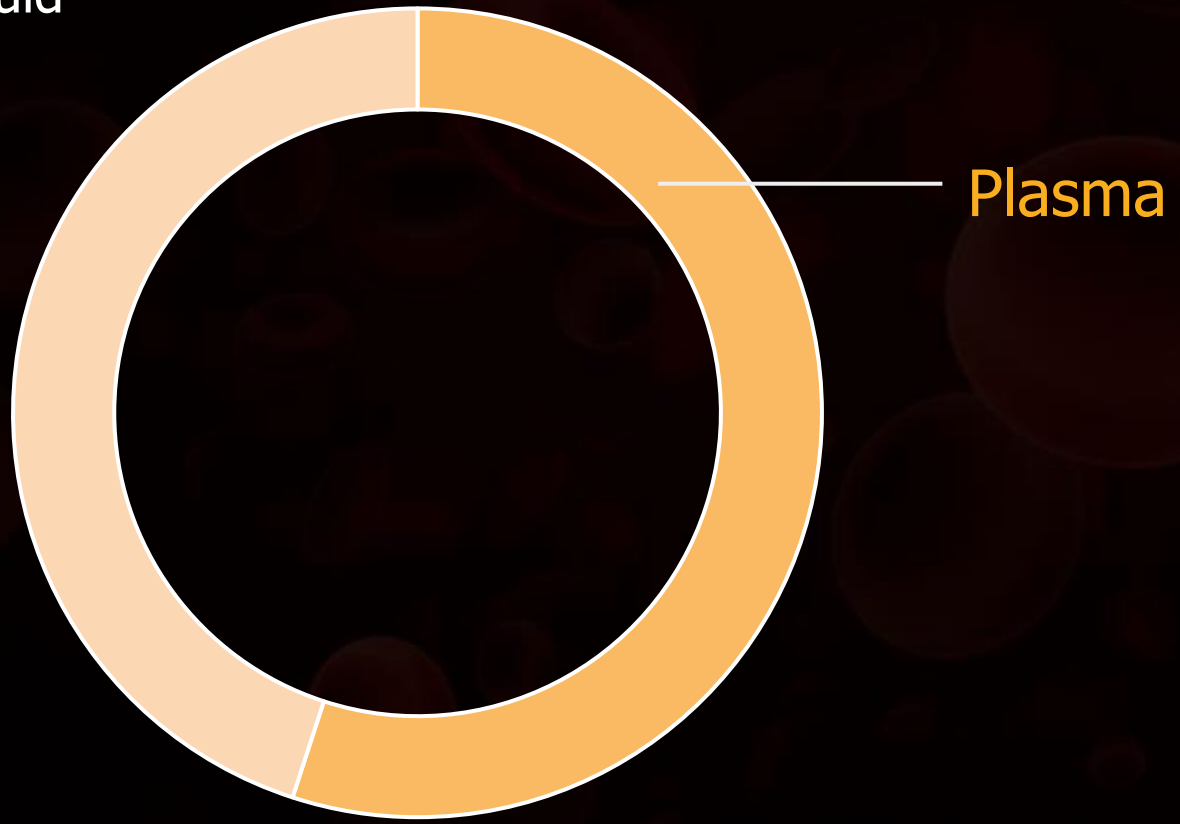
Components of Blood



Components of Blood

Plasma

- **Straw coloured** liquid
- **Viscous** fluid

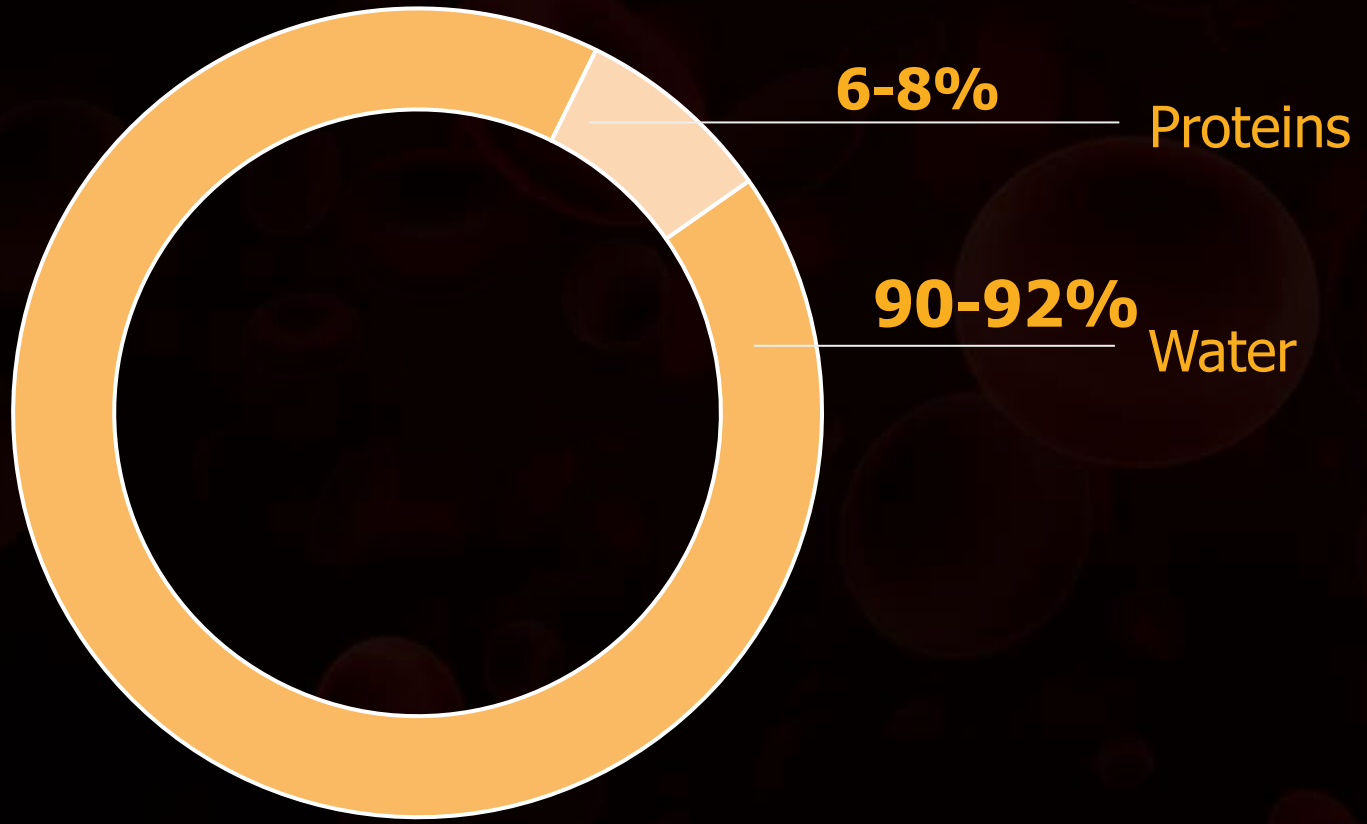


Blood Volume

Components of Blood

Plasma

Plasma composition

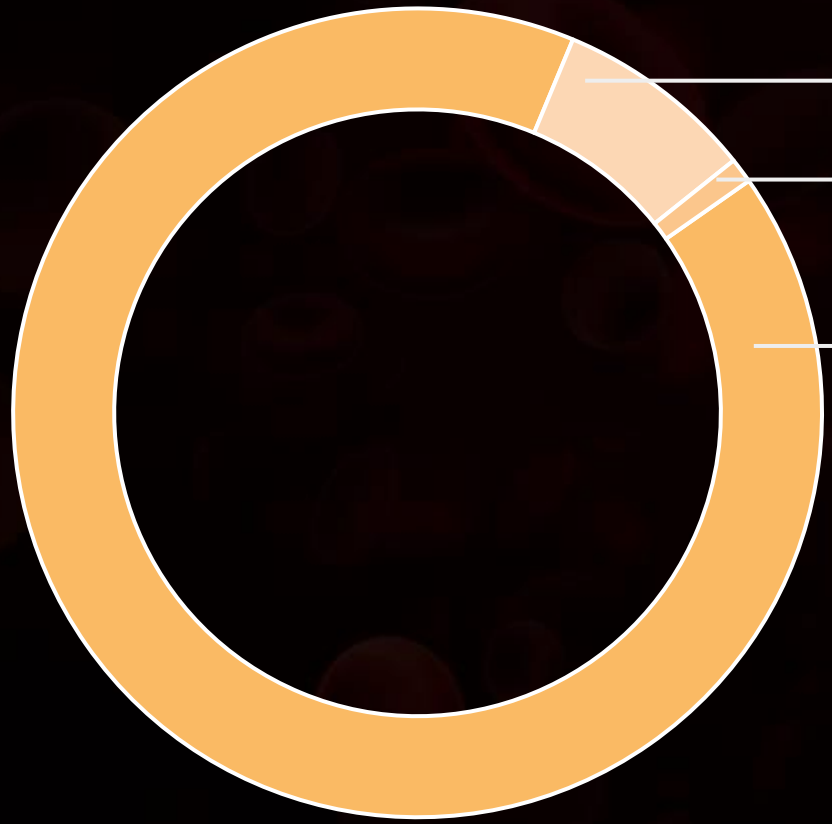


Plasma

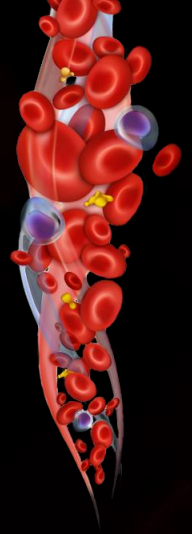
Components of Blood

Plasma

Plasma composition



Plasma



Components of Blood

Plasma

Dissolved components

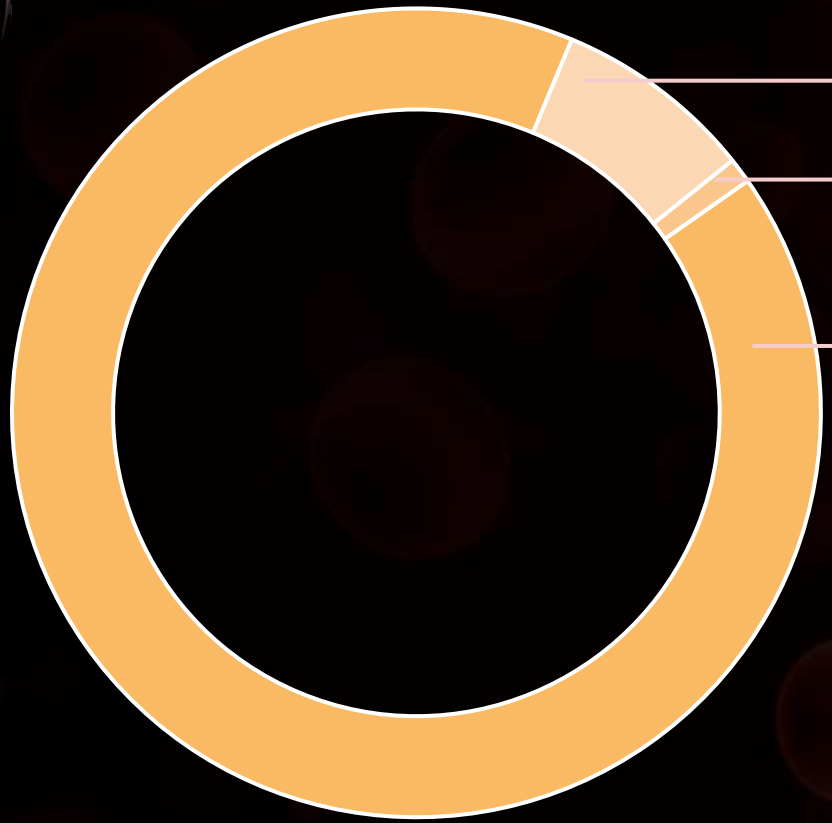
- Na^+, Ca^{2+}, Mg^{2+}, HCO_3^-, Cl^-
- Simple Sugars
- Amino acids
- Lipids
- Urea
- Ammonia
- Carbon dioxide
- Oxygen
- Hormones
- Vitamins etc

Did you know ?

Blood is GOLD

Components of Blood

Plasma proteins



6-8%

Proteins

- Albumin
- Globulins
- Fibrinogen

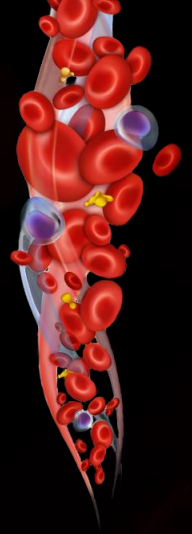
<1%

Disolved components

90-92%

Water

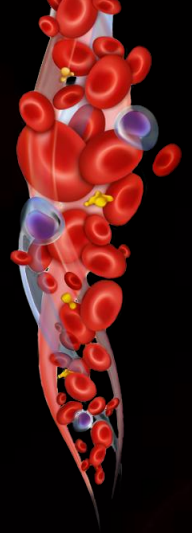
Plasma



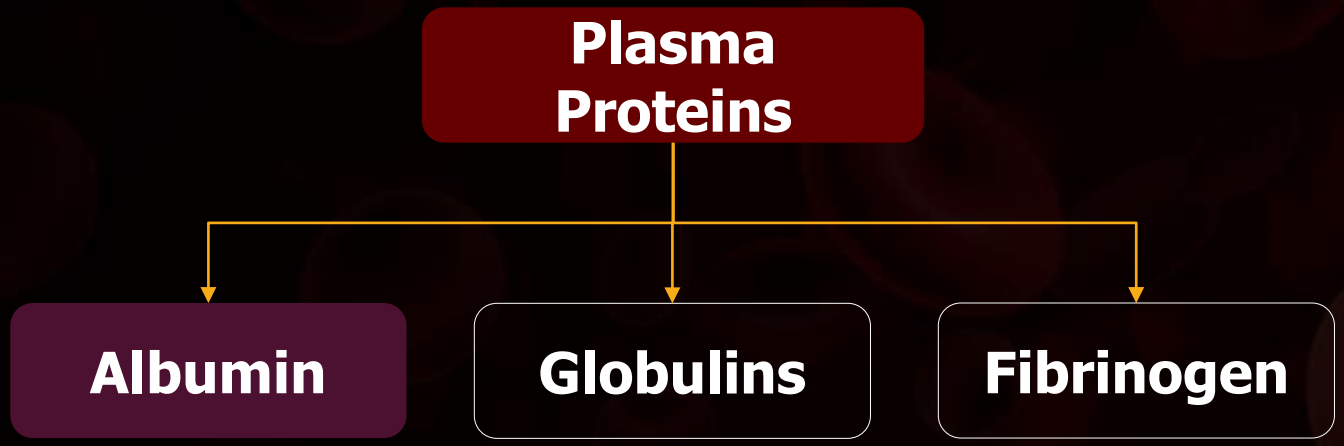
Components of Blood

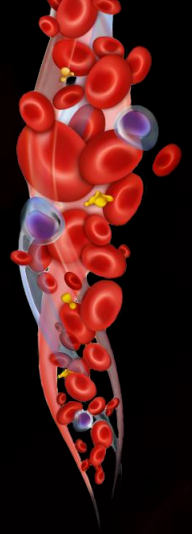
Plasma Proteins

- **Albumin**
- **Globulins**
- **Fibrinogen**



Components of Blood



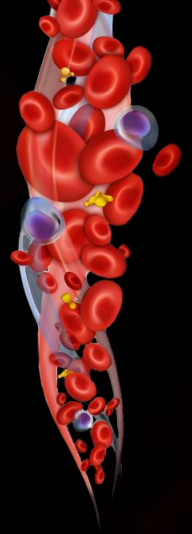


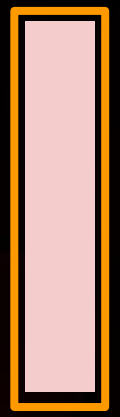
Components of Blood-

Plasma Proteins

- **Albumin**
  - *Most **abundant** plasma proteins*
  - *Maintains **osmotic balance** of blood*
- **Globulins**
- **Fibrinogen**

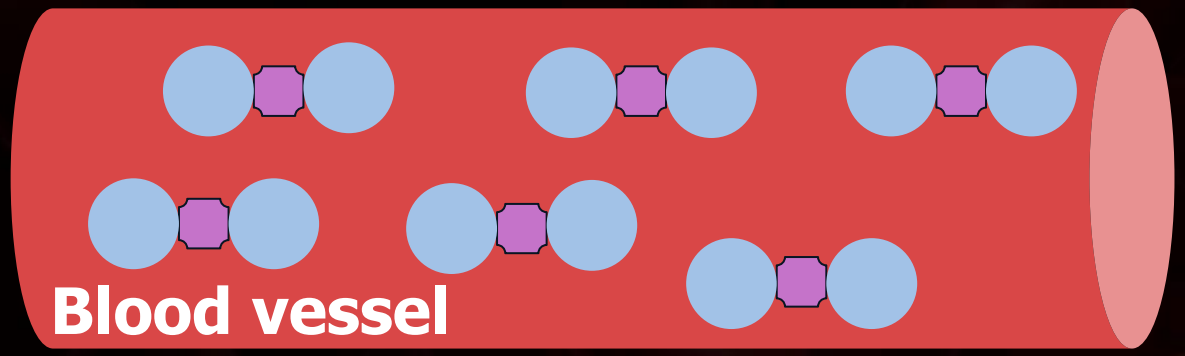
Plasma Protein: Albumin

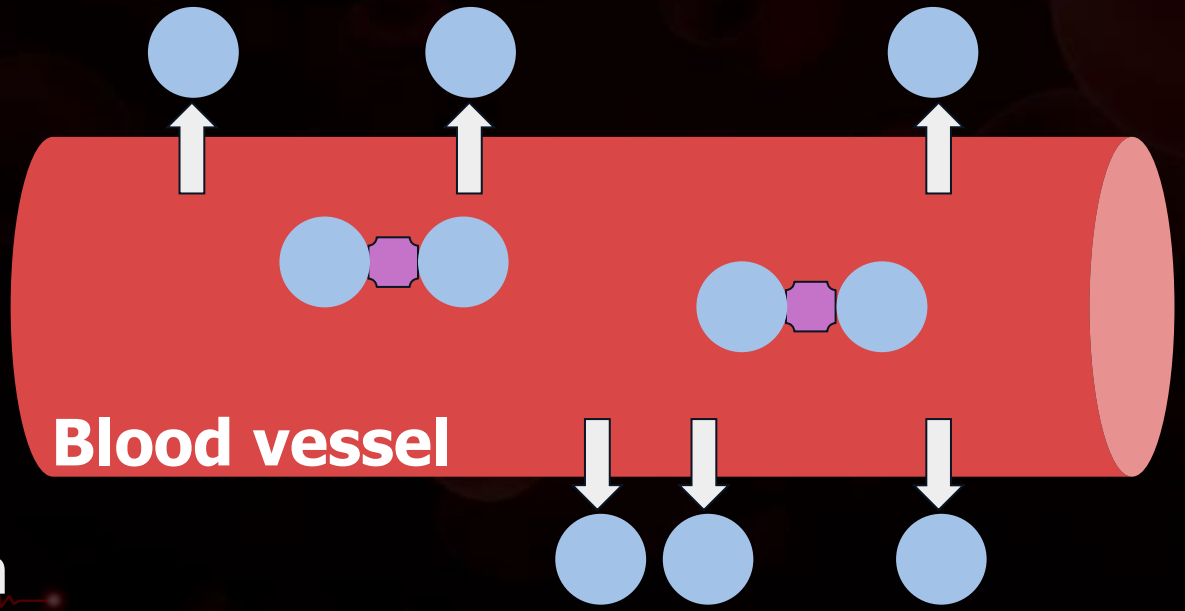




Normal albumin

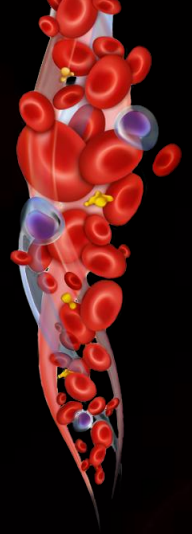
Low albumin





Water molecule

Albumin protein



Components of Blood

Plasma Proteins

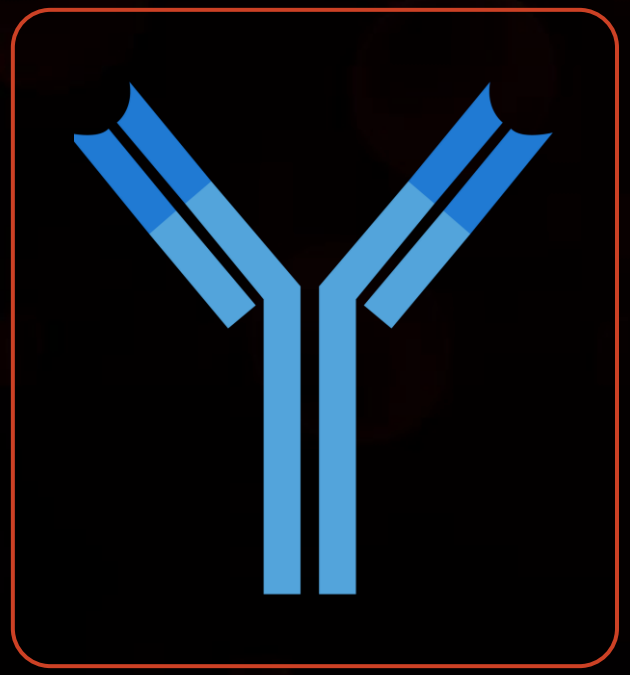
- Albumin
- **Globulins**
- Fibrinogen

- *Globular in structure*
- *Includes immunoglobulins, carrier proteins, etc.*
- *Primary function - Defense mechanism of the body*

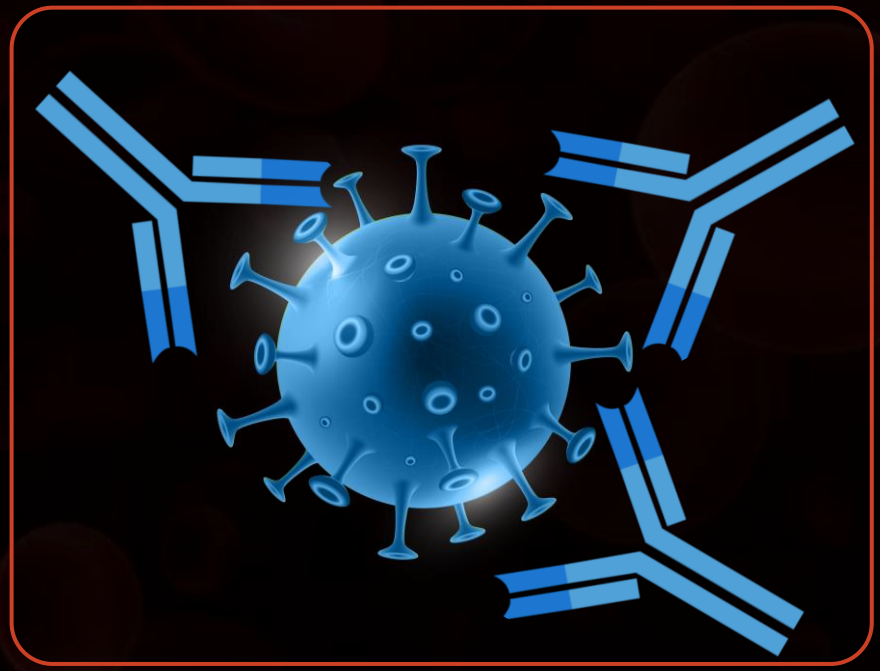
Plasma Proteins: Globulins

Immunoglobulins

- Also called **'Antibodies'**



Antibodies



Pathogen

Plasma Proteins: Globulins

Immunoglobulins

- **Shield** our body against pathogens

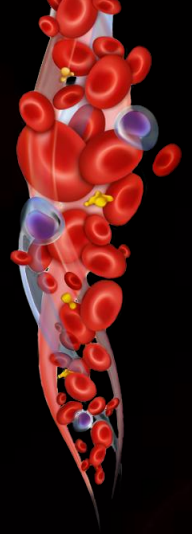
Have you ever been wounded?


Stocksy
UNITED

What causes blood to clot?

What causes blood to clot?

Fibrinogen



Plasma Proteins

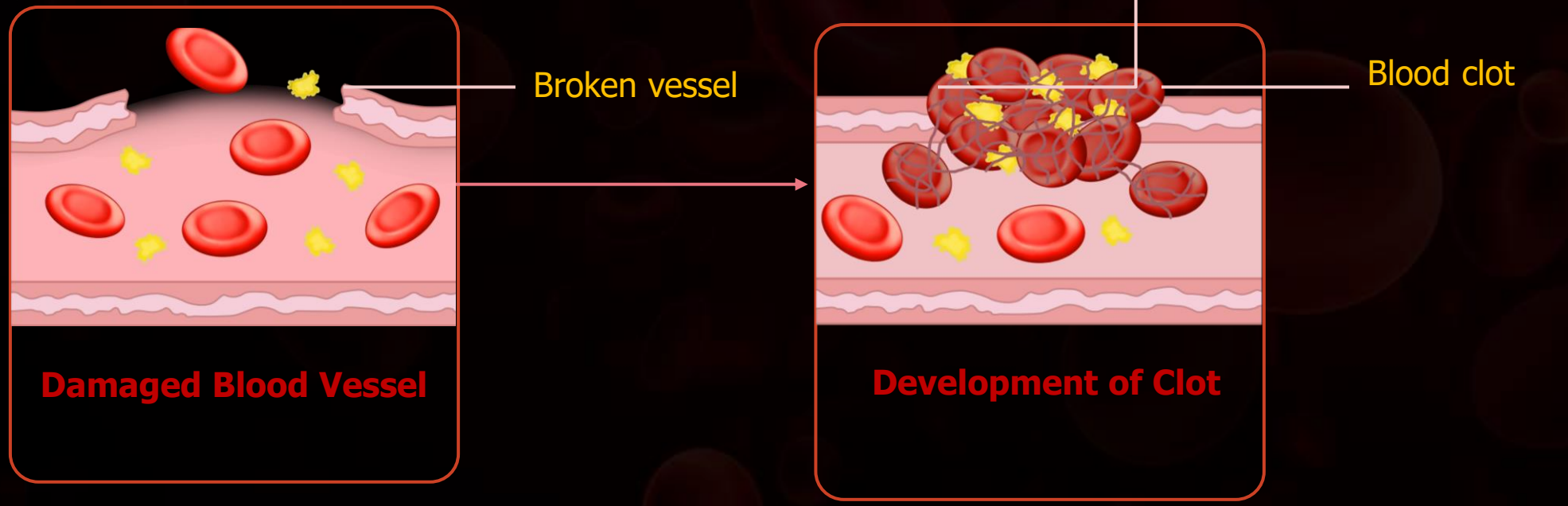
Plasma Proteins

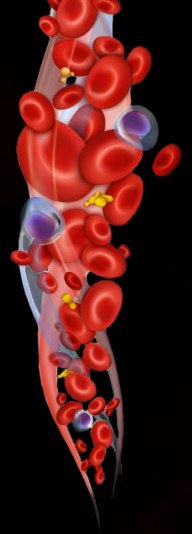
- Albumin
- **Globulins**
- Fibrinogen

- *One of the clotting factors*
- *Required for clotting of blood*
- *Fibrinogen → Insoluble fibrin network*

Plasma Proteins: Fibrinogen

Blocks **blood flow** from damaged vessel





Serum

Plasma − Clotting factors = Serum

Did you know ?

Mosquito feeding blood

Did You Know ?

Female mosquito feeding blood

Question Time !!

_____ protein is needed for blood clotting

a) Albumin

b) Fibrinogen

c) Platelets

d) Immunoglobulin

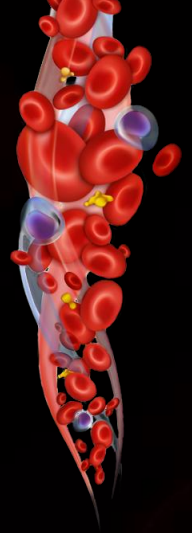
_____ protein is needed for blood clotting

a) Albumin

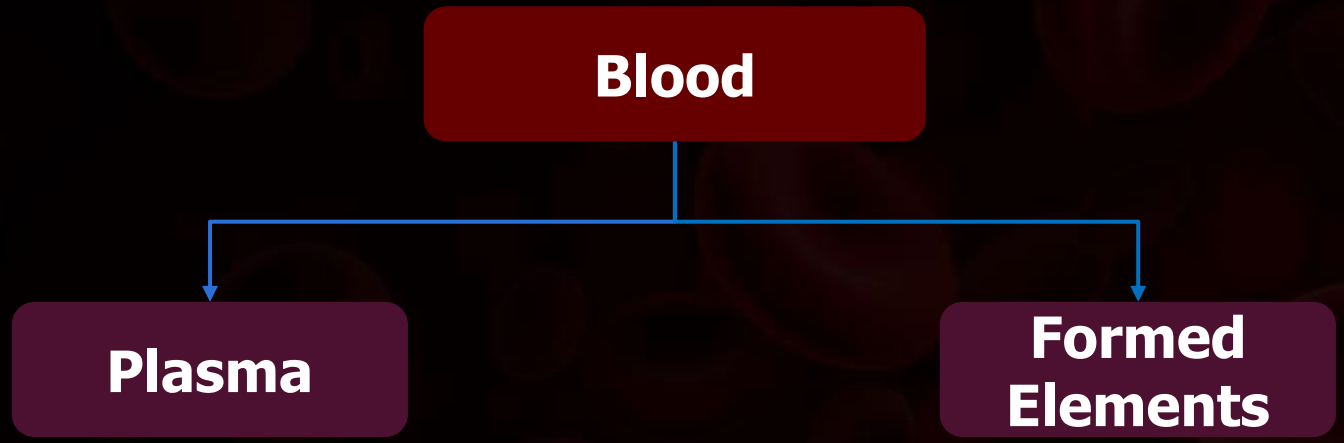
b) Fibrinogen

c) Platelets

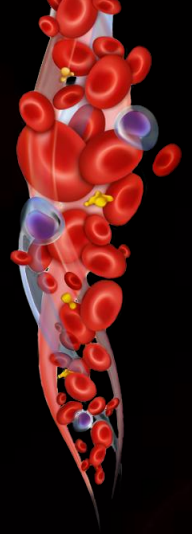
d) Immunoglobulin

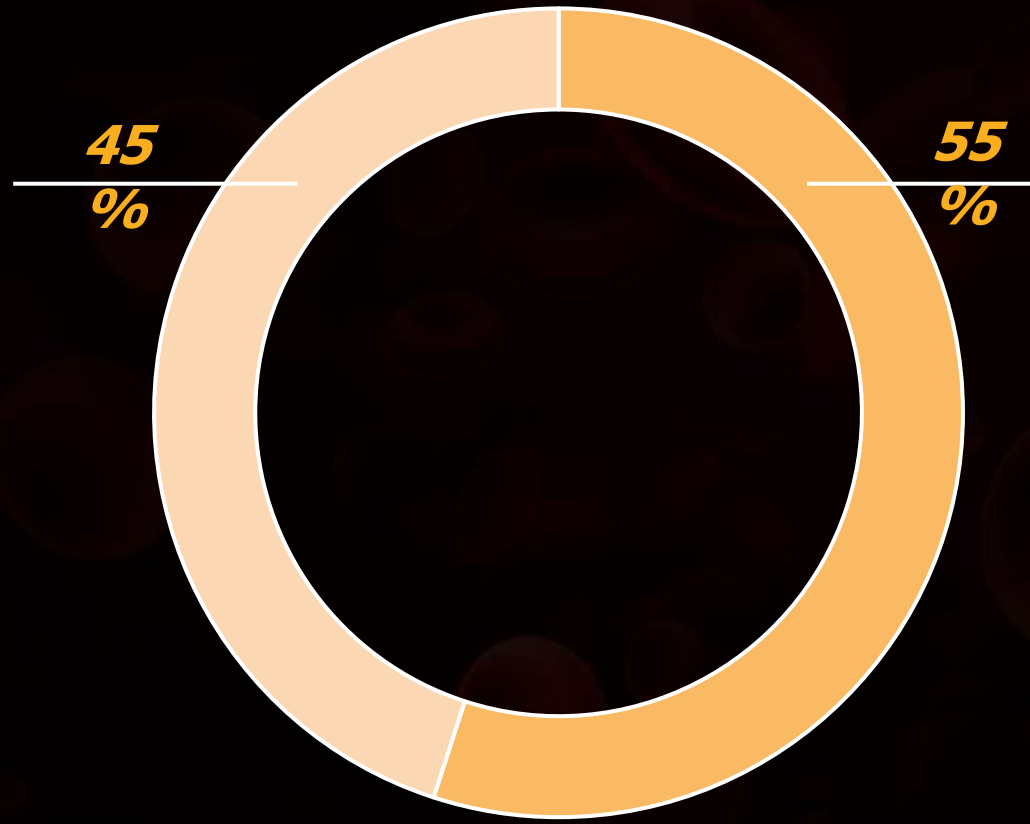


Components of blood

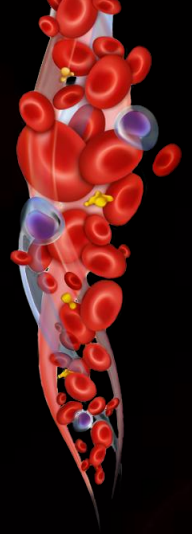


Formed Elements

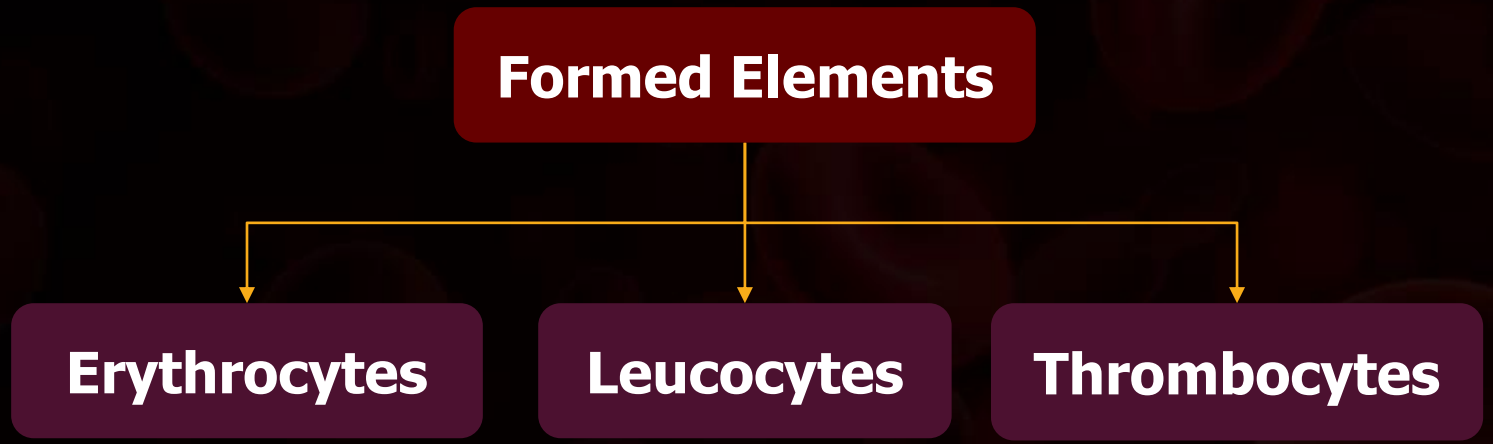


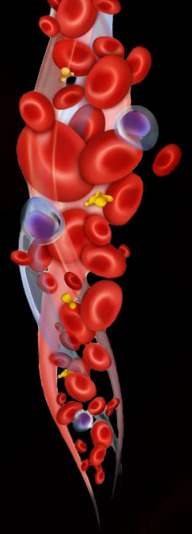


Blood Volume



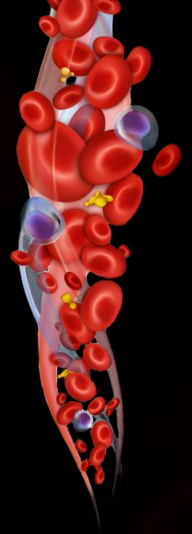
Formed Elements





Formed Elements

- **Formed Elements**
  - **Erythrocytes**
  - **Leucocytes**
  - **Thrombocytes**



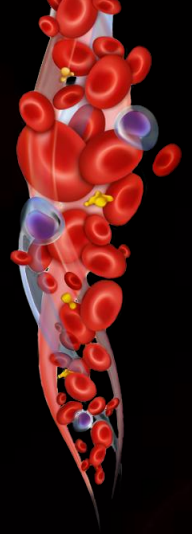
Formed Elements

Formed Elements

- **Erythrocytes**
- Leucocytes
- Thrombocytes

- *Also called Red blood cells (RBCs)*
- *Most abundant cells in blood*
- *5 millions to 5.5 millions of RBCs per microlitre of blood*

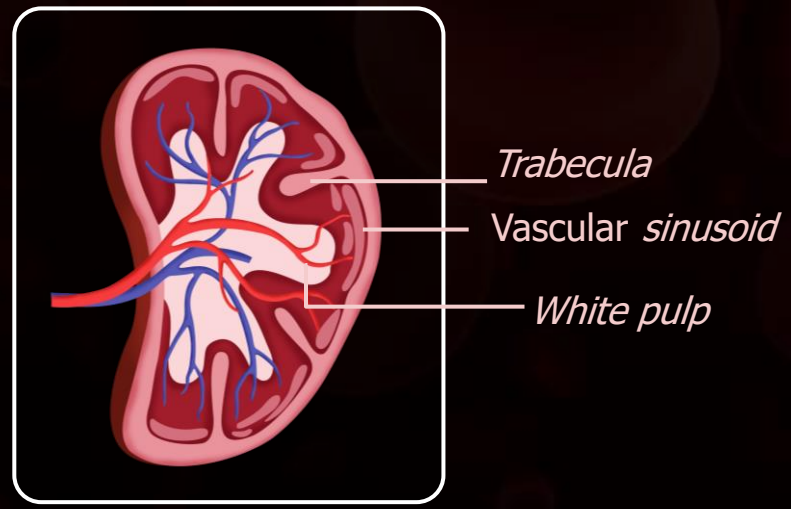
Formed Elements



Formed Elements

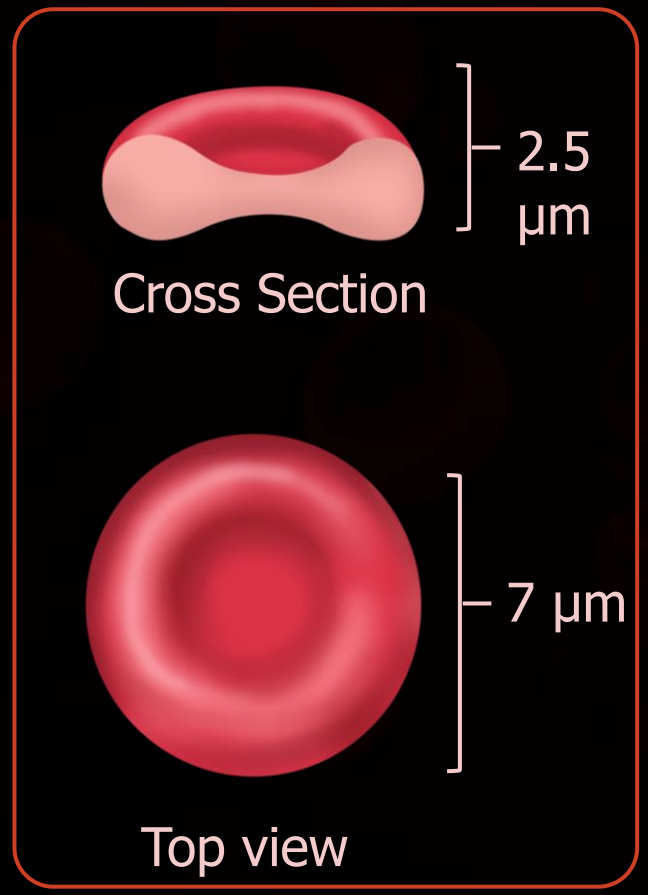
- **Erythrocytes**
- Leucocytes
- Thrombocytes

- *RBCs have life span of 120 days*
- *Spleen - graveyard of RBCs*



Spleen

Formed Elements: Erythrocytes



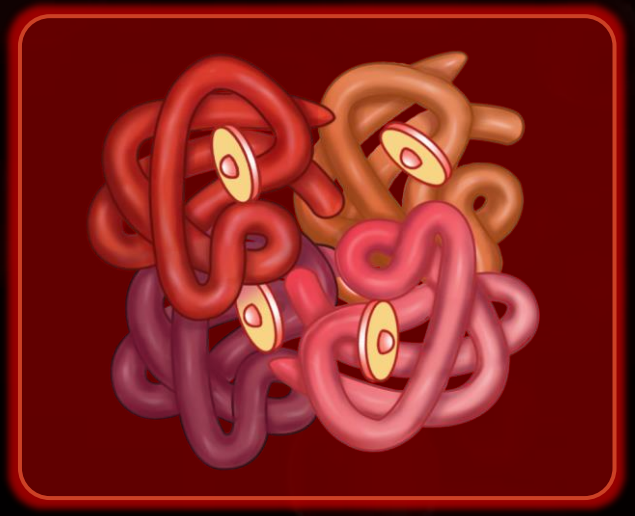
Structure of RBC

- Biconcave shape
- Mammalian RBCs are enucleated (no nucleus)
- Corpuscles - no organelles
- Has haemoglobin

Formed Elements: Erythrocytes

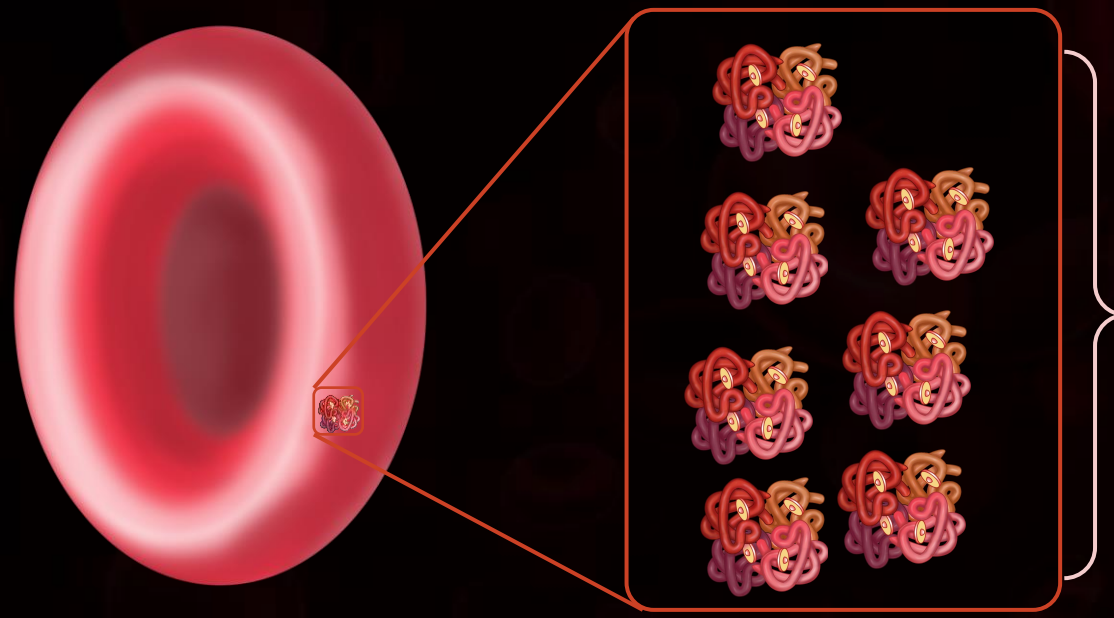
Haemoglobin

- Iron containing protein
- Carries respiratory gases
- 12-16 gm of haemoglobin per 100 ml of blood



Haemoglobin

Formed Elements: Erythrocytes

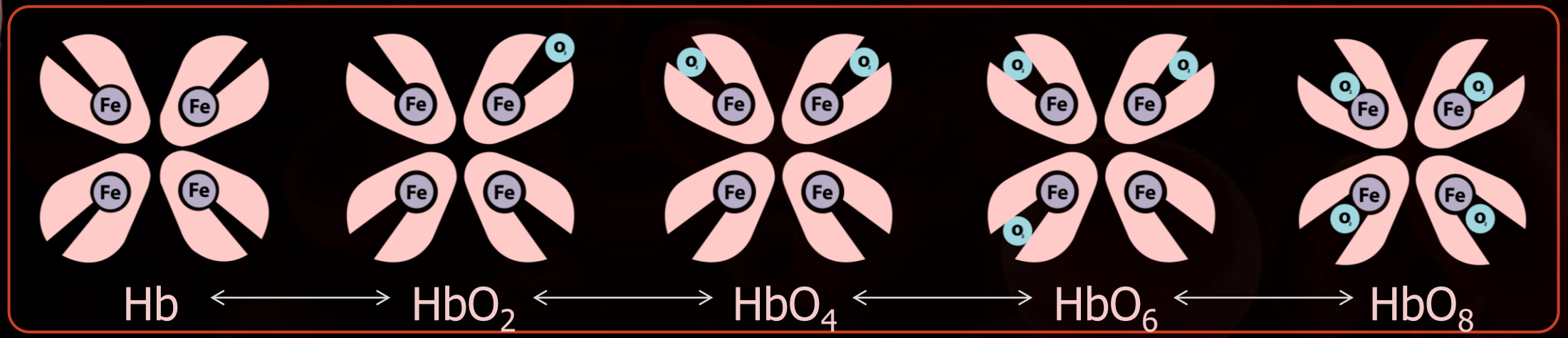


Erythrocytes

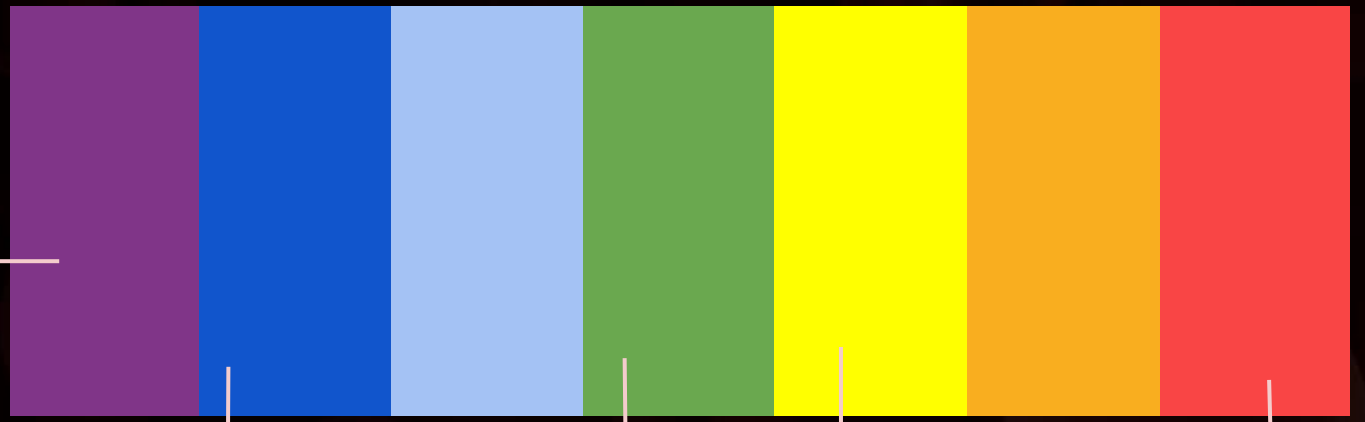
Haemoglobin

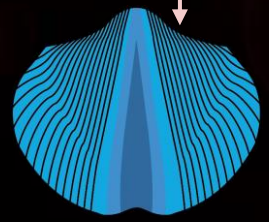
Formed Elements: Erythrocytes

Oxygen binding to Haemoglobin



Did you know ?





Brachiopod

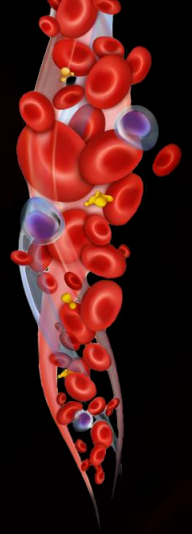
Crustaceans, spiders, octopus, squids

Skink (Lizard)

Insects

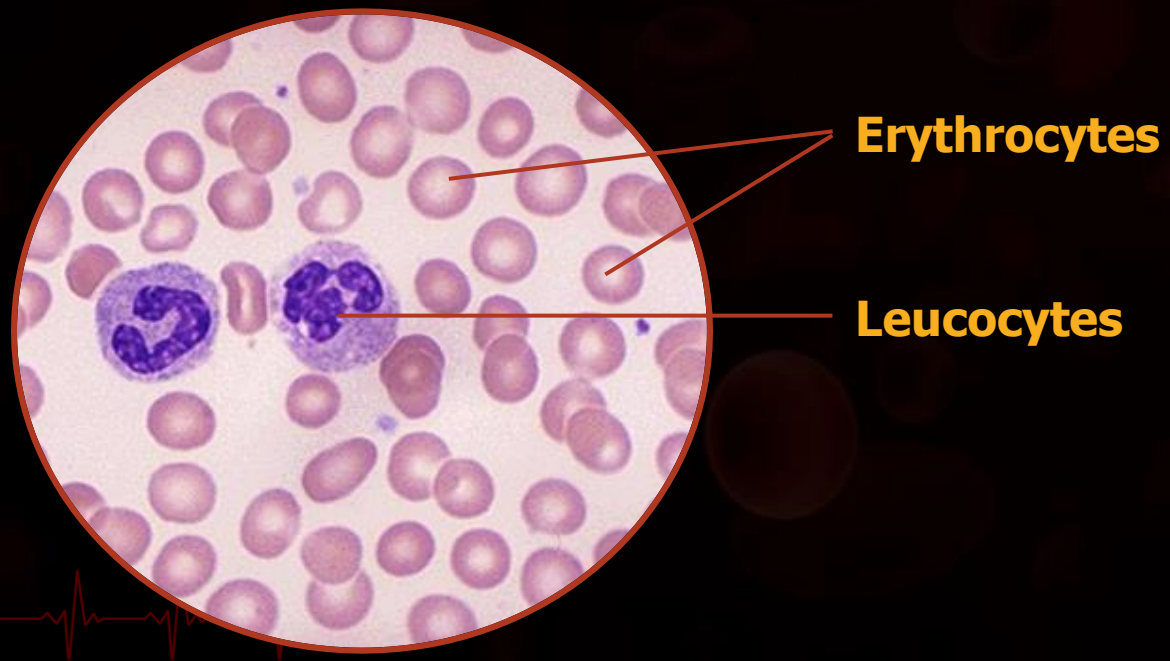
Vertebrates

Formed Elements: Leucocytes

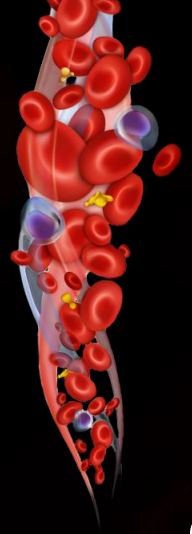


Formed Elements

- Erythrocytes
- **Leucocytes**
- Thrombocytes



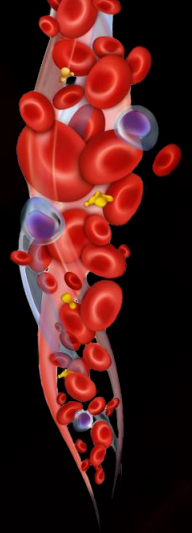
Formed Elements: Erythrocytes



Formed Elements

- Erythrocytes
- **Leucocytes**
- Thrombocytes

- *Colourless cells- White Blood Cells (WBCs)*
- *Lack haemoglobin*
- *Less Abundant; 6000-8000 cells per microlitre of blood*



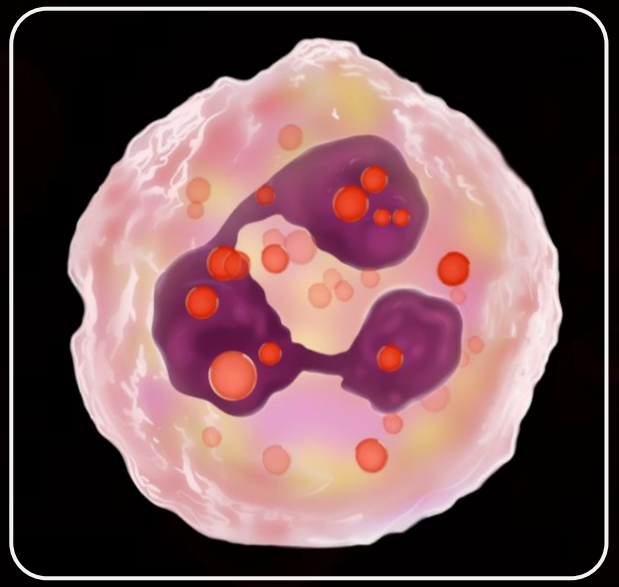
Formed Elements: Leucocytes

Formed Elements

- Erythrocytes
- **Leucocytes**
- Thrombocytes

- *Short lived cells*
- *Protects from infectious microorganisms*

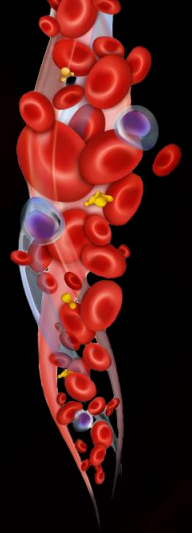
Leucocytes

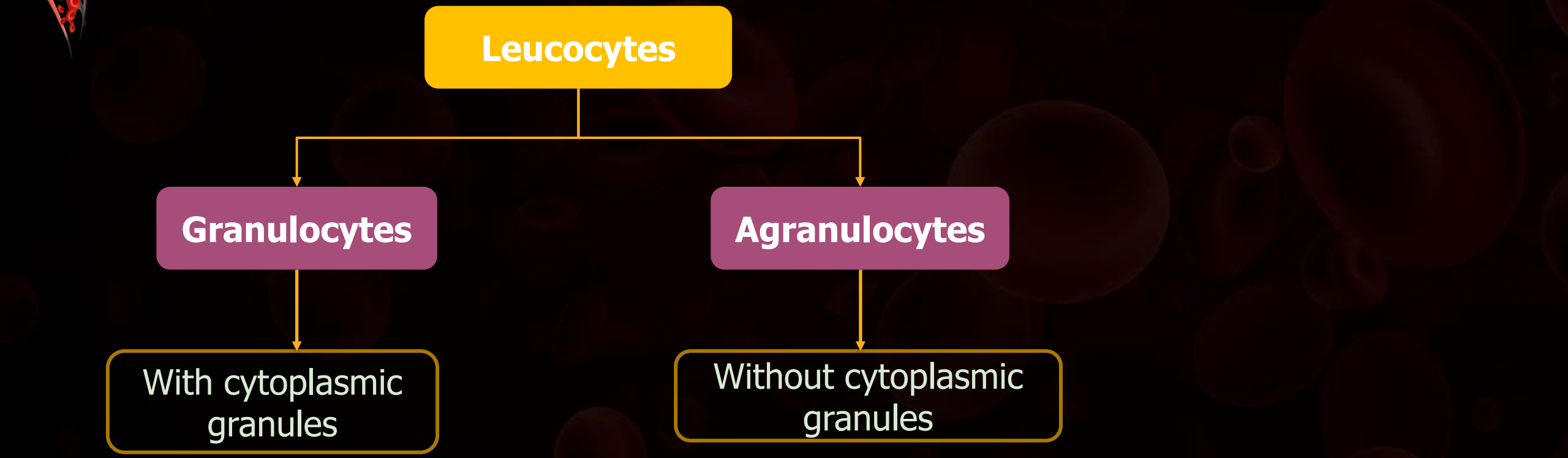


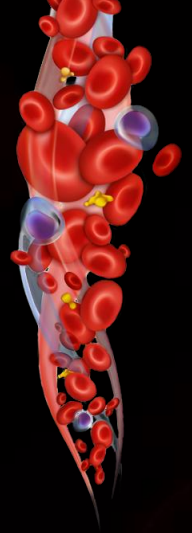
White Blood Cells

- Nucleated
- Roughly spherical

Formed Elements: Leucocytes



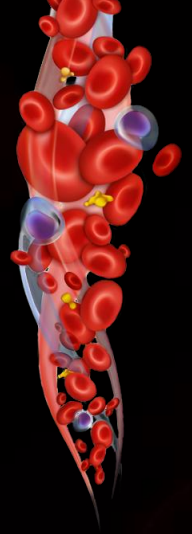




Formed Elements: Leucocytes

Leucocytes

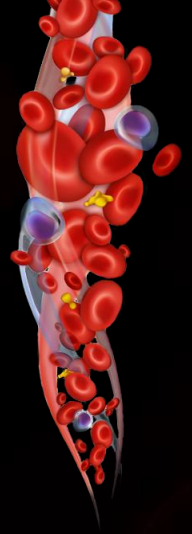
- **Granulocytes**
  - Non-spherical nuclei with lobes
- **Agranulocytes**



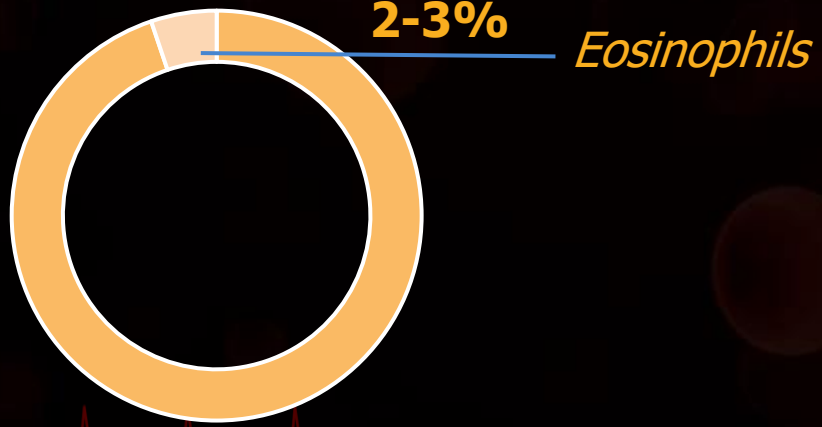
Formed Elements: Leucocytes

- **Leucocytes**
  - **Granulocytes**
    - Eosinophils
    - Basophils
    - Neutrophils
  - **Agranulocytes**

Formed Elements: Leucocytes



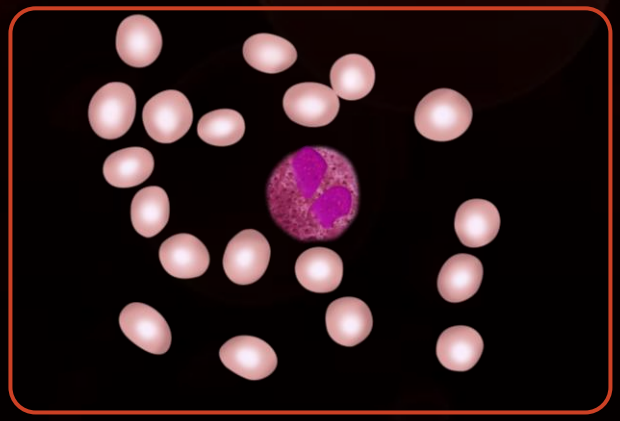
- **Leucocytes**
  - **Granulocytes**
    - **Eosinophils**
    - Basophils
    - Neutrophils
  - **Agranulocytes**



Formed Elements: Leucocytes

- **Leucocytes**
  - **Granulocytes**
    - **Eosinophils**
    - Basophils
    - Neutrophils
  - **Agranulocytes**

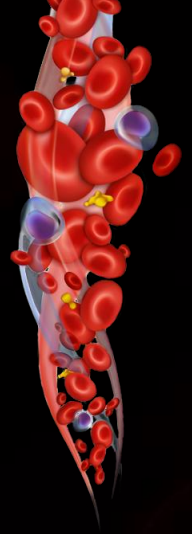
- Eosinophils- 'Acid loving'
- Appear red in colour



Eosinophils

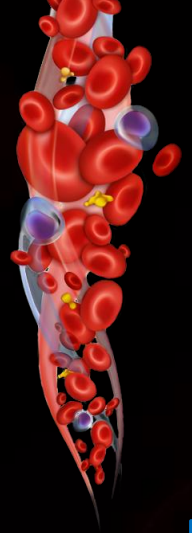
Leucocytes : Eosinophils

- Have role in **stopping allergic reactions**

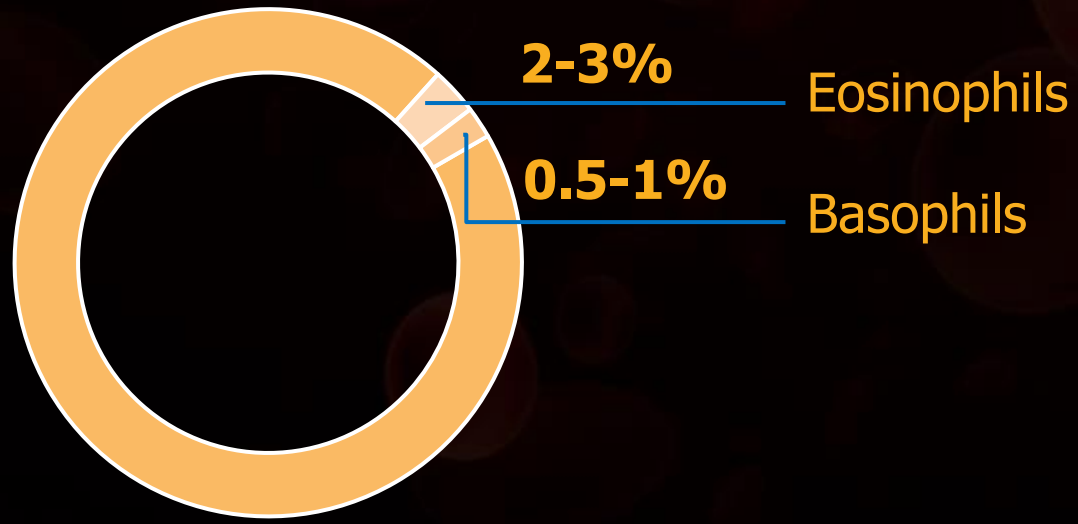


Formed Elements: Leucocytes

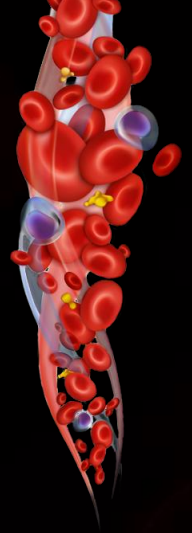
- **Leucocytes**
  - **Granulocytes**
    - Eosinophils
    - **Basophils**
    - Neutrophils
  - **Agranulocytes**



- Leucocytes
  - Granulocytes
    - Eosinophils
    - Basophils
    - Neutrophils
  - Agranulocytes

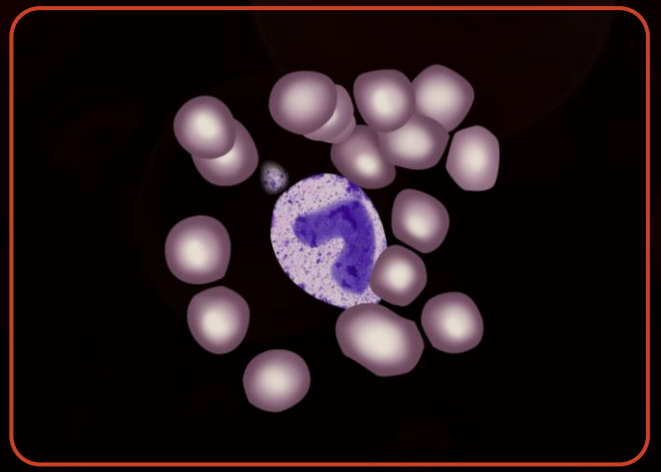


Total WBCs



Leucocytes

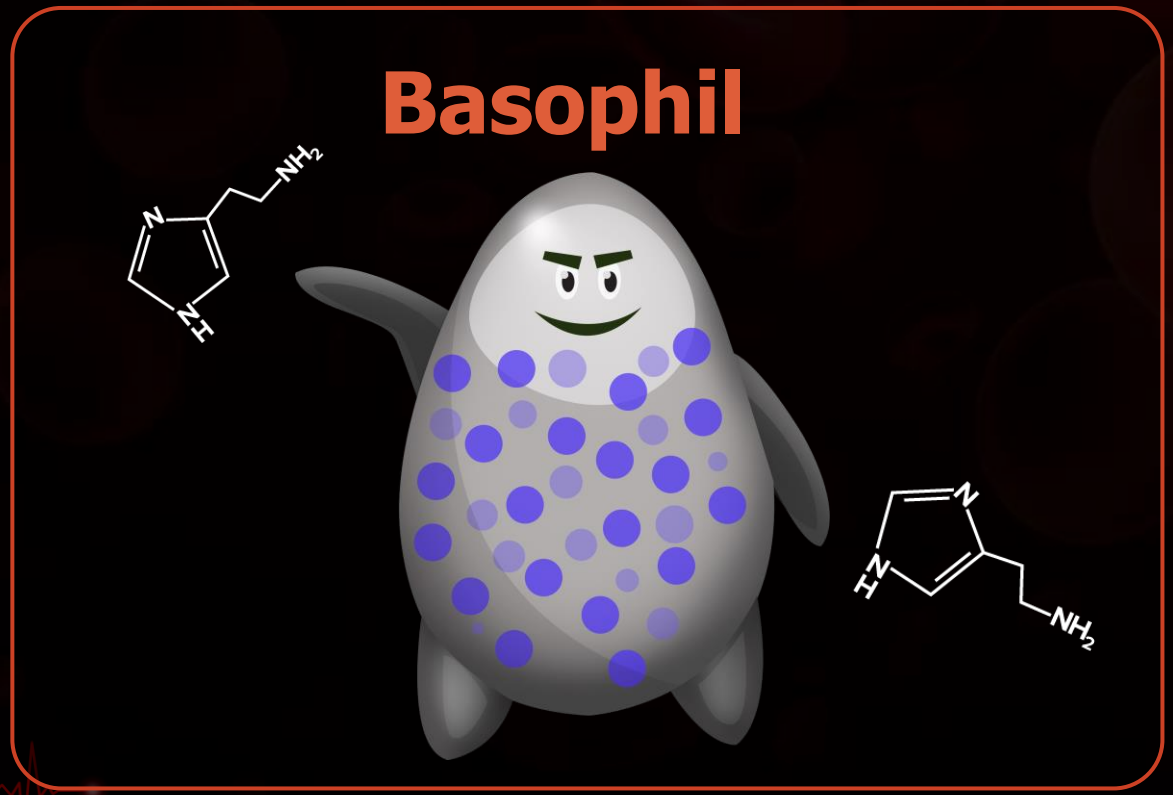
- **Granulocytes**
  - Eosinophils
  - **Basophils**
    - *Basophils -'Base loving'*
    - *Appear blue in colour*
  - Neutrophils
- **Agranulocytes**



Basophils

Leucocytes : Basophils

- Secretes **histamine, heparin, serotonin.**
- Histamine mediates **inflammation;** heparin – natural **anticoagulant**



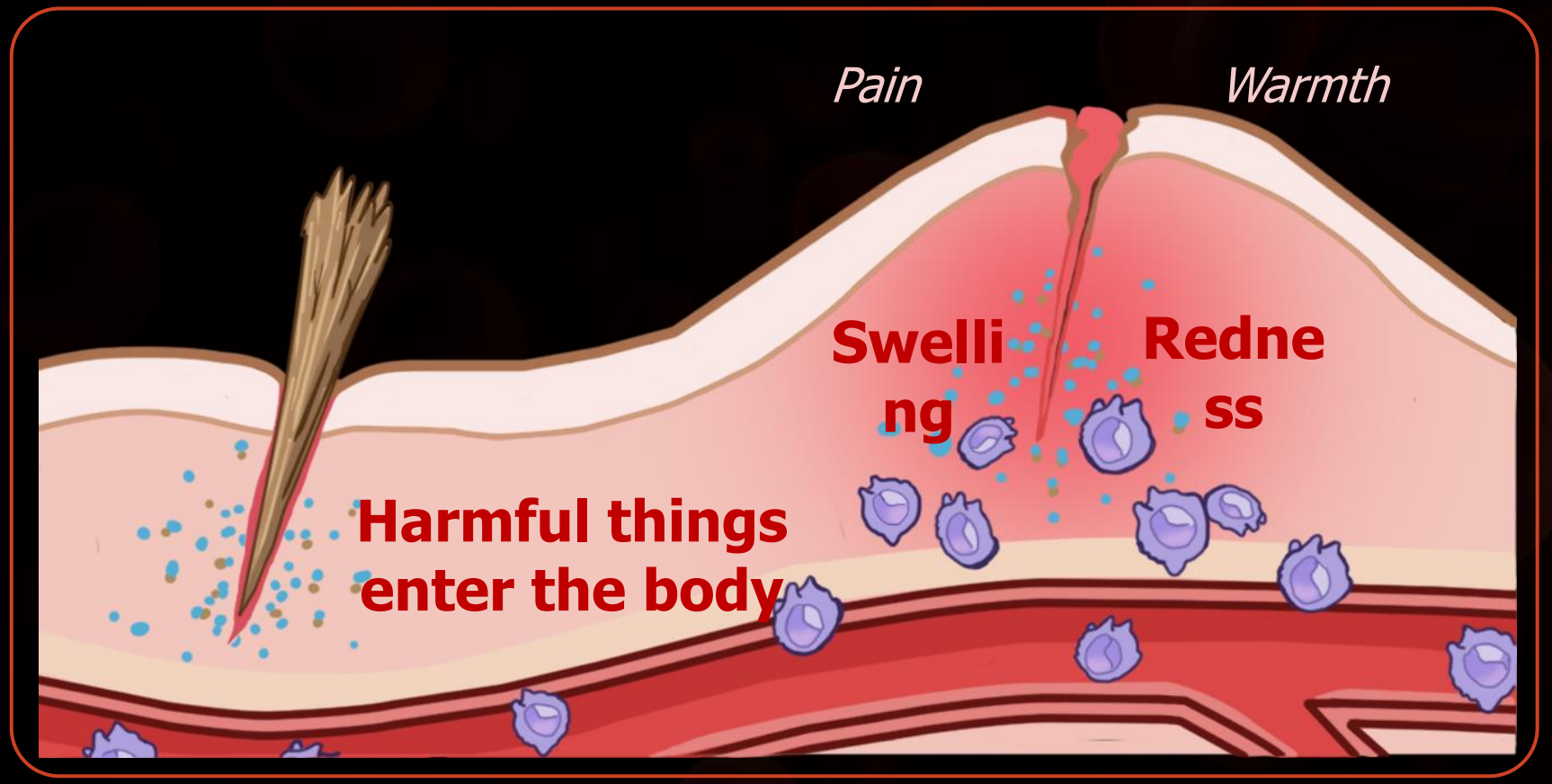
But what is inflammation?

Leucocytes : Basophils

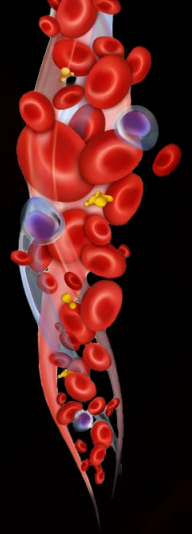
- Swelling
- Redness
- Heat
- Pain

Inflammation

Leucocytes : Basophils

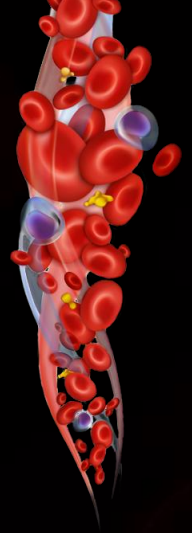


Inflammation

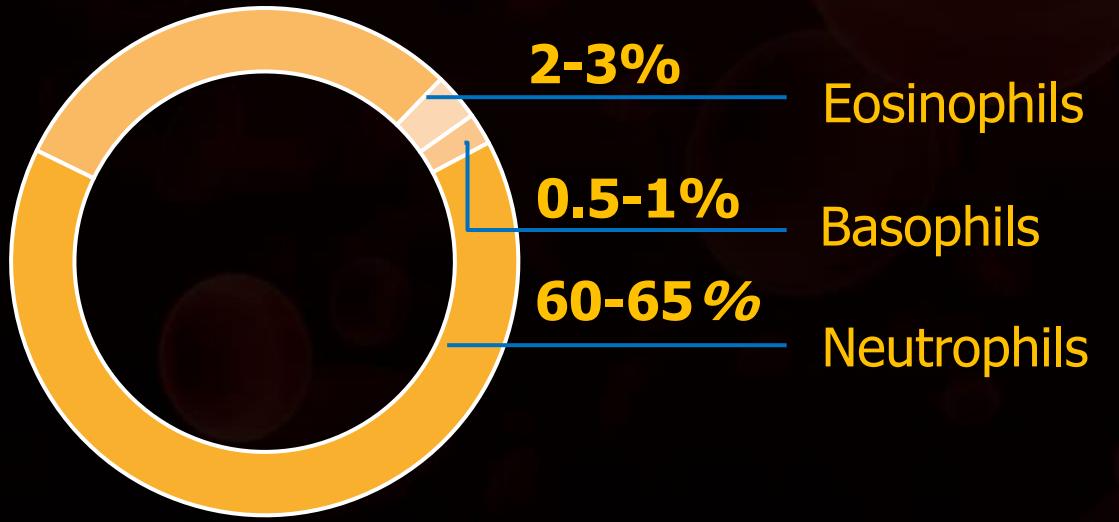


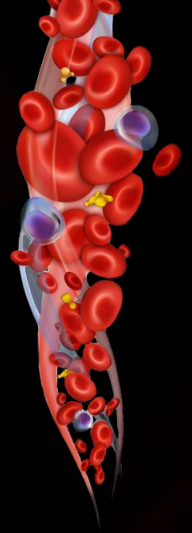
Formed Elements: Leucocytes

- **Leucocytes**
  - **Granulocytes**
    - Eosinophils
    - Basophils
    - **Neutrophils**
  - **Agranulocytes**

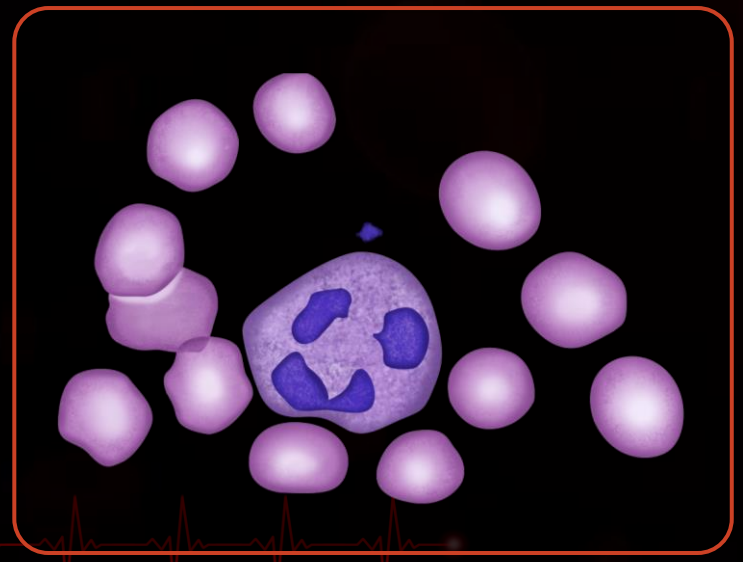


- **Leucocytes**
  - **Granulocytes**
    - Eosinophils
    - Basophils
    - **Neutrophils**
  - **Agranulocytes**





- **Leucocytes**
  - **Granulocytes**
    - Eosinophils
    - Basophils
    - **Neutrophils**
  - **Agranulocytes**

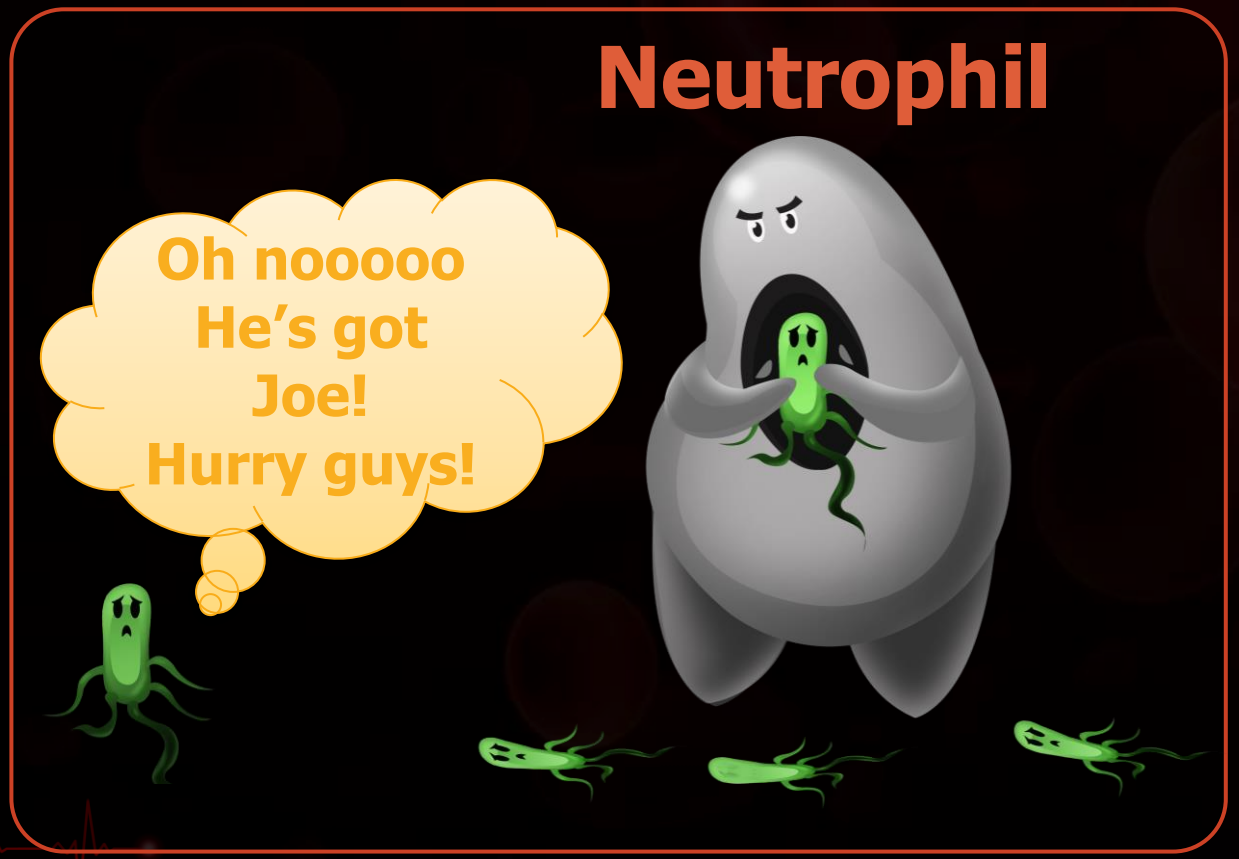


- *Neutrophils- **'Neutral loving'***
- *Appear purple in colour*

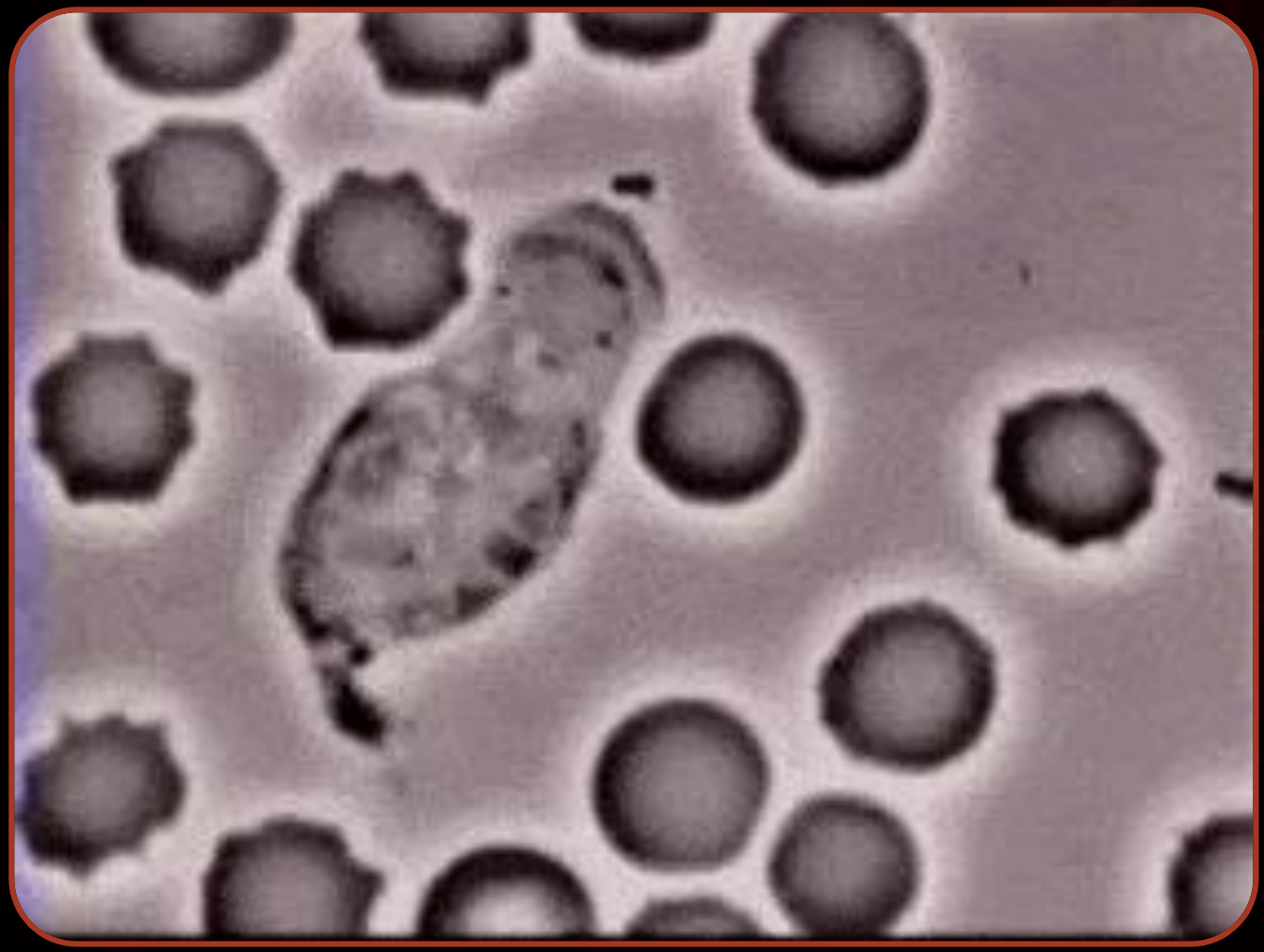
Neutrophils

Leucocytes : Neutrophils

- Neutrophils are **phagocytic cells.**
- They **engulf** foreign organisms



Leucocytes : Neutrophils



Neutrophils

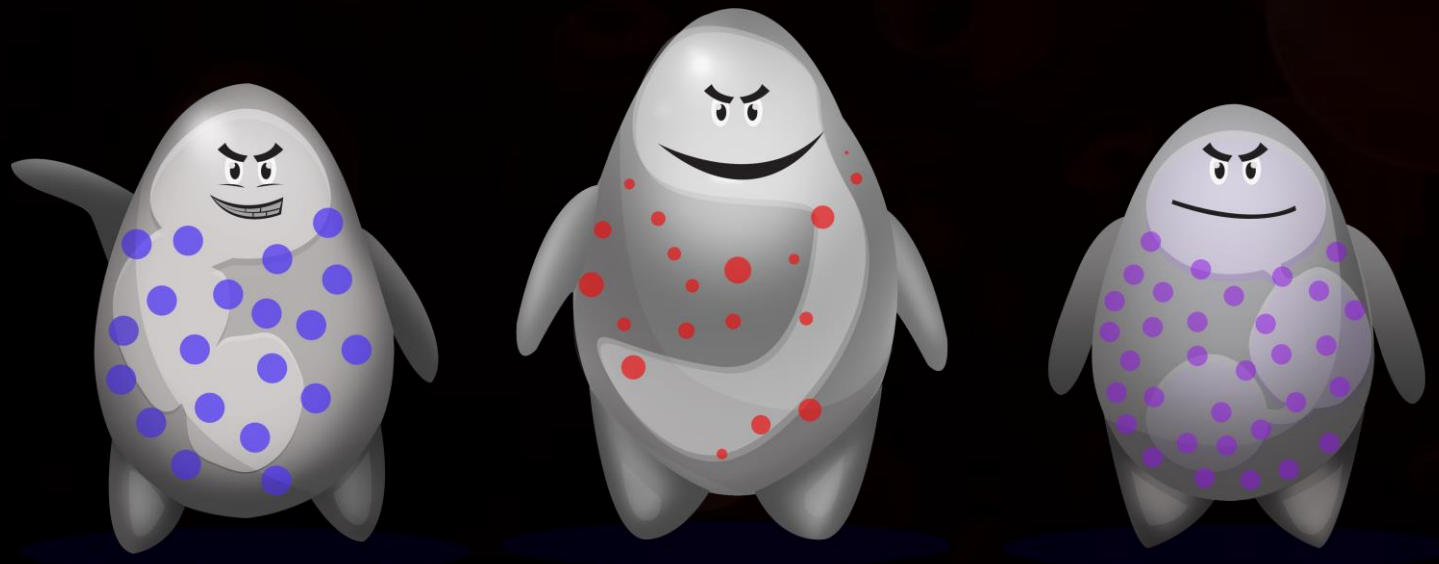
Let's Revise! Granulocytes

The Gran Team

Eosinophil

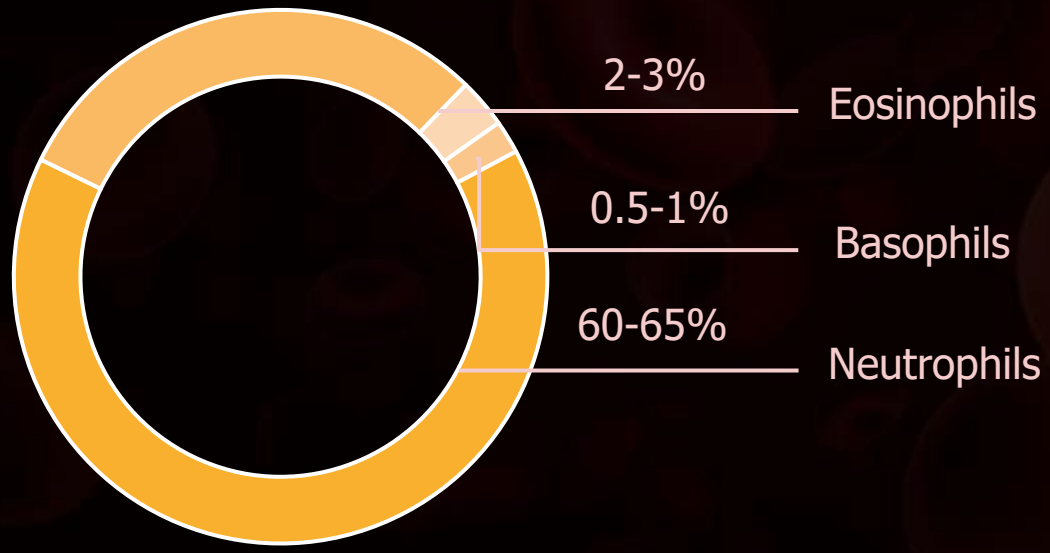
Basophil

Neutrophil



Let's Revise! Granulocytes

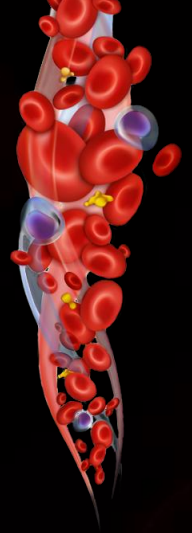
Neutrophils	Basophils	Eosinophils

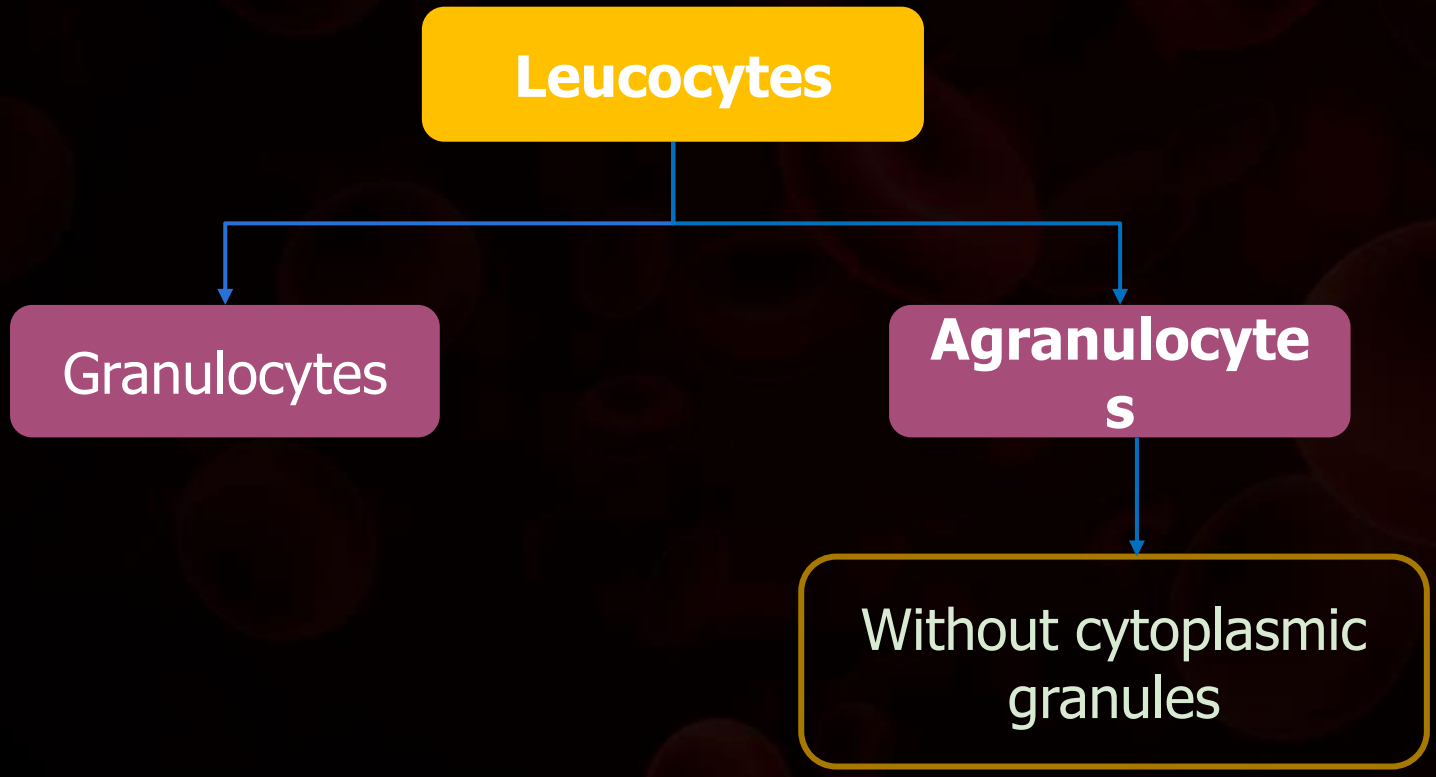


Let's Revise! Granulocytes

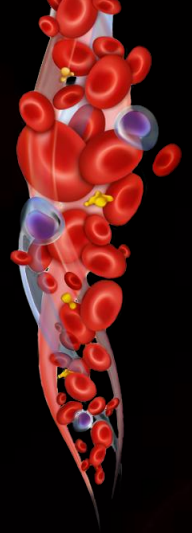
Neutrophils	Basophils	Eosinophils
Cells take up red and blue stains equally	Cells take up basic blue stains	Cells take up acidic red stains
Appear purple in colour	Appear blue in colour	Appear red in colour
Function: Phagocytosis	Function: Mediates inflammation	Function: Stop allergy

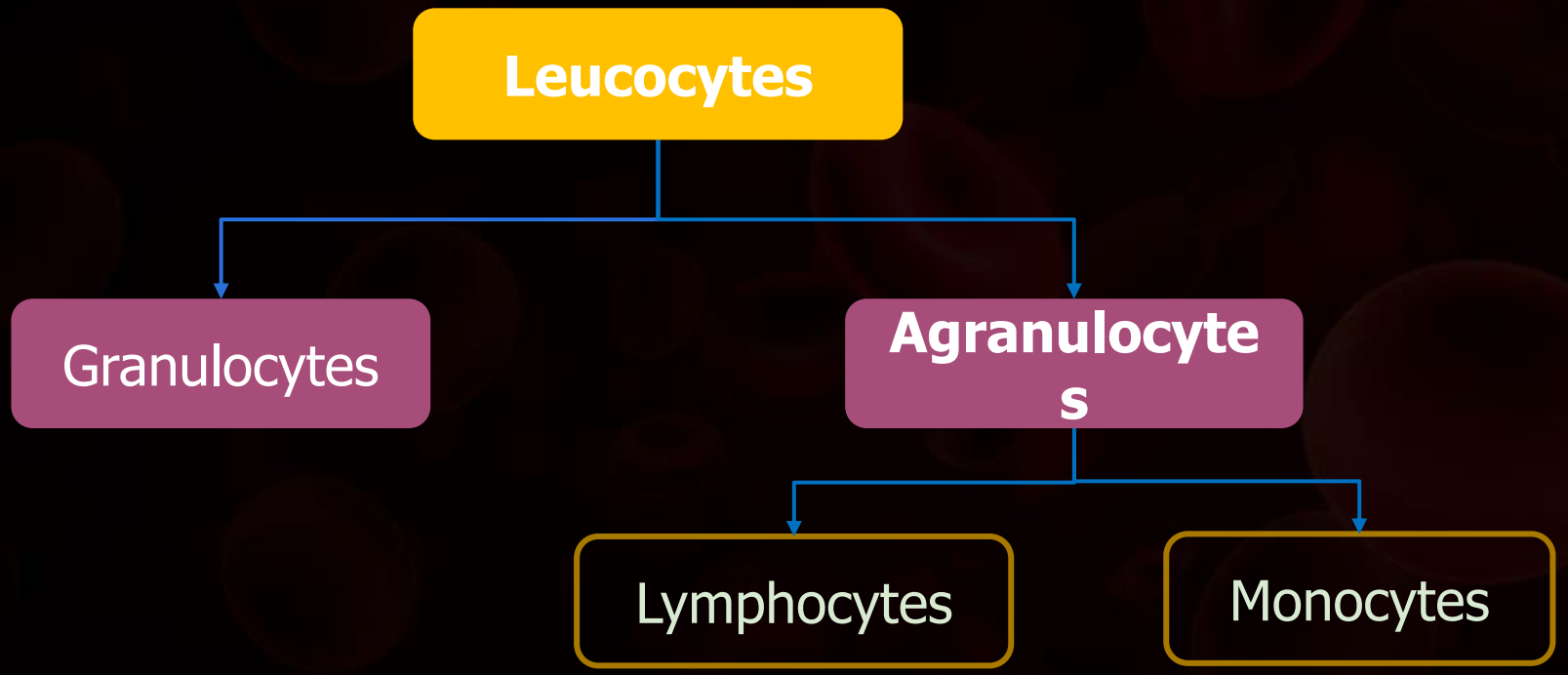
Formed Elements: Leucocytes



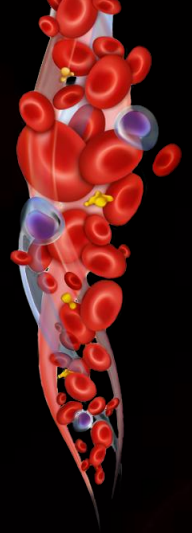


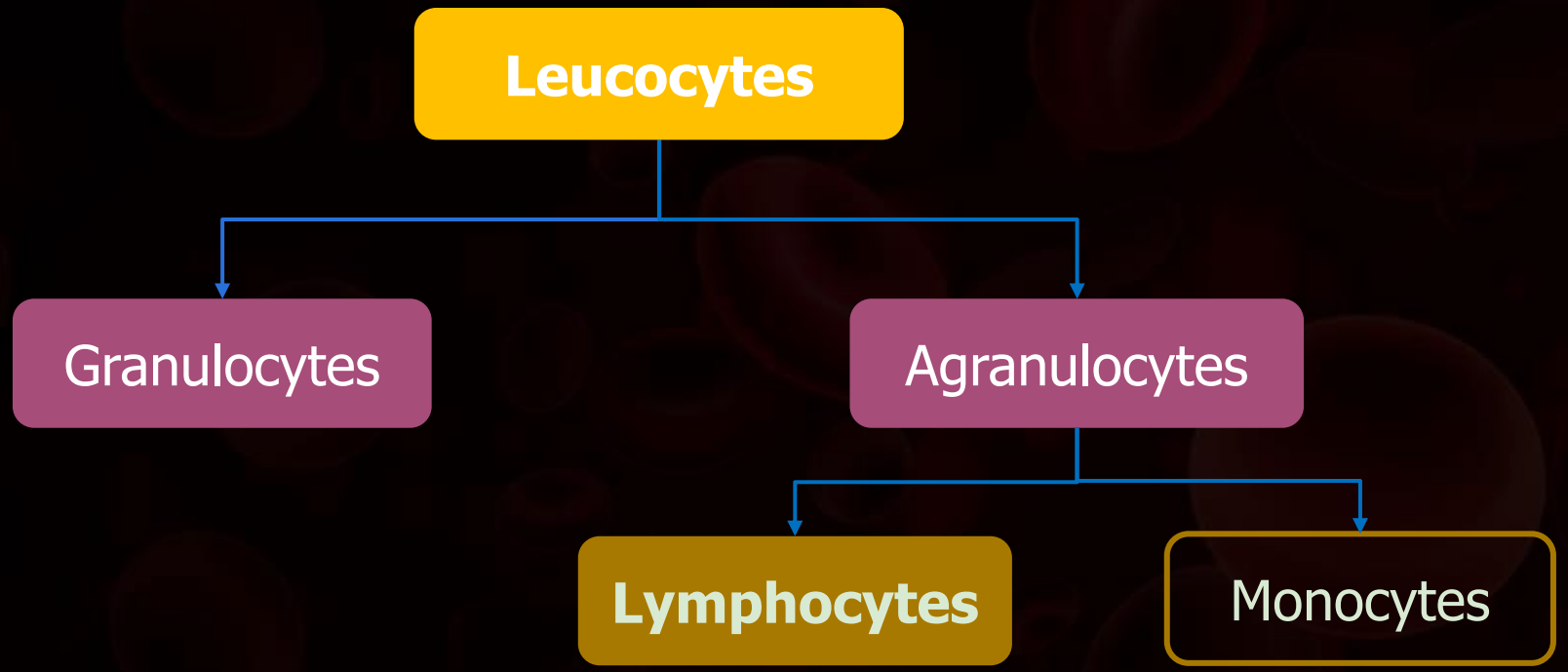
Formed Elements: Leucocytes



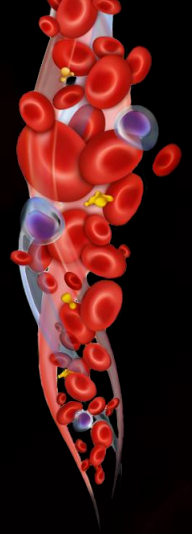


Formed Elements: Leucocytes

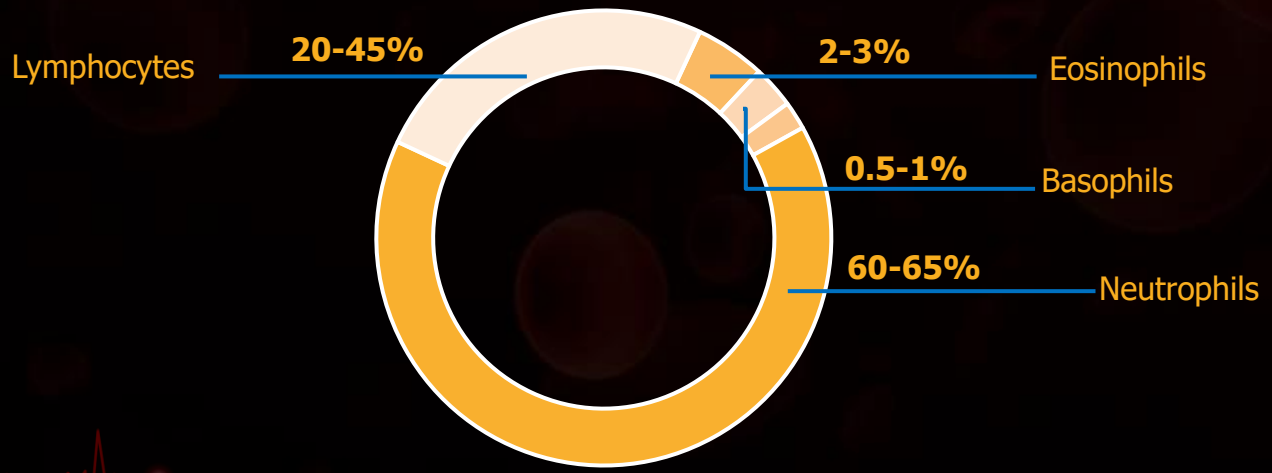




Formed Elements: Leucocytes

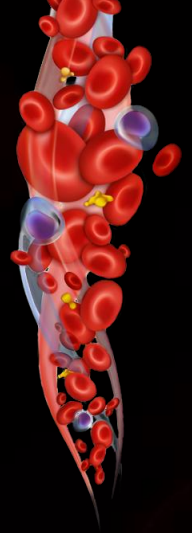


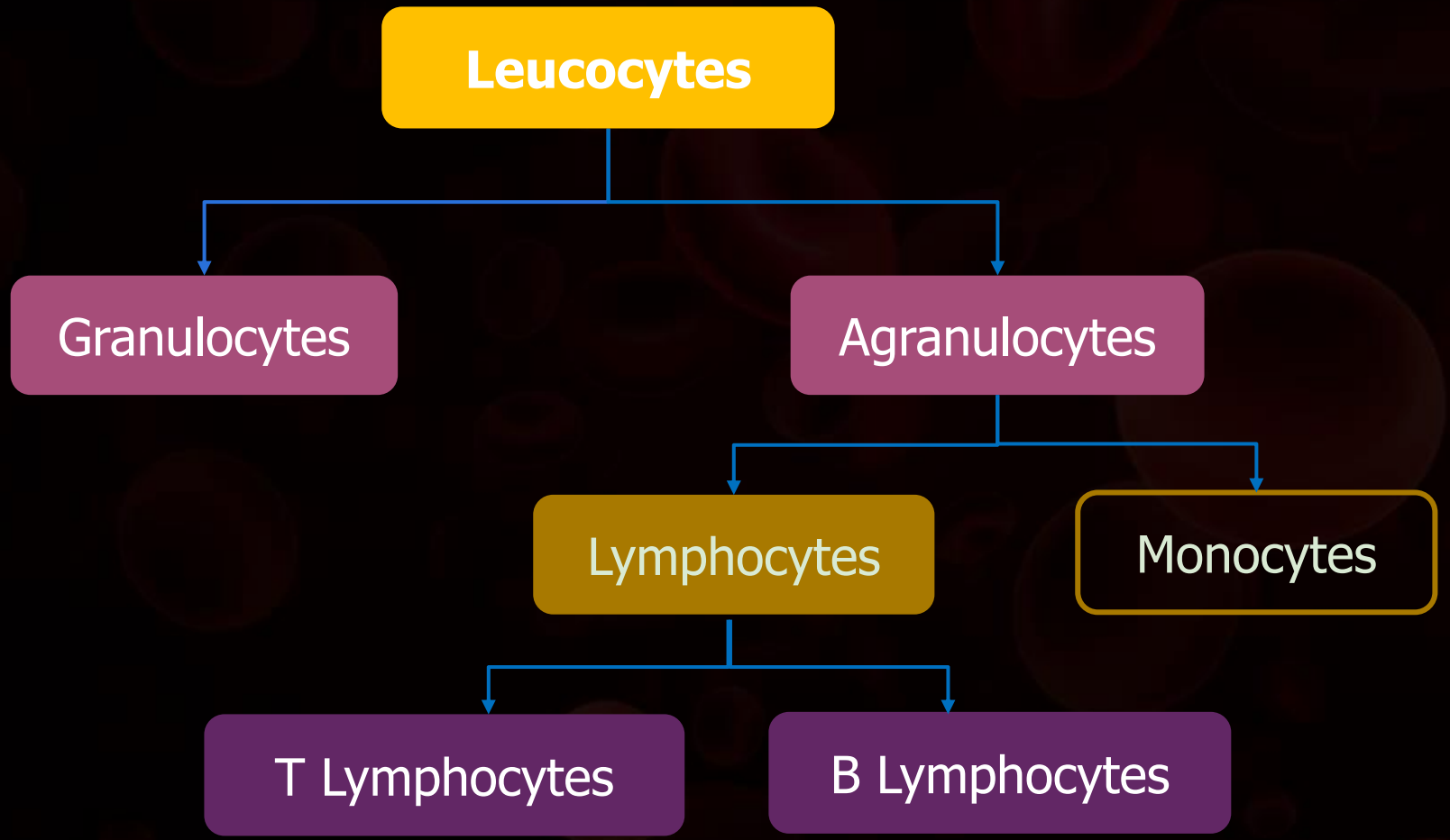
- **Leucocytes**
  - **Granulocytes**
  - **Agranulocytes**
    - **Lymphocytes**
    - **Monocytes**



Total WBCs

Formed Elements: Leucocytes





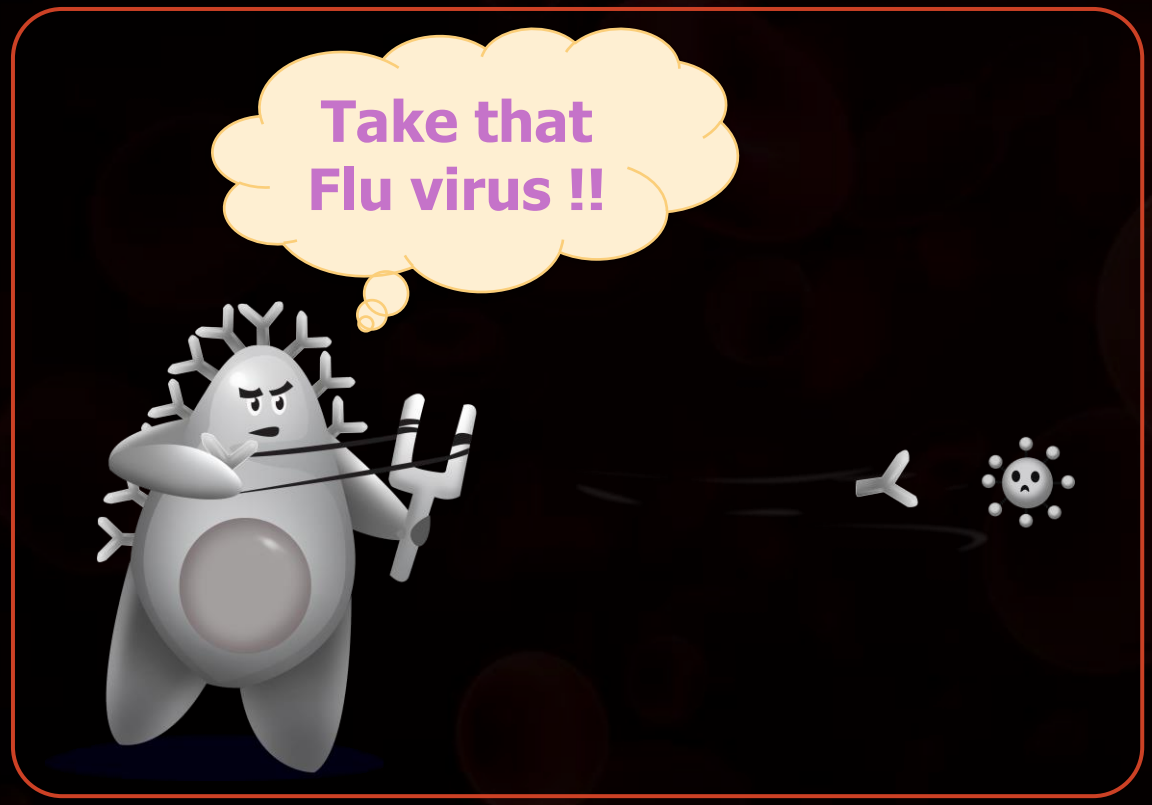
Leucocytes : T Lymphocytes

- Matures inside thymus gland, hence T lymphocytes
- Recognise infected cells

T Lymphocytes

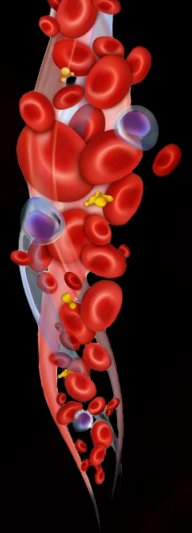
Leucocytes : B Lymphocytes

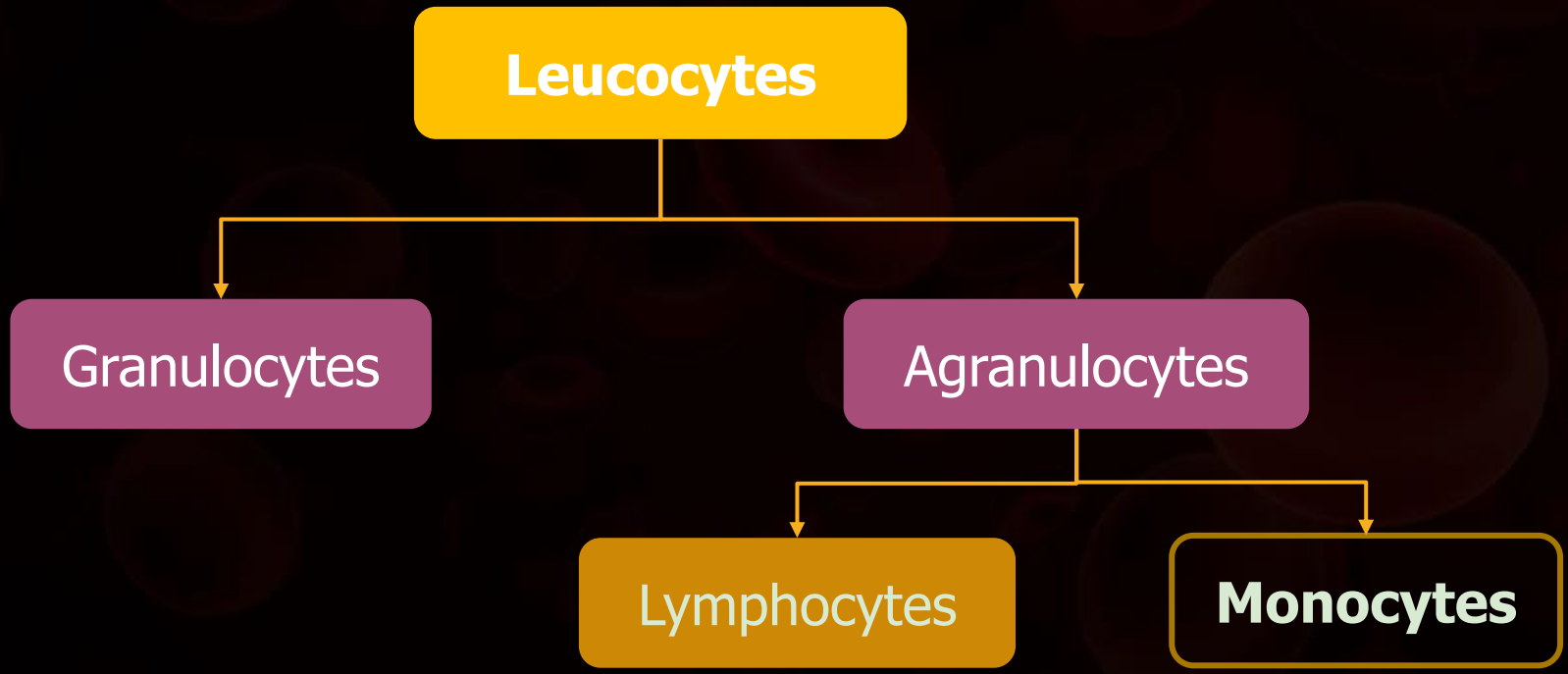
- Matures inside **bone marrow**, hence **B** lymphocytes
- B cells release **antibodies**



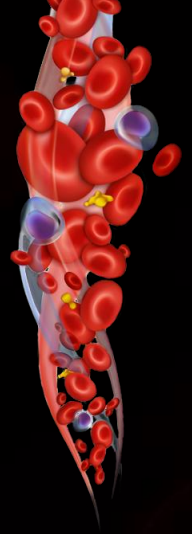
B Lymphocytes

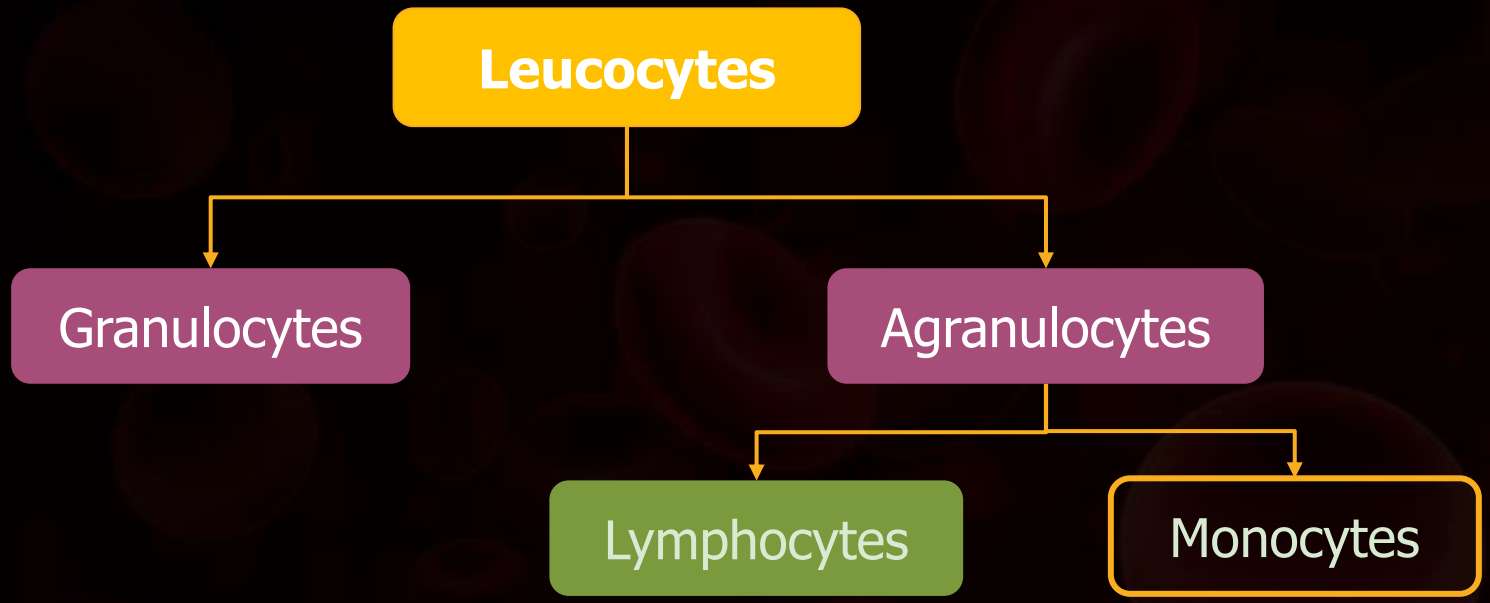
Formed Elements: Leucocytes

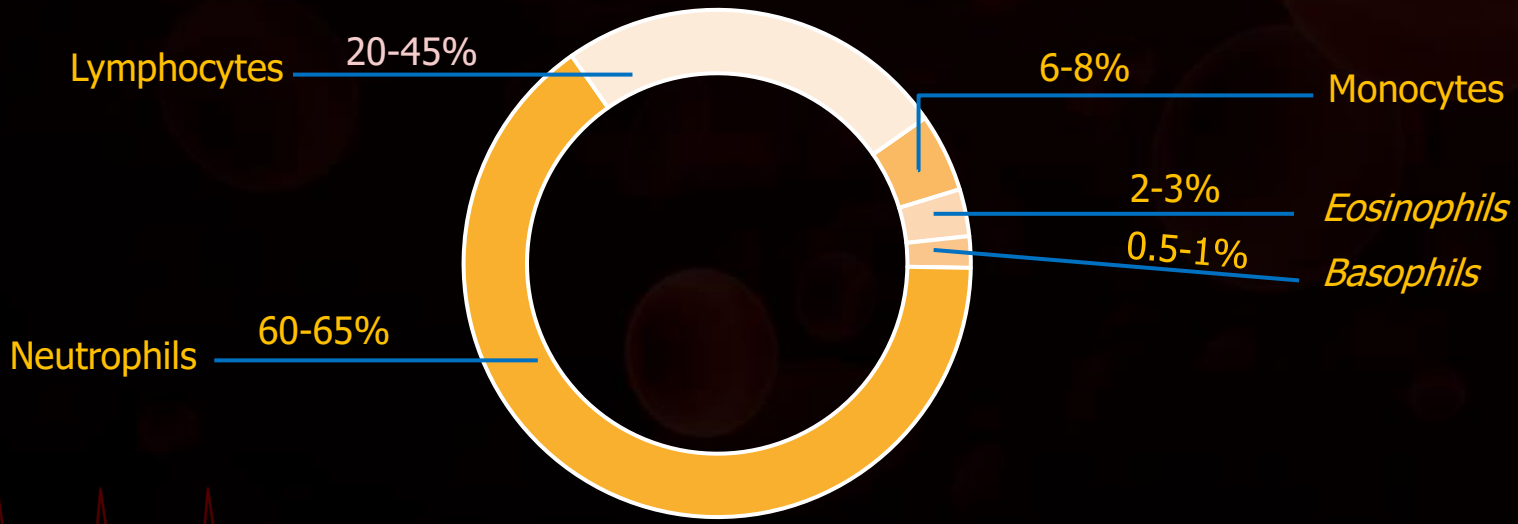




Formed Elements: Leucocytes







Total WBCs

Formed Elements: Leucocytes

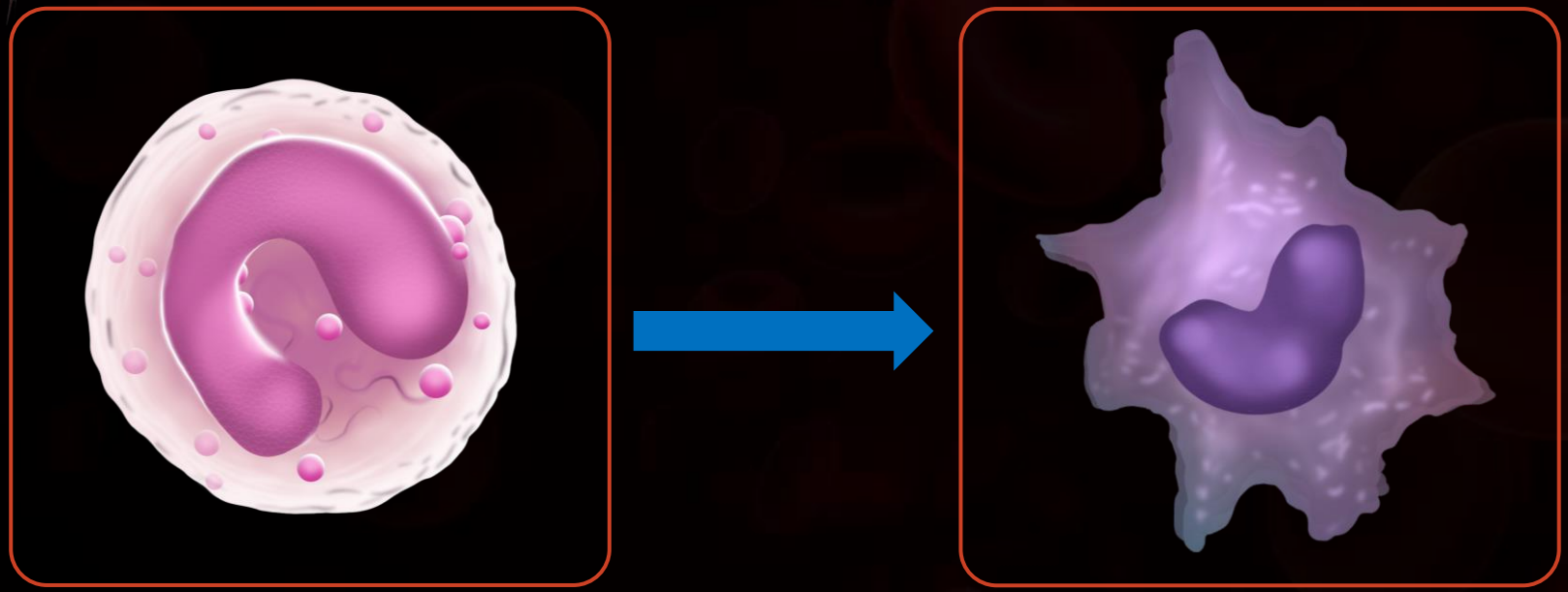
- **Leucocytes**
  - Granulocytes
  - Agranulocytes
    - Lymphocytes
    - **Monocytes**

Monocytes

Horse shoe

Leucocytes : Monocytes

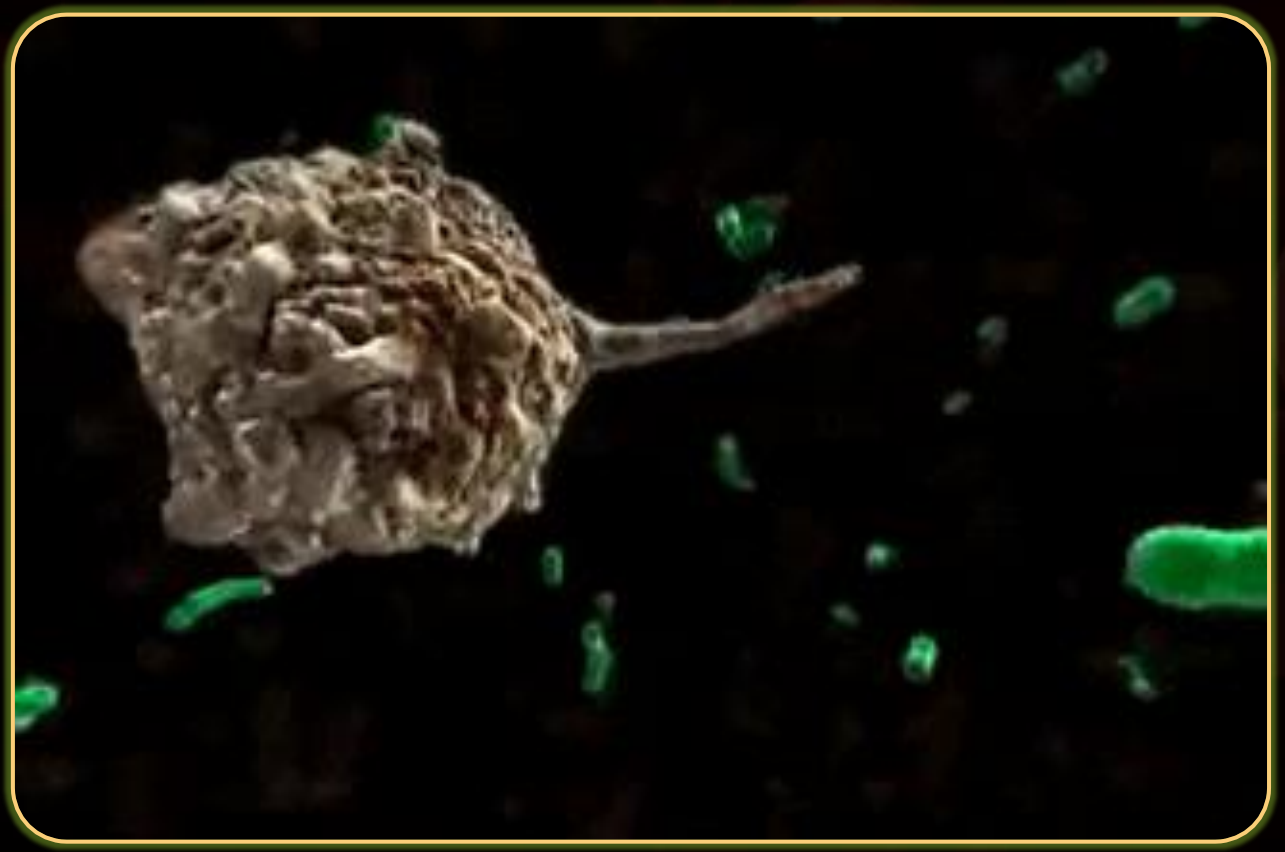
- Monocytes transform into **macrophages**



Monocytes **Macrophages**

Leucocytes : Macrophages

- Macrophages are **phagocytic cells**



Macrophages

Revise! Leucocytes

- White Blood Cells
  - Granulocytes
    - Eosinophils
    - Basophils
    - Neutrophils
  - Agranulocytes
    - Lymphocytes
      - T Lymphocytes
      - B Lymphocytes
    - Monocytes

Question Time !!

Cells that release antibodies are

a) Monocytes

b) T Lymphocytes

c) Macrophages

d) B Lymphocytes

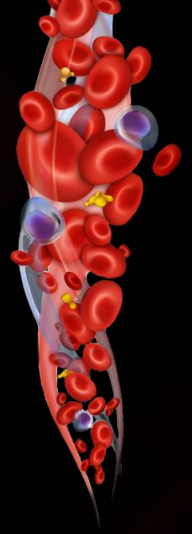
Cells that release antibodies are

a) Monocytes

b) T Lymphocytes

c) Macrophages

d) B Lymphocytes



Formed Elements: Thrombocytes

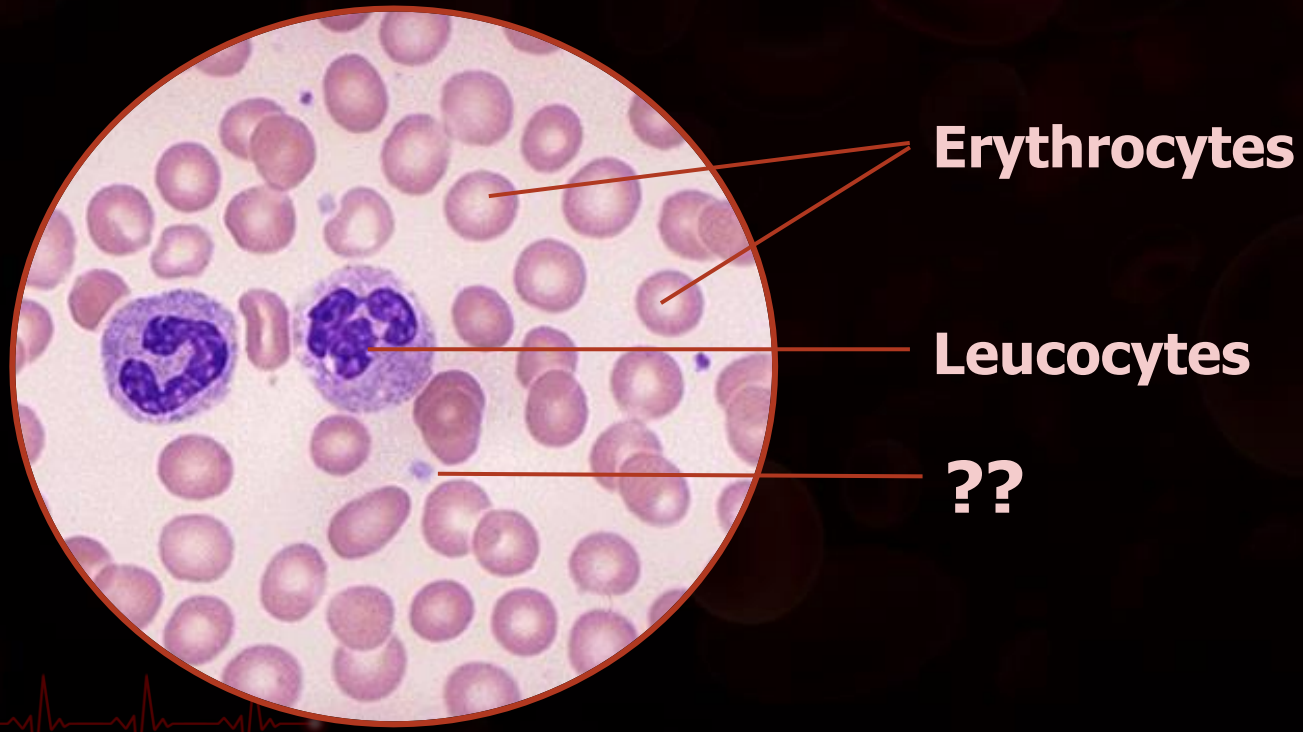
Formed Elements

- Erythrocytes
- Leucocytes
- **Thrombocytes**

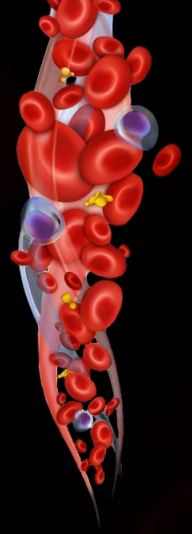
Formed Elements: Thrombocytes

Formed Elements

- Erythrocytes
- Leucocytes
- **Thrombocytes**

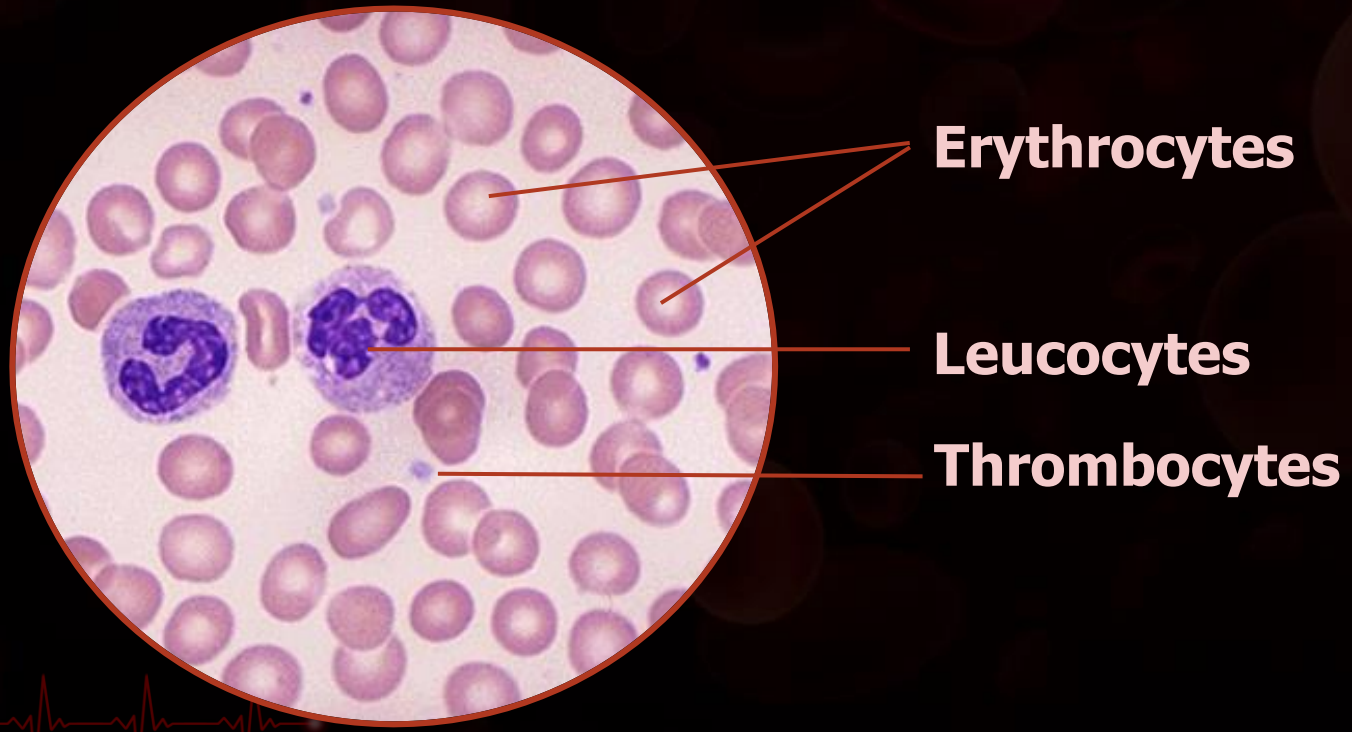


Formed Elements: Thrombocytes



Formed Elements

- Erythrocytes
- Leucocytes
- **Thrombocytes**



Formed Elements: Thrombocytes

Formed Elements

- Erythrocytes
- Leucocytes
- **Thrombocytes**

Thrombocytes

- *Thrombo – 'clotting'; cytes – 'cells'*
- *Also called platelets*
- *1,500,00-3,500,00 of platelets per microlitre of blood.*

Formed Elements : Thrombocytes

- Functions: **Blood clotting**
- Release **'thromboplastin'** – initiates clotting

Blood Clot

Fibrin

Platelets

Blood Cells

Keep Learning..!