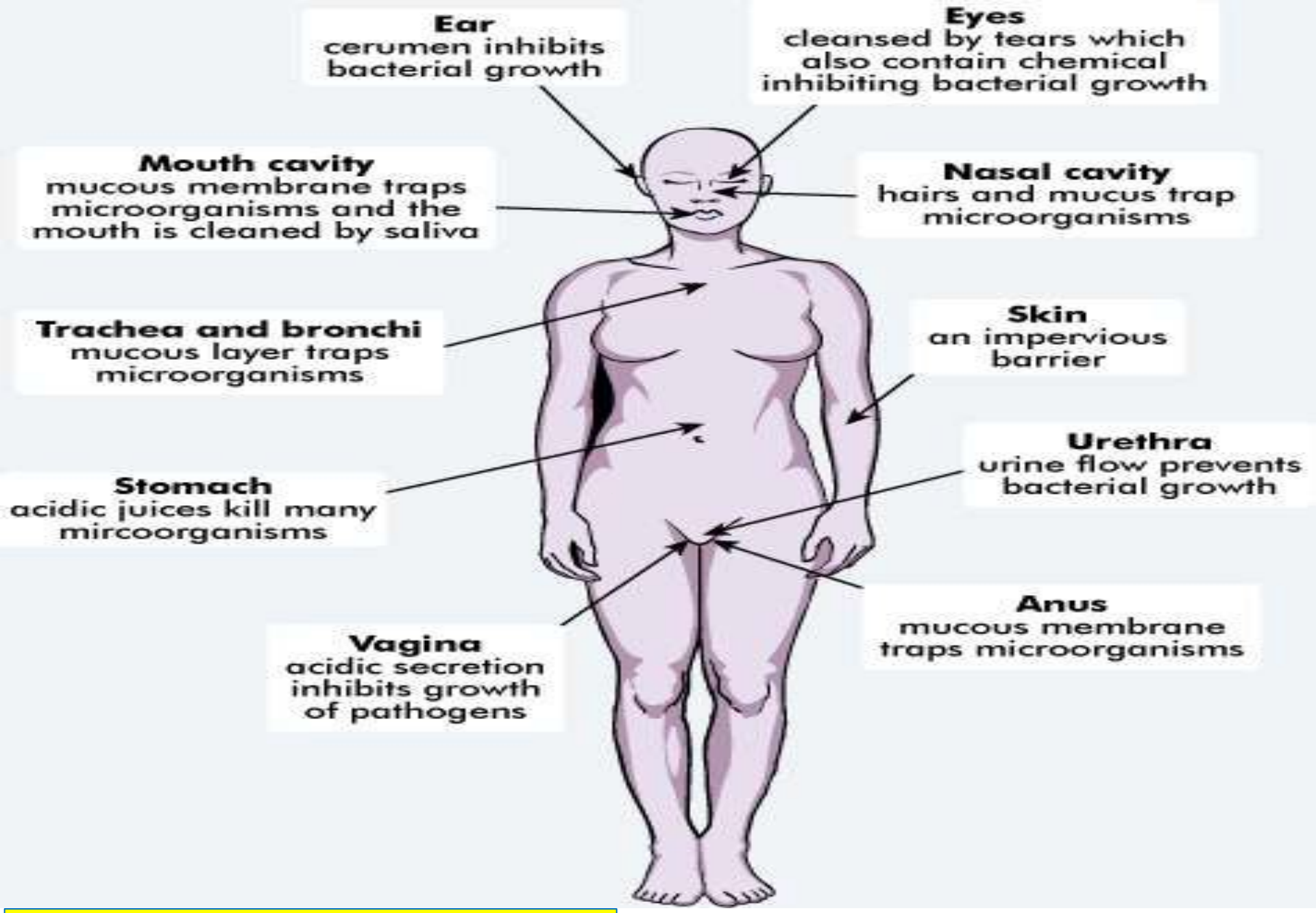
كل عام وانتم بخير

أطيب التمنيات بالتوفيق والتفوق

إن شاء الله

By Prof. Dr. GAMAL FADL



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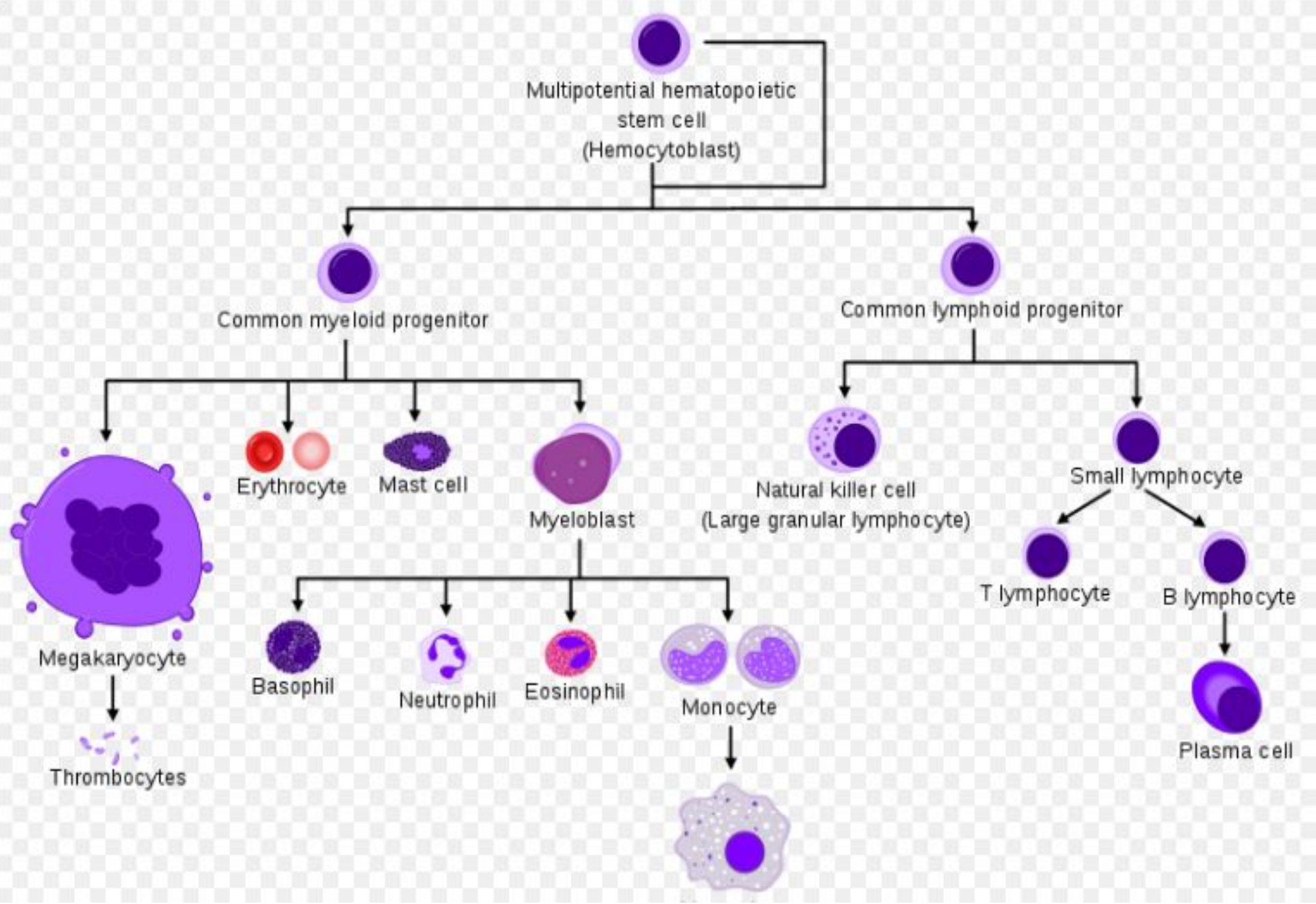
nnate vs. Adaptive immunity

	Innate response	Adaptive response
Onset of action	Immediately after infection	Relatively delayed
Main cells	Granulocytes, Monocytes, Macrophage & NK cells	B-cells & T-cells
Memory	Absent	Present
Efficiency	Less efficient	More efficient and improves with each exposure
Specificity	Non-specific	Very specific



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IV) Cells of the immune system

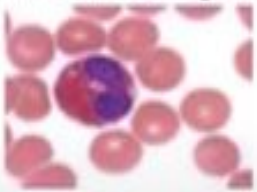
Leukocytes (4000-10000/mm3)

Granular

Neutrophil

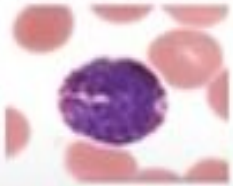
40 – 75%

Eosinophil



1 - 6%

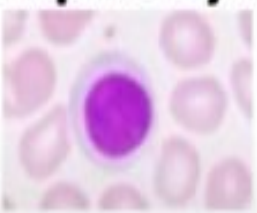
Basophil



0 – 2%

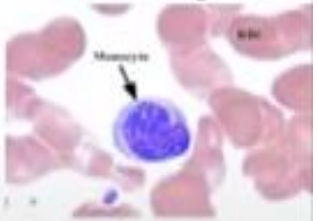
Agranular

Lymphocytes



15 – 40%

Monocyte



2 – 8%

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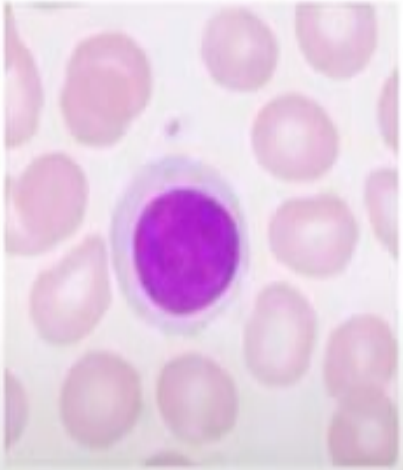
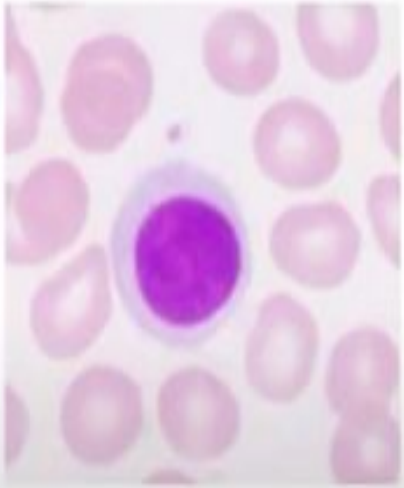
Lymphocytes (40%)

BM -Bursa - Thymus

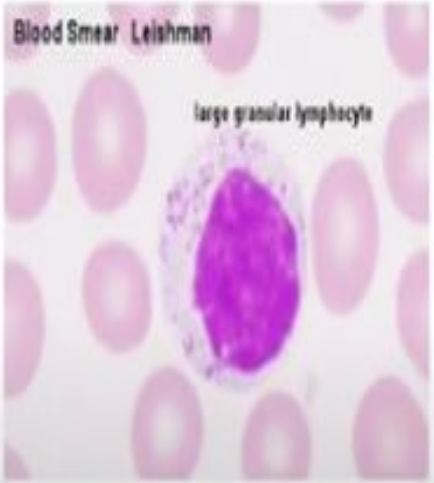
B cells



T cells



NK cells



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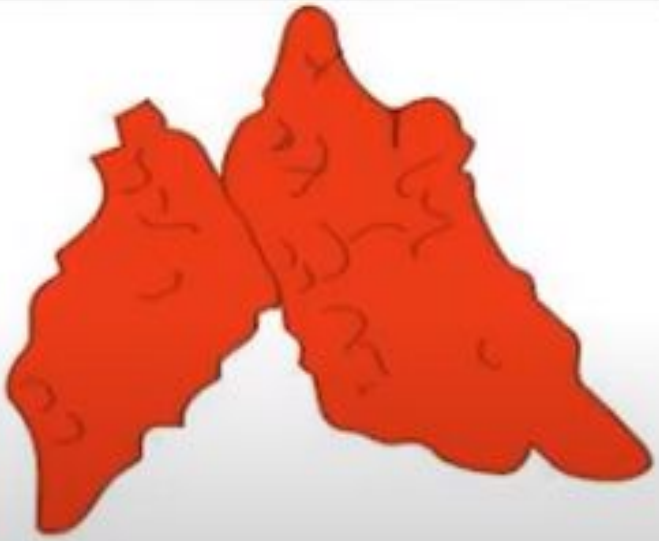
) Primary (Central) lymphoid organs

Bone marrow

Maturation and education of the immune cells



Thymus

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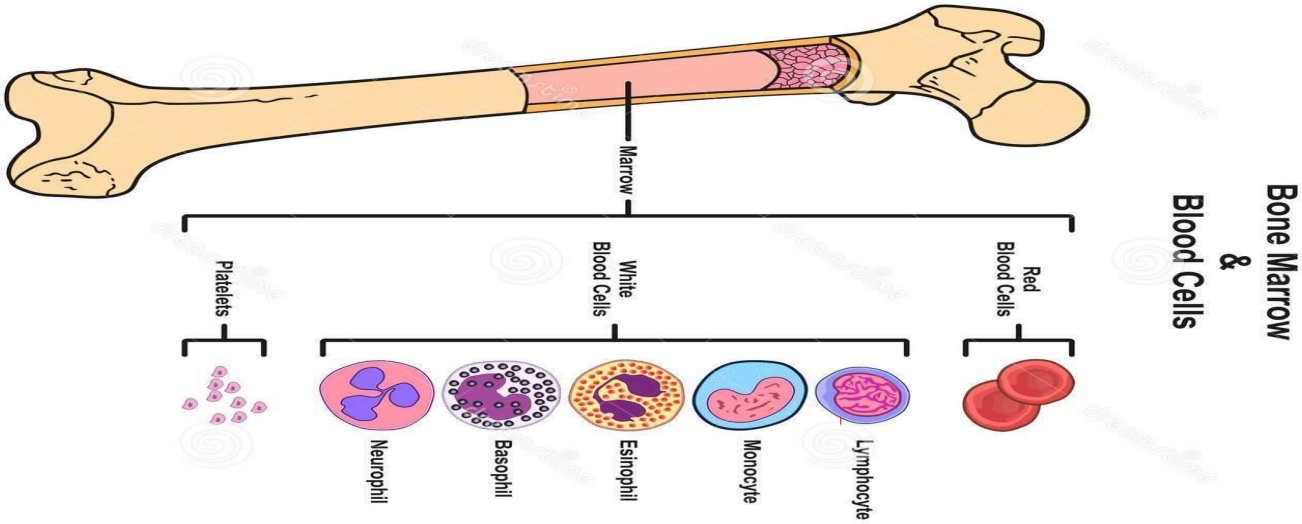
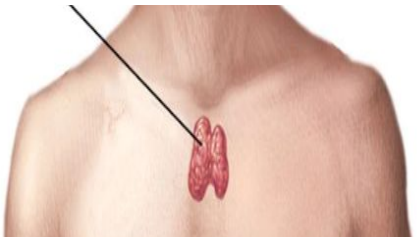
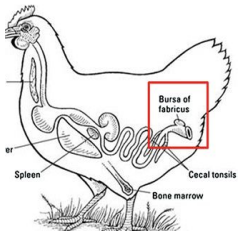


Ly mp hot es

Thymus gland



Bursa of Fabricius
Bone marrow



Education, Development and maturation in 1ry lymphoid organs

Then Enter

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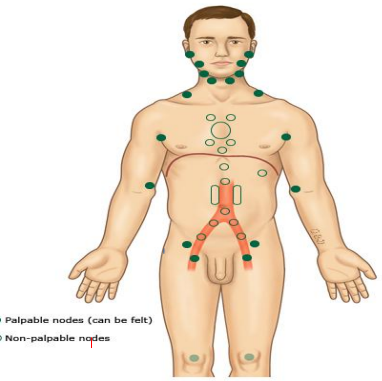
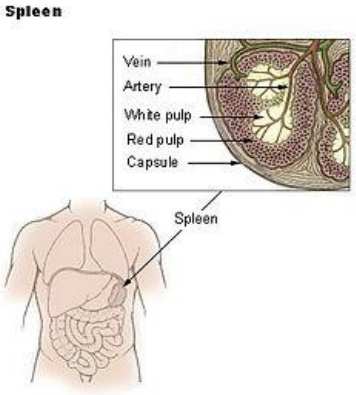
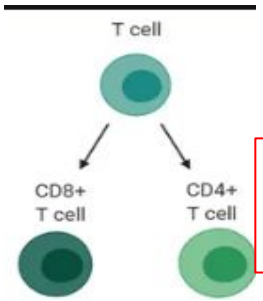
T lymphocytes

B lymphocytes

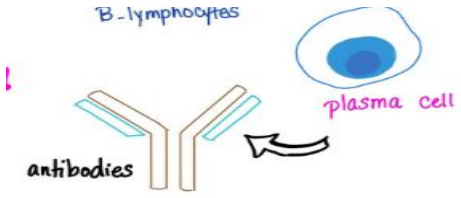
T and B lymphocytes enter 2ry lymphoid organs (Spleen and lymph nodes) for proliferation and differentiation

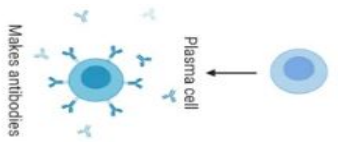






Cellular Immunity or cellular immune response





Humoral Immunity or cellular immune response

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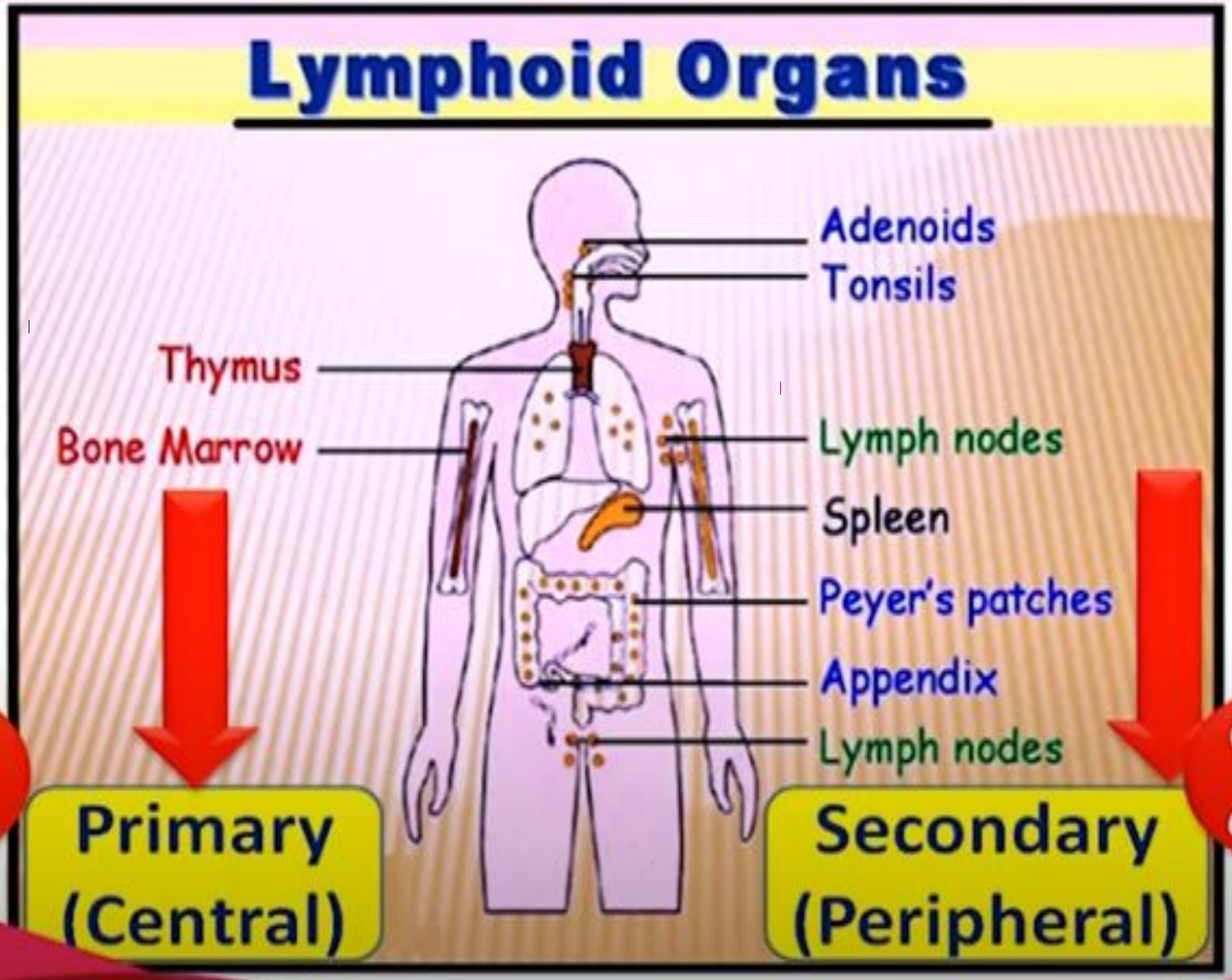
III) Organs of Immune cells



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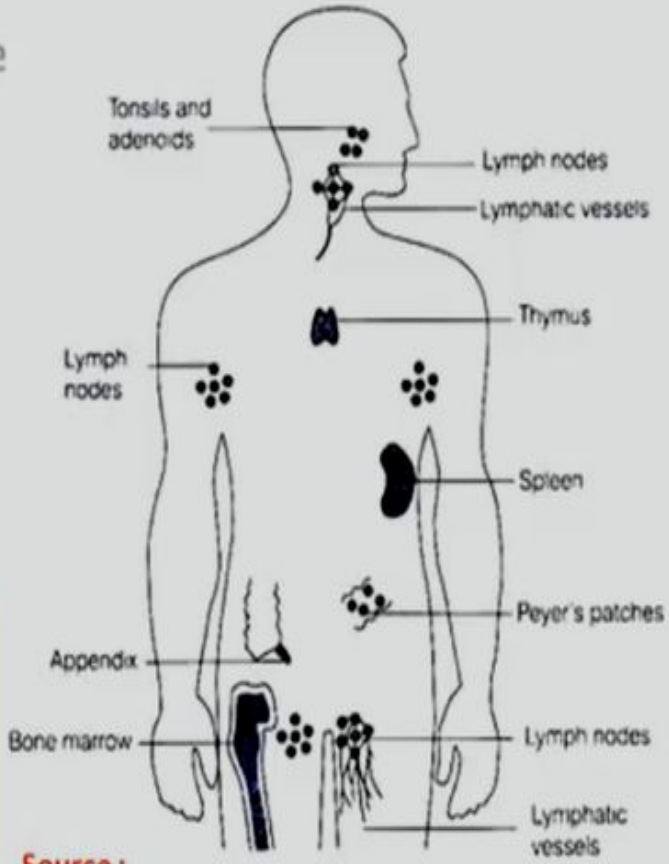
The lymphoid organs

- They are defined as a part of lymphatic system where
  - Lymphocytes can differentiate and proliferate.
  - Lymphocytes can interact with antigens.

Divided into

Primary	Secondary
Where the lymphocytes complete their maturation	Where the lymphocytes interact with the antigens
• Bone marrow Maturation of B-cells	• Lymph nodes
• Thymus Maturation of T-cells	• Spleen
	• Gut-associated lymphoid tissues (GALT)



Source :
www.biologydiscussion.com/immunology/lymphoid-organs-primary-and-secondary-with-diagram/56268

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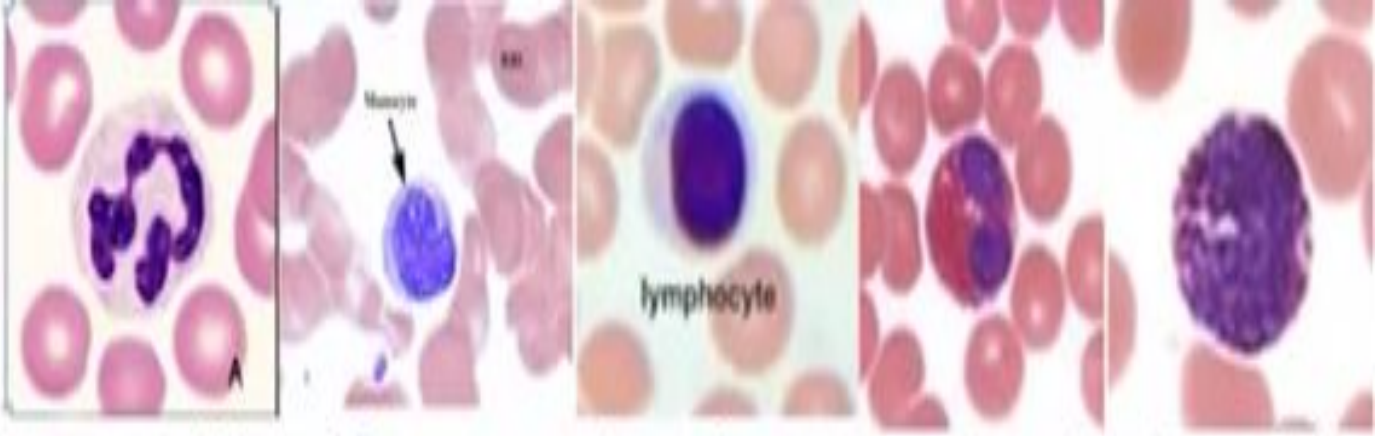
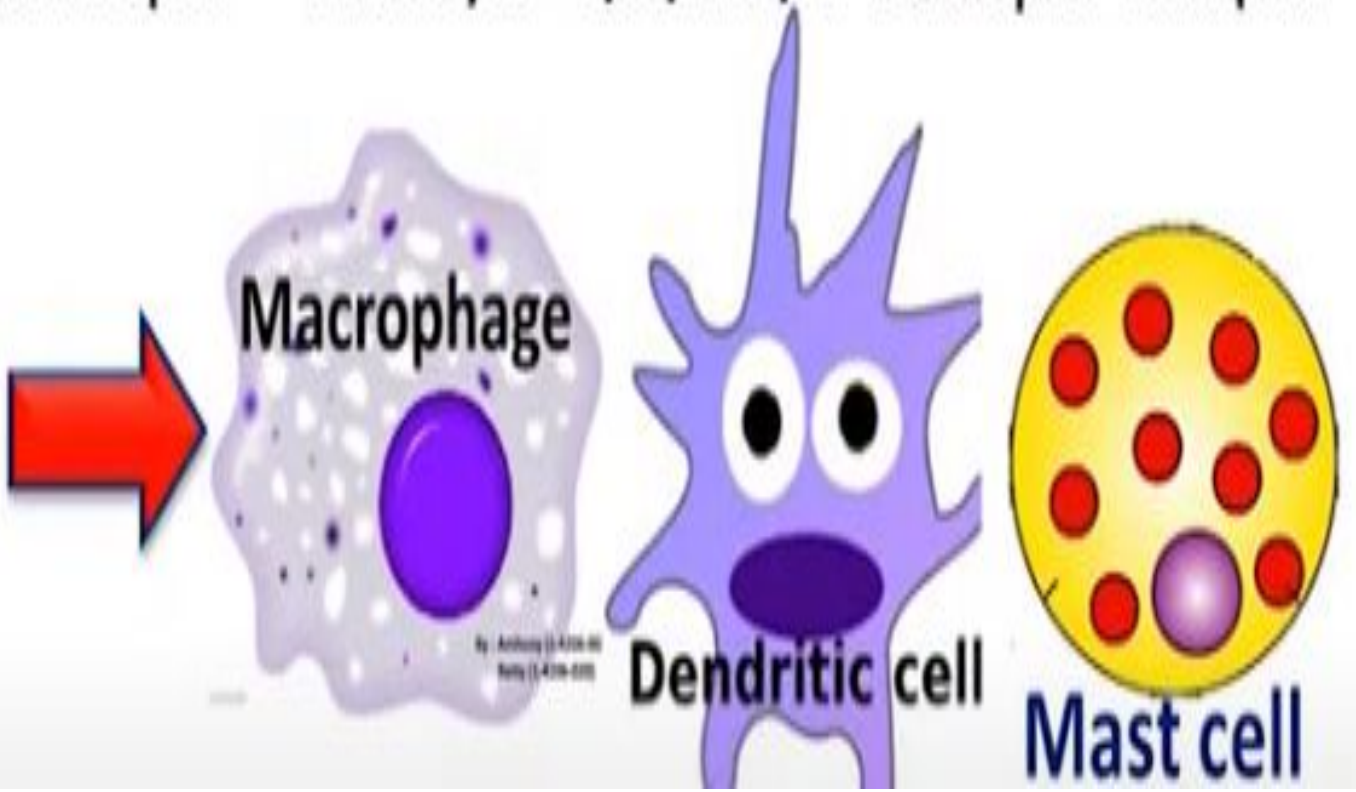
❑ Circulating in Blood



Neutrophil Monocyte Lymphocyte Eosinophil Basophil

❑ Residing in tissues



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Antigen presenting cells

antigens (inhaled, ingested, or injected) are taken up by antigen-presenting cells (APCs). These include:

- Macrophages
- Dendritic cells
- B cell

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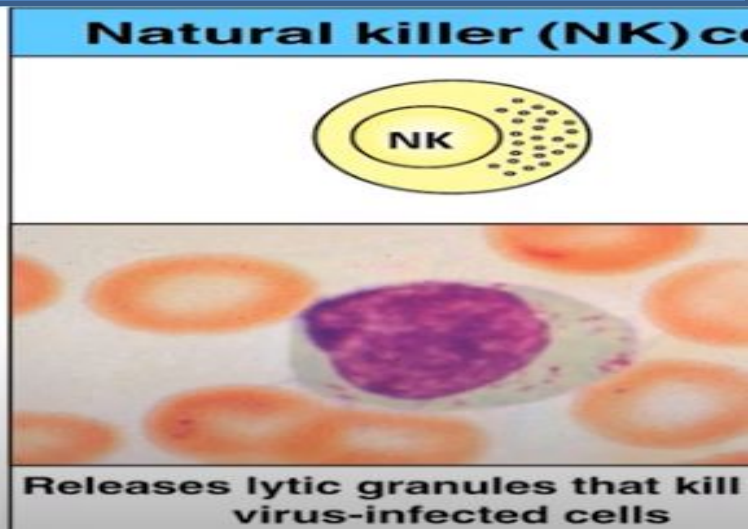
NK cells

- Large granular lymphocytes

They comprise 10-15% of the peripheral lymphocytes.



Natural killer (NK) cells are also known as large granular lymphocytes (LGL) because they resemble lymphocytes in their morphology, except that they are slightly larger and have numerous granules. NK cells are capable of killing ~~virus infected~~ and ~~malignant target cells~~ by perforin and Granzymes (process called Apoptosis)

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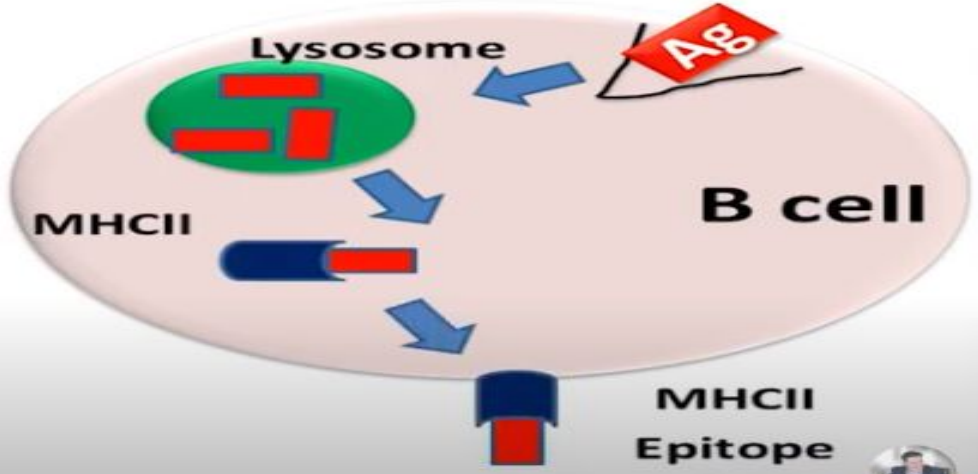
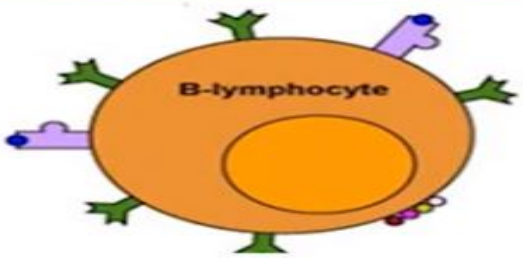
❑ Function of B cell

1 Antigen Presentation (APC)



2 They differentiate into plasma cells and producing antibody.



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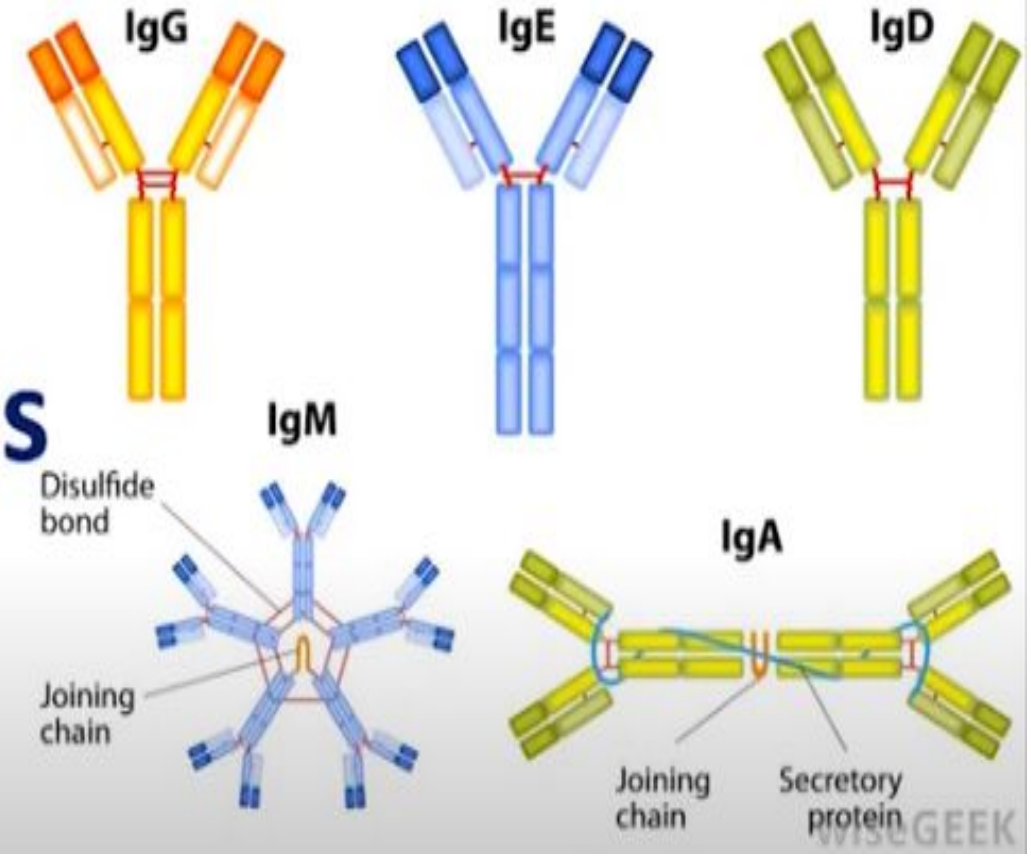
Soldiers of acquired immunity (Proteins)

Ab production

Activated B cell
(Plasma cell)

- Antibodies



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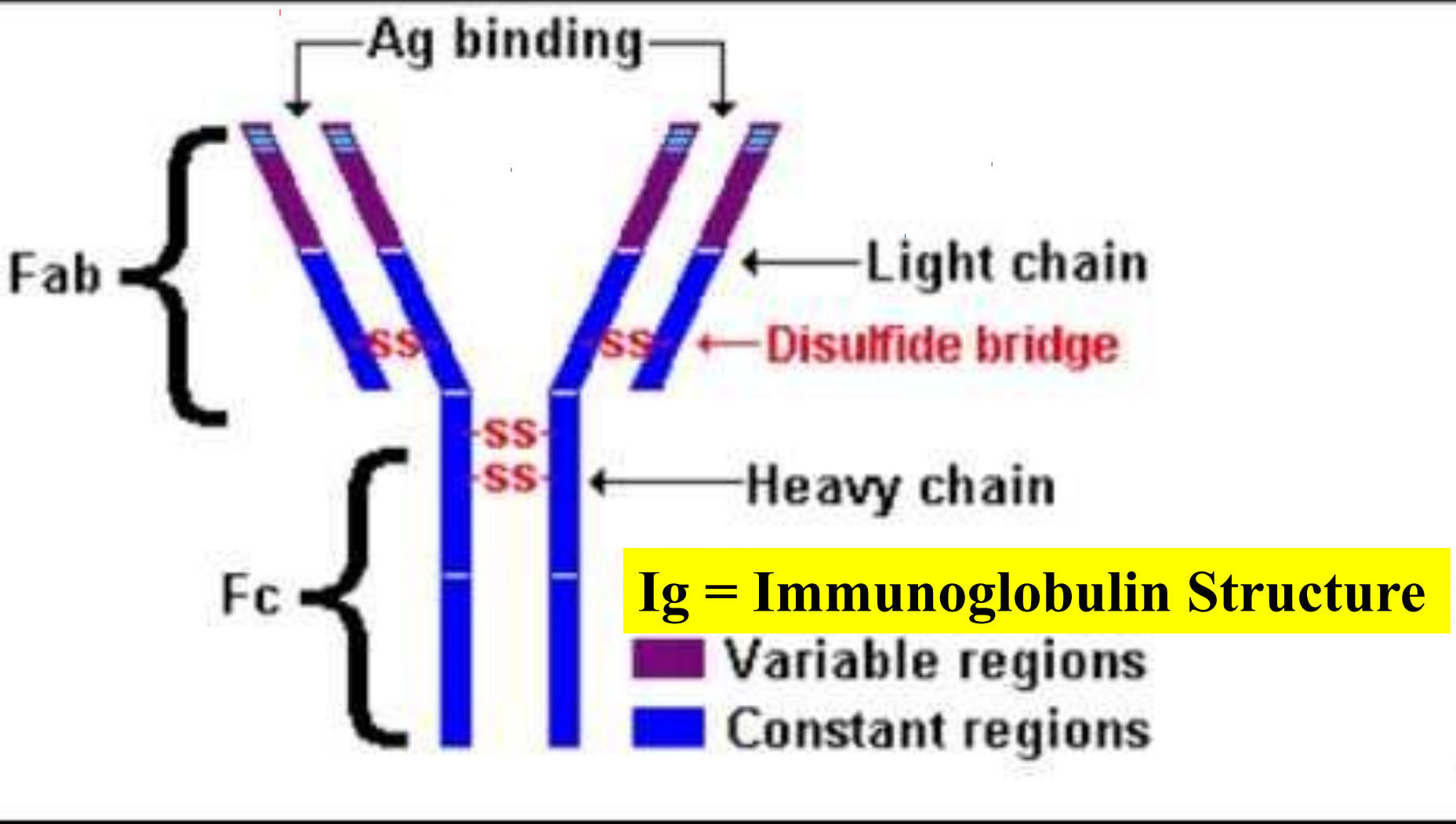
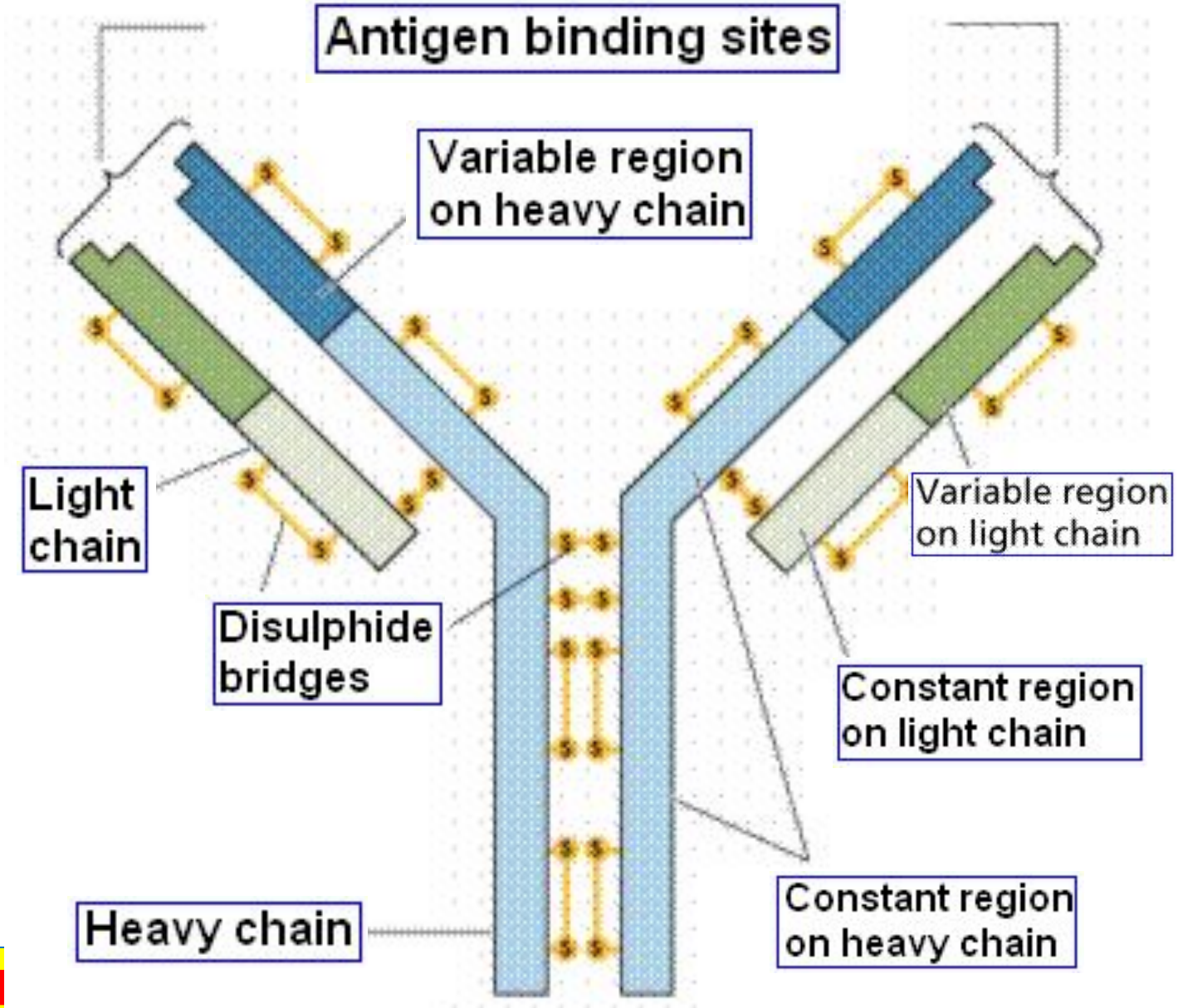
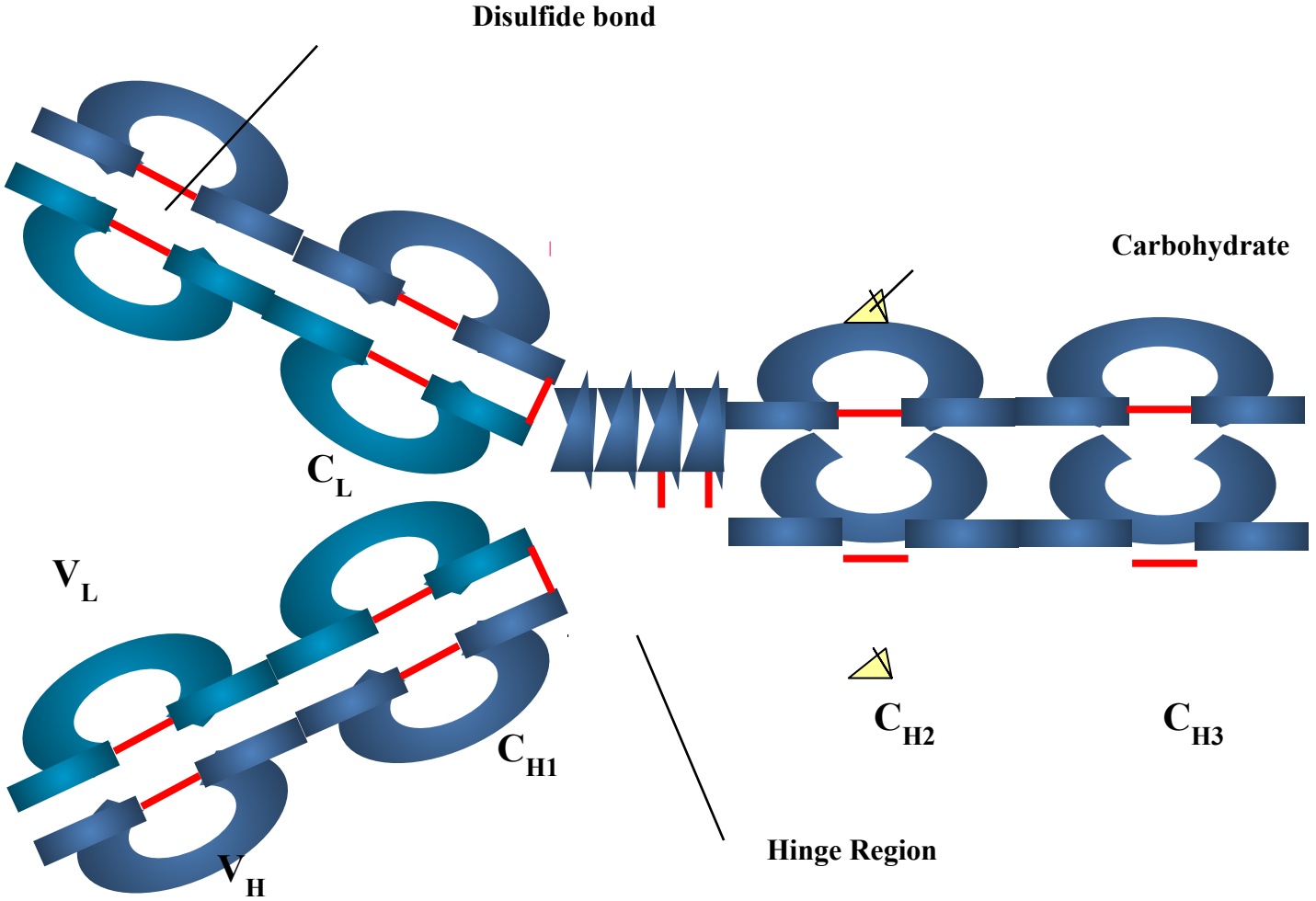

Ag binding
Fab
Light chain
ss
ss
Disulfide bridge
ss
ss
Heavy chain
Fc
Ig = Immunoglobulin Structure
Variable regions
Constant regions

Structural Regions



III. BASIC STRUCTURE OF IMMUNOGLOBULINS

Although different immunoglobulins can differ structurally they all are built from the same basic unit.



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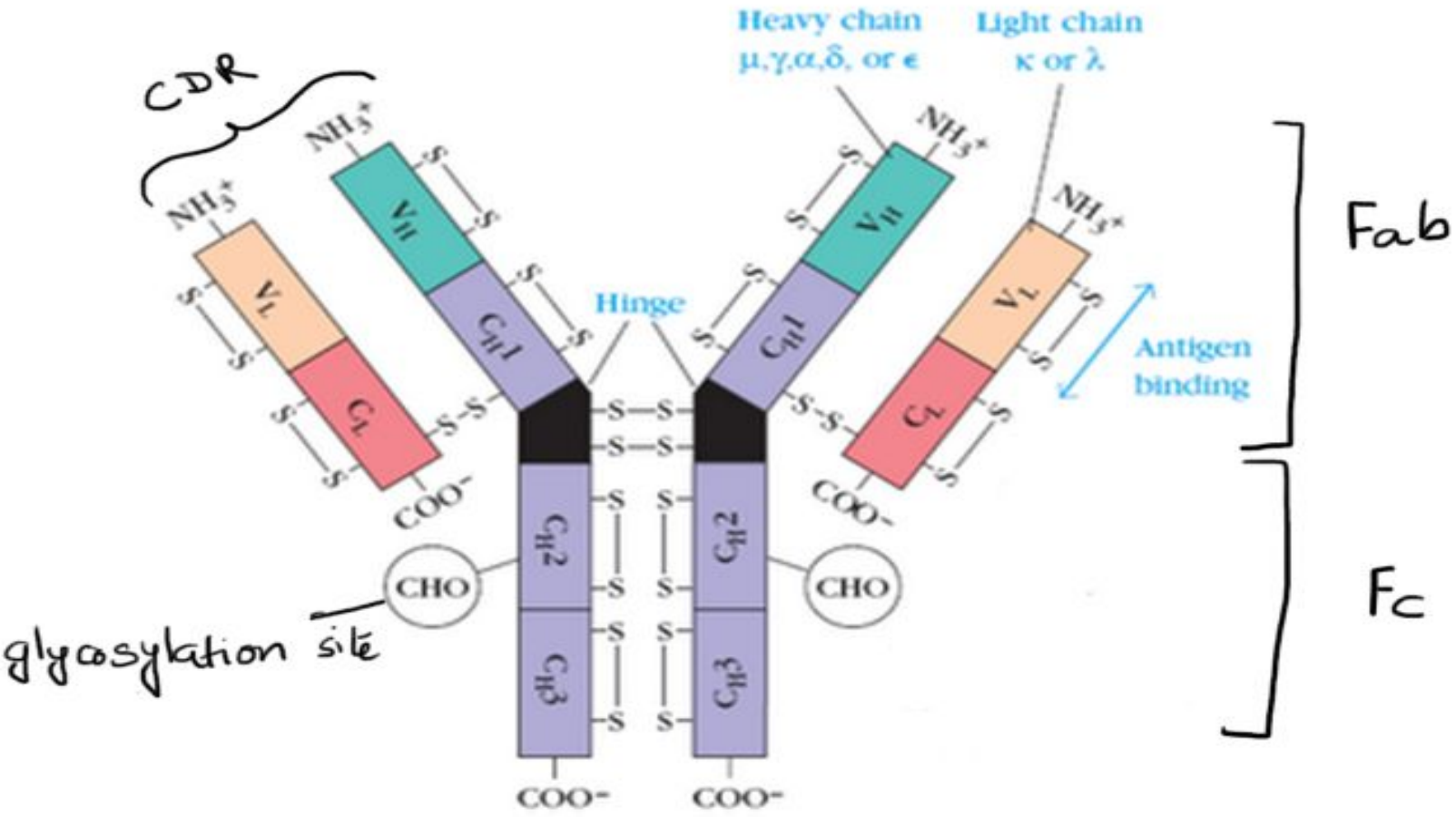
Ab Structure



A. Heavy and Light Chains

All immunoglobulins have a four chain structure as their basic unit. They are composed of two identical light chains and two identical heavy chains

B. Disulfide bonds

1. The heavy and light chains and the two heavy chains are held together by inter-chain disulfide bonds interactions.

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C. Variable (V) and Constant (C) Regions

both the heavy and light chain could be divided into two regions based on variability in the amino acid sequences:

1. Light Chain - VL and CL
2. Heavy Chain - VH and CH

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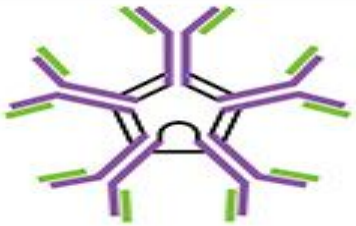
The Five Immunoglobulin (Ig) Classes					
	IgM pentamer	IgG monomer	Secretory IgA dimer	IgE monomer	IgD monomer
					
Heavy chains	μ	γ	α	ε	δ
Number of antigen binding sites	10	2	4	2	2
Molecular weight (Daltons)	900,000	150,000	385,000	200,000	180,000
Percentage of total antibody in serum	6%	80%	13%	0.002%	1%
Crosses placenta	no	yes	no	no	no
Fixes complement	yes	yes	no	no	no
Fc binds to		phagocytes		mast cells and basophils	
Function	Main antibody of primary responses, best at fixing complement; the monomer form of IgM serves as the B cell receptor	Main blood antibody of secondary responses, neutralizes toxins, opsonization	Secreted into mucus, tears, saliva, colostrum	Antibody of allergy and antiparasitic activity	B cell receptor

B

- **Types of T cells**
  - **T- Helper (CD4 T cells)**
    - **Helps T-cytotoxic**
    - **Helps B cells**
    - **Helps NK cells**
  - **T- Cytotoxic (CD8 T cells)**
  - **T- Regulatory**

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- **Pioneers in Microbiology"**
- • **Antonie Van Leeuwenhoeek** (1632 - 1-723). The 1st who had seen and described microbes using simple microscope..
- **Joseph listre** (1823 – 1912) he discovered antiseptics in 1867.
- **Loeffler:** discovered the causative agent of Diphtheria.
- **Behring:** The 1st to introduce antitoxic sera to cure diseases.
- - **Louis Pasteur:(1822 - 1895)** "Father of Bacteriology" his achievements were Pasteurization & Vaccination
- - **Tyndall (1877)** Intermittent sterilization "Tyndallization“
- **Gram** : Gram staining
- **Alexander Fleming:** Dicovery of Penicilln

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