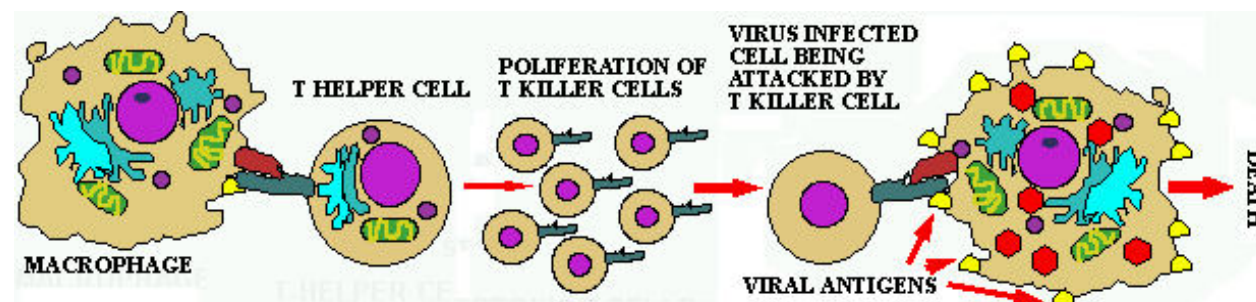


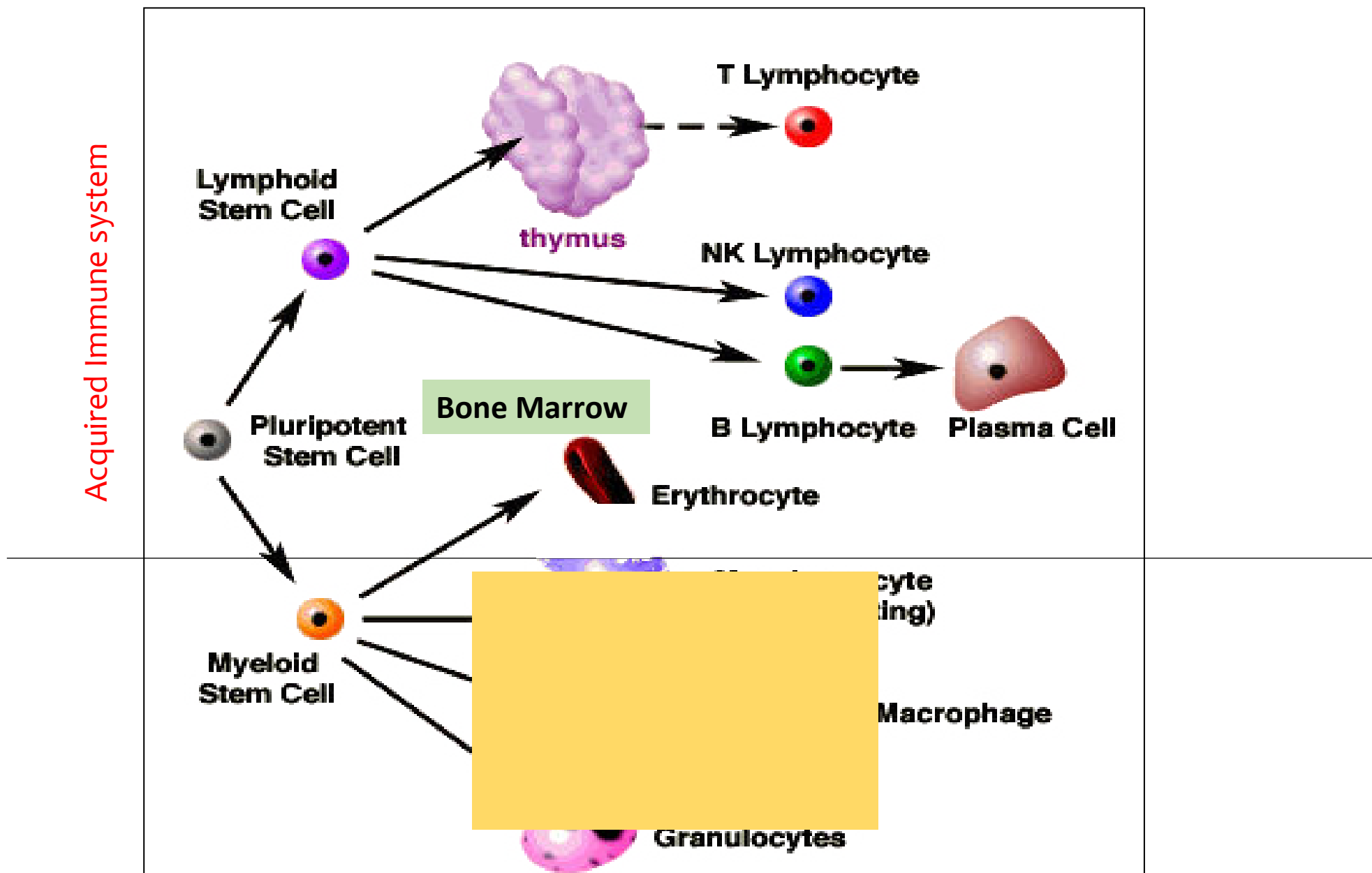
Immune system-Acquired/Adaptive immunity

Learning Objectives

- To understand about acquired or adaptive immunity
- Steps of humoral immune response
- Steps of cellular immune response
- Cytokines
- Unwanted effects of immune system
- AIDS

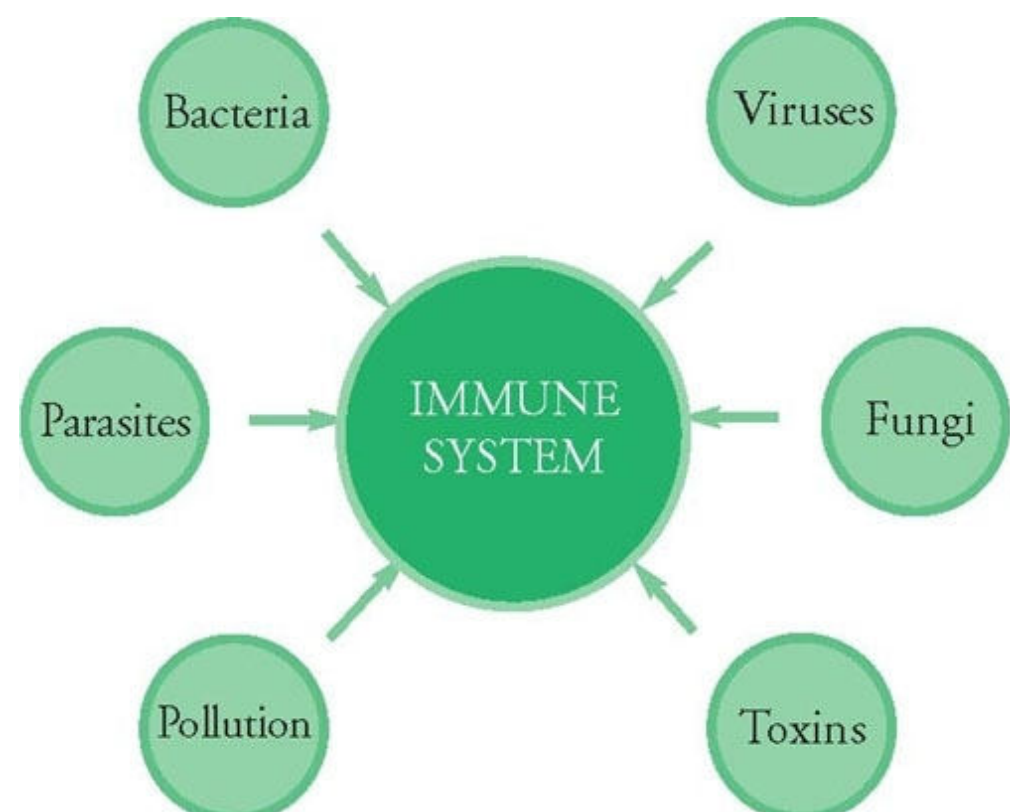


Immune system



Acquired/Adaptive/Specific Immunity

Adaptive immunity is body's ability **to eradicate** possibly harmful foreign materials or abnormal cells by developing specific immune response against a **particular antigen**.

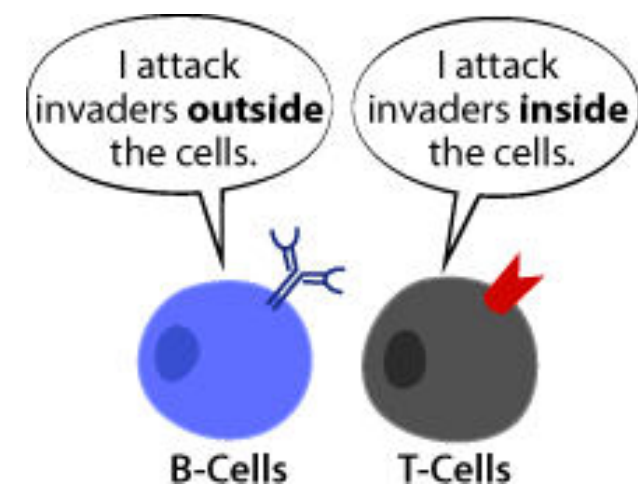


Acquired/Adaptive/Specific Immunity

Acquired immunity has two components: humoral immunity and cellular immunity.

Humoral immunity is mediated by **B Lymphocytes**-

Cellular immunity is mediated by **T lymphocytes**-



MHC Antigens: Major Histocompatibility Complex / HLA Ag (Human Leukocytes Associated Ag)

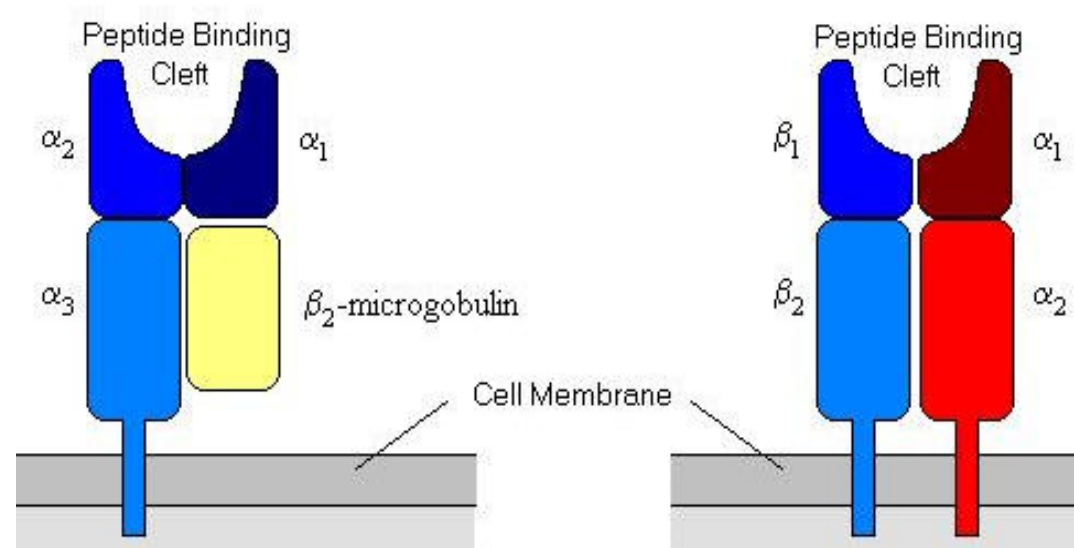
- These were first identified on the membrane of human leukocytes for the first time.
- These glycoproteins are encoded by Histocompatibility Gene on short arm of chromosome 6
- These are the self antigens, which are very specific to a person and present on the surface membrane of **all the nucleated cells** of body **EXCEPT RBCs**.

Self to Nonself recognition • Second level caution

MHC Antigens – 2 Types

MHC Class I

- Expressed on almost **all cells**



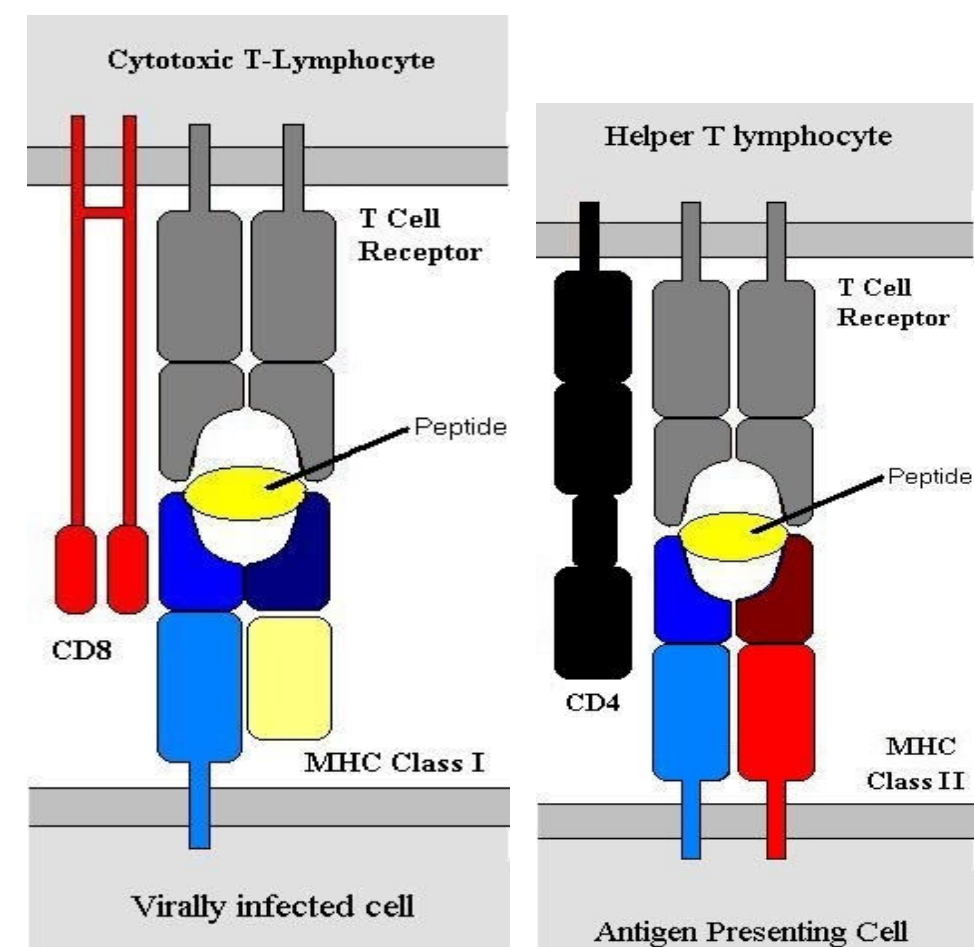
MHC Class II

- Expressed mainly on specialized **APCs**

CD molecule

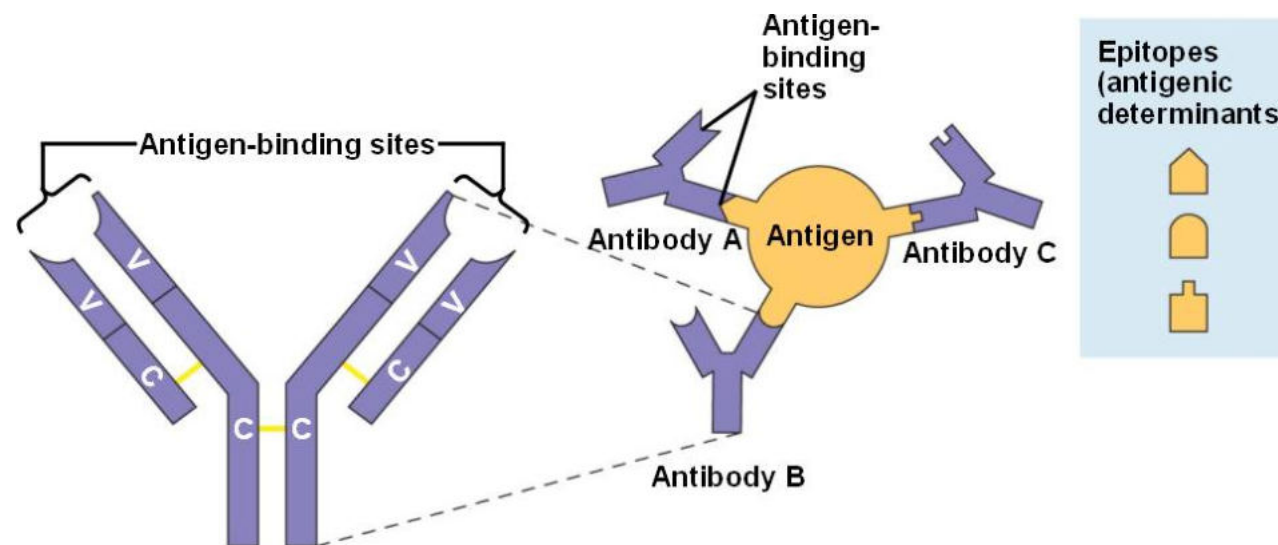
T-helper cells express CD4 which, facilitates the binding of MHC-II to the helper T cells receptors.

Cytotoxic T-cells express the molecule CD8 with the T-cell receptor (TCR). CD8 facilitates the binding of MHC-I to the T cell receptors



Antigens

- **Antigen:** Elicits a specific immune response in a host.
- **Epitope:** antigenic



Haptens - low molecular weight molecules that are not antigenic but when covalently bound to a large protein called a 'carrier protein' forming Hapten-Carrier Conjugate and become antigenic.

Humoral & Cellular Immunity

Humoral Immunity

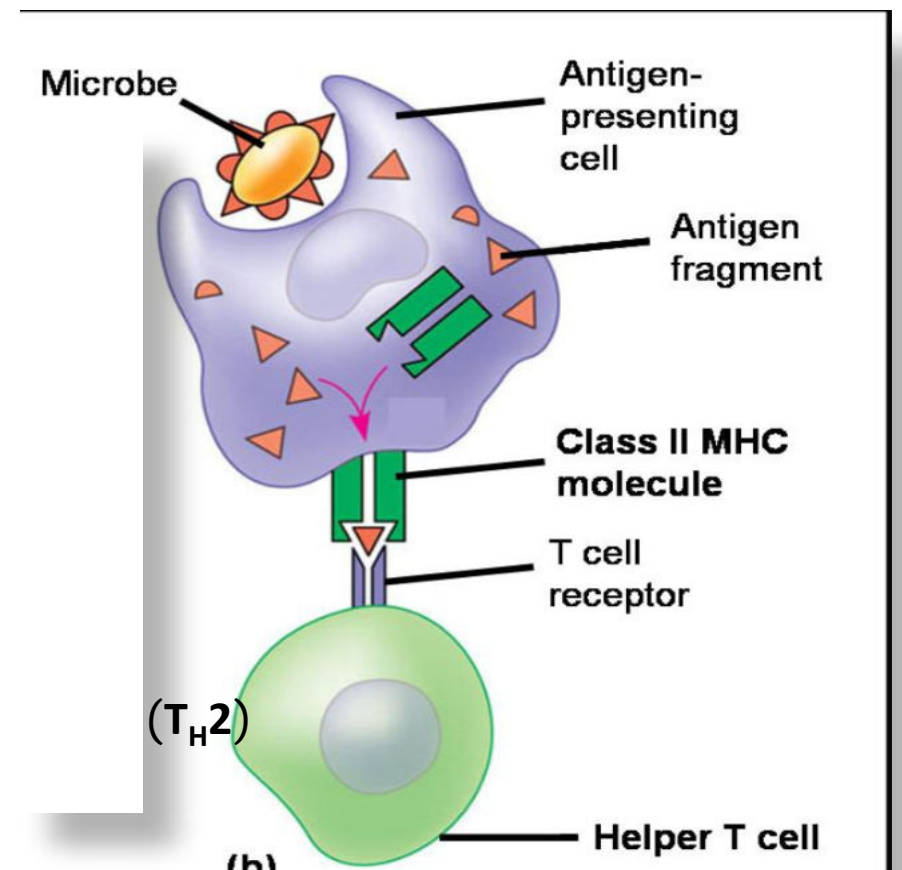
It is a 'B cells' generated - antibody mediated immune response especially effective against bacterial antigens.

Cellular Immunity

It is a 'T cells' mediated immune response especially effective against intracellular organisms like viruses, parasites, fungi and others like cancer cells and transplant cells (few bacterial infection like tubercular bacilli).

Events between entry of ag, its processing and presentation by antigen presenting cells (Macrophages/B cells) to helper T cells.

- Ingestion of Ag
- Enzymatic degradation of Ag
- Presentation of these processed Ag (epitopes) in association with **MHC II** to **Helper T cells (T_H2)** or CD4 cells.

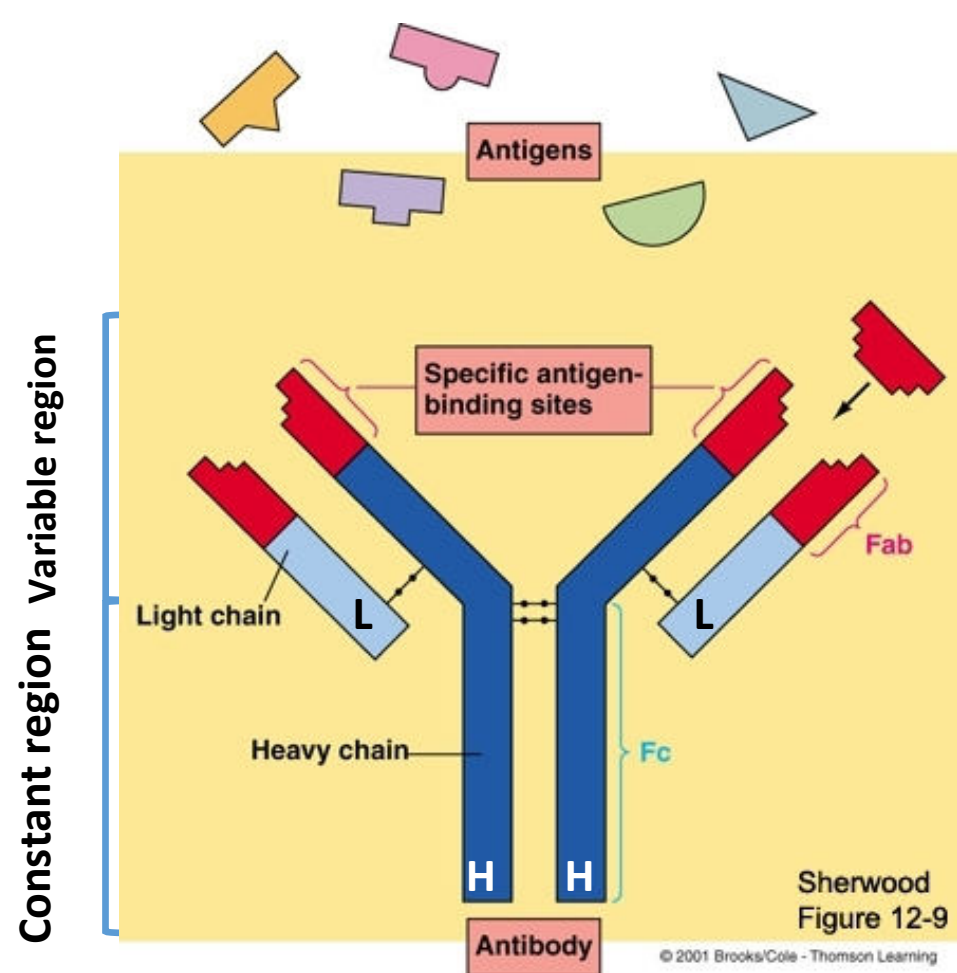


1) TCR are surrounded by Adhesion protein to complementary proteins of APC 12) Processed Ag to TCR MHCII –Immunogenic synapse.

Humoral Immunity

Clones of B cells recognize antigens (Clonal Selection) through the T_H2 , Gets activated by the released cytokines
Differentiate into **plasma cells** and **memory cells** → The immunoglobulins are secreted

Humoral Immunity – Antibody- Basic Structure



- 2 identical heavy chains
- 2 identical light chains
- Each heavy chain – has a constant and a variable region and each light chain has a constant and a variable region.
- Fab – fragment antigen binding site,
- Fc- Fragment complement and some immune cell binding site.

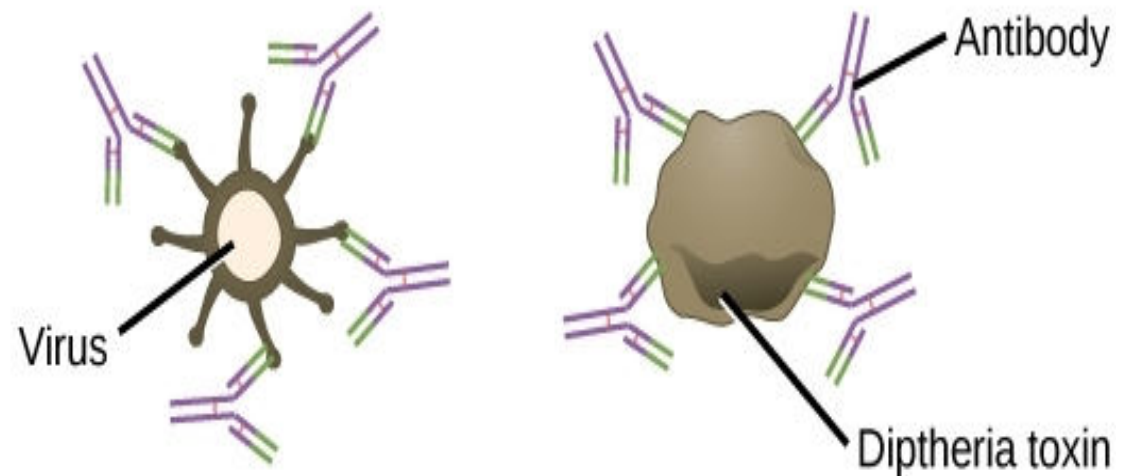
Humoral Immunity - Effector Phase-Antibodies

The Five Immunoglobulin (Ig) Classes					
	IgM pentamer	IgG monomer	Secretory IgA dimer	IgE monomer	IgD monomer
Heavy chains	μ	γ	α	ϵ	δ

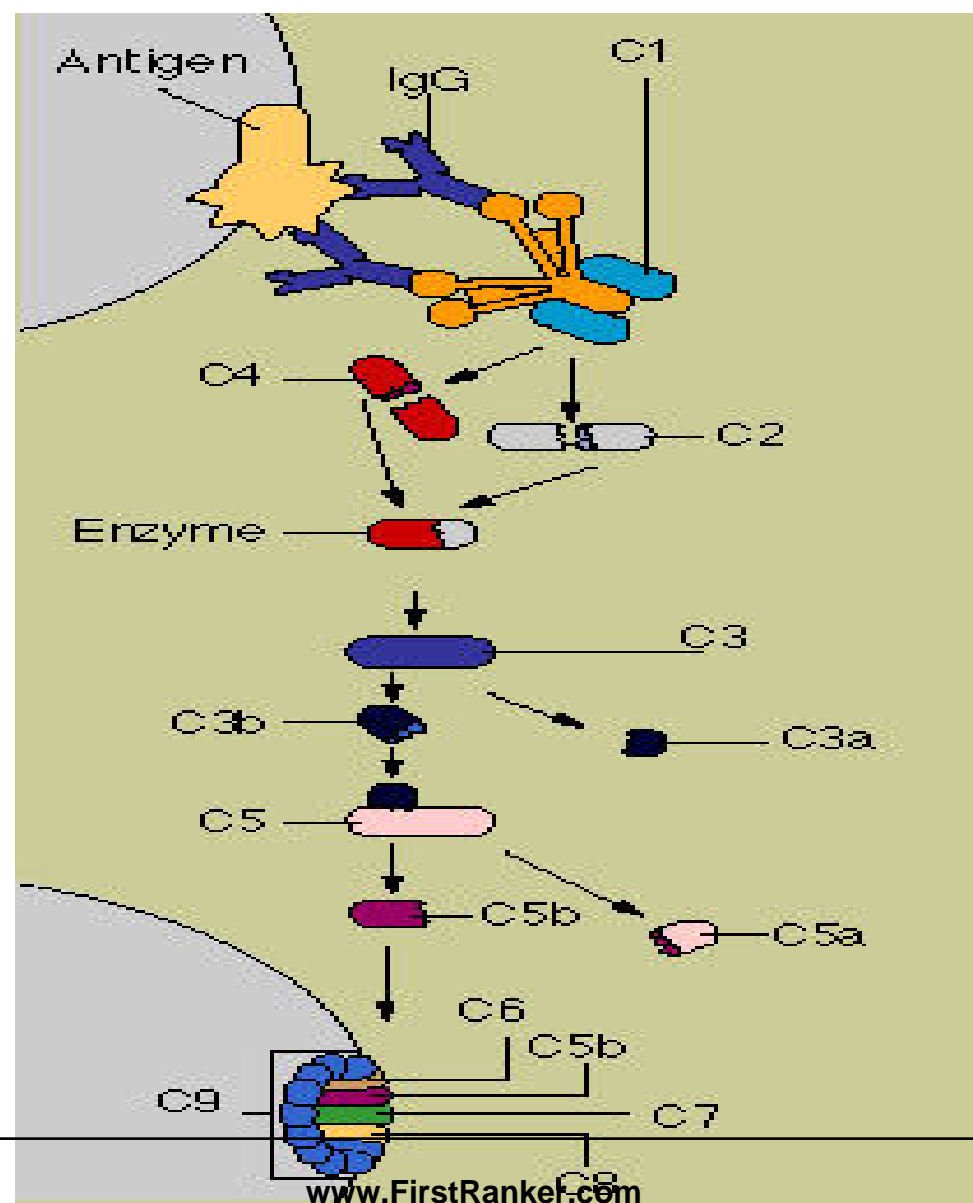
Humoral Immunity - Effector Phase-Antibodies-Mechanism of Action

Antibodies released into the blood stream will bind to the antigens that they are specific for.

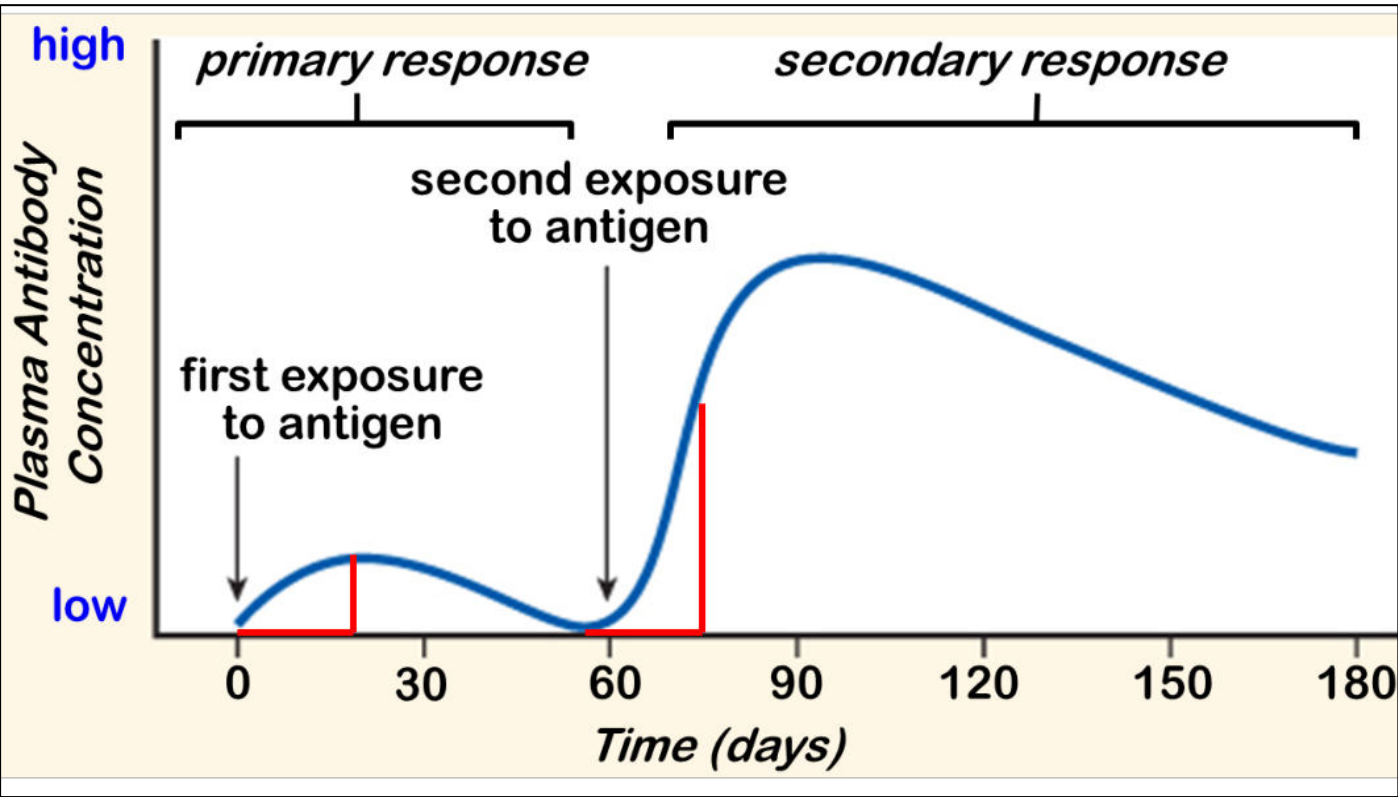
(a) Neutralization Antibodies prevent a virus or toxic protein from binding their target.



Humoral Immunity - Effector Phase-Antibodies-Mechanism of Action



Humoral Immunity – Action of B-Memory Cells



Self Assessment

Humoral immunity is mediated by lymphocytes.

Cellular immunity is mediated by lymphocytes.

..... fragment of antibody is antigen binding site.

.....fragment of antibody is complement and some immune cell binding site.

Presentation of theses processed Ag occurs in association withto Helper T cells.

Thank you

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