

Immunology

Humoral Immunity & Immunoglobulin Structure and Function

In this document you will find some main points gathered from the 4th lecture..This document is NOT a replacement for the lecture..If you need additional information go back to the lecture or use a book as a reference so you understand everything correctly.

Hopefully all the information is correct and Hope you find them Useful.

Good Luck to everyone.

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Immunology

Humoral Immunity & Immunoglobulin Structure and Function

Some main points you can go through and revise from:

Humoral (Antibody-Mediated) Immunity

*Immunity which depends on Antibodies.. (Can not happen without them)

*Involves production of antibodies against foreign antigens.

B-Cells → Develop From Stem Cells in Bone Marrow (In Adults) ..(The Liver of Fetuses)

B-Cells (After identifying antigens with the help of antibodies) → Turn into → Plasma Cells (Stimulated B-Cells) → Secrete Antibodies (which identify that specific antigen)

Each B-Cell → Produces antibodies that will recognize only one antigen.

Antibodies:

*found in extracellular fluids (blood plasma, lymph, mucus, etc.) and the surface of B cells.

*Work outside the cells ..

***Antibodies** cause certain reactions against transplanted tissue.(Antigens of the transplanted organ are considered foreign and are attacked)

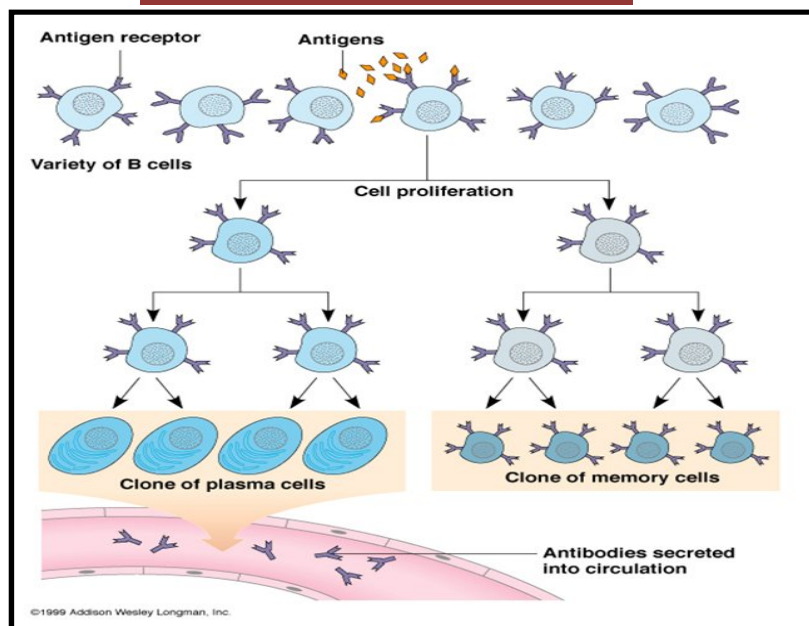
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After B-Cells are stimulated they turn into 2 types of cells:

*Plasma Cells → Secrete antibodies for current infection

*Memory Cells→ Remember the antigen and fights it when the same infection occurs again

Diagram showing how B-Cells are differentiated into Plasma Cells and Memory Cells

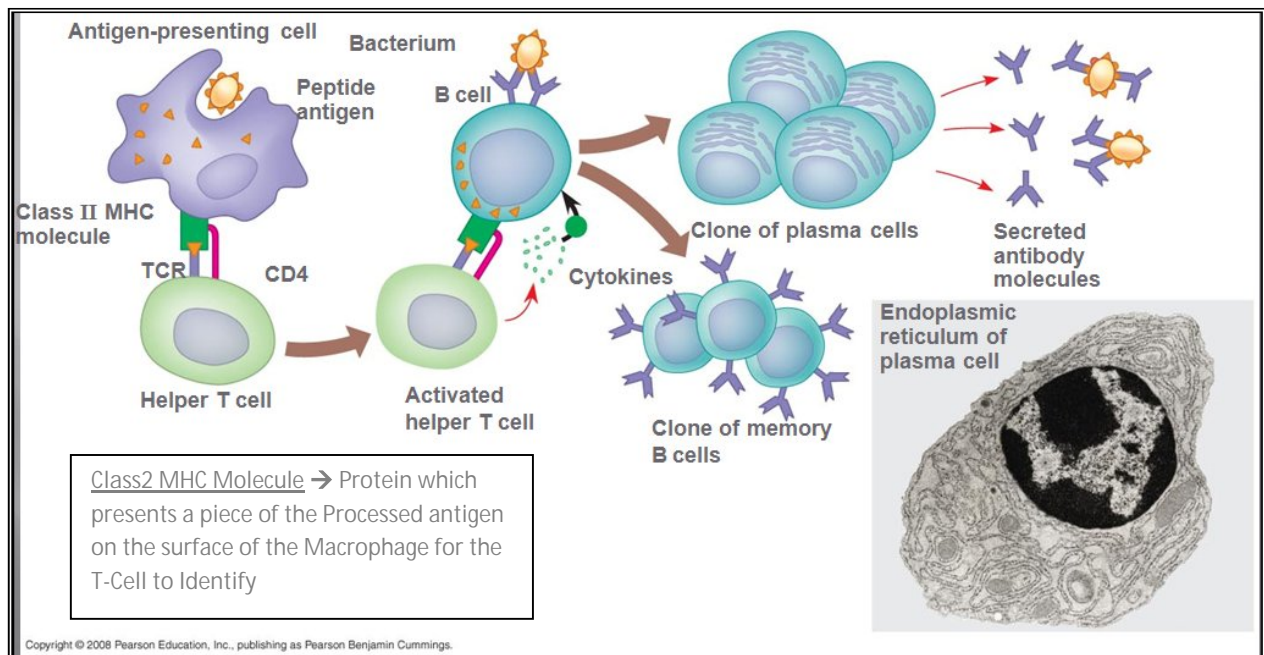


Antibody Production:

T-Dependant Antigens → Need T-Cells to help B-Cells with secreting Antibodies (*Is stronger than T-Independent antigens*)

T-Independent Antigens → Do not Need T-Cells for Secreting Antibodies (*Weaker Immune response than for T-Dependant antigens*)

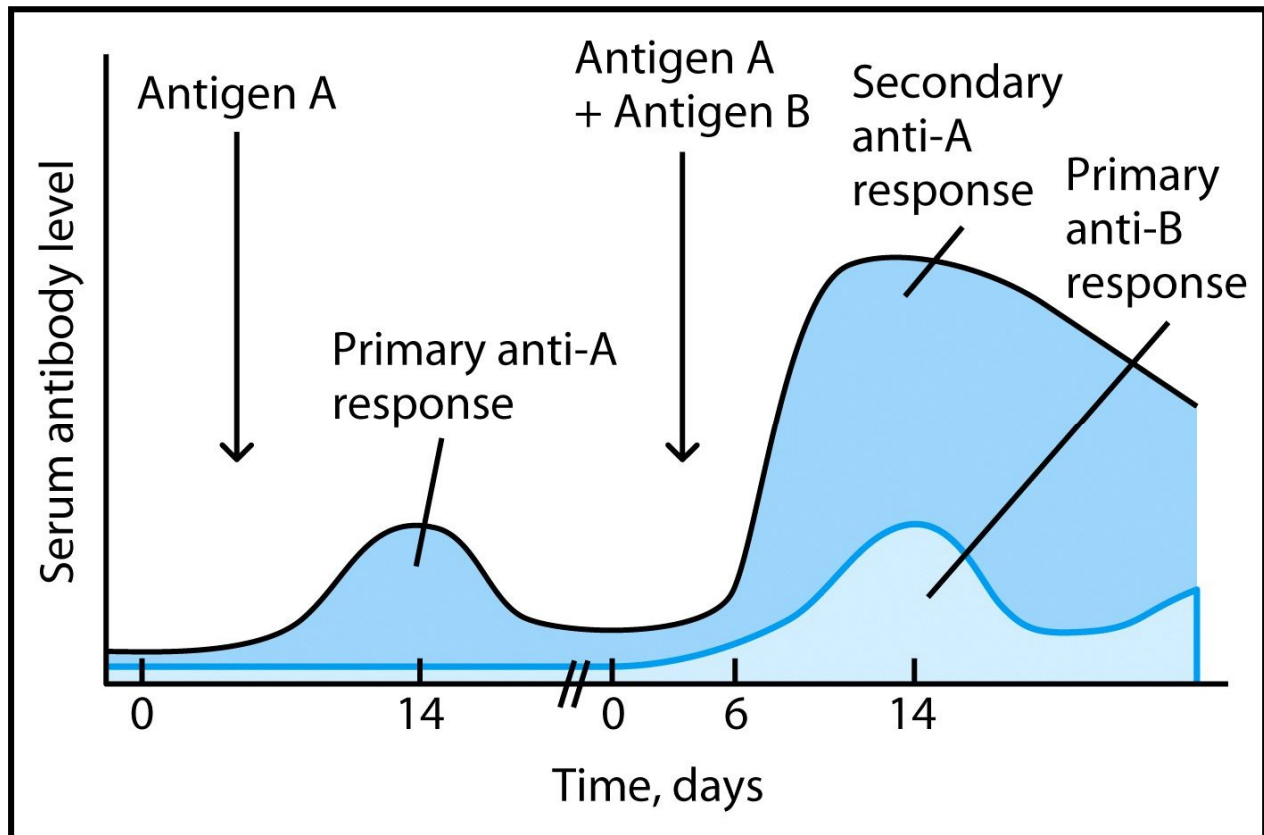
Diagram Explaining T-Dependant and T-Independent Antibody Production



Primary Response → IgM

Secondary Response → IgG

Diagram shows what Happens in Primary and Secondary Responses

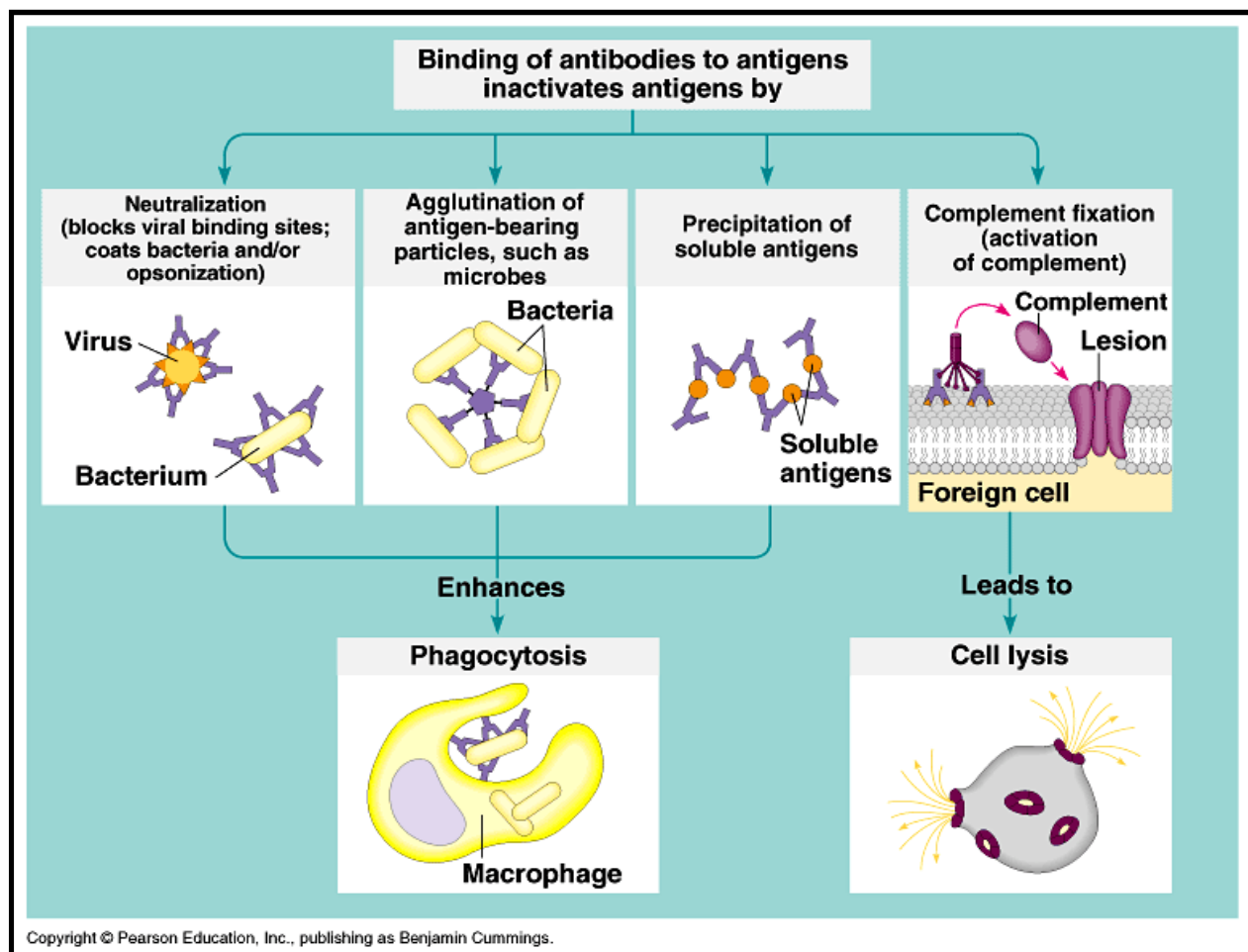


**Secondary Response for antigen A is higher because Memory cells remember the antigen and secrete antibodies right away*

Antibodies → Mark Bacteria and Viruses for macrophages to see them then engulf them

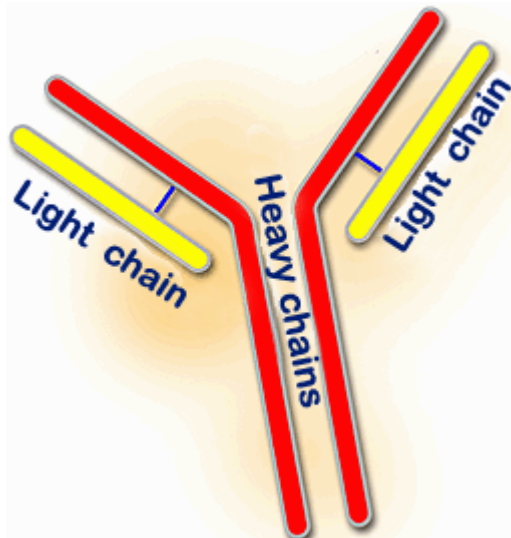
Antibodies → Attach to Complements in order to activate them and lysis Harmful Cells

Diagram shows What antibodies do to (Bacteria, Viruses....etc..)

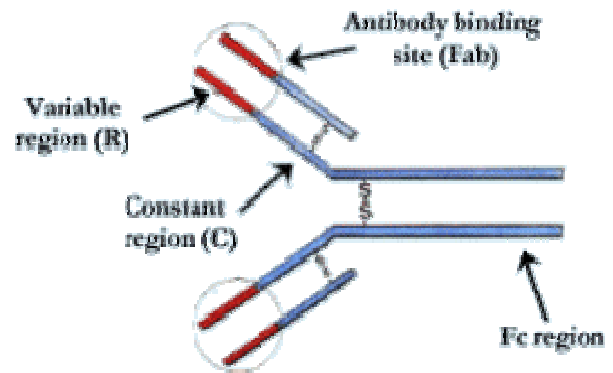


Immunoglobulins

Immunoglobulin's
are made of
2 heavy chains and
2 light chains



Immunoglobulin's
Consist of a
(Fab) Region and
an (Fc) Region



Antigens Bind to the (Fab) Region of the antibody

(Fc) Region Binds to Cells that are going to destroy Bacteria, Viruses...etc (e.g. Complement Proteins & Macrophages)

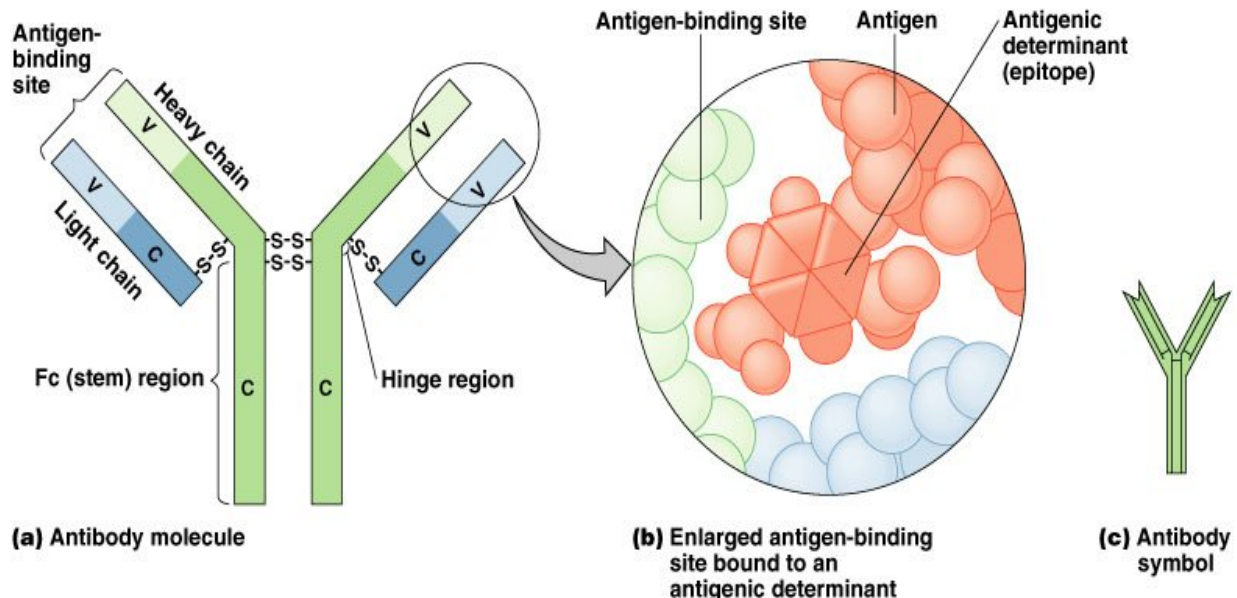

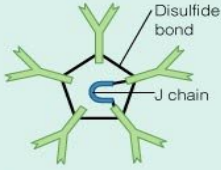
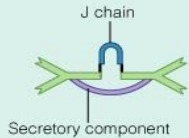




Table Summarizing Types of Immunoglobulin's and Important points about them

TABLE 17.1 A Summary of Immunoglobulin Classes

Characteristics	IgG	IgM	IgA	IgD	IgE
Structure	 Monomer	 Pentamer	 Dimer (with secretory component)	 Monomer	 Monomer
Percentage of total serum antibody	80%	5–10%	10–15%*	0.2%	0.002%
Location	Blood, lymph, intestine	Blood, lymph, B cell surface (as monomer)	Secretions (tears, saliva, mucus, intestine, milk), blood, lymph	B cell surface, blood, lymph	Bound to mast and basophil cells throughout body, blood
Molecular weight	150,000	970,000	405,000	175,000	190,000
Half-life in serum	23 days	5 days	6 days	3 days	2 days
Complement fixation	Yes	Yes	No†	No	No
Placental transfer	Yes	No	No	No	No
Known functions	Enhances phagocytosis; neutralizes toxins and viruses; protects fetus and newborn	Especially effective against microorganisms and agglutinating antigens; first antibodies produced in response to initial infection	Localized protection on mucosal surfaces	Serum function not known; presence on B cells functions in initiation of immune response	Allergic reactions; possibly lysis of parasitic worms

*Percentage in serum only; if mucous membranes and body secretions are included, percentage is much higher.

† May be yes via alternate pathway.

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Antibody Dependent Cell Mediated Cytotoxicity (ADCC)

Large organisms that cannot be phagocytosed are destroyed by (ADCC).

Cells bind to large organisms by Antibodies –(Fab) region binds to antigen of organism, (Fc) Region binds to cells that are going to destroy the organism.

Cells secrete *enzymes* which *destroy the large organism*

–Without engulfing it–(e.g of cells. Macrophages & Eosinophils)

Diagram showing Lyses of Large Organisms by (ADCC)

