Immunology
Basic Terminologies

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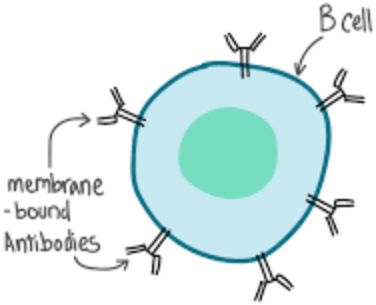
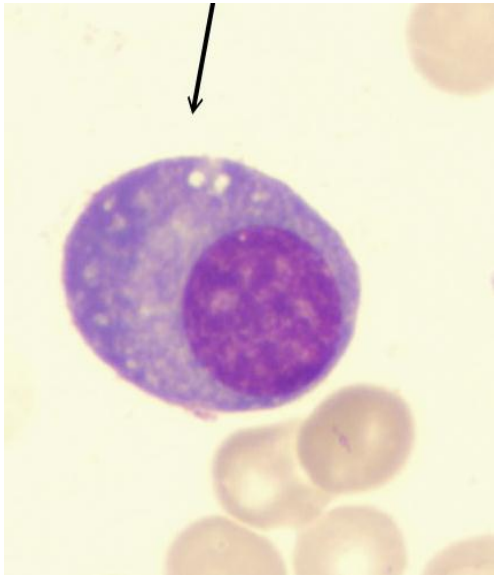
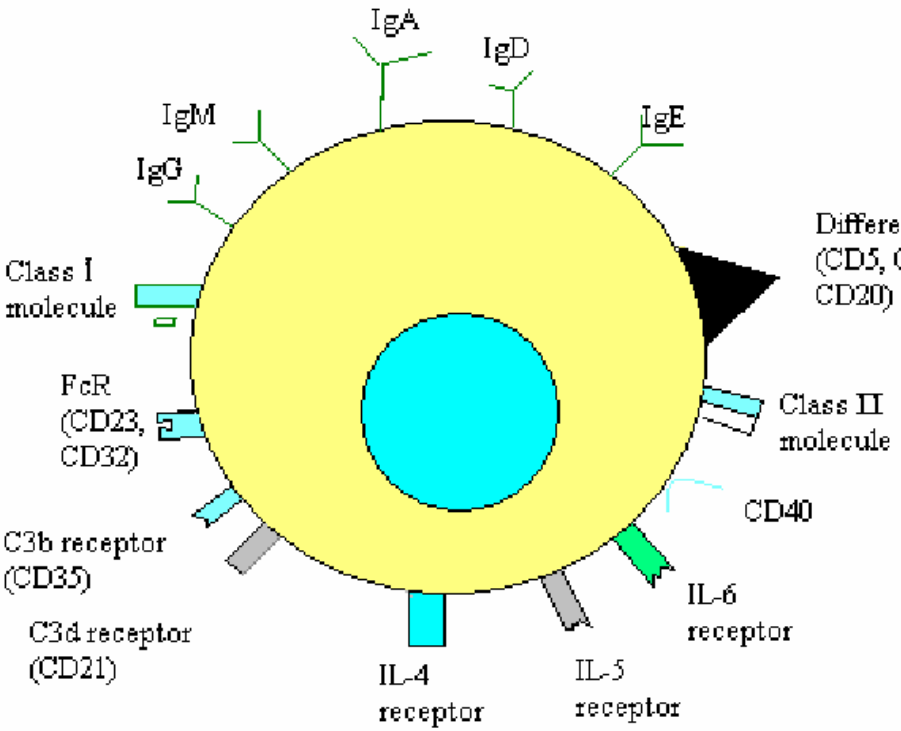
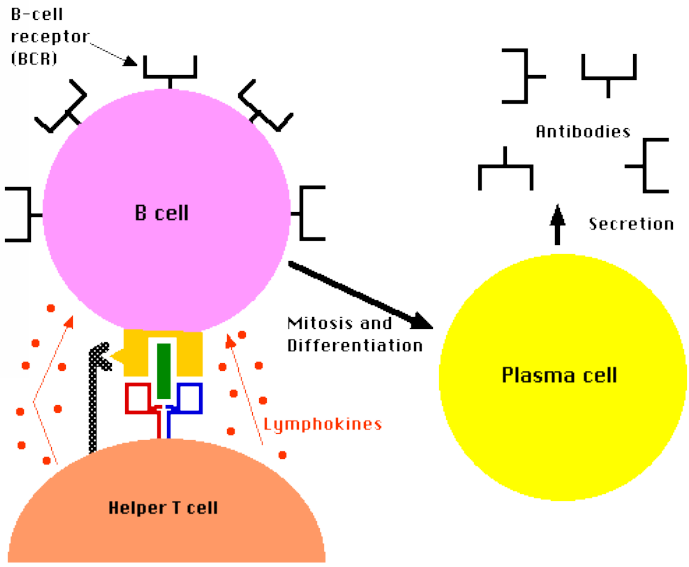
(1) IMMUNITY:- Sum total of all the naturally occuring defence mechanisms that protects the host from infections

(2) Lymphocytes:- Special group of white blood cells produced in bone marrow hematopoietic stem cells that are involved in immune responses.
- They are small, non phagocytic, mononuclear leukocyte.
- Immunologically competent or precursors of such cells.
- Lack stainable cytoplasmic granules.
- Produced at very high rates. (10^9 cells/day)


B cell
membrane
- bound
Antibodies




IgA
IgD
IgM
IgE
IgG
Differentiation markers
(CD5, CD9, CD10, CD19,
CD20)
Class I
molecule
FcR
(CD23,
CD32)
Class II
molecule
CD40
C3b receptor
(CD35)
IL-6
receptor
C3d receptor
(CD21)
IL-4
receptor
IL-5
receptor


B-cell
receptor
(BCR)
B cell
Antibodies
Secretion
Mitosis and
Differentiation
Plasma cell
Lymphokines
Helper T cell

③ Antigen :- A foreign (non-self) substance (such as proteins, glycoproteins, nucleoproteins phospholipids etc.) to which lymphocyte responds.

OR. A molecule capable of interacting with specific component of immune system

Ag may be an immunogen.

- They react with either Abs or antigen specific TCRs.
- Includes all proteins & lipopolysaccharides, many polysaccharides, some N.A & teichoic acid
- To act as antigen a substance (molecule) must have fairly high mol. wt. (greater than 10,000)

(4) Immunogen :- Substance that when administered under appropriate conditions in a host induce immune responses. They may include Ab production, activation of sp T cells or both. They are always antigenic.

- In most cases Immunogens are synonymous of Ag. However all Ags are not Immunogens

eg. Haptanes, low mol. wt. substances that can bind with Ab present already, but can not induce Ab production. These are usually sugars, a.a. or other low mol. wt. organic substances.

Notes

(5) Haptanes :- Low mol. wt. organic substances that are not

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antigenic by themselves but when coupled with macromolecular carrier, can elicit Abs production against itself.

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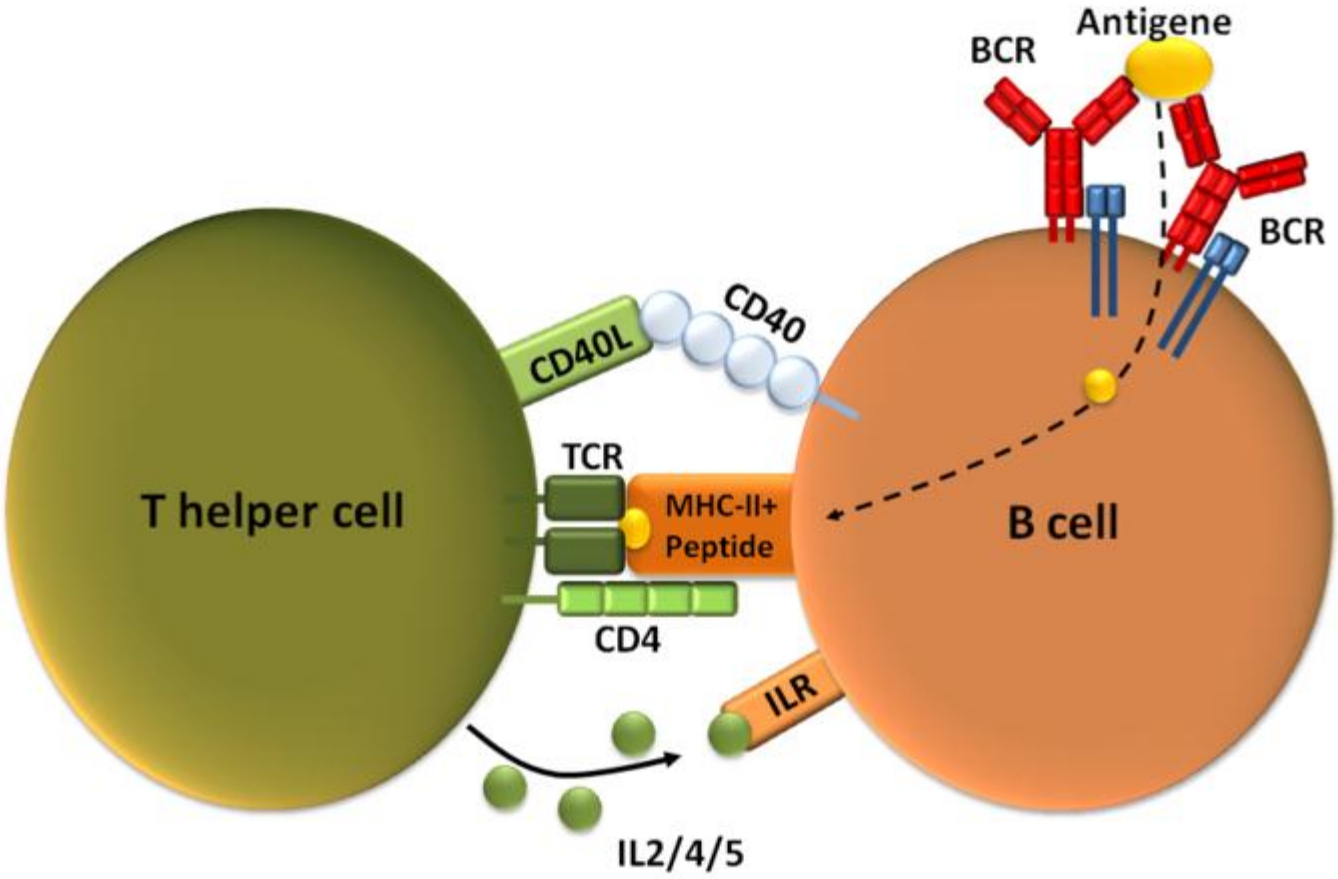
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	


Antigene
BCR
BCR
CD40
CD40L
TCR
MHC-II+
Peptide
T helper cell
B cell
CD4
ILR
IL2/4/5

(6) Antibody :- A glycoprotein produced by B- lymphocytic cells in response to the interaction with an Ag. It has ability to combine with Ag that triggers its production.

- Also called as Immunoglobulins (Igs).
- Soluble proteins.
- Divided into 5 basic types on the basis of their physical, Chemical & immunological properties.
  IgM, IgD, IgG, IgE & IgA.
- IgG → Most abundant.

(7) **Plasma:** The cell free, fluid portion of blood which contain all the clotting factors

(8) **Serum:-** Liquid portion of blood which is free of blood cells & clotting factors

(9) **Active Immunity:-** An immune system achieved by self production of Abs.

(10) **Passive Immunity:-** Immunity resulting from transfer of Abs or Immune cells from an immune to non immune individual.

↓

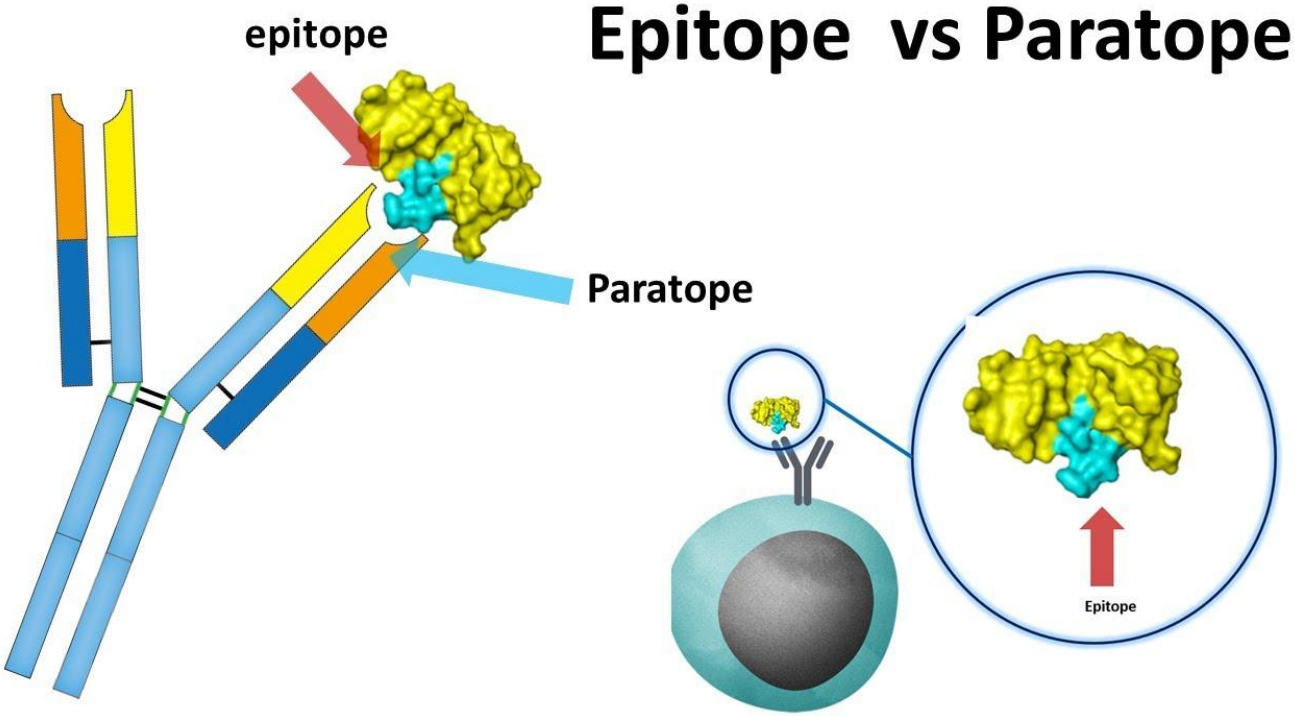
Involves transfer of Abs to non immune individuals.

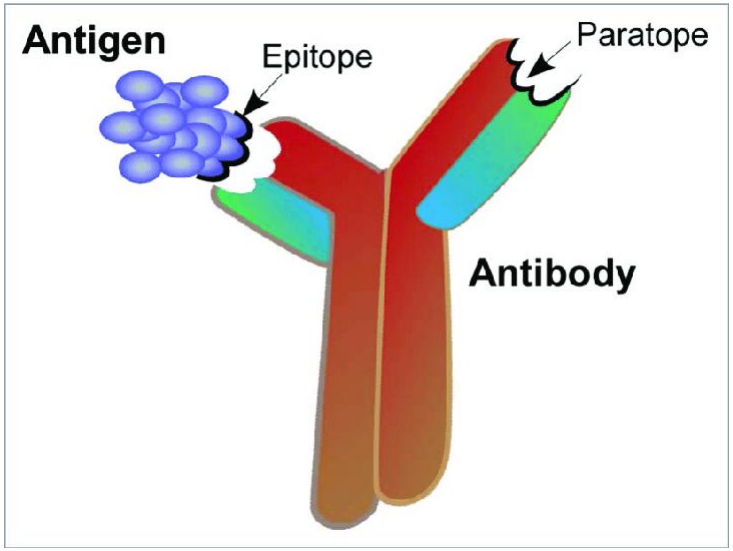
(11) **Epitopes:-** Portion of antigen that interacts with an Immunoglobulin or TCR.

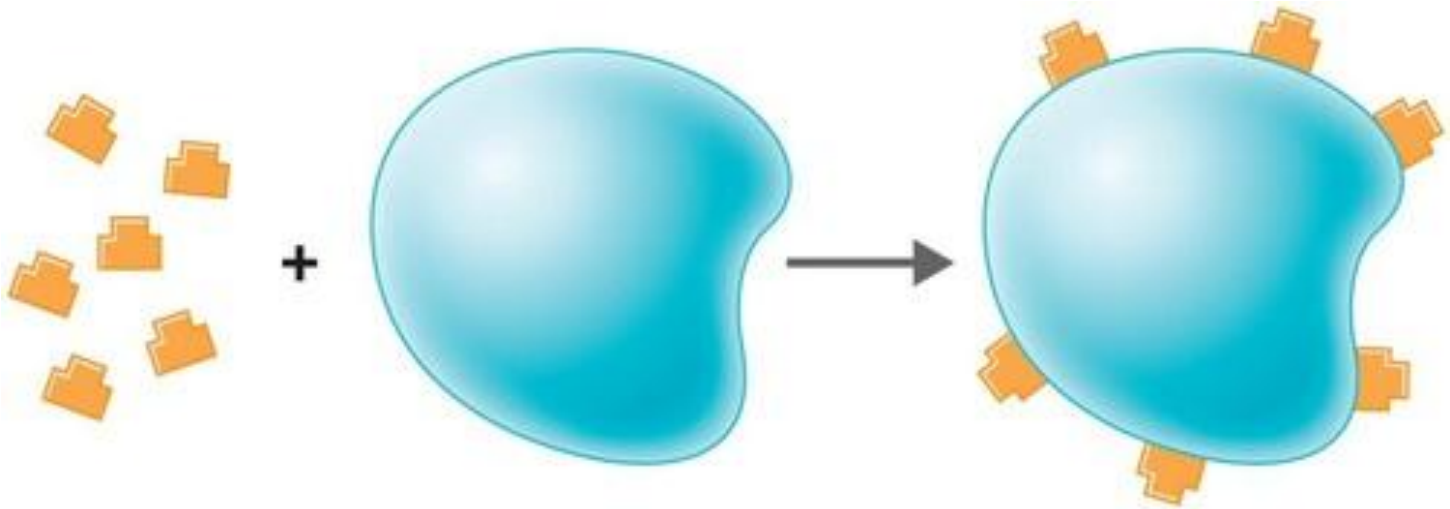
It is a sequence of 4-6 a.a.

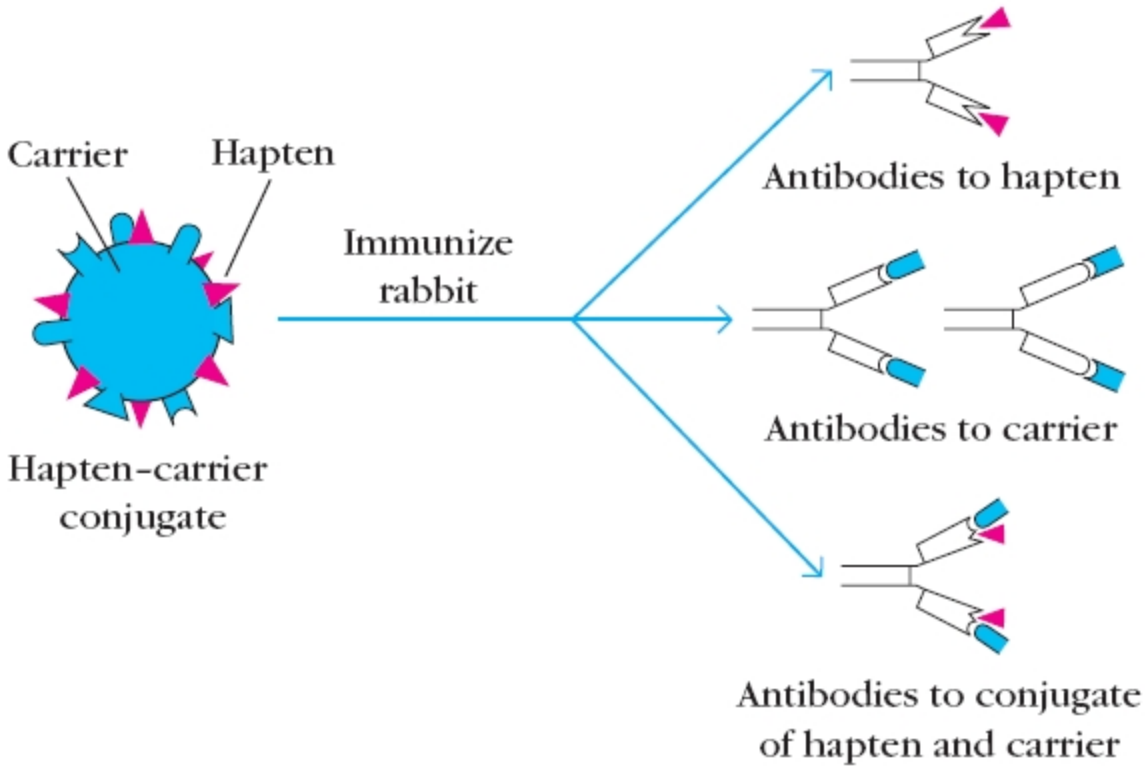
Notes

Epitope vs Paratope



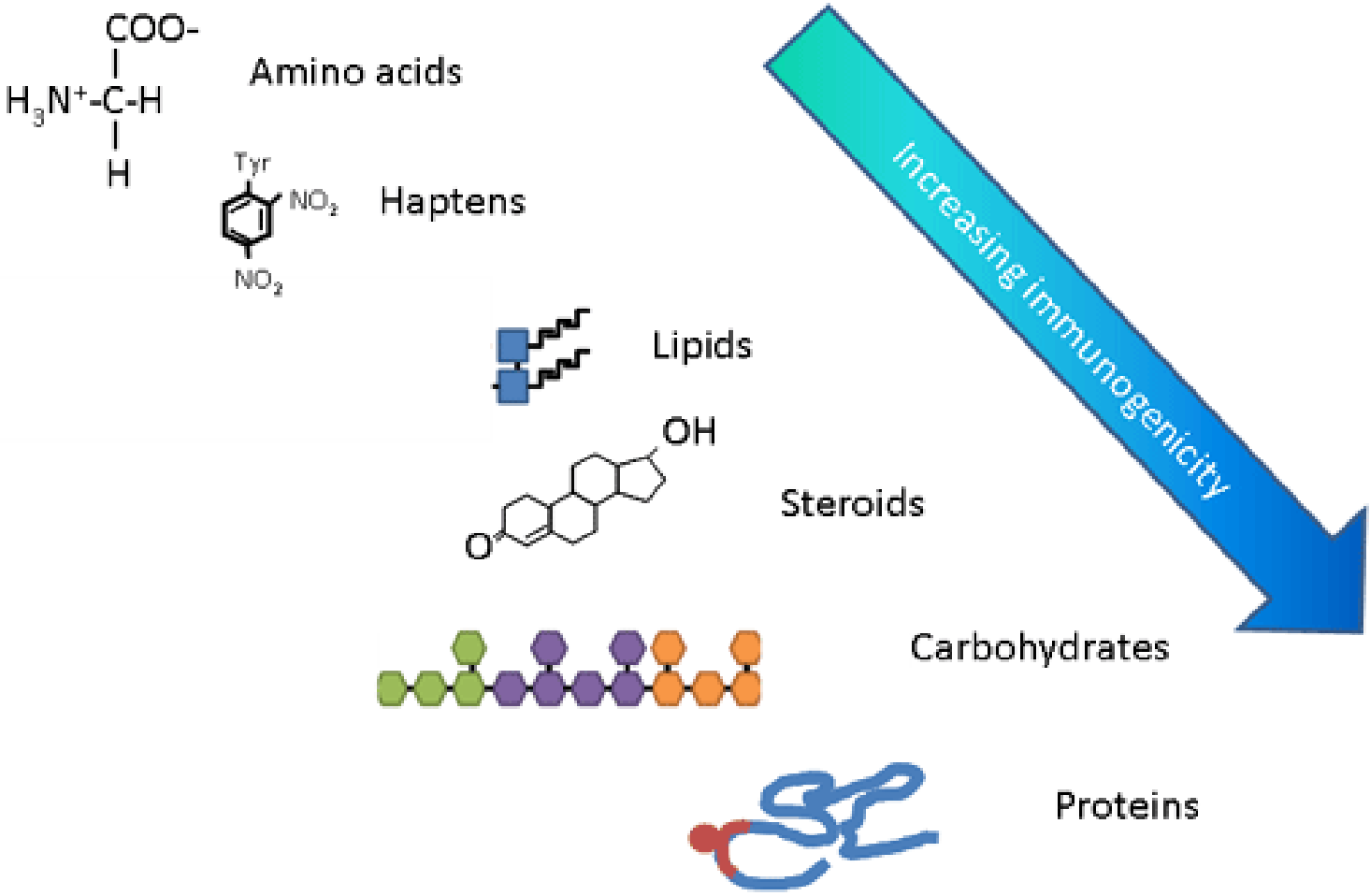


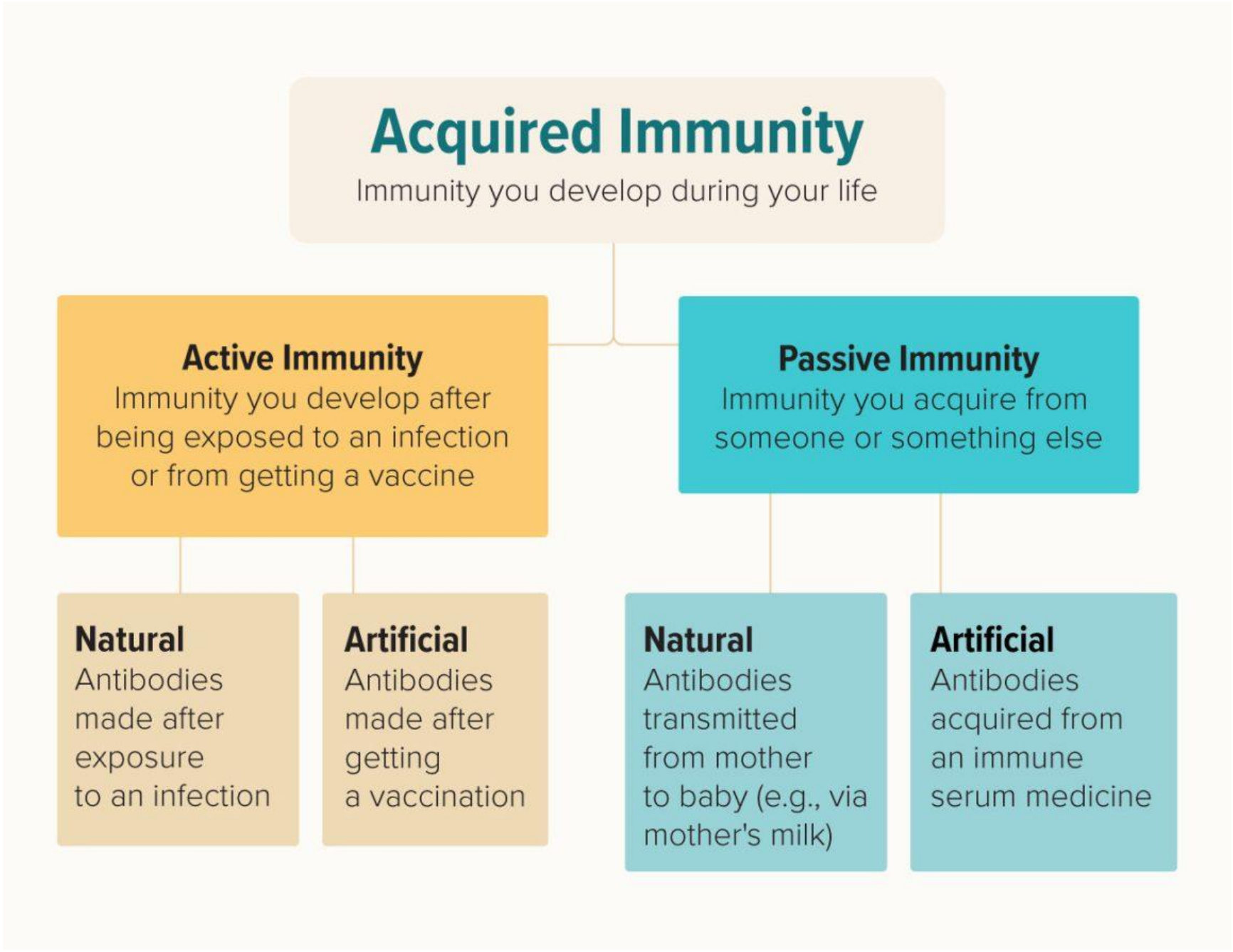


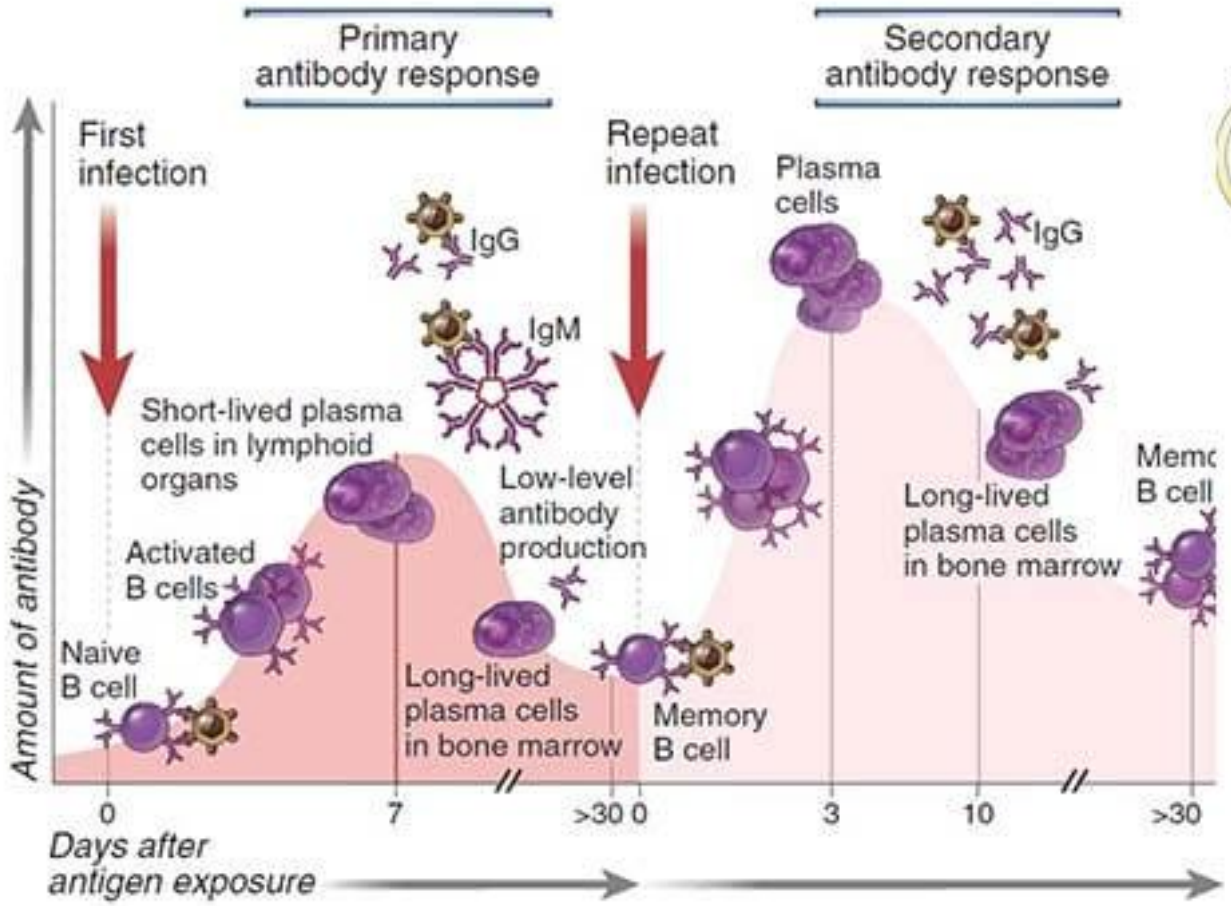


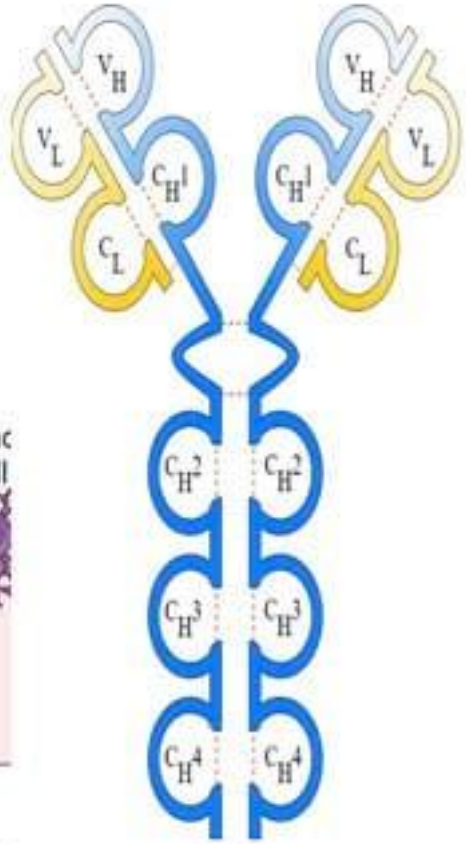
Injection with:	Antibodies formed:
Hapten (DNP)	None
Protein carrier (BSA)	Anti–BSA
Hapten–carrier conjugate (DNP-BSA)	Anti–DNP (major) Anti–BSA (minor) Anti–DNP/BSA (minor)

Immunogenicity




Acquired Immunity
Immunity you develop during your life
Active Immunity
Immunity you develop after being exposed to an infection or from getting a vaccine
Passive Immunity
Immunity you acquire from someone or something else
Natural
Antibodies made after exposure to an infection
Artificial
Antibodies made after getting a vaccination
Natural
Antibodies transmitted from mother to baby (e.g., via mother's milk)
Artificial
Antibodies acquired from an immune serum medicine


Primary antibody response
Secondary antibody response
First infection
Repeat infection
IgG
IgM
Plasma cells
IgG
Short-lived plasma cells in lymphoid organs
Low-level antibody production
Activated B cells
Long-lived plasma cells in bone marrow
Memo B cell
Naive B cell
Long-lived plasma cells in bone marrow
Memory B cell
Amount of antibody
0
7
>30
0
3
10
>30
Days after antigen exposure


V_H
V_L
C_H1
C_L
C_H2
C_H3
C_H4