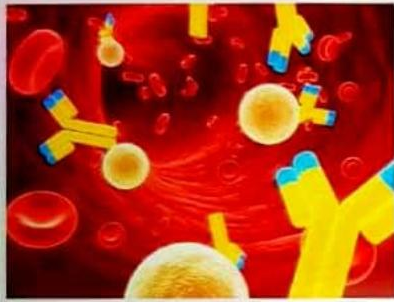
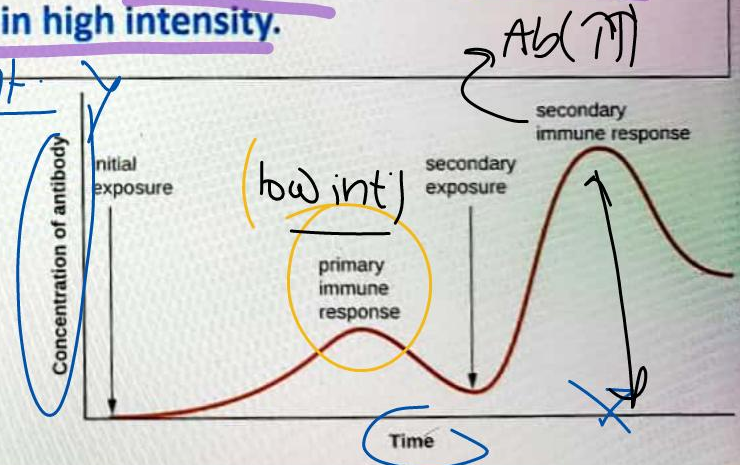
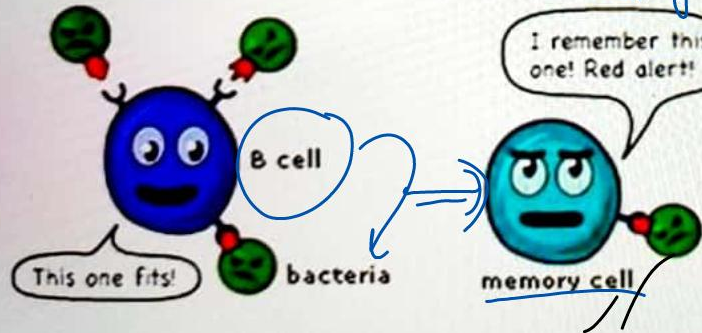


2. ACQUIRED IMMUNITY



- Pathogen specific immunity developed during life time.
- It is characterized by memory, i.e. during first encounter of a pathogen, body produces primary response in low intensity. Second encounter of the same pathogen causes a secondary (anamnestic) response in high intensity.



2. ACQUIRED IMMUNITY

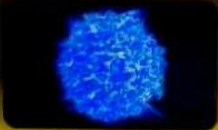
Primary & secondary immune responses are carried out with **B-lymphocytes (B-cells)** & **T-lymphocytes (T-lymphocytes)**.

B-lymphocytes

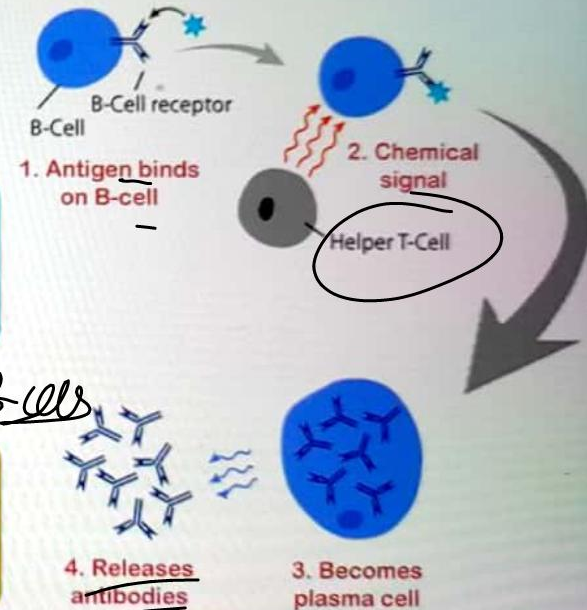


- Produce antibodies.
- These are the proteins to fight with pathogens.

T-lymphocytes



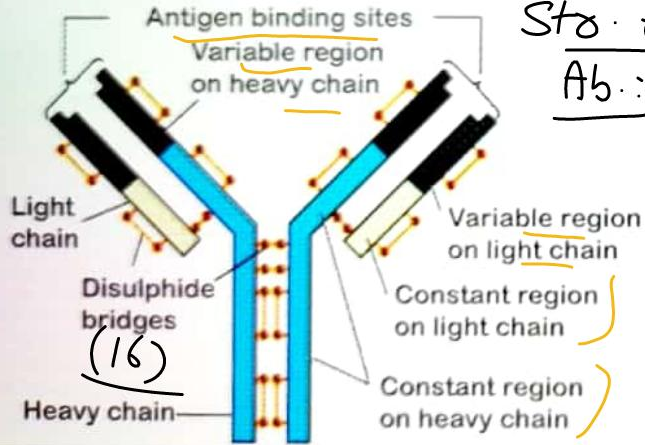
- Help B-cells to produce antibodies.



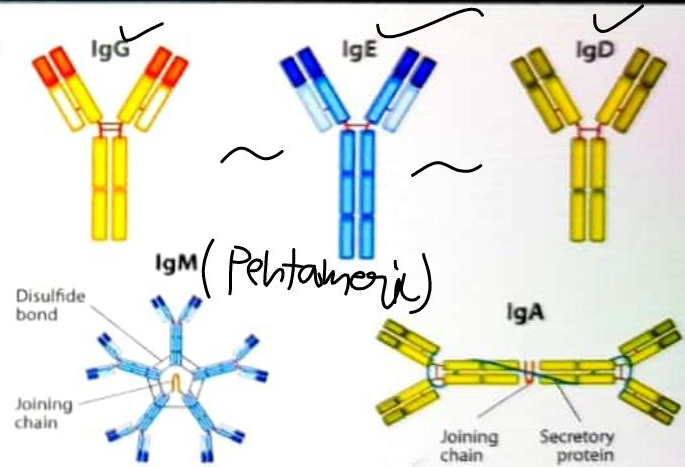
2. ACQUIRED IMMUNITY

Structure of Antibody

- An antibody has 4 polypeptide chains **2 light chains & 2 heavy chains** (H_2L_2).
- Types of antibodies: **IgA, IgG, IgM, IgE & IgD.**



Sto. of 5
Ab. :-



2. ACQUIRED IMMUNITY

Types of Acquired immune response

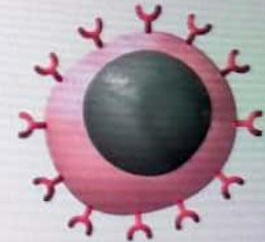
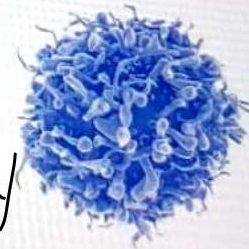
1. Humoral or Antibody mediated response/ Antibody mediated immunity (AMI)

→ "fluid"

(B-cell)

2. Cell-mediated response or cell-mediated immunity (CMI)

(T-cell)



2. ACQUIRED IMMUNITY

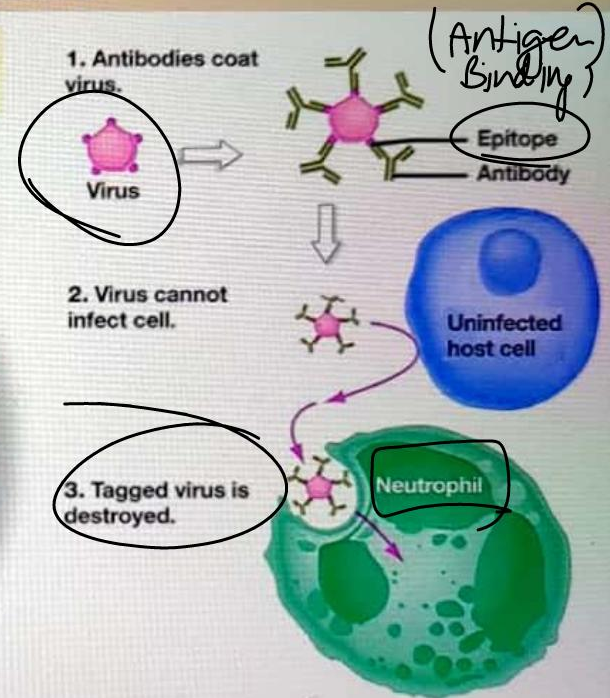
Types of Acquired immune response

Humoral or Antibody mediated response/
Antibody mediated immunity (AMI)

Cell-mediated response or cell-mediated immunity (CMI)

Epitope

- It is the immune response mediated by antibodies. *by B-cell*
- Antibodies are found in blood plasma. So called as Humoral immune response.



2. ACQUIRED IMMUNITY

Types of Acquired immune response

Cell-mediated response or cell-mediated immunity (CMI)

Basis of "Graft Rejection"

- It is the immune response mediated by T-lymphocytes (T-cells).
- The body can differentiate 'self' and 'non-self' and the CMI causes Graft rejection.

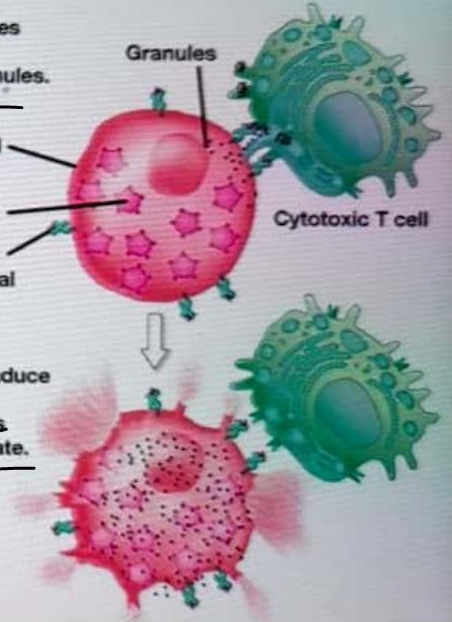
1. T cell makes contact and releases granules.

Virus-infected host cell
Virus particle
MHC protein displaying viral antigen

Granules

Cytotoxic T cell

2. Granules induce cell to self-destruct, virus cannot replicate.



HUMAN IMMUNE SYSTEM

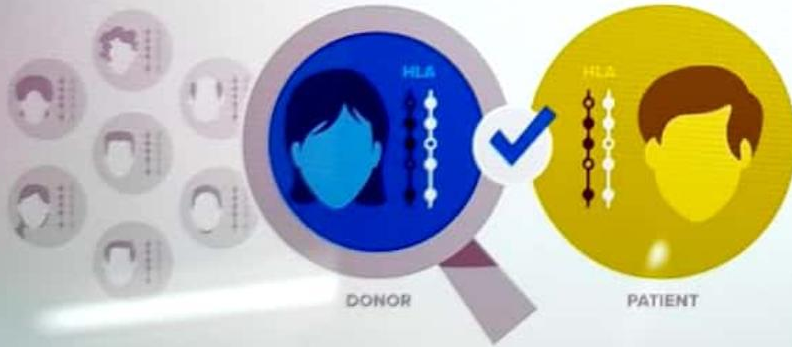
IMMUNITY

2. ACQUIRED IMMUNITY



Tissue matching & blood group matching are essential before undertaking any **graft/transplant**. After this, the patient has to take **immuno-suppressants** all his life.

Matching **donors** with **patients**.

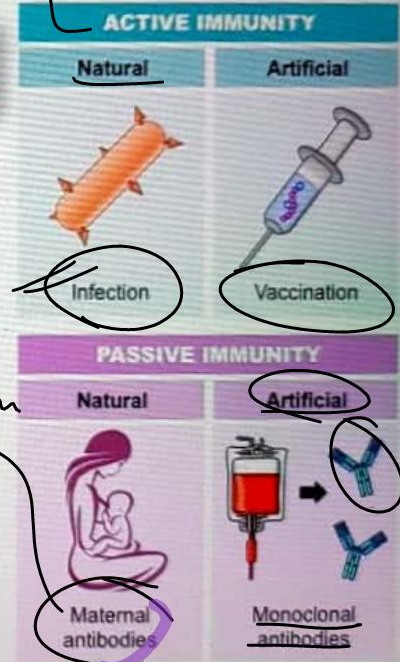
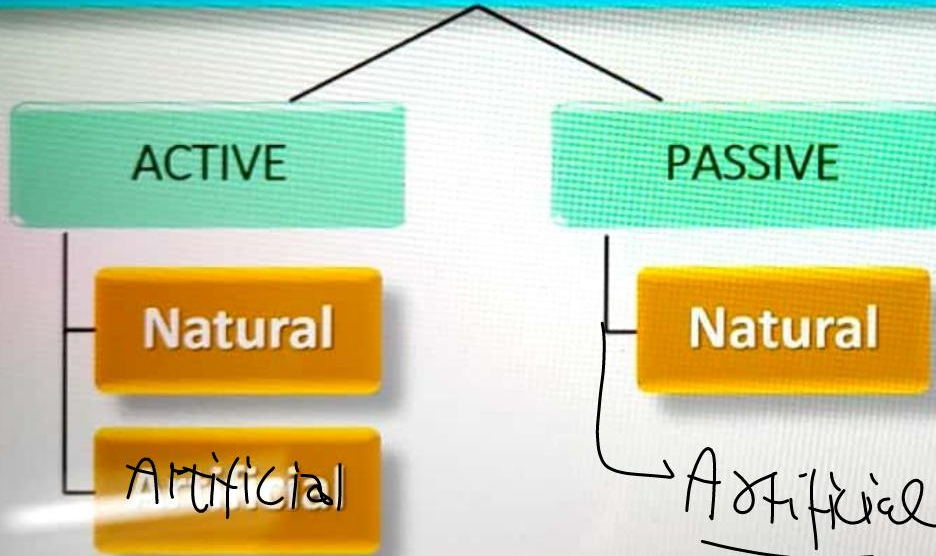


→ universal donor - (O)

Recipient	Blood donor			
	O	A	B	AB
O	✓	X	X	X
A	✓	✓	X	X
B	✓	X	✓	X
AB	✓	✓	✓	✓

2. ACQUIRED IMMUNITY

TYPES OF ACQUIRED IMMUNITY



2. ACQUIRED IMMUNITY

ACTIVE IMMUNITY

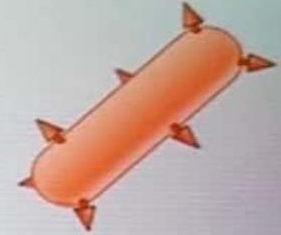
- It is the immunity in which antibodies are produced in a host body when the host is exposed to antigens (e.g. living or dead microbes or other proteins).
- It is a slow process. → 1 & 2
- It is produced by 2 ways:

1. Natural Active Immunity

- It is developed during natural infection by microbes.

2. Artificial Active Immunity

- It is developed by injecting microbes deliberately during immunization.



Infection



Vaccination

HUMAN IMMUNE SYSTEM

IMMUNITY

2. ACQUIRED IMMUNITY

IMMUNIZATION

↳ Creation of immunity

- This is based on 'memory' of the immune system.
- 2 types: -



1

Active (Vaccines)
immunization



2

Antidote
Passive (ATS,
immunization



HUMAN IMMUNE SYSTEM

IMMUNITY

2. ACQUIRED IMMUNITY

IMMUNIZATION

1

Active
immunization
(Vaccination)



- In this, a preparation of vaccine (antigenic proteins of pathogen or inactivated pathogen) is introduced into the body. It results in the development of antibodies.
- During actual infection, the antibodies neutralize antigens.



2. ACQUIRED IMMUNITY

IMMUNIZATION

1

Active
immunization
(Vaccination)



- The vaccines also generate *memory B and T cells*. They recognize the pathogen quickly. *
- E.g. *Polio vaccine, Hepatitis B vaccine, DPT vaccine* etc.
- *(OPV)* Vaccines are produced using DNA recombinant technology (E.g. Hepatitis B vaccine produced from Yeast).



HUMAN IMMUNE SYSTEM

IMMUNITY

2. ACQUIRED IMMUNITY

IMMUNIZATION

2

Passive immunization

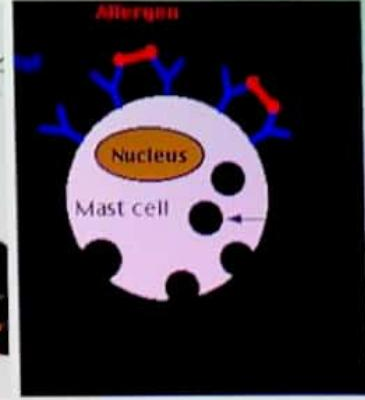
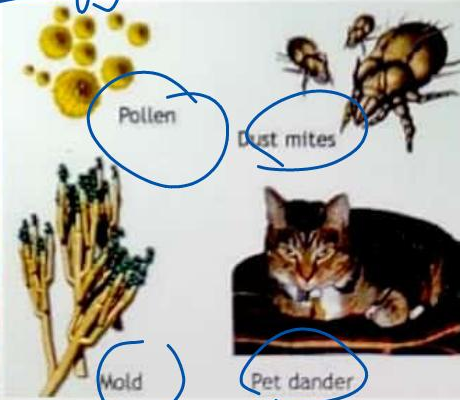


- It is the direct injection of pre-formed antibodies or antitoxin.
- It is required for quick immune response.
- E.g. Immunization against Tetanus, snake venom etc.



ALLERGY

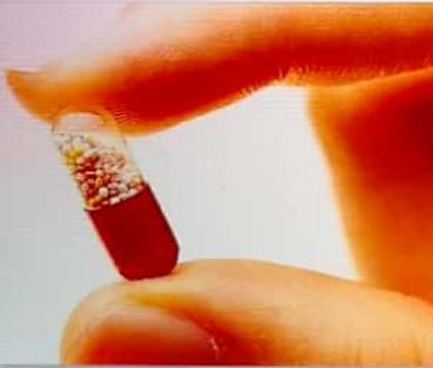
- It is the *exaggerated response of immune system to some antigens* seen in environment.
- **Allergens:** Substances causing allergy. E.g. mites in dust, pollens, animal dander, fur etc.
- Antibodies produced against the allergens are *IgE type*.
- IgE binds on **mast cells** to release chemicals like **histamine and serotonin** from them. It results in allergic reactions.



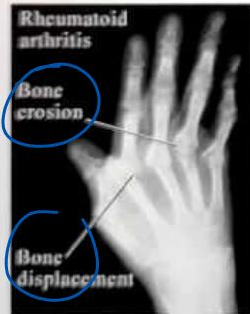
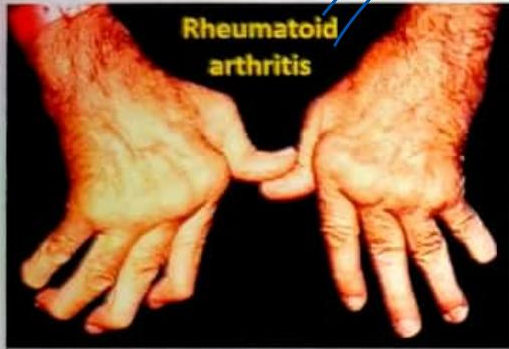
↳ skin allergy

ALLERGY

- **Treatment:** Drugs like anti-histamine, adrenaline and steroids quickly reduce the symptoms of allergy.
- Asthma is a respiratory disease due to allergy.
- Modern-day life style results lowering of immunity and more sensitivity to allergens. Many children in metro cities suffer from allergies and asthma due to sensitivity to the environment. This is due to the protected environment provided early in life.



AUTOIMMUNITY



- In higher vertebrates, memory based acquired immunity evolved based on the ability to differentiate foreign organisms from self-cells.
- Sometimes, due to genetic and other unknown reasons, the body attacks self-cells resulting in damage to the body. It is called auto-immune disease. E.g. Rheumatoid arthritis, Cystic Fibrosis

Myasthenia Gravis,

Consider the following four statements (1-4) regarding kidney transplant and select the two correct ones out of these.

- (1) Even if a kidney transplant is proper the recipient may need to take immuno-suppressants for a long time
- (2) The cell-mediated immune response is responsible for the graft rejection.
- (3) The B-lymphocytes are responsible for rejection of the graft.
- (4) The acceptance of rejection of a kidney transplant depends on specific interferons.

→ T-cell
 ↓
 Cell Mediated
 Immune
 Response.

The Two correct statement are

- (A) (2) and (3)
- (C) (1) and (3)

- ~~(B) (3) and (4)~~
- ~~(D) (1) and (2)~~

In higher vertebrates, the immune system can distinguish self-cells and non-self. If this property is lost due to genetic abnormality and it attacks self-cells, then it leads to

- (A) Graft rejection
- ~~(B) Auto-immune disease~~
- (C) Activate immunity
- (D) Allergic response

Self & Non-self^{cell} is not distinguished

Read the following statements:

(i) The main antibody produced as a result of allergic reaction is

IgA

→ IgE α

(ii) Modern day lifestyle has resulted in lowering of immunity and more sensitivity to allergens

(iii) Recombinant DNA technology has allowed the production of antigenic polypeptides of pathogen in bacteria or yeasts

(iv) Allergy is suppressed due to the release of histamine and serotonin.

(v) The drugs like anti-histamine adrenaline and steroids quickly reduce the symptoms of allergy

→ ANTI-Hist.

Which of the above statement are incorrect?

(A) (ii), (iii), (v)

~~(B) (i), (iv)~~

(C) (ii), (v)

(D) (ii), (iii)

Increased asthmatic attacks in certain seasons are related to :

(A) Hot and humid environment

(B) Eating fruits preserved in tin containers

~~(C) Inhalation of seasonal pollen~~ → allergy ⇒ Bronchial Asthma.

(D) Low temperature

Allergies could be because of

(A) Protected environment provided in early life

(B) Modern day lifestyle

(C) More sensitivity to the environment

~~(D) All of these~~

Mast cells secrete :

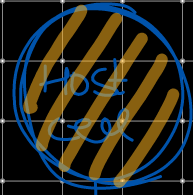
- (A) Hippurin → Protein which is involved in
inflammatory reactions.
- (B) Myoglobin
- ~~(C) Histamine~~
- (D) Haemoglobin

① Concentration:

IgG*
IgM
IgA
IgD
IgE

② Size:

IgM*
IgG
IgA
IgE
IgD



Cytotoxic T cell
releases granules

virus infected
HOST cell



APOPTOSIS ("prog. cell death")