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1. *Role of the immune system*

The role of the immune system is to protect our body from any foreign matters that might/ can cause any damage or homeostatic imbalance. The immune system has the ability to distinguish between foreign cells or organisms from host cells or organisms. The immune system acts on the foreign organism( microorganism, viruses or cancer cells) as a form of protection. The lack of immune response is called **TOLERANCE.**

1. *Types of immunity*

* Innate immune system; innate or non-specific immunity is the defense system in which a person is born with. It protects the body system against antigens. Innate immunity is first in line defense specified to confine infection and in immunity response. Innate immunity involves barriers that keep harmful materials from entering the body such as the epithelial of the skin, genitourinary tract, humoral component such as opsonins, and cellular component such as neutrophil, monocytes etc.

Mechanism of innate immunity works to inhibit the entry of pathogens into the body system or total elimination to prevent infection. Innate immune mechanism clear host cells and microbial debris from the body.

Examples of innate immune system include cough reflex, skin, stomach acid, mucous which traps bacteria and small particles etc.

*Functions of innate immunity*

1. Recruiting immune cells to sites of infection through the production of chemical factors.
2. Identification and removal of foreign materials found in the body system.
3. Activation of adaptive immune system through a process called **antigen presentation ( is the process by which protein antigen is presented to lymphocytes in form of short peptide fragments).**
4. Acts as a physical and chemical barrier to infectious agent.

* Adaptive immune system; It is also known as acquired immunity, is a subsystem of the immune system that is composed of specialized, systematic cells and processes that eliminates pathogens. Adaptive immunity is an immunity that occurs after the exposure to an antigen either from a pathogen or vaccination. This part of the immune system is activated when innate response is insufficient to control the infection.

Acquired immunity is highly specified to a particular pathogen, it involves an immunological memory that provides a long lasting protection. Acquired is divided into 2;

a) Natural

b) Artificial

a) Natural: Divided into;

i. Active; Antigens enter body naturally with response of Innate and adaptive immune systems. Provides long term protection.

ii. Passive; Antibodies pass from mother to fetus across placenta and infant in breast milk. It provides immediate short term protection.

b) Artificial: Divided into;

i. Active; Antigens enter body through vaccination with response of innate and adaptive immune system. Provides long term protection.

ii. Passive; Antibodies from immune individuals are injected into body, referred to as Immune serum globulins (ISG), Immune globulins (IG), Gamma globulins. It provides immediate short term protection.

Types of adaptive responses

* Cell-mediated immune response; immune response in which antigen T-cells is dominant
* Humoral immune response which is controlled by activated B-cell and antibodies. Can be transferred by non-immune recipient by serum.

Activated B-cell and T-cell are specified to molecular structures on the pathogen proliferation and the attack the invading pathogens. Their attack can kill pathogens directly or secrete antibodies that enhances phagocytosis of pathogens and disrupt infection.

Functions of adaptive immune system

* Recognition of specific “non-self” antigen in the presence “self” antigen during the process of antigen presentation.
* Development of immunological memory in which pathogens are remembered in component B-cells and T-cells.
* Generations of responses that are tailored to maximally eliminate specific pathogens or pathogen-infected cells.

1. *Types of antibodies*

* Immunoglobulin G (IgG); is a type of antibody representing approximately 80% of serum antibodies in human. IgG is the most common antibody found in the blood circulation, IgG molecules are created and released by Plasma B-cells.

Role of Immunoglobulin G

It controls the infection of body tissues by binding kinds of pathogen such as bacteria, viruses and fungi. It protects the body from infection. It also enhances phagocytosis, neutralizes toxins and viruses, protects fetus and newborns.

* Immunoglobulin M (IgM); it is the largest antibody, and the first antibody to appear when a pathogen or antigen enters the body system. IgM production is responsible in the spleen. It is found in the blood, lymph and B cell surface (monomer)

Role of Immunoglobulin M

It’s the first antibody produced during an infection. It’s effective against microbes and agglutinating antigens. It also interacts with several physiological molecules.

* Immunoglobulin A (IgA); it is an antibody that is found in mucosal areas or body secretions such as genitourinary tract, tears, saliva, respiratory and intestinal secretions and colostrum (first breast milk produced by a lactating mother). Very little amount of IgA is found in serum (10-15%), it is produced by B-cells, and located in secretions, blood and lymph.

Role of Immunoglobulin A

Localized protection of the mucosal surfaces and provides immunity to infant digestive tract.

* Immunoglobulin D (IgD); it is a type of antigen bound to B cells but doesn’t circulate, instead signals the cells to become active. It is made up of 1% protein in plasma membrane of immature B lymphocytes where it is co-expressed with IgM. It is produced in a secreted form that is found in very small amounts in serum (0.2%). It is located in B-cell surface, blood and lymph.

Role of Immunoglobulin D

It’s role in serum is still unknown. On B-cell surface, it initiates immune response.

* Immunoglobulin E (IgE); is a type of antibody that is synthesized by plasma cells. Monomers of IgE are two heavy chains and two light chains. It evolves as the last line of defense to protect against venoms. It’s percentage serum antibodies is 0.002%. It is located in the blood, bound to mast cell and basophils throughout the body.

Role of Immunoglobulin E

It’s main role is in immune defense against protozoan parasites such as *plasmodium falciparum.* It also has an essential role in Type I hypersensitivity such as allergic reactions and in Responses to allergens such as anaphylactic reactions to drugs, bee stings.