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**ANSWERS**

1. The immune system is to protect our body from any foreign matters that might cause damage or homeostatis imbalance. The success of the immune system depends on its ability to discriminate between foreign (non self) and host (self) cells.

 When a foreign matter enters the human body, our defense system recognizes this as foreign through the immune system. Each cell in the human body carries on its surface a mixture of protein and sugars that serve to identify the cell to the immune system. Foreign bodies lack identifiers that all of the body’s cells have, but each have unique features or antigens where the immune system attaches identifiers called **antibodies**. This **i**s the basis for the specific defense mechanisms.

Principal functions of the immune system are;

* To protect humans from pathogenic microorganisms
* Pathogenic microorganisms (pathogens)

-Microorganisms capable of causing infections and or diseases

* Infections

-Ability of pathogens to enter host, multiply and stimulate an immune response

* Disease

-clinical manifestation associated with infection, a deviation from the normal functioning of an organ

 (2) Immunity is defined as the ability of a host to resist a particular infection or disease.

 The two types of immunity are;

* **Innate (specific) immunity**

It is also called native immunity, exists by virtue of an organisms constitution, that is its genetic makeup, without an external stimulation or a previous infection. It is divided into two types; (a) non-specific innate immunity, a degree of resistance to all infections in general. (b) specific innate immunity, a resistance to a particular type of microorganism only.

-Host defense mechanism that act from the start of an infection but do not adapt to a particular pathogen

-Anatomic barriers (skin, mucous membranes)

-Physiological barriers (temperature, pH)

-Phagocytes barriers (cells that eat invaders)

-Inflammatory barriers (redness, swelling)

* **Adaptive (specific) immunity**

It can be sub-divided depending on how the immunity was introduced in ‘naturally acquired’ through chance contact with a disease-causing agent, whereas ‘artificially acquired immunity’ develops through deliberate actions such as **vaccination.** Bothnaturally andartificially acquired immunity can be further subdivided depending on whether the host build up immunity itself by antigen as ‘active immunity’ and lasts long-term, sometimes lifelong. ‘passive immunity’ is acquired through transfer(injection or infusion) of antibiotics or activated T-cells from an immune host; it is short lived usually lasting only a few months.

Adaptive immunity can also be divided by the type of immune mediators involved; **humoral** **immunity** is the aspect of immunity that is mediated by secreted antibodies, whereas **cell** **mediated immunity** involves T-lymphocytes alone. Humoral immunity is called active when the organism generates its antibodies , and passive when antibodies are transferred between individuals or species. Similarly , the cell mediated immunity is active when the organisms T-cells are stimulated, and passive when T-cells come from another organism.

* Response of an antigen specific B and T lymphocytes to an antigen
* Immunological memory
* Self and non-self recognition

(3)The different types of antibodies are;

* IgG
* IgM
* IgA
* IgE
* IgD
1. IgG- is the most abundant antibody isotype in the blood (plasma), accounting for 70-75% of human immunoglobulins (antibodies). IgG dexotifies harmful substances and is important in the recognition of antigen-antibody complexes by leukocytes and macrophages. IgG is transferred to the fetus through the placenta and protects the infant until its own immune system is functional.

Structure ; monomer

Percentage serum antibodies; 80%

Location; blood, lymph, intestine

Half-life in serum; 23 days

Complement fixation; yes

Placental transfer; yes

Known functions; enhances phagocytosis, neutralizes toxins and viruses, protects fetus and newborn.

1. IgM- IgM usually circulates in the blood, accounting for about 10% of human immunoglobulins. IgM has a pentameric structure in which five basic y-shaped molecules are linked together. B cells produce IgM first in response to microbial infection/antigen invasion. Althouh IgM has a lower affinity for antigens than IgG, it has higher avidity for antigens because of its pentameric/hexameric structure. IgM by binding to the cell surface receptor, also activates cell signaling pathways.

Structure; pentamer

Percentage serum antibodies; 5-10%

Location; blood, lymph, B cell surface (monomer)

Half –life in serum; 5 days

Complement fixation; yes

Placental transfer; no

Known functions; first antibodies produced during an infection. Effective against microbes and agglutinating antigens.

1. IgA- IgA is abundant in serum, nasal mucus ,saliva, breast milk, and intestinal fluid, accounting for 10-15% of human immunoglobulins. IgA forms dimers (i.e two IgA monomers joined together). IgA in breast milk protects the gastrointestinal tract of neonates from pathogens.

Structure; dimer

Percentage serum antibodies; 10-15%

Location; secretions (tears, saliva, intestine, milk)

Complement fixation; no

Placental transfer; no

Known fuctions; localized protection of mucosal surfaces. Provides immunity to infant digestive tract

1. IgE- IgE is present in minute amounts, accounting for no more than 0.001% of human immunoglobulins. Its original role is to protect against parasites. In regions where parasitic infections is rare, IgE is primarily involved in allergy.

Structure; monomer

Percentage serum antibodies; 0.002%

Location; bound to mast cells and basophils

Half-life in serum; 2 days

Complement fixation; no

Placental transfer; no

Known functions; allergic reactions. Possibly lysis of worms.

1. IgD- IgD accounts for less than 1% of human immunoglobulins . IgD may be involved in the induction of antibody production in B cells, but its exact function remains unknown.

Structure; monomer

Percentage serum antibodies; 0.2%

Location; B- cells surface, blood, and lymph

Half-life in serum; 3 days

Complement fixation; no

Placental transfer no

Known functions; in serum function is unknown. On B cell surface, initiate immune response.