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1. **THE ROLE OF THE IMMUNE SYSTEM**

The immune system functions as the body’s defense mechanism against invasion. Its role is to protect our body from any foreign matters that might cause any damage or homeostasis imbalance. The success of the immune system depends on its ability to discriminate between foreign or host cells. When an organism is threatened by microorganisms, viruses, or cancer cells, the immune system acts to provide protection. Normally the immune system does not mount a response against itself. This lack of an immune response is called tolerance.

When a foreign matter enters the human body, our defense system recognizes this as foreign through the immune system. There are three lines of defense: the first is to keep invaders out (through skin, mucus membranes, etc.), the second line of defense consists of non-specific ways to defend against pathogens that have broken through the first line of defense (such as with inflammatory response and fever). The third line of defense is mounted against specific pathogen that are causing disease (B cells produce antibodies against bacteria or viruses in the extracellular fluid, while T cells kill cells that have become infected).

1. **DESCRIPTION ON THE TWO TYPES OF IMMUNITY**

There are two general types of immunity: natural (innate) and acquired (adaptive). Natural immunity is a non-specific immunity present at birth. Acquired or specific immunity develops after birth. Natural immune responses to a foreign invader are very similar from one encounter to the next regardless of the number of times the invader is encountered; in contrast, acquired responses increase in intensity with repeated exposure to the invading agent. Although each type of immunity plays a distinct role in defending the body against harmful invaders, the various components usually acts in an inter-dependent manner.

**NATURAL IMMUNITY:**

Natural (innate) immunity provides a nonspecific response to any foreign invader, regardless of the invader’s composition. The basis of natural defense mechanisms is the ability to distinguish between friend and foe or “self” and “non self”. Such natural mechanisms include physical and chemical barriers, the action of WBCs, and inflammatory responses.

**Physical and chemical barriers:** Physical surface barrier include intact skin and mucous membranes, which prevent pathogens from gaining access to the body, and the cilia of the respiratory tract along with coughing and sneezing responses, which act to filter and clear pathogens from the upper respiratory tract before they can invade the body further. Chemical barriers, such as acidic gastric secretions, mucus, enzymes in tears and saliva, and substances in sebaceous and sweat secretions, act in a nonspecific way to destroy invading bacteria and fungi.

**White blood cell action:** WBCs or leukocytes, participate in both the natural and the acquired immune responses. Granular leukocytes, or granulocyte, fight invasion by foreign bodies or toxins by releasing cell mediators such as histamine, bradykinin, and prostaglandins, and engulfing the foreign bodies or toxins. Granulocytes include neutrophils, eosinophils, and basophils. Neutrophils are the first cells to arrive at the site where inflammation occurs. Eosinophils and basophils, other types of granulocytes, increase in number during allergic reactions and stress responses.

**Inflammatory Response:** This is a major function of the natural immune system elicited in response to tissue injury or invading organisms. Chemical mediators assist this response by minimizing blood loss, walling off the invading organism, activating phagocytes, and promoting formation of fibrous scar tissue and regeneration of injured tissue.

**ACQUIRED IMMUNITY**

Acquired (adaptive) immunity, immunologic responses acquired during life but not present at birth, usually develops as a result of prior exposure to an antigen through immunization (vaccination) or by contracting a disease, both of which generate a protective immune response. Weeks or months after exposure to the disease or vaccine, the body produces an immune response that is sufficient to defend against the disease upon re-exposure to it. The two types of acquired immunity are known as active and passive.

In active acquired immunity, the immunologic defenses are developed by the person’s own body. This immunity generally lasts many years or even a lifetime.

Passive acquired immunity is temporary immunity transmitted from another source that has developed immunity through previous disease or immunization. For example, immune globulin and antiserum, obtained from the blood plasma of people with acquired immunity, are used in emergencies to provide immunity to disease when the risk for contracting a specific disease is great and there is not enough time for a person to develop adequate active immunity.

1. **ANTIBODIES AND THEIR ROLES**

Antibodies are large protein called immunoglobulin because they are found in the globulin fraction of the plasma protein. All immunoglobulin are glycoproteins and contain a certain amount of carbohydrate. The body can produce five different types of immunoglobulins. Each of the five types, or classes, is identified by a specific letter of the alphabet (IgG, IgM, IgA, IgE, and IgD).

**IgG:** IgG is the most abundant antibody isotype in the blood (plasma), accounting for 70-75% of human immunoglobulin (antibodies). IgG detoxifies 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.

**IT’S ROLES:**

* Appears in serum and tissues (interstitial fluid)
* Activates the complement system
* Crosses the placenta
* Assumes a major role in bloodborne and tissue infections.

**IgM:** It 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.

**IT’S ROLES:**

* Appears as the first immunoglobulin produced in response to bacterial and viral infections
* Activates the complement system
* Appears mostly in intravascular serum

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

**IT’S ROLES:**

* Protects against respiratory, gastrointestinal, and genitourinary infections.
* Passes to neonate in breast milk for protection
* Appears in body fluids
* Prevents absorption of antigens from food

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

**IT’S ROLES:**

* Takes part in allergic and some hypersensitivity reactions
* Appears in serum
* Fights parasitic infections

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

**IT’S ROLE:**

* Possibly influences B-lymphocyte differentiation, but role is unclear
* Appears in small amounts in serum