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**MATRICULATION NUMBER: 17/MHS02/032**

**DEPARTMENT: NURSING SCIENCE**

**COURSE: MEDICAL SURGERY**

*ASSIGNMENT*

1. EXPLAIN THE ROLE OF THE IMMUNE SYSTEM
2. DESCRIBE THE TWO TYPES OF IMMUNITY
3. EXPLAIN THE DIFFERENT TYPES OF ANTIBODIES AND THEIR ROLES

*ANSWERS*

The **immune system** is a host defence system comprising many biological structures and processes within an organism that protects against disease.

1. The role of the immune system 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(non self) and host(self) 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 self. This lack of an immune response is called tolerance.

When a foreign matter enters the human body, our defense system recognises this as foreign through the immune system. How the human body recognise foreign against itself employs a complex "I.D." system. Each cell in the human body carries on it's surface a mixture of proteins and sugars that serve to identify the cell to the immune system. Foreign objects lack the identifiers that all of the body's cells have, but each one has unique features or antigens where the immune system attaches identifiers called antibodies. This is the basis for the specific defense mechanisms. Once you have built the antibodies for a specific antigen, the immune system will respond faster than if the had been no previous exposure to the antigen (i.e. you are immune to the pathogen, but only that specific pathogen, because your immune system responds faster.) The non-specific part of the immune system is mostly composed of phagocytes (eating-cells) which engulf and digest foreign substances like bacteria and viruses, which do not bear the body's specific identifiers.

2.There are two main types of immunity:**Innate**, also called natural or inherited, and **Adaptive**.

***Innate Immunity***

Plants and animals have what is called innate immunity. Innate immunity is the first line of defense against pathogens. It involves several cell types, proteins, and even an organ. The organ involved is your skin. Skin is part of the first line of defense. It protects you and prevents pathogens from getting inside your body.

Some ways a pathogen gets inside can be through air, food, or a break in the skin. A pathogen entering through food or air has mucus to go through. The mucosal surfaces prevent pathogens from attaching to cells and causing disease. A set of proteins called the complement system is also involved. The complement system attacks the pathogen and marks it for destruction.

A pathogen getting through skin and mucus will have to deal with several types of cells including phagocytes, eating cells, and natural killer (NK) cells before it can cause disease. Pathogens have a warning flag.

Neutrophils, macrophages, and dendritic cells are all phagocytes. They recognise the warning flag, attack the pathogen, and eat it - a process known as **phagocytosis**. If a pathogen is too big for one cell alone, several cells attack at once.

NK cells on the other hand, identify infected cells (host cells) and activate the host cell's death receptor pathway or give the cell a lethal injection (injecting enzymes that degrade proteins). Host cells even try to fight back by turning off machinery that would help the pathogen and sending out distress signals.

If pathogens make it through all this, it's time for adaptive immunity to step in, and they do this with the help of dendritic cells.

***Adaptive Immunity***

Adaptive immunity works slower than innate, and id more specific. There are two types : **PASSIVE** and **ACTIVE**.

 Passive immunity occurs when antibodies are passed from one person to another, as though transfusion.

 Active immunity involves two types of white blood cells - T-cells and B-cells. Dendritic cells, after they have eaten and digested the pathogen, present the pathogen pieces to T-cells, which activates (turns on) the T-cells.

3. There are five types of antibodies;

* IgG- gamma: IgG is the main type of antibody found in blood and extracellular fluid, allowing it to control infection of body tissues. By binding many kinds of pathogens such as viruses, bacteria, and fungi, IgG protects the body from infection.

FUNCTIONS

* IgG-mediated binding of pathogens causes their immobilization and binding together via agglutination; IgG coating of pathogen surfaces (known as opsonization) allows their recognition and ingestion by phagocytic immune cells leading to the elimination of the pathogen itself;
* IgG activates all the classical pathway of the complement system, a cascade of immune protein production that results in pathogen elimination;
* IgG also binds and neutralises toxins;
* IgM-: IgM is the largest antibody, and it is the first antibody to appear in the response to initial exposure to an antigen.

FUNCTION

1. IgM can bind complement component c1 and activate the classical pathway, leading to opsonization of antigens and cytolysis.
2. IgM binds to the polyimmunoglobulin receptor (pIgR) in a process that brings IgM to mucosal surfaces, such as the gut l and into breast milk. This binding depends on J chain.
* IgA- alpha

FUNCTIONS

The vast surfaces of the gastrointestinal, respiratory, and genitourinary tracts represent major sites of potential attack by invading micro-organisms. Immunoglobulin A (IgA), as the principal antibody class in the secretions that bathe these mucosal surfaces, acts as an important first line of defence. IgA, also an important serum immunoglobulin, mediates a variety of protective functions through interaction with specific receptors and immune mediators. The importance of such protection is underlined by the fact that certain pathogens have evolved mechanisms to compromise IgA-mediated defence, providing an opportunity for more effective invasion. IgA function may also be perturbed in certain disease states, some of which are characterised by deposition of IgA in specific tissues. This review details current understanding of the roles played by IgA in both health and disease.IgD- delta heavy chain

* IgE- epsilon

FUNCTION

 IgE's main function is immunity to parasites such as helminths like Schistosoma mansoni, Trichinella spiralis, and Fasciola hepatica. IgE is utilized during immune defense against certain protozoan parasites such as plasmodium falciparum. IgE may have evolved as a last line of defense to protect against venoms.

IgE also has an essential role in Type 1 hypersensitivity, which manifests in various allergic diseases, such as allergic asthma, most types of sinusitis, allergic rhinitis, food allergies, and specific types of chronic urticaria and atopic dermatitis. IgE also plays a pivotal role in responses to allergens, such as: anaphylactic reactions to drugs, bee stings, and antigen preparations used in desensitisation immunotherapy.