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**MEDICAL SURGICAL ASSIGNMENT**

1. **The role of immune system**
* To protect humans from pathogenic microorganisms
* Pathogenic microorganisms (Pathogens)
	+ Microorganisms capable of causing infection and/or disease
* Infection
	+ Ability of pathogen to enter host, multiply and stimulate an immune response
* Disease
	+ Clinical manifestations associated with infection, a deviation from the normal functioning of an organ

The role of the immune system is to protect our body from any foreign matters that might cause any 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 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 recognizes this as foreign through the immune system. How the human body recognize 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 specifc idenifers.

1. **Types of immunity**
* **Innate immunity:**

 Innate (natural) immunity does not require prior exposure to an antigen (ie, immunologic memory) to be effective. Thus, it can respond immediately to an invader. Innate immunity recognizes mainly antigen molecules that are broadly distributed rather than specific to one organism or cell. Components include Phagocytic cells innate lymphoid cells (e.g., natural killer [NK] cells) Polymorphonuclear leukocytes Phagocytic cells (neutrophils in blood and tissues, monocytes in blood, macrophages in tissues) ingest and destroy invading antigens. Attack by phagocytic cells can be facilitated when antigens are coated with antibody (Ab), which is produced as part of acquired immunity, or when complement proteins opsonize antigens. Natural killer cells kill virus-infected cells and some tumor cells. Polymorphonuclear leukocytes (neutrophils, eosinophils, basophils) and mononuclear cells (monocytes, macrophages, mast cells) release inflammatory mediators.

* **Active Immunity:**

 Acquired (adaptive) immunity requires prior exposure to an antigen and thus takes time to develop after the initial encounter with a new invader. Thereafter, response is quick. The system remembers past exposures and is antigen-specific. Components include T cells B cells Acquired immunity includes:

•Cell-mediated immunity: Derived from certain T-cell responses

● Humoral immunity: Derived from B-cell responses (B cells secrete soluble antigen-specific antibody) B cells and T cells work together to destroy invaders. Antigen-presenting cells are needed to present antigens to T cells.

1. **Types of antibodies and their functions**

There are five different antibody isotypes seen in humans: IgG, IgA, IgM, IgE, and IgD.

* **IgG**

IgG is the most abundant antibody isotype in the blood (plasma), accounting for 70-75% of human immunoglobulins (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.

* **IgM**

IgM is one of the first types of antibody to be produced after a pathogen has entered the body. Since it is made up of five Ig subunits bound together, it has very high avidity. In other words, it sticks very strongly to its target. IgM is very important in the early stages of an infection. IgM sometimes appears when an infection becomes reactivated, such as with a herpes outbreak. It can also appear when someone is reexposed to a disease they've previously gotten rid of.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.
Although 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.

* **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.

* **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 infection is rare, IgE is primarily involved in allergy.

* **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.