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Assignment:1) Explain the role of immune system.

2. Explain two types of immunity
3. Explain different types of antibodies and their roles.

1. **ROLE OF IMMUNE SYSTEM**

The immune system distinguishes self from nonself and eliminates potentially harmful nonself molecules and cells from the body. The immune system also has the capacity to recognize and destroy abnormal cells that derive from host tissues. Any molecule capable of being recognized by the immune system is considered an antigen (Ag). The skin, cornea, and mucosa of the respiratory, GI, and GU tracts form a physical barrier that is the body's first line of defense. Some of these barriers also have active immune functions:

- Outer, keratinized epidermis: Keratinocytes in the skin secrete antimicrobial peptides (defensins), and sebaceous and sweat glands secrete microbe-inhibiting substances (eg, lactic acid, fatty acids). Also, many immune cells (eg, mast cells, intraepithelial lymphocytes, antigen-sampling Langerhans cells) reside in the skin.
- Mucosa of the respiratory, GI, and GU tracts: The mucus contains antimicrobial substances, such as lysozyme, lactoferrin, and secretory IgA antibody (SIgA).

Breaching of anatomic barriers can trigger 2 types of immune response:

- Innate
- Acquired

Many molecular components (eg, complement, cytokines, acute phase

proteins) participate in both innate and acquired immunity.

2. **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 (eg, 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.

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

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

•IgG is the antibody isotype that most people think of when they're talking about antibodies. It is the antibody that is built by immunization. It activates an immune cascade that can eliminate some forms of infection. IgG can also neutralize certain toxins.

•IgA is the antibody isotype that is found in usually mucosal areas, such as the mouth and the vagina. It can also be found in saliva, tears, and breast milk. IgA is formed by two Ig subunits bound together. When IgA binds to a target, it can stimulate inflammation. In mucosal areas, IgA can also keep pathogens from sticking to epithelial cells.The production of IgA against inappropriate targets is associated with certain autoimmune diseases, such as celiac disease.

•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.

•IgE is the antibody that is responsible for the allergic response.It is mostly found in the lungs, skin, and mucous membranes. When IgE binds to an allergen, it starts the histamine reaction. It's the histamine reaction that causes the symptoms of an allergy attack. This single subunit antibody also helps to protect the body from parasitic worms.

•IgD is important in the early stages of the immune response. Bound to

B cells, it does not circulate.Instead, it signals those cells to become active. This can help to stimulate inflammation. IgD is the least understood type of antibody, and its functions are still being discovered.