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Commentary

An Overview of Innate Immune System and its Functions

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DESCRIPTION

The innate immune system is the major immune system response seen in plants, fungi, insects, and primitive multicellular creatures, and it is an older evolutionary defense strategy. One of the two basic immunity systems in vertebrates is the innate, or nonspecific, immune system. Physical, chemical, and biological barriers are examples of anatomical barriers. The epithelial surfaces operate as the initial line of defense against invading organisms, forming a physical barrier that is impenetrable to most pathogens. Desquamation of the epithelial surface of the skin also aids in the removal of bacteria and other infectious organisms that have stuck to it. The absence of blood vessels, the epidermis' inability to hold moisture, and the presence of sebaceous glands in the dermis provides an unfavorable environment for microbial life. Movement in the gastrointestinal and respiratory tracts is caused by peristalsis or cilia, aids in the removal of pathogens. Mucus also acts as a barrier to infectious pathogens. By secreting harmful compounds or competing with pathogenic bacteria for nutrition or cell surface attachment sites, gut flora can prevent pathogenic bacteria from colonizing the gut. Tears and saliva flush the eyes and mouth, which helps to avoid infection.

Functions of innate immune system

- Attract immune cells to infection sites by creating chemical substances like as cytokines, which are chemical mediators.
- Initiate the complement cascade in order to detect bacteria, stimulate cells, and enhance the clearance of antibody complexes or dead cells.
- Use specialized white blood cells to recognize and eliminate foreign compounds found in organs, tissues, blood, and lymph.
- Antigen presentation activates the adaptive immune system.
- Acts as a physical and chemical barrier to infectious pathogens, using physical barriers like skin and chemical barriers like clotting factors in blood, which are produced when a contusion or other damage breaks through the first-line physical barrier.

Inflammation is one of the immune system's earliest reactions to infection or irritation. Chemical factors generated by wounded cells induce inflammation. It creates a physical barrier against infection and aids the recovery of any damaged tissue once the pathogen has been removed.

Acute inflammation is triggered by resident macrophages, dendritic cells, histiocytes, Kupffer cells, and mast cells, which are found in all organs. Pattern Recognition Receptors (PRRs), which are found on the surface or inside these cells, identify chemicals that are widely shared by pathogens but distinct from host molecules, and are generally referred to as pathogen-associated molecular patterns. These cells get activated when an infection, a burn, or other injury occurs, and they produce inflammatory mediators that cause the clinical indications of inflammation.

Histamine, bradykinin, serotonin, leukotrienes, and prostaglandins are chemical substances released during inflammation that sensitize pain receptors, promote local dilatation of the blood vessels, and attract phagocytes, particularly neutrophils.

Other components of the immune system are subsequently triggered by neutrophils producing substances that summon more leukocytes and lymphocytes. The inflammatory response is mediated by cytokines released by macrophages and other cells of the innate immune system. TNF, HMGB1, and IL-1 are examples of these cytokines.

Leukocytes are another term for white blood cells. Because most leukocytes are not intimately connected with a specific organ or tissue, their function is comparable to that of single-cell organisms. Most leukocytes can freely migrate and interact with cellular detritus, foreign particles, and invading microbes, capturing them. Most innate immune leukocytes, unlike many other cells, are the offspring of multipotent hematopoietic stem cells found in bone marrow. Natural killer cells, mast cells, eosinophils, and basophils are examples of innate leukocytes, while macrophages, neutrophils, and dendritic cells are examples of phagocytic cells.

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