G D B **BIO-201 Cell Biology**



By

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Solution:

Role of Immune System against pathogens:

The primary function of the immune system is to defend the body from pathogens, which are disease-causing organisms such as viruses and bacteria. Tissues, cells, and proteins in the immune system work together to achieve this function. To fight infections, the immune system must be able to identify pathogens.

To fight infections, the immune system must be able to identify pathogens. Pathogens have molecules called antigens on their surface. Antigens provide a unique signature for the pathogen that enables immune system cells to recognize different pathogens and distinguish pathogens from the body's own cells and tissues. When a pathogen gets into the body, the immune system reacts in 2 ways.

The innate immune response against pathogens is a rapid reaction. Innate immune cells recognize certain molecules found on many pathogens. These cells also react to signaling molecules released by the body in response to infection. Through these actions, innate immune cells quickly begin fighting an infection. This response results in inflammation. The

cells involved in this reaction can kill pathogens and can also help activate cells involved in adaptive immunity.

The adaptive immune response against pathogens is slower than the innate response but is better able to target specific pathogens. There are 2 main cell types involved in this response: T cells and B cells. Some T cells kill pathogens and infected cells. Other T cells help control the adaptive immune response. The main function of B cells is to make antibodies against specific antigens. Antibodies, also known as immunoglobulins, are proteins that attach themselves to pathogens. This signals immune cells to destroy the pathogen.

Immune system mechanism against virus

Innate response against viruses

The most effective mechanisms of the innate response against viral infections are mediated by interferon and by the activation of NK cells. These mechanisms are mainly aimed against infected cells.

Interferon is a cytokine with three different types: a, b and g. The first two are mainly produced by monocytes-macrophages and to a lesser extent by fibroblasts. However, interferon-g is produced by CD 4 and CD 8 lymphocytes and NK cells. Interferon has a stong anti-viral action and promotes different mechanisms such as: transitory resistance of cells; induction of different molecules with anti-viral activity; activation of genes expressing anti-viral proteins, and increasing the expression of SLA I and SLA II.

Adaptive response against viruses.

Adaptive immunity acts against both viral particles and infected cells. The most important mechanisms against viral particles are antibodies; while the cytotoxic mechanisms are the most important against infected cells. This is mediated by cells (CD 8+), antibodies and cells (ADCC) or antibodies and the complement (classical pathway).

The viral capsid is made of proteins and therefore, it is very antigenic. It induces the production of a large number of antibodies that can have different actions against the virus:

Neutralization of the infection (IgG, IgM and IgA), prevents the virus from entering the cells,

Viral aglutination (IgM), reduces the number of infectious agents. Phagocytosis activation forms the antigen-antibody complex and stimulates the Fc receptor on macrophages.

Regards:

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