



A Short Note on Immune System

Rakesh Shain*

Department of Immunology, MIT Academy of Sciences, Alandi, Pune, Maharashtra, India

DESCRIPTION

The immune system is a network of biological processes that protect an organism from disease. It recognizes and responds to a variety of pathogens, from viruses to parasites, objects such as cancer cells and tree debris, and distinguishes them from the organism's own healthy tissue. Many species have two major immune system subsystems. The innate immune system provides a pre-configured response to a variety of situations and stimuli. The adaptive immune system provides a tuned response to each stimulus by learning to recognize previously encountered molecules. Both use molecules and cells to perform their functions.

When bacteria like viruses enter your body, they attack and multiply, this is called an infection. Infections cause illnesses that make you sick. Your immune system protects you from illness by fighting off bacteria. The immune system is complex and ubiquitous. There are many cell types that circulate throughout the body or are present in specific tissues. Each cell type plays a unique role in different ways of detecting problems, communicating with other cells, and performing their functions. By understanding all the details behind this network, researchers can optimize their immune response to address specific problems, from infection to cancer.

Types of immunity

Innate immunity is to protect you by nature, it is the first line of defense of your body. This includes barriers such as skin and mucous membranes. They prevent contaminants from entering the body. It also contains cells and chemicals that can attack foreign substances. Active immunity, also called adaptive immunity, develops when you are infected with or vaccinated against a foreign substance. Active immunity is usually long-lasting. For many diseases, it can last your entire life. Passive immunity happens when you receive antibodies to a disease instead of making them through your own immune system. For example, newborn babies have antibodies from their mothers. People can also get passive immunity from blood products that contain antibodies. This type of immunity gives you immediate protection. But it only lasts for weeks or months.

Immune sensing

Innate immune cells use pattern recognition receptors to recognize the molecular structures produced by pathogens. They are proteins expressed primarily by cells of the natural immune system such as dendritic cells, macrophages, monocytes, neutrophils, epithelial cells, and distinguish between two classes of molecules: associated

with microbial pathogens. Damage-related molecular patterns associated with pathogen-associated molecular patterns Accompanied by components of the host cell released upon cell damage or cell death.

Innate immune cells

Cells of the innate immune system use pattern recognition receptors to recognize molecular structures. Phagocytosis is an important feature of the cell's innate immunity, which is carried out by cells called phagocytes that swallow pathogens and particles. Phagocytes generally patrol the body in search of pathogens, but cytokines can summon them to specific locations. When the pathogen is swallowed by phagocytes, it is trapped in intracellular vesicles called phagosomes, which then fuse with other vesicles called lysosomes to form phagolysosomes. Pathogens are killed by the activity of digestive enzymes or after respiratory bursts that release free radicals into phagolysosomes. Phagocytosis has evolved as a means of nutrient uptake, but its role is expanded in phagocytes and involves swallowing pathogens as a defense mechanism.

Inflammation

Inflammation is one of the first reactions of the immune system to infection. Symptoms of inflammation include redness, swelling, fever, and pain caused by increased blood flow to the tissues. Inflammation is caused by eicosanoids and cytokines released from damaged or infected cells. Eicosanoids include prostaglandins, which cause vasodilation associated with fever and inflammation, and leukotrienes, which attract specific white blood cells. Common cytokines include interleukins, which are involved in communication between leukocytes, chemokines, which promote chemotaxis, and interferon.

Humoral defenses

The complement system is a biochemical cascade that attacks the surface of foreign cells. It contains more than 20 proteins and is named after its ability to "supplement" the death of pathogens with antibodies. Complement is the major humoral component of the innate immune response. Many species have a complement system that includes non-mammals such as plants, fish, and some invertebrates. In humans, this response is activated by complement that binds to antibodies attached to these microorganisms, or by complement proteins that bind to carbohydrates on the surface of the microorganism. This recognition signal causes a rapid killing reaction. The rate of reaction is the result of signal amplification that occurs after continuous proteolytic activation of complement molecules, which are also proteases. After the complement proteins first bind to the microorganism, they activate their protease activity and then activate other complement proteases.

Correspondence to: Rakesh Shain, Department of Immunology, MIT Academy of Sciences, Alandi, Pune, Maharashtra, India, E-mail: srakesh@mit.ac.in

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