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Structural Concepts of Clinical Immunology

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Description

Immunology is the study of the immune system and is a very important branch of medical and biological sciences. The immune system protects us from infection through several lines of defense. When the immune system is not working properly, it can lead to diseases such as autoimmunity, allergies, and cancer. It is also now becoming clear that immune responses contribute to the development of many common diseases that are not traditionally considered immunological, including metabolic, cardiovascular and neurodegenerative diseases such as Alzheimer's.

An immunologist is a scientist and/or clinician who specialize in immunology. Many immunologists work in research-oriented laboratories, either in academia or in the private sector. Other immunologists known as clinical immunologists are physicians who focus on diagnosing and treating immune system disorders such as autoimmune diseases and allergies.

Microbial Immunology

The number of mechanisms that have evolved in microbes to undermine the immune response seems limitless. In recent years, it has become increasingly clear that microorganisms of many species have developed the ability to undermine the host's immune response. Pathogenic mycobacteria are intracellular parasites of macrophages and have acquired the ability to invade macrophages through several classes of receptors expressed on the surface of macrophages: receptors for complement component C3, mannose receptors, and scavenger receptors class A.

Innate immunity is the first line of defense and is nonspecific. This means that the reactions are the same for all potential pathogens, no matter how different they are. Innate immunity includes physical barriers (eg, skin, saliva, etc.) and cells. These components are "ready to use" and protect the body in the first days of infection. In some cases this is enough to eliminate the pathogen, in other cases the first line of defense is overwhelmed and a second line of defense occurs.

Adaptive immunity is the second line of defense, involving the construction of memories of the infections that have occurred so that they can be converted into an enhanced response that is specific to the pathogen or foreign substance. Adaptive immunity includes antibodies that generally target foreign pathogens that circulate freely in the bloodstream. T cells are also involved, specifically targeting pathogens with colonized cells and directly killing infected cells or helping to control the antibody response.

Pathogenic microbes trigger an immune response and manipulate the immune system during an infection. Researchers work with bacterial and eukaryotic microorganisms and viruses that cause a variety of diseases, including dengue, malaria, leishmaniasis, and tuberculosis. They are also interested in understanding how the immune response in host organisms reacts to infection.

It becomes apparent that commensal bacteria play an important role in various autoimmune and inflammatory diseases such as autism, Rheumatoid Arthritis (RA), and Inflammatory Bowel Disease (IBD). The identification of the family of TLR receptors that recognize microorganisms has contributed to the understanding that both commensal and periopathogenic bacteria can activate the innate immune response. Stress in the first years of life can have a lifelong impact on the microbial content of the gut and permanently alter immune function. It has long been known in psychiatry that stress in early life can also influence adult psychopathology.

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