

Innovative Aspects of Immunology

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DESCRIPTION

Immunology is the branch of biomedical science that encloses the study of structure and function of the immune system in all organisms. Immunology strives to understand what happens to the body during an allergic response and the factors responsible for causing them. This should lead to better methods of diagnosing, preventing and controlling allergic diseases.

Immunology charts, measures, and contextualizes the physiological functioning of the immune system in states of both health and diseases; malfunctions of the immune system in immunological disorders (such as autoimmune diseases, hypersensitivities, immune deficiency, and transplant rejection); and the physical, chemical, and physiological characteristics of the components of the immune system *in vitro*, *in situ*, and *in vivo*. Immunology has applications in numerous disciplines of medicine, particularly in the fields of organ transplantation, oncology, rheumatology, virology, bacteriology, parasitology, psychiatry, and dermatology.

The term was coined by Russian biologist Ilya Ilyich Mechnikov, who advanced studies on immunology and received the Nobel Prize for his work in 1908. He pinned small thorns into starfish larvae and noticed unusual cells surrounding the thorns. This was the active response of the body trying to maintain its integrity. It was Mechnikov who first observed the phenomenon of phagocytosis, in which the body defends itself against a foreign body.

Prior to the designation of immunity, from the etymological root *immunis*, which is Latin for "exempt", early physicians characterized organs that would later be proven as essential components of the immune system. The important lymphoid organs of the immune system are the thymus, bone marrow, and chief lymphatic tissues such as spleen, tonsils, lymph

vessels, lymph nodes, adenoids, and liver. When health conditions worsen to emergency status, portions of immune system organs, including the thymus, spleen, bone marrow, lymph nodes, and other lymphatic tissues, can be surgically excised for examination while patients are still alive. Many components of the immune system are typically cellular in nature and not associated with any specific organ, but rather are embedded or circulating in various tissues located throughout the body.

Clinical immunology

Clinical immunology is the study of diseases caused by disorders of the immune system (failure, aberrant action, and malignant growth of the cellular elements of the system). It also involves diseases of other systems, where immune reactions play a part in the pathology and clinical features.

The diseases caused by disorders of the immune system fall into two broad categories: Immunodeficiency, in which parts of the immune system fail to provide an adequate response (examples include chronic granulomatous disease and primary immune diseases); autoimmunity, in which the immune system attacks its own host's body (examples include systemic lupus erythematosus, rheumatoid arthritis, Hashimoto's disease and myasthenia gravis). Other immune system disorders include various hypersensitivities (such as in asthma and other allergies) that respond inappropriately to otherwise harmless compounds. The most well-known disease that affects the immune system itself is AIDS, an immunodeficiency characterized by the suppression of CD4+ ("helper") T cells, dendritic cells and macrophages by the Human Immunodeficiency Virus (HIV). Clinical immunologists also study ways to prevent the immune system's attempts to destroy allografts

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