



Pediatric Allergy and Immunology Outpatient Electronic Consultation Hours

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DESCRIPTION

The human body is a marvel of defence mechanisms, with one of the most remarkable being the immune system. Within this complex system lies adaptive immunity, a sophisticated defence mechanism that protects the body from a multitude of pathogens. In this comprehensive article, we delve into the intricate world of adaptive immunity, exploring its principles, components, functions, the process of immune memory, its role in vaccines, and its pivotal contribution to human health and well-being. The immune system is a complex network of cells, tissues, and molecules that work together to defend the body against harmful invaders, including bacteria, viruses, fungi, and parasites. Immunity can be broadly categorized into two types: Innate immunity, which provides immediate, non-specific defence against pathogens, and adaptive immunity, which offers a tailored, specific response based on prior exposure. Adaptive immunity, also known as acquired immunity or specific immunity, is a component of the immune system that develops a targeted response to pathogens. This immunity is characterized by its specificity and memory, allowing the body to recognize and defend against previously encountered pathogens. Adaptive immunity involves a complex interplay of cells, including T cells, B cells, and Antigen-Presenting Cells (APCs), and molecules like antibodies. The adaptive immune response begins with the recognition of antigens, which are specific molecular markers on pathogens. Antigen-Presenting Cells (APCs) play a crucial role in capturing and presenting antigens to T cells and B cells. T cells are a subset of lymphocytes that play a central role in cell-mediated immunity. They recognize antigens presented by APCs and can directly destroy infected cells or activate other immune cells. B cells are another subset of lymphocytes that produce antibodies, proteins that can neutralize pathogens or tag them for destruction. The process of antibody

production is known as humoral immunity. One of the defining features of adaptive immunity is its ability to remember previous encounters with pathogens. Memory T cells and memory B cells persist after an infection, providing a faster and more potent response upon re-exposure. The initial encounter with a pathogen leads to a primary immune response, while subsequent exposures trigger secondary immune responses characterized by a quicker and more robust reaction. Vaccination is a deliberate exposure to a harmless form of a pathogen or its components to stimulate adaptive immunity. By mimicking an infection without causing disease, vaccines prepare the immune system for future encounters with the actual pathogen. Herd immunity is a concept in which a sufficiently high proportion of a population is immune to a disease, either through vaccination or previous infection, thereby providing indirect protection to those who are not immune. Autoimmune diseases occur when the immune system mistakenly targets and attacks the body's own tissues and cells. Conditions like rheumatoid arthritis, lupus, and multiple sclerosis are examples of autoimmune diseases. Immunodeficiency disorders result from a weakened or dysfunctional immune system. They can be primary (inherited) or secondary (acquired). HIV/AIDS is a well-known example of a secondary immunodeficiency disorder. Immunotherapy is a rapidly advancing field that harnesses the power of adaptive immunity to treat various diseases, including cancer. Techniques like CAR-T cell therapy and immune checkpoint inhibitors have shown remarkable results.

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CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.

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