

Cell-mediated immunity: Unleashing the power of T Cells in immune defense.

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Introduction

The immune system is a complex network of cells, tissues, and organs that work together to protect the body from foreign invaders, such as viruses, bacteria, and cancer cells. One of the key components of the immune system is cell-mediated immunity, which relies on specialized cells to identify and eliminate pathogens. In this article, delving into the basics of cell-mediated immunity to shed light on the intricate processes involved. Cell-mediated immunity is a branch of the adaptive immune system that involves the activation and proliferation of T cells [1]. T cells are specialized white blood cells that recognize and respond to specific antigens, or foreign substances, that are displayed on the surface of infected or cancerous cells. This process requires the presentation of the antigen by specialized cells called antigen-presenting cells (APCs), such as dendritic cells and macrophages.

T cell activation and proliferation

The first step in cell-mediated immunity is the activation of T cells by APCs. The APCs display the antigen on their surface, where it can be recognized by T cells through their T cell receptors (TCRs). This recognition triggers a complex signalling cascade that ultimately leads to the activation and proliferation of the T cells. The activated T cells differentiate into different subtypes, each with a unique function in the immune response [2].

Effector T Cells: Effector T cells are T cells that have been activated and differentiated to perform a specific function in the immune response. There are several types of effector T cells, including cytotoxic T cells, helper T cells, and regulatory T cells. Cytotoxic T cells are responsible for directly killing infected or cancerous cells, while helper T cells assist other cells of the immune system in the response to infection. Regulatory T cells help to control the immune response and prevent damage to healthy cells and tissues [3].

Memory T Cells: Memory T cells are a type of T cell that are formed following an immune response and are capable of providing long-term protection against subsequent infections with the same pathogen. Memory T cells are able to recognize and respond to the antigen more quickly and efficiently than

naïve T cells, providing a rapid and robust immune response [4].

Limitations of cell-mediated immunity

While cell-mediated immunity is an important component of the immune response, it does have some limitations. For example, cell-mediated immunity is primarily effective against intracellular pathogens, such as viruses and some bacteria, but is less effective against extracellular pathogens, such as bacteria and fungi that are found outside of cells. Additionally, some viruses have evolved strategies to evade the immune system and prevent the activation of T cells [5].

Conclusion

Cell-mediated immunity is a crucial component of the immune system's response to pathogens and cancer cells. The process involves the activation and proliferation of T cells, which differentiate into effector T cells and memory T cells. While cell-mediated immunity has some limitations, on-going research is uncovering new strategies to enhance and optimize the immune response, leading to innovative approaches to preventing and treating infectious and neoplastic diseases.

References

1. Pearson MN, Raffel S. Macrophage-digested antigen as inducer of delayed hypersensitivity. *J Exp Med.* 1971;133(3):494-505.
2. Criswell BS, Butler WT, Rossen RD, et al. Murine malaria: The role of humoral factors and macrophages in destruction of parasitized erythrocytes. *J Immunol.* 1971;107(1):212-21.
3. Mackaness GB, Lagrange PH, Miller TE, et al. Feedback inhibition of specifically sensitized lymphocytes. *J Exp Med.* 1974;139(3):543-59.
4. Mackaness GB. The influence of immunologically committed lymphoid cells on macrophage activity *in vivo*. *J Exp Med.* 1969;129(5):973-92.
5. Notkins AL. Immune mechanisms by which the spread of viral infections is stopped. *Cell Immunol.* 1974;11(1-3):478-83.

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