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T Cells: The First Line of Defence

Miss. Vaishnavi S. Jadhav, Mr. Mahesh H. Mohite,
Miss. Swapnali T. Bhosle, Miss. Shrutika M. Yadav
Nootan College of Pharmacy, Kavathe Mahankal, Sangli, Maharashtra, India

Abstract: *T cells are a part of the immune system that focuses on specific foreign particles. Rather than generically attack any antigens, T cells play a critical part in immunity to foreign substances. The immune system's core component is the T cell, also known as the T lymphocyte. These cells are made for response to manage the infection to defend the body in this article the functions types and working of t cells and the immune response of t cells are highlighted.*

Keywords: Human Immune Response, Life Stages, Homeostasis, T lymphocyte, Immune Response, Defence Mechanism Of Human Body, T Cells

I. INTRODUCTION

Throughout a person's lifespan, T cells coordinate several components of adaptive immunity, such as reactions to infections, allergies, and malignancies. In mice models, the function of T cells is examined in relation to a particular pathogen, antigen, or disease situation over a short period of time, but in humans, T cells manage several insults concurrently across the body and uphold immunological homeostasis over extended periods of time. It is important to note that tissue localization and subset delineation are important factors in determining the functional role of T cells in immune responses as we explain how human T cells mature and provide crucial immune protection at various life stages in this study. We also go through the different age-related changes in T cell subset composition and function that occur over the course of a lifetime in anatomic compartments.

II. IMMUNE SYSTEM

Organs and cells that make up the immune system work together to keep us healthy. This is accomplished by making a distinction between what we refer to as self (our own healthy cells and tissue) and pathogens like bacteria, viruses, and fungus that cause illness. They are known as pathogens. Sometimes, the immune system is able to detect and eliminate cancer.

The majority of immune system cells are situated in our circulation. They are known as white blood cells, and they move to various parts of the body as needed. Hematopoietic stem cells, which are created in the bone marrow, are the source of their development.

2.1 What are Lymphocytes

One category of white blood cells is the lymphocyte. They are essential to our continued health. We would perish without them.

T cells defend us against infection. We are continually exposed to pathogens including bacteria, viruses, and fungus throughout our daily lives. Every exposure might be fatal without T lymphocytes, commonly known as T cells. T cells can eliminate malignant or contaminated cells. Additionally, they control the immune response by assisting B cells in eradicating foreign infections.

Antibodies are made by B cells. An antibody is a kind of protein produced by B lymphocytes, sometimes known as B cells. To kill diseases or foreign substances like poisons, these antibodies attach to them. An antibody, for instance, can attach to a virus and stop it from entering.

2.2 T cells

T cells are a part of the immune system that focuses on specific foreign particles. Rather than generically attack any antigens, T cells circulate until they encounter their specific antigen. As such, T cells play a critical part in immunity to foreign substances. The immune system's core component is the T cell, also known as the T lymphocyte.

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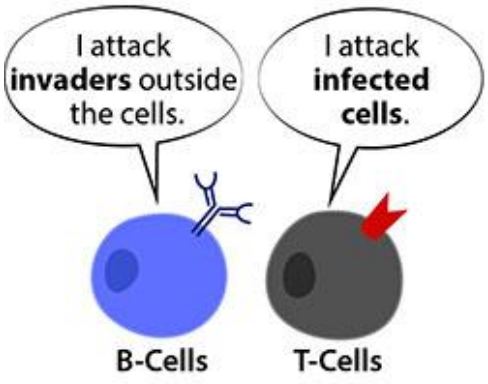
These cells were created particularly to combat illnesses that they had not yet encountered. Any research project could occasionally require T cells for isolation. They develop in the thymus before being discharged as immature T lymphocytes into the circulation. Unassigned T lymphocytes known as naive T cells look for an antigen-presenting cell (APC). Self-antigens and non-self antigens are both types of antigens.

2.3 B Cells

B cells or B lymphocytes, which are produced from bursae, are important components of the adaptive immune response that underlies humoral immunity in animals. Humans produce B cells throughout their lifetimes, first in the foetal liver intrauterine and then in the bone marrow following birth. Hematoietic stem cells are the source of their development. f B lymphocytes are a subset of cells that have immunoglobulin (Ig) receptors on their cell surfaces that are clonally diverse and specific antigenic epitopes.



2.4 T Cells and Cellular Mediated Immunity

A cell that has been infected by a virus is the first step in the activation of cytotoxic T cells, also known as CD8+ T cells. This infected cell generates viral proteins and peptides and harbours viral mRNA and DNA. The MHC class I on the surface of the infected cell displays these viral peptides.

By displaying the infectious proteins on its membrane, the infected cell is essentially sending a warning signalto CD8+ T cells. Through their T cell receptors (TCRs), CD8+ T cells identify viral peptides and release cytotoxins like perforin or granulysin that cause programmed cell death**.**

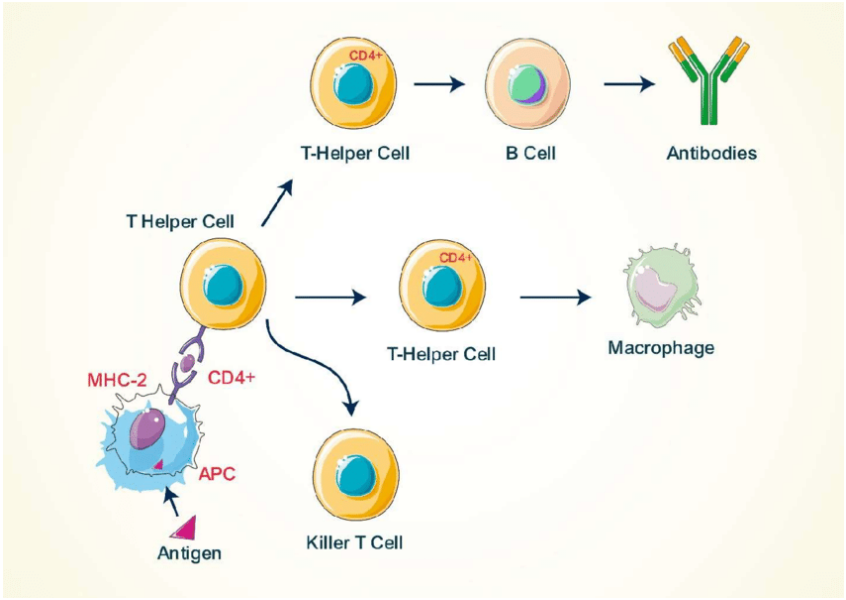


Image Source : Google/Activation Of T Cells

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As an alternative, the Fas ligand pathway can be used by cytotoxic T cells to destroy infected cells. The Fas ligand, which is produced by cytotoxic T cells, binds to transmembrane receptor proteins on the target cell. Through an intricate signalling mechanism, this interaction modifies the Fas proteins and causes cell death.

There are memory T cells in addition to helper and cytotoxic T cells. Memory T cells come in a variety of forms, but what sets them apart is their ability to swiftly activate a particular immune response even after an illness has been successfully treated. Memory T cells have a rapid ability to transform into effector T cells and target a pathogen they have previously seen.

Because T cells have a T-cell receptor (TCR) on their cell surface, they may be recognised from other white blood cells, which are the primary effector cells of the adaptive immune system. T cells move from the thymus gland where they differentiate into CD4+ and CD8+ T cells after being differentiated from bone marrow-derived hematopoietic stem cells. The CD4+ and CD8+ T cells' periphery undergoes further differentiation into a number of subtypes, each of which plays a unique function in the development of an immune response. For both CD4+ and CD8+ T cells to become activated, antigen must be presented by MHC class II or I via specialist antigen-presenting cells, such as dendritic cells and B cells.

III. CONCLUSION

T cells can play different roles. They can act as “killer cells”, attacking cells which have been infected with a virus or another kind of pathogen, or they can act as “helper cells” by supporting B cells to produce antibodies. Regulatory T cells suppress your immune system to keep its response in check. In addition to preventing autoimmune disease, they also prevent other white blood cells from fighting real or perceived antigens. Perceived antigens include substances like allergens and normal flora bacteria in the gastrointestinaltract. Allergens are things that cause an allergic reaction, which could include pollen, molds, or pet dander.

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