

CD4 Human, Active

CD4 Human Recombinant, Active

CDA0074

Product Overview

Name	CD4 Human, Active
Accession(Primary)	P01730
Immunogen	Activated Human B cells.
Description	CD4 Human Recombinant, Active

Target information (P01730)

Gene Name

About Gene Symbol

Background

CD4 protein, also known as Cluster of Differentiation 4, is a cell surface glycoprotein primarily expressed on helper T cells. It plays a crucial role in immune system regulation by mediating interactions between T cells and antigen-presenting cells (APCs). This research aims to explore the function, signaling pathways, and significance of CD4 protein in T cell biology and disease pathogenesis.

Function of CD4 Protein: CD4 protein serves as a co-receptor for the T cell receptor (TCR) and interacts with major histocompatibility complex class II (MHC-II) molecules on APCs. This interaction enables CD4+ T cells to recognize and respond to antigenic peptides presented by MHC-II. CD4 protein enhances TCR signaling and facilitates the formation of immunological synapses between T cells and APCs, thereby promoting efficient T cell activation, proliferation, and differentiation.

Role of CD4 Protein in T Cell Differentiation: CD4 protein is involved in determining the differentiation fate of CD4+ T cells. By interacting with specific cytokines secreted by APCs, CD4 protein directs the differentiation of naive T cells into distinct effector T cell subsets, including Th1, Th2, Th17, and regulatory T cells (Tregs). Each subset exhibits unique functions and cytokine profiles, contributing to immune responses, inflammation,

and immune tolerance. **Signaling Pathways Activated by CD4 Protein:** Upon engagement with MHC-II, CD4 protein initiates signaling cascades that regulate T cell activation and differentiation. The cytoplasmic tail of CD4 contains conserved motifs, such as immunoreceptor tyrosine-based activation motifs (ITAMs) and proline-rich regions, which recruit and activate various signaling molecules, including protein kinases and adaptor proteins. These signaling events culminate in the activation of transcription factors, such as NF- κ B and AP-1, which control gene expression required for T cell function. **Implications of CD4 Protein in Disease Pathogenesis:** Dysregulation of CD4 protein expression or function can lead to immune dysfunctions and contribute to the development of various diseases. CD4 protein is a primary receptor for human immunodeficiency virus (HIV) entry into CD4⁺ T cells, resulting in the destruction of these crucial immune cells and the progression of acquired immunodeficiency syndrome (AIDS). Moreover, altered CD4⁺ T cell responses and imbalances in T cell subsets have been associated with autoimmune diseases, allergic reactions, and chronic inflammatory conditions. **Conclusion:** The investigation of CD4 protein in T cell biology provides valuable insights into its role in immune system regulation and disease pathogenesis. Understanding the function and signaling pathways of CD4 protein enhances our knowledge of T cell activation, differentiation, and immune responses. Further research on CD4 protein may lead to the development of targeted therapies for immune-related disorders and provide novel strategies for immune modulation.