Protein receptor

A protein receptor is a specialized protein molecule found on the cell surface or within cells. These receptors have a specific shape and binding site that allows them to interact with and respond to specific signaling molecules, such as hormones, neurotransmitters, growth factors, or other ligands. When a signaling molecule binds to its corresponding receptor, it triggers a series of biochemical reactions within the cell, leading to specific cellular responses.

The interaction between a signaling molecule (ligand) and its receptor is often likened to a “lock and key” mechanism. The ligand acts as the key that fits into the receptor's lock, resulting in a conformational change in the receptor that initiates the cellular response. This response can include changes in gene expression, activation of intracellular signaling pathways, alterations in cell metabolism, or modifications in cell membrane properties.

There are various types of protein receptors, and they play crucial roles in almost every physiological process within the human body. Some common types of protein receptors include:

G protein-coupled receptors (GPCRs): These receptors are the largest family of cell surface receptors and are involved in transmitting signals from extracellular molecules (ligands) to intracellular signaling pathways through interactions with G proteins.

Enzyme-linked receptors: These receptors possess intrinsic enzyme activity or are associated with intracellular enzymes. Ligand binding to these receptors activates the enzymatic function, initiating specific cellular responses.

Ion channel receptors: These receptors are involved in regulating the flow of ions (e.g., sodium, potassium, calcium) across cell membranes, thus controlling electrical signals in neurons and muscle cells.

Nuclear receptors: These receptors are found in the cell nucleus and function as transcription factors, regulating gene expression by binding to specific DNA sequences in the promoter regions of target genes.

Protein receptors are crucial for communication between cells, tissues, and organs, and they are essential for maintaining the body's homeostasis and responding to various external and internal stimuli. Dysregulation or dysfunction of protein receptors can lead to various diseases and disorders, making them important targets for pharmaceutical interventions and therapeutic strategies. Studying protein receptors and their signaling pathways is fundamental to understanding cellular physiology and developing new treatments for a wide range of medical conditions.

In biochemistry and pharmacology, a receptor is a protein molecule usually found embedded within the plasma membrane surface of a cell that receives chemical signals from outside the cell. When such chemical signals bind to a receptor, they cause some form of cellular/tissue response, e.g. a change in the electrical activity of the cell. In this sense, a receptor is a protein molecule that recognises and responds to endogenous chemical signals, e.g. the acetylcholine receptor recognizes and responds to its endogenous ligand, acetylcholine. However sometimes in pharmacology, the term is also used to include other proteins that are drug targets, such as enzymes, transporters and ion channels.

see Angiotensin-converting enzyme 2 receptor

see Cell surface receptor

see Estrogen receptor

see Growth factor receptor

see Opioid receptor

see VEGF receptor.