

JAK-STAT signaling overview

The cytokine-activated Janus kinase (JAK)-signal transducer and activator of transcription (STAT) pathway has an important role in the control of immune responses. Dysregulation of JAK-STAT signaling is associated with various immune disorders. The JAK-STAT signaling pathway transmits information from extracellular chemical signals to the nucleus resulting in DNA transcription and expression of genes involved in immunity, proliferation, differentiation, apoptosis and oncogenesis. This pathway plays a prominent role in mediating signal transduction for many cytokines. Mechanistically, JAK-STAT signaling is relatively simple, the signaling cascade consists of three main components: a JAK binding receptor, a Janus kinase (JAK) and signal transducer and activator of transcription (STAT) protein.

JAK binding receptor

Many cytokines and growth factors transmit signals through the [JAK-STAT signaling pathway](#), including interleukins 2-7 (IL2-7), granulocyte-macrophage colony stimulating factor (GM-CSF), growth hormone (GH), (Epidermal growth factor (EGF), platelet-derived growth factors (PDGF) and interferons (IFN). These cytokines and growth factors have corresponding receptors on the cell membrane. Many cytokines and growth factor cytokine receptors can be divided into two groups: those whose intracellular domains exhibit intrinsic protein tyrosine kinase (PTK) activity, and those whose intracellular domains are devoid of such activity. Many of the latter group of receptors, however, activate intracellular soluble PTKs upon ligand binding.