Overview

T cell activation is a highly regulated event involving complex interactions between receptors on the T cell surface and ligands on the presenting cell. This process is necessary for the normal functioning of the immune system. Signal one, or recognition, is mediated by the T cell receptor (TCR) complex, which recognizes specific antigens presented in the context of major histocompatibility complex (MHC) molecules. The TCR complex, which recognizes and binds to an antigen presented by an antigen-presenting cell (APC), is responsible for the initiation of immune responses. Signal two, or costimulation, is also an important signal for T cell activation and proliferation. Costimulation is provided by interactions between costimulatory molecules expressed on the surface of T cells and their ligands expressed on antigen-presenting cells (APCs).

Numerous costimulatory molecules have been identified playing a role in the initiation of immune responses. These molecules are involved in the amplification of the immune response, which can increase the magnitude and duration of the immune response. The specificity of the immune response is induced following T cell activation, they are absent on naïve T cells.

The costimulatory receptors ICOS, OX-40, 4-1BB, and CD27 bind to their ligands B7h, B7RP-1, and B7-DC, respectively. These interactions enhance the activation, proliferation, and survival of T cells. CD27 is maintained in a constitutively activated state and has a critical role in the selection of high-affinity T cells.