Interleukin 10 (IL-10) is a Type II cytokine in a family that includes: IL19, IL-20, IL-22, IL-26, and IL-29. These cytokines have similar gene organisation and bind to receptors of similar structure. However, they all display very different biological activities. Several immune cells produce IL-10 (see Figure 1) but production is also observed in epithelial cells, keratinocytes in the skin and some distinct tumour cells.

In general, the main biological functions of IL-10 are to decrease or regulate the inflammatory response produced by dendritic cells and macrophages, as well as reducing the adaptive responses of CD4+ T cells. This cytokine is a potent inhibitor of antigen presentation as it reduces the expression of the major histocompatibility complex class II (MHC II) and the accessory co-stimulatory molecules CD80 and CD86 by dendritic cells. The overall effect is to inhibit the maturation of these cells.

Inhibition of dendritic cell maturation in turn causes a reduction of the pro-inflammatory cytokines interferon gamma (IFNγ), IL-4 and IL-5 from T cells. IL-10 also inhibits the production of other inflammatory mediators such as IL-1 and tumour necrosis factor alpha (TNFα) by macrophages. On naïve CD4+ T cells, IL-10 inhibits CD28 signalling rendering these cells unable to properly activate. IL-10 is not always inhibitory, it can also promote B-cell activation and stimulate NK-cell proliferation.

When IL-10 is produced and secreted, it acts specifically on the IL-10 receptor, the structure of which consists of two subunits; IL-10 receptor 1 and IL-10 receptor 2 (see Figure 1). Upon binding to the cytokine, the receptor subunits associate with signal transduction molecules in the cytoplasm of the cell expressing the receptor, inducing a signal that mainly dampens the activity of some of the genes required to produce an immune response, but can also promote the activation of some specific target cells as mentioned above.

IL-10 is highly secreted in mucosal tissues, such as the gut and the lung, where unwanted or uncontrolled immune responses can be very damaging. In line with this, mice lacking IL-10 develop spontaneous inflammatory diseases such as autoimmune colitis.