

Snapshot: Cytokines I

Cell

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Cytokine	Receptor	Source	Targets	Major Function	Disease Association
Interleukin (IL)-1α; IL-1β	IL1RI and IL1R-AcP	Macrophages, many others	Macrophages, thymocytes, CNS, others	Inflammatory; promotes activation, costimulation, and secretion of cytokines and other acute-phase proteins; pyrogenic	↑ = inflammatory bone resorption; gout; promotes Th17 response
IL-1ra (antagonist)	Soluble decoy receptor: IL1RII and IL1R-AcP			IL-1ra and the soluble decoy receptor complex inhibit IL-1-mediated inflammatory responses	
IL-2	IL2R α , IL2R β , and IL2R γ	T cells	T, B, NK cells, and macrophages	Proliferation; enhancement of cytotoxicity, IFN γ secretion, and antibody production	↓ = lymphoproliferative disease and susceptibility to autoimmune disease; reduced Treg development. ↑ = reduced Th17 development.
IL-3	IL3R α and β c	T cells, mast cells, eosinophils	Hematopoietic progenitors, macrophages, mast cells	Differentiation and survival of lymphoid and myeloid compartment	
IL-4	IL4R α and IL2R γ or IL4R α and IL13R	T cells, mast cells	T cells, B cells, macrophages, monocytes	Proliferation; differentiation of Th2; promotes IgG and IgE production; inhibits cell-mediated immunity and Th17 development	↓ = susceptibility to extracellular pathogens and decreased response to allergens. ↑ = allergic asthma.
IL-5	IL5R α and β c	Th2 cells	Eosinophils, B cells	Proliferation and activation; hallmark of Th2 effector cells	↓ = eosinophil and B-1 cell deficiency. ↑ = allergic asthma.
IL-6	IL6R α and gp130	Macrophages, T cells, fibroblasts, and others	Wide variety of cells: B cells, T cells, thymocytes, myeloid cells, osteoclasts	Inflammatory and costimulatory action; induces proliferation and differentiation; synergizes with TGF β to drive Th17	↓ = deficient innate immunity and acute-phase responses, lymphopenia
IL-7	IL7R α and IL2R γ	Thymic stromal cells, bone marrow, and spleen	B cells, T cells, thymocytes	Homeostasis, differentiation, and survival	↓ = severe combined immune deficiency (SCID)
IL-9	IL9R and IL2R γ	T cells (Th2)	T cells, mast cells, neutrophils, epithelial cells	Proliferation; promotes Th2 cytokine secretion	
IL-10	IL10R1 and IL10R2	Differentiated T helper cells, Tregs, B cells, dendritic cells, others	Macrophages, T cells, dendritic cells, B cells	Immune suppression; decreases antigen presentation and MHC class II expression of dendritic cells; down-regulates pathogenic Th1, Th2, and Th17 responses	↓ = immune pathology due to uncontrolled inflammation. ↑ = inhibits sterile immunity to some pathogens.
IL-11	IL11R α and gp130	Stromal cells	Hematopoietic stem cells, B cells, megakaryocytes	Proliferation	↑ = exacerbates airway diseases
IL-12 (p35 + p40)	IL12R β 1 and IL12R β 2	Macrophages, dendritic cells, B cells, neutrophils	T cells, NK cells	Differentiation and proliferation; promotes Th1 and cytotoxicity	↓ = impaired Th1 responses and increased susceptibility to intracellular pathogens
IL-13	IL13R and IL4R α	T cells	B cells, macrophages, others	Goblet cell activation in lung and gut; proliferation and promotion of IgE production; regulation of cell-mediated immunity	↓ = impaired Th2 responses to extracellular pathogens and allergens. ↑ = exacerbates airway diseases.
IL-14	Not defined	T cells	B cells	Promotion of B cell growth	
IL-15	IL15R α , IL2R β , and IL2R γ	Broad expression in hematopoietic cells	T cells, NK cells, epithelial cells, others	Proliferation and survival; cytokine production	↓ = deficiency in NK cells and defective generation of memory T cells
IL-16	Not defined	T cells, eosinophils, mast cells	CD4 $^+$ T cells	Recruitment of CD4 $^+$ T cells	

SnapShot: Cytokines I



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Abbreviations

AcP, accessory protein; IL, interleukin; R, receptor; β c, common beta chain; Th17, IL-17-producing helper T cells; Treg, regulatory T cells; NK, natural killer cells; \uparrow , increased expression; \downarrow , decreased expression; CNS, central nervous system; Th2, T helper 2 cells; Th1, T helper 1 cells; TGF β , transforming growth factor- β .

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