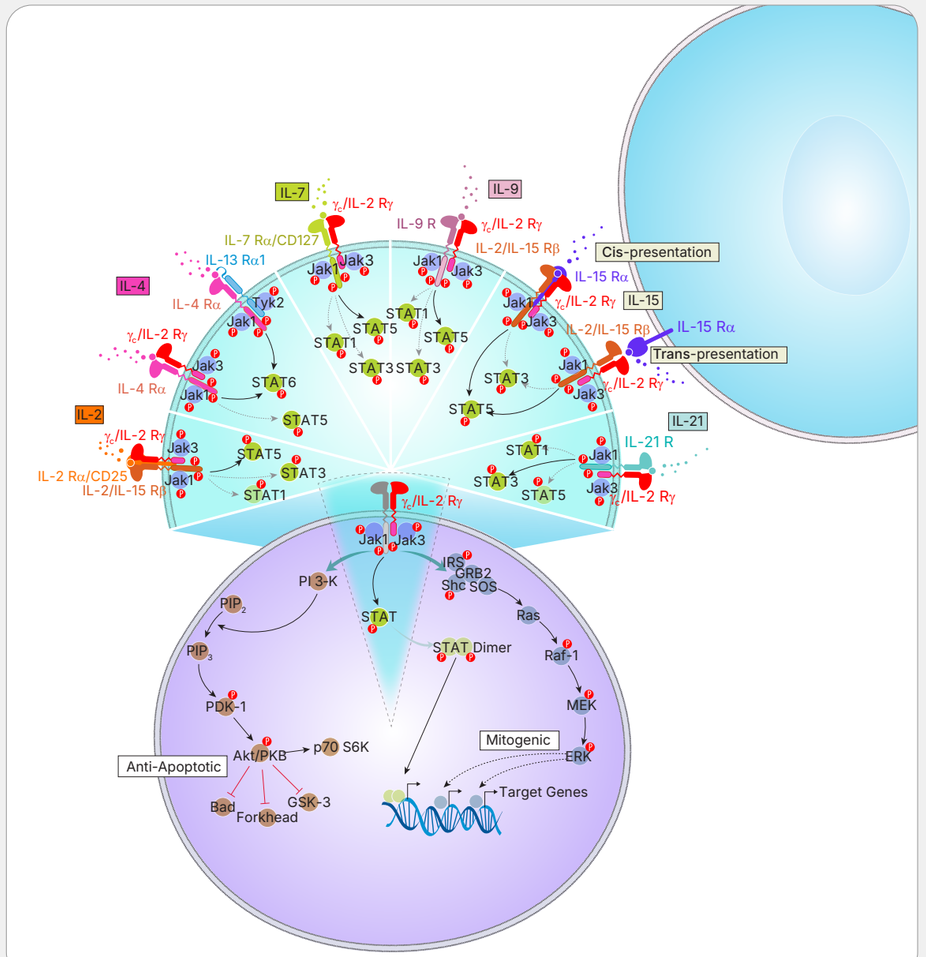
bio-techne® | R&D SYSTEMS

Common Cytokine Receptor γ-Chain Family

Common γ-Chain Family Cytokines Regulate Immune System Functions

Cytokines belonging to the common cytokine receptor γ-chain (γ_c) family include IL-2, IL-4, IL-7, IL-9, IL-15, and IL-21. Members of this family signal through receptor complexes that contain the γ_c/IL-2 Rγ subunit. The γ_c subunit associates with different cytokine-specific receptor subunits to form unique heterodimeric receptors for IL-4, IL-7, IL-9, and IL-21, or associates with both IL-2/IL-15 Rβ and IL-2 Rα or IL-15 Rα to form heterotrimeric receptors for IL-2 or IL-15, respectively. γ_c family cytokines generally activate three major signaling pathways that promote cellular survival and proliferation, the PI 3-K-Akt pathway, the Ras-MAPK pathway, and the JAK-STAT pathway. Differences in the expression patterns of the cytokines or their unique receptor components, along with the activation of different STAT proteins may account for some of the distinct effects mediated by γ_c family cytokines.

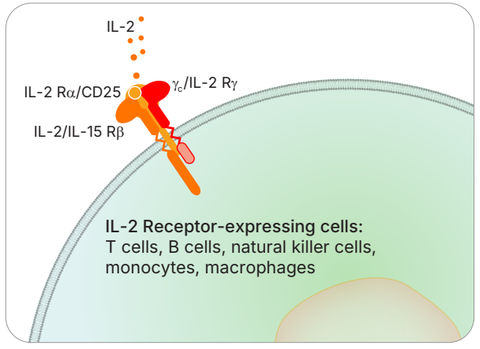
Signaling by γ_c family cytokines plays a major role in regulating the development, survival, proliferation, differentiation, and/or function of different immune cell types. The importance of the γ_c family cytokines for the establishment and maintenance of the immune system is emphasized by the fact that mutations in γ_c/IL-2 Rγ are associated with a disease known as X-linked severe combined immunodeficiency (XSCID), which is characterized by the absence of T cells and natural killer (NK) cells, and the presence of non-functional B cells. Knockout studies in mice have demonstrated that the lack of T cell and NK cell development in this disease can be primarily attributed to the respective loss of IL-7 and IL-15 signaling, while the loss of IL-4, IL-7, and IL-21 signaling leads to defective B cell development (although IL-7 is not required for B cell development in humans). Several additional unique and overlapping effects of the γ_c family cytokines on different immune cell types have been documented. A number of these effects are highlighted on the following pages to demonstrate the central role that γ_c family cytokines play in controlling immune system functions. Understanding the unique and overlapping activities of these cytokines and how their signaling pathways can be regulated is important to harness the therapeutic potential of the common γ-chain family cytokines for cancer immunotherapy, allergic and autoimmune diseases, and immunodeficient disease states. For more information, please visit rndsystems.com/research-area/common-gamma-chain-receptor-family



Common γ-Chain Family Cytokines, Receptors, and Associated Signaling Pathways. Common γ-chain family cytokines signal through receptor complexes that contain the common γ-chain subunit (γ_c) associated with a cytokine-specific receptor component, such as IL-2 Rα, IL-4 Rα, IL-7 Rα, IL-9 R, IL-15 Rα, or IL-21 R. In addition to the γ_c and the IL-2 Rα or IL-15 Rα subunits, the receptor complexes for IL-2 and IL-15 also contain the IL-2/IL-15 Rβ subunit. Unique to IL-15, a functional IL-15 receptor complex can be formed either through the expression of all three subunits on the same cell (cis-presentation) or by the association of IL-15-IL-15 Rα on one cell with the γ_c-IL-2/ IL-15 Rβ subunits on a second cell (trans-presentation). γ_c family cytokines activate signaling pathways that have mitogenic and anti-apoptotic effects. Signaling by these cytokines plays a pivotal role in regulating the development, homeostasis, proliferation, and/or function of different immune cell types. A loss of cytokine signaling caused by inactivating mutations in the γ_c family cytokines, receptors, or a subset of the intracellular signaling molecules involved in these pathways can lead to immune system defects.

Interleukin-2

Interleukin-2 (IL-2) is an O-glycosylated four α-helix bundle cytokine that is primarily produced by activated T cells, dendritic cells, and B cells. It binds with high affinity to a receptor complex that consists of IL-2 Rα/CD25, IL-2 Rβ, and the common γ-chain/IL-2 Rγ subunit. Functionally, IL-2 induces the expression of both IL-2 and IL-2 Rα on activated $CD4^+$ and $CD8^+$ T cells and stimulates their proliferation. In contrast, IL-2 also plays an important role in the maintenance of peripheral self-tolerance both by initiating Fas-mediated activation-induced cell death (AICD) of $CD4^+$ T cells following antigen restimulation, and by its ability to promote the development and survival of regulatory T (Treg) cells. Rather than displaying a severe immunodeficient phenotype, mice lacking IL-2, IL-2 Rα, or IL-2 Rβ accumulate activated T lymphocytes, have reduced numbers of Treg cells, and develop autoimmune diseases. This suggests that the maintenance of T cell homeostasis and prevention of self-reactivity is the primary function of IL-2 signaling. IL-2 also enhances the cytotoxicity of natural killer cells and may be required for B cell proliferation and immunoglobulin production.

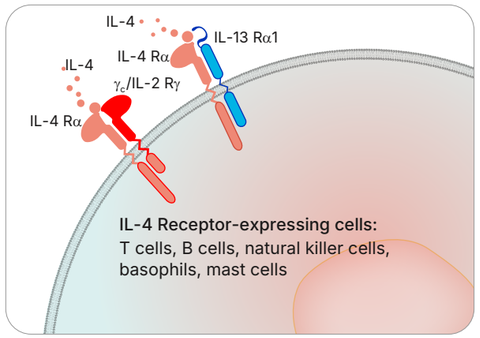


Primary Biological Effects of IL-2 Signaling

- Regulates Activated T Cell Proliferation
- Promotes Activation-induced Cell Death (AICD)
- Promotes Treg Development, Survival, and Maintenance
- Promotes the Differentiation of Näive $CD8^+$ T Cells and $CD8^+$ T Cell Expansion and Activation
- Promotes B Cell Proliferation

Interleukin-4

Interleukin-4 (IL-4) is a glycosylated, type I cytokine with three intra-chain disulfide bridges that adopts a bundled four α-helix structure. It is produced primarily by T cells, NKT cells, mast cells, and eosinophils. IL-4 initiates signal transduction through one of two different receptor complexes, a type I receptor expressed on hematopoietic cells or a type II receptor expressed on nonhematopoietic cells. The type I receptor consists of IL-4 Rα and common γ-chain/IL-2 Rγ and is specific for IL-4, while the type II receptor consists of the IL-4 Rα and IL-13 Rα1 subunits and can be activated by either IL-4 or IL-13. IL-4 signaling is required for the differentiation of Th2 and Th9 cells, and regulates immunoglobulin class switching. In addition, IL-4 plays a central role in the development of allergic inflammation and asthma by enhancing the expression of Fcε RI on B cells, mast cells, and basophils, promoting mast cell survival and proliferation, and inducing mast cell, basophil, and eosinophil chemotaxis.

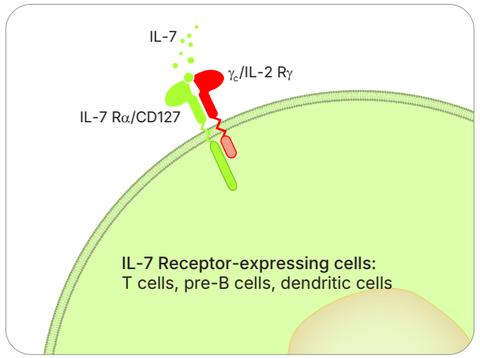


Primary Biological Effects of IL-4 Signaling

- Regulates Activated T Cell Proliferation
- Promotes Th2 or Th9 Differentiation
- Promotes B Cell Proliferation
- Regulates Ig Production and Class Switching
- Promotes Mast Cell Survival and Proliferation
- Promotes Priming and Chemotaxis of Mast Cells and Basophils

Interleukin-7

Interleukin-7 (IL-7) is a type I glycoprotein that is predicted to form a four α-helix structure with a hydrophobic core. It is produced primarily by non-immune stromal cells and exerts its effects through a receptor complex consisting of IL-7 Rα and common γ-chain/IL-2 Rγ. IL-7 signaling is essential for the establishment and maintenance of normal immune system functions. It is required for mouse and human T cell development and homeostatic proliferation, mouse B cell development, and the generation of $CD4^+$ and $CD8^+$ memory T cells. IL-7 Rα-deficient mice have reduced numbers of thymocytes, impaired T cell and B cell development, and lack γδ T cells, a small subset of T cells found in epithelium-rich tissues. The requirement of IL-7 for T cell survival has been partially attributed to its ability to induce expression of the anti-apoptotic Bcl-2, Bcl-xL, and Mcl-1 proteins. In addition, IL-7 has been found to play a role in regulating V(D)J recombination at the TCRγ, TCRβ, and immunoglobulin heavy chain loci.

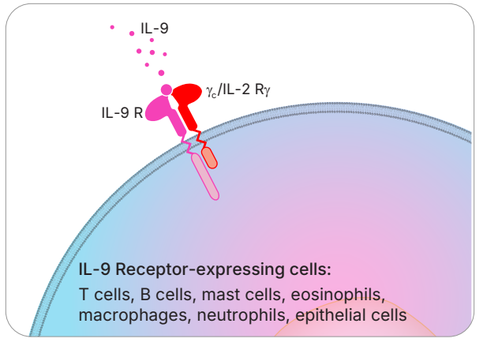


Primary Biological Effects of IL-7 Signaling

- Promotes Human and Mouse T Cell Development
- Promotes Näive T Cell Homeostasis
- Regulates Activated T Cell Proliferation
- Regulates the Generation and Survival of Memory T Cells
- Promotes Mouse B Cell Development
- Regulates V(D)J Recombinant at the TCR and Distal Ig Heavy Chain Loci

Interleukin-9

Interleukin-9 (IL-9) is a pleiotropic cytokine that is produced by activated T lymphocytes. It signals through a receptor complex consisting of IL-9 R and common γ-chain/IL-2 Rγ. IL-9 was initially identified as a mouse T cell and mast cell growth factor. Subsequent studies demonstrated that it also regulates immunoglobulin production by B cells, enhances mast cell protease expression, and promotes goblet cell hyperplasia and mucus production, suggesting a link between IL-9 and the development of allergic inflammation. Although IL-9 was originally thought to be produced primarily by Th2 cells, it was recently demonstrated that in the presence of IL-4 and TGF-β, naïve $CD4^+$ T cells differentiate into a distinct IL-9-secreting T cell subset known as Th9 cells. Th9 cells secrete IL-9 and IL-10 (in mice), but do not produce cytokines characteristic of other T helper subsets. Since the precise role of Th9 cells in the pathogenesis of allergic inflammation and other human diseases is currently not well understood, growing interest in this area will help to better define the effects of IL-9 signaling.

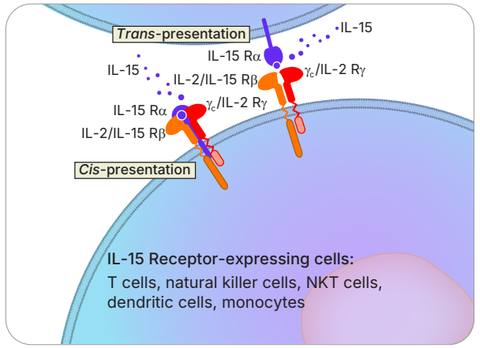


Primary Biological Effects of IL-9 Signaling

- Regulates Activated T Cell Proliferation
- Regulates Ig Production
- Promotes Mast Cell Proliferation and Cytokine Secretion
- Promotes Mucus Production

Interleukin-15

Interleukin-15 (IL-15) is a four α-helix bundle cytokine that is structurally and functionally related to IL-2. It is produced primarily by dendritic cells, monocytes, and epithelial cells. The heterotrimeric IL-15 receptor consists of a unique IL-15 Rα subunit, IL-2 Rβ, and common γ-chain/IL-2 Rγ. Unlike IL-2, IL-15 binds with high affinity to IL-15 Rα, which then associates with a complex composed of the IL-2 Rβ and common γ-chain/IL-2 Rγ subunits, expressed either on the same cell (*cis*-presentation) or on a different cell (*trans*-presentation). IL-15 signaling is essential for normal immune system functions. It stimulates T cell proliferation and inhibits IL-2-mediated activation-induced cell death (AICD). In addition, IL-15 is required for the development, survival, and activation of natural killer (NK) cells, homeostasis of natural killer T (NKT) cells and intraepithelial lymphocytes, and maintenance of naïve and memory CD8⁺ T cells. Both IL-15- and IL-15 Rα-deficient mice lack natural killer cells and have severely reduced numbers of NKT cells, memory CD8⁺ T cells, and specific subsets of intestinal intraepithelial lymphocytes.

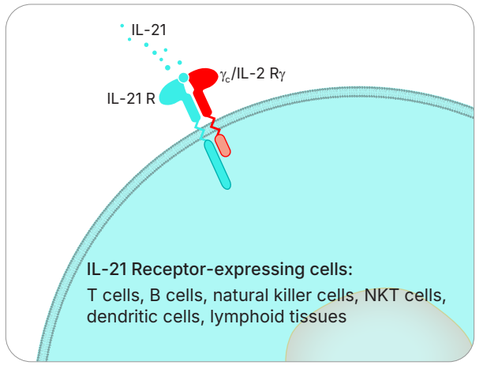


Primary Biological Effects of IL-15 Signaling

- Regulates Activated T Cell Proliferation
- Inhibits Activation-induced Cell Death (AICD)
- Regulates the Maintenance of Näive and Memory CD8⁺ T Cells
- Protects Intestinal Intraepithelial Lymphocytes
- Promotes NK Cell Development and Survival
- Promotes Dendritic Cell Priming of NK Cell Activation
- Promotes Expansion and Homeostasis of NKT Cells

Interleukin-21

Interleukin-21 (IL-21) is the most recently described cytokine belonging to the common cytokine receptor γ-chain family. Like other γ_c family members, IL-21 is a four α-helix bundle type I cytokine. It signals through a receptor complex consisting of IL-21 R and common γ-chain/IL-2 Rγ. IL-21 is produced primarily by CD4⁺ T cells and natural killer T (NKT) cells and has a broad range of effects on a number of different cell types. IL-21 signaling in CD4⁺ T cells is required for both Th17 cell differentiation and the generation of T follicular helper (Tfh) cells, a T cell subset that supports B cell differentiation and antibody production in germinal centers. IL-21 also directly regulates B cell proliferation and apoptosis in a context-dependent manner, and can promote immunoglobulin production and isotype class switching. In addition, IL-21 has been shown to enhance the cytotoxicity of CD8⁺ T cells, natural killer (NK) cells, and NKT cells.

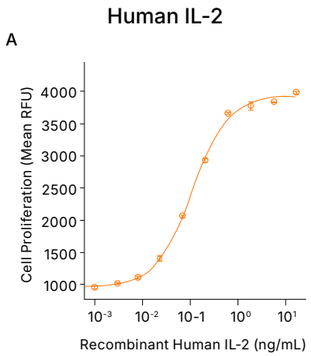


Primary Biological Effects of IL-21 Signaling

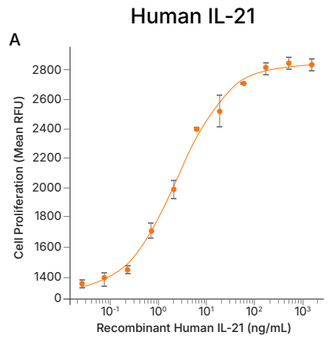
- Promotes Tfh Cell Generation and Germinal Center Formation
- Promotes Th17 Differentiation and Clonal Expansion
- Enhances Cytotoxicity of CD8⁺ T Cells, NK Cells, and NKT Cells
- Promotes B Cell Proliferation and Differentiation
- Promotes B Cell Apoptosis in the Absence of BCR and T Cell Signals
- Regulates Ig Production and Class Switching
- Inhibits Dendritic Cell Maturation and Function

Recombinant Proteins for Common Cytokine Receptor γ-Chain Family Research

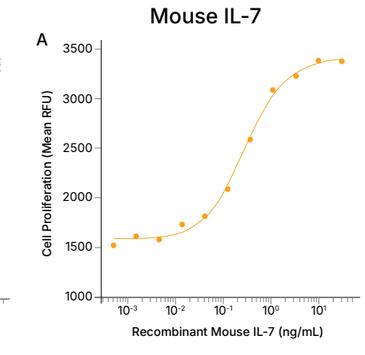
R&D Systems offers a wide selection of recombinant proteins that can be used to characterize the effects of common cytokine receptor γ-chain family cytokines. Stringent production and purification standards ensure that R&D Systems™ proteins will provide researchers with industry-leading bioactivity and lot-to-lot consistency. Our current portfolio includes more than 4,800 proteins that we manufacture under standard conditions, along with Animal-free and GMP-grade recombinant proteins. Additionally, we offer custom protein development services.



Recombinant Human IL-2 Promotes Proliferation of CTLL-2 Cytotoxic T Cells. (A) The CTLL-2 mouse cytotoxic T cell line was treated with increasing concentrations of Recombinant Human IL-2 (Catalog # BT-002) and cell proliferation was measured. The ED_{50} for this effect is typically 0.03–0.25 ng/mL. (B) The purity of Recombinant Human IL-2 (Catalog # BT-002) was assessed by SDS-PAGE analysis under reducing (R) and non-reducing (NR) conditions and visualized by Coomassie® Blue staining.



Recombinant Human IL-21 Promotes Proliferation of N1186 Human T Cells. (A) The N1186 human T cell line was treated with increasing concentrations of Recombinant Human IL-21 (Catalog # 8879-IL) and cell proliferation was measured. The ED_{50} for this effect is typically 2–12 ng/mL. (B) The purity of Recombinant Human IL-21 was assessed by SDS-PAGE analysis under reducing (R) conditions and visualized by silver staining.



Recombinant Mouse IL-7 Promotes Proliferation of PHA-Activated Human Peripheral Blood Lymphocytes. (A) PHA-activated human peripheral blood lymphocytes were treated with increasing concentrations of Recombinant Mouse IL-7 (Catalog # 407-ML) and cell proliferation was measured. The ED_{50} for this effect is typically 0.15–0.3 ng/mL. (B) The purity of Recombinant Mouse IL-7 (Catalog # 407-ML) was assessed by SDS-PAGE analysis under reducing (R) conditions and visualized by silver staining.

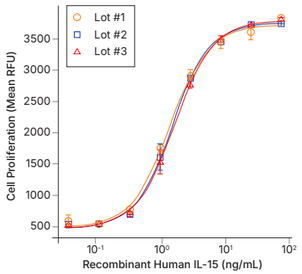
Learn More

Scan the QR Code or Visit
rndsystems.com/proteins

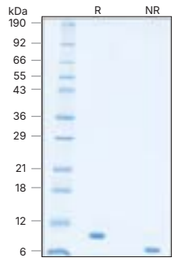
GMP-grade Proteins Available from R&D Systems

The ability of the common cytokine receptor γ-chain family cytokines to activate the immune system has led to several studies investigating their therapeutic potential as anti-cancer agents. R&D Systems offers GMP-grade Recombinant Human IL-2, IL-4, IL-7, IL-15, and IL-21. Our GMP-grade proteins frequently originate from the same clone, sequence, and expression system as our traditional research-grade materials, making the switch to GMP as seamless as possible.

GMP-grade Human IL-15



Bioactivity and Lot-to-Lot Consistency of GMP-grade Recombinant Human IL-15. The bioactivity and lot-to-lot consistency of GMP-grade Recombinant Human IL-15 (Catalog # BT-015-GMP) was assessed by testing the ability of three different lots of the protein to stimulate proliferation of the M07e human megakaryocytic leukemic T cell line. The ED_{50} for this effect is 0.3-2.6 ng/mL.



Purity of GMP-grade Recombinant Human IL-15. The purity of GMP-grade Recombinant Human IL-15 (Catalog # BT-015-GMP) was analyzed by loading 2 ug/lane of the protein onto a SDS-PAGE gel under reducing (R) and non-reducing (NR) conditions and visualized by Coomassie® Blue staining.

Proteins

Molecule	Species	Source	Catalog #	Animal-free (Catalog #)	GMP-grade (Catalog #)
IL-2	Human	*E. coli*	BT-002	BT-002-AFL*	BT-002-GMP*
	Mouse	*E. coli*	402-ML		
IL-4	Human	*E. coli*	BT-004	BT-004-AFL	BT-004-GMP
	Mouse	*E. coli*	404-ML		
IL-7	Human	*E. coli*	BT-007	BT-007-AFL*	BT-007-GMP*
	Mouse	E. coli	407-ML		
IL-9	Human	*Sf21* (stably transfected)	209-ILB		
	Mouse	*Sf21* (baculovirus)	409-ML		
IL-15	Human	*E. coli*	BT-015	BT-015-AFL*	BT-015-GMP*
	Mouse	E. coli	447-ML		
IL-21	Human	*E. coli*	8879-IL	BT-021-AFL*	BT-021-GMP*
	Mouse	*E. coli*	594-ML		

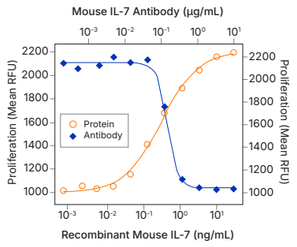
* Liquid formulations of these cytokines are now available. Visit bio-techne.com/reagents/proteins/ready-to-use for more information.

Molecule	Species	Source	Catalog #
Common γ chain/IL-2 Rγ	Human	*Sf21* (baculovirus)	384-RG
	Mouse	*Sf21* (baculovirus)	784-MR
IL-2 Rα/CD25	Human	NS0	223-2A
	Mouse	NS0	2438-RM
IL-2 Rβ	Human	*Sf21* (baculovirus)	224-2B
IL-4 Rα	Human	*Sf21* (baculovirus)	230-4R
	Human	HEK293	7700-4R
	Mouse	NS0	530-MR
IL-7 Rα/CD127	Human	NS0	306-IR
	Mouse	NS0	747-MR
IL-9 R	Human	NS0	290-RNS
IL-15 Rα	Human	*Sf21* (baculovirus)	147-IR
	Human	HEK293	7194-IR
	Mouse	NS0	551-MR
IL-21 R	Human	NS0	991-R2
	Mouse	NS0	596-MR

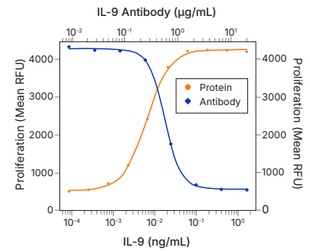
Antibodies for Common Cytokine Receptor γ-Chain Family Cytokines & Receptors

Antibodies for Blocking/Neutralization

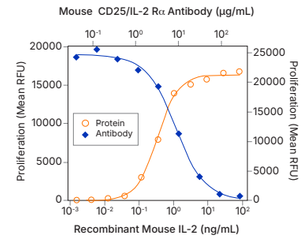
R&D Systems offers the most complete selection of blocking/neutralization antibodies for common cytokine receptor γ-chain family cytokines and receptors. We offer Anti-Human and Anti-Mouse blocking/neutralization antibodies for IL-2, IL-4, IL-7, IL-9, and IL-15 and Anti-Mouse blocking/neutralization antibodies for IL-21. In addition, our catalog includes Anti-Human blocking/neutralization antibodies for all of the cytokine-specific receptor subunits that bind to common cytokine receptor γ-chain family cytokines as well as for the common γ chain/IL-2 Rγ itself.



IL-7-induced Proliferation and Neutralization using an Anti-Mouse IL-7 Antibody. PHA-activated human peripheral blood mononuclear cells were treated with increasing concentrations of Recombinant Mouse IL-7 (Catalog # 407-ML; orange line) and cell proliferation was assessed. The stimulatory effect induced by 1.5 ng/mL Recombinant Mouse IL-7 was neutralized by treating the cells with increasing concentrations of a Goat Anti-Mouse IL-7 Antigen Affinity-purified Polyclonal Antibody (Catalog # AF407; blue line). The ND_{50} is typically 0.2-0.4 ug/mL.



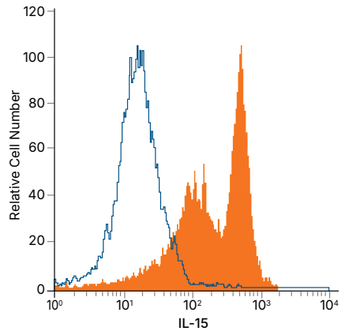
IL-9-induced Proliferation and Neutralization using an Anti-Mouse IL-9 Antibody. The TS1 mouse T helper cell line was treated with increasing concentrations of Recombinant Mouse IL-9 (Catalog # 409-ML; orange line) and cell proliferation was assessed. The stimulatory effect induced by 0.05 ng/mL Recombinant Mouse IL-9 was neutralized by treating the cells with increasing concentrations of a Rat Anti-Mouse IL-9 Monoclonal Antibody (Catalog # MAB4091; blue line).



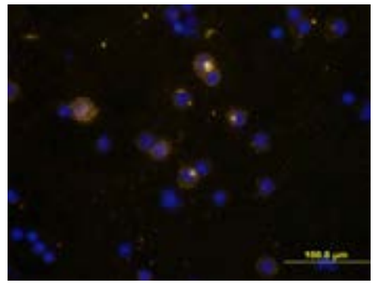
IL-2-induced Proliferation and Neutralization using an Anti-Mouse IL-2 R alpha Antibody. The CTLL-2 mouse cytotoxic T cell line was treated with increasing concentrations of Recombinant Mouse IL-2 (402-ML; orange line) and cell proliferation was assessed. The stimulatory effect induced by 2 ng/mL Recombinant Mouse IL-2 was neutralized by treating the cells with increasing concentrations of a Goat Anti-Mouse CD25/IL-2 R alpha Antigen Affinity-purified Polyclonal Antibody (Catalog # AF2438; blue line). The ND_{50} is typically 5-20 ug/mL.

Antibodies for Flow Cytometry, Immunocytochemistry, Immunohistochemistry, and Western blot

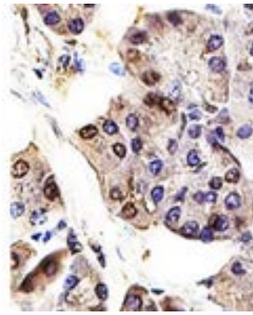
In addition to our blocking/neutralization antibodies, R&D Systems also offers unconjugated and fluorochrome-conjugated antibodies for common cytokine receptor γ-chain family cytokines and receptors that are qualified for flow cytometry, immunocytochemistry (ICC), immunohistochemistry (IHC), and/or Western blot. Like all of our antibodies, our flow cytometry, ICC, IHC, and Western blot antibodies are 100% guaranteed to work in the application and species listed on the R&D Systems website. They are designed to provide specificity and consistent performance.



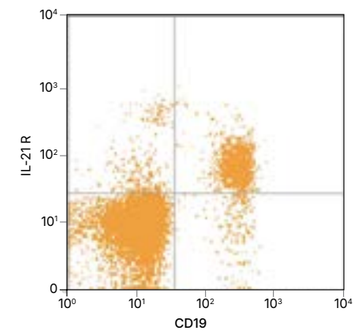
Intracellular Staining of IL-15 in Human Monocytes by Flow Cytometry. Human peripheral blood monocytes, resting (open histogram) or treated overnight with 1 µg/mL lipopolysaccharide (filled histogram), were stained with an APC-conjugated Mouse Anti-Human IL-15 Monoclonal Antibody (Catalog # IC2471A) or an APC-conjugated Mouse IgG1 Isotype Control Antibody (Catalog # IC002A). To facilitate intracellular staining, cells were fixed with Flow Cytometry Fixation Buffer (Catalog # FC004) and permeabilized with Flow Cytometry Permeabilization/ Wash Buffer I (Catalog # FC005).



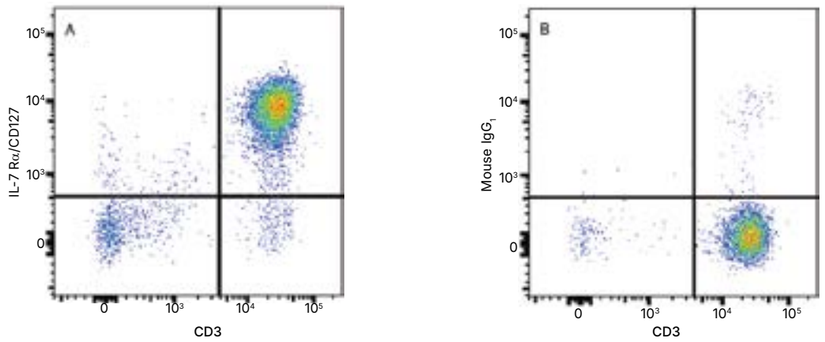
Detection of IL-2 in Human Peripheral Blood Mononuclear Cells by Immunocytochemistry. IL-2 was detected in immersion-fixed, PMA-, ionomycin-stimulated human peripheral blood mononuclear cells using a Goat Anti-Human IL-2 Antigen Affinity-purified Polyclonal Antibody (Catalog # AF-202-NA) at 10 µg/mL for 3 hours at room temperature. Cells were stained using the NorthernLights™ 557-conjugated Anti-Goat IgG Secondary Antibody (Catalog # NL001; yellow) and counterstained with DAPI (Catalog # 5748; blue).



Detection of IL-15R alpha in Human Pancreas. Formalin-fixed paraffin-embedded tissue sections of human pancreas were processed for immunohistochemistry using a Goat Anti-Human IL-15 R alpha Antigen Affinity-purified Polyclonal Antibody (Catalog # AF247) at 3 ug/mL with overnight incubation at 4°C followed by incubation with Anti-Goat IgG VisUCyte HRP Polymer Antibody (Catalog # VC004) and DAB chromogen (yellow-brown). Tissue was counterstained with hematoxylin (blue). Specific staining was localized to the exocrine glands.



Detection of IL-21 R in Human Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human IL-21 R Monoclonal Antibody (Catalog # FAB9911P) and a Fluorescein-conjugated Mouse Anti-Human CD19 Monoclonal Antibody (Catalog # FAB4867F). Quadrant markers were set based on staining with a PE-conjugated Mouse IgG1 Antibody (Catalog # IC002P; filled histogram) or a PE-conjugated Mouse IgG1 Isotype Control Antibody (Catalog # IC002P; open histogram).



Detection of IL-7 Rα/CD127 on Human Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with an APC-conjugated Mouse Anti-Human CD3ε Monoclonal Antibody (Catalog # FAB100A) and either (A) a PE-conjugated Mouse Anti-Human IL-7 Rα/CD127 Monoclonal Antibody (Catalog # FAB306P) or (B) a PE-conjugated Mouse IgG1 Isotype Control Antibody (Catalog # IC002P).

Learn More

Scan the QR Code or Visit

rndsystems.com/products/antibodies

Select Antibodies for Detecting Common γ-Chain Family Cytokines & Receptors

Antibodies for Detecting Common γ-Chain Family Cytokines & Receptors

			Unconjugated Antibodies	Fluorochrome-conjugated Antibodies						
Molecule	**Species**	**Clone**	**Catalog # (Applications)**	**PE**	**Alexa Fluor® 405**	**Alexa Fluor® 488**	**Alexa Fluor® 594**	**Alexa Fluor® 647**	**Alexa Fluor® 700**	**Alexa Fluor® 750**
IL-2	Human	5334	MAB202 (B/N, FC, ICC/IF)	IC202P		IC202G	IC202T	IC202R	IC202N	IC202S
	Human	1019308	MAB103561 (FC)		IC103561V	IC103561G	IC103561T	IC103561R	IC103561N	IC103561S
	Mouse	JES6-1A12	MAB702 (B/N, E)							
	Mouse	Polyclonal	AF-402-NA (B/N, E, WB)							
IL-4	Human	3007	MAB304 (B/N, ICC/IF, WB)	IC204P						
	Human	Polyclonal	AF-204-NA (B/N, WB)							
	Mouse	30340	MAB404 (B/N, E, WB)							
	Mouse	Polyclonal	AF-404-NA (B/N, WB)							

Application Key: B/N Blocking/Neutralization E ELISA FC Flow Cytometry ICC/IF Immunocytochemistry/Immunofluorescence IHC Immunohistochemistry WB Western Blot

Antibodies for Detecting Common γ-Chain Family Cytokines & Receptors

			Unconjugated Antibodies	Fluorochrome-conjugated Antibodies						
Molecule	**Species**	**Clone**	**Catalog # (Applications)**	**PE**	**Alexa Fluor® 405**	**Alexa Fluor® 488**	**Alexa Fluor® 594**	**Alexa Fluor® 647**	**Alexa Fluor® 700**	**Alexa Fluor® 750**
IL-7	Human	7417	MAB207 (B/N, E, WB)							
	Human	Polyclonal	AF-207-NA (B/N, WB)							
	Mouse	Polyclonal	AF407 (B/N, E, WB)							
	Mouse	Polyclonal	AB-407-NA (B/N, WB)							
IL-9	Human	623153	MAB209 (FC)		FAB209V	FAB209G	FAB209T	FAB209R	FAB209N	FAB209S
	Human	Polyclonal	AF209 (B/N, WB)							
	Mouse	222604	MAB409 (FC, WB)		IC409V	IC409G	IC409T	IC409R	IC409N	IC409S
	Mouse	Polyclonal	AF409 (B/N, WB)							
IL-15	Human	34559	MAB2471 (B/N, FC, WB)	IC2471P	IC2471V	IC2471G	IC2471T	IC2471R	IC2471N	IC2471S
	Human	Polyclonal	AF315 (B/N, IHC, WB)							
	Mouse	Polyclonal	AF447 (B/N, IHC, WB)							
IL-21	Human	Polyclonal	AF15001 (E, WB)							
	Mouse	149204	MAB594 (FC, WB)	IC594P	IC594V	IC594G	IC594T	IC594R	IC594N	IC594S
	Mouse	Polyclonal	AF594 (B/N, E, ICC/IF, WB)							
Common γ chain/ IL-2 Rγ	Human	633162	MAB2842 (B/N, FC)	FAB2842P	FAB2842V	FAB2842G	FAB2842T	FAB2842R	FAB2842N	FAB2842S
	Human	31134	MAB2841 (FC)		IC2841V	IC2841G	IC2841T	IC2841R	IC2841N	IC2841S
	Human	Polyclonal	AF284 (B/N, FC, WB)							
	Mouse	644346	MAB7842 (FC)		FAB7842V	FAB7842G	FAB7842T	FAB7842R	FAB7842N	FAB7842S
	Mouse	Polyclonal	AF784 (B/N, WB)							
IL-2 Rα/ CD25	Human	24212	MAB1020 (FC, WB)	FAB1020P	FAB1020V	FAB1020G	FAB1020T	FAB1020R	FAB1020N	FAB1020S
	Human	22722	MAB223 (B/N, ICC/IF, IHC, WB)							
	Human	Polyclonal	AF-223-NA (B/N, FC, WB)							
	Mouse	280406	MAB2438 (FC)	FAB2438P	FAB2438V	FAB2438G	FAB2438T	FAB2438R	FAB2438N	FAB2438S
	Mouse	Polyclonal	AF2438 (B/N, E, IHC, WB)							
IL-2 Rβ	Human	27302	MAB224 (B/N, FC, IHC)	FAB224P	FAB224V	FAB224G	FAB224T	FAB224R	FAB224N	FAB224S
	Human	Polyclonal	AF-224-NA (B/N, WB)							
	Mouse	130122	MAB5891 (FC)		FAB5891V	FAB5891G	FAB5891T	FAB5891R	FAB5891N	FAB5891S
	Mouse	130128	MAB589 (WB)							
IL-4 Rα	Human	25463	MAB230 (B/N, FC, IHC, WB)	FAB230P	FAB230V	FAB230G	FAB230T	FAB230R	FAB230N	FAB230S
	Human	Polyclonal	AF6844 (ICC/IF)							
	Mouse	Polyclonal	AF530 (FC, WB)	FAB530P						

Antibodies for Detecting Common γ-Chain Family Cytokines & Receptors

			Unconjugated Antibodies	Fluorochrome-conjugated Antibodies						
Molecule	**Species**	**Clone**	**Catalog # (Applications)**	**PE**	**Alexa Fluor® 405**	**Alexa Fluor® 488**	**Alexa Fluor® 594**	**Alexa Fluor® 647**	**Alexa Fluor® 700**	**Alexa Fluor® 750**
IL-7 Rα/ CD127	Human	40131	MAB306 (FC, WB)	FAB306P	FAB306V	FAB306G	FAB306T	FAB306R	FAB306N	FAB306S
	Human	Polyclonal	AF-306-PB (FC, WB)							
	Mouse	1140A	MAB7473 (FC)		FAB7473V	FAB7473G	FAB7473T	FAB7473R	FAB7473N	FAB7473S
IL-9 R	Human	33423	MAB290 (B/N, FC)		FAB290V	FAB290G	FAB290T	FAB290R	FAB290N	FAB290S
	Mouse	224325	MAB2134 (WB)							
IL-15 Rα	Human	2639B	MAB10900 (FC)		FAB10900V	FAB10900G	FAB10900T	FAB10900R	FAB10900N	FAB10900S
	Human	Polyclonal	AF247 (B/N, FC, IHC, WB)							
	Mouse	888220	MAB5511 (FC)		FAB5511V	FAB5511G	FAB5511T	FAB5511R	FAB5511N	FAB5511S
	Mouse	Polyclonal	AF551 (B/N, FC, WB)							
IL-21 R	Human	152512	MAB9911 (FC)	FAB9911P	FAB9911V	FAB9911G	FAB9911T	FAB9911R	FAB9911N	FAB9911S
	Human	Polyclonal	AF991 (FC, WB)							
	Mouse	155516	MAB5961 (WB)	FAB5961P						
	Mouse	Polyclonal	AF596 (FC, ICC/IF, WB)							

Application Key: B/N Blocking/Neutralization E ELISA FC Flow Cytometry ICC/IF Immunocytochemistry/Immunofluorescence IHC Immunohistochemistry WB Western Blot

Sample Sizes Available for Over 10,000 Antibodies

Learn More

Scan the QR Code or Visit

rndsystems.com/product-highlights/sample-size-antibodies

ELISA Kits for Common Cytokine Receptor γ-Chain Family Ligands & Receptors

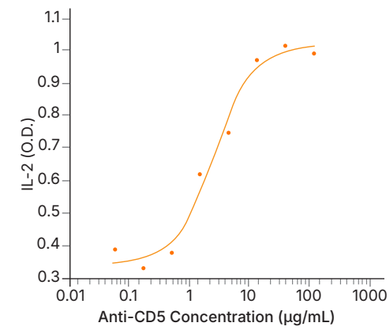
For detecting common cytokine receptor γ-chain family ligands and soluble receptors, Bio-Techne offers R&D Systems™ complete, ready-to-use Quantikine™ ELISA Kits and the more versatile DuoSet™ ELISA Development Systems that provide all the components necessary for a customer to develop their own working assay. Our immunoassays are vertically integrated, meaning our proteins, antibodies, and diluents are manufactured in-house, allowing us to maintain complete control over the quality of our products and ensuring long-term supply stability.

Quantikine ELISA Kits

- Complete, ready-to-use kits
- Extensively tested for long-term consistency and reproducibility
- Fully validated sample types
- Optimized reagents and diluents for accurate sample values

DuoSet ELISA Development Reagents

- Includes carefully selected and validated matched antibody pairs for optimal performance
- Large menu – more than 1000 targets with novel targets across multiple species
- Includes mass calibrated recombinant standard, reducing assay variability
- Can be adapted for use across multiple platforms



Measurement of Anti-Human CD5-induced IL-2 Production by Human T Cells. Freshly prepared human T cells were added to a plate coated with suboptimal amounts of a Mouse Anti-Human CD3ε Monoclonal Antibody (Catalog # MAB100) and a Mouse Anti-Human CD28 Monoclonal Antibody (Catalog # MAB342), plus the indicated concentrations of a Goat Anti-Human CD5 Antigen Affinity-purified Polyclonal Antibody (Catalog # AF1636). Following incubation at 37 °C, the levels of IL-2 in the cell culture supernatants were measured using the Human IL-2 Quantikine® ELISA Kit (Catalog # D2050).

ELISA Kits for Common Cytokine Receptor γ-Chain Family Ligands

Molecule	Species	Quantikine™ ELISA Kits (Catalog #)	DuoSet™ ELISA Development Systems (Catalog #)
IL-2	Human	D2050	DY202
	Mouse	M2000	DY402
IL-4 *	Human	D4050	DY204
	Mouse	M4000B	DY404
IL-7 *	Human		DY207
	Mouse	M7000	DY407
IL-9	Human		DY209
	Mouse		DY409
IL-15	Human	D1500	DY247
	Mouse		DY447
IL-21	Human		DY8879
	Mouse		DY594

* Human Quantikine™ High Sensitivity Kits are also available for these analytes.

ELISA Kits for Soluble Common Cytokine Receptor γ-Chain Family Receptors

Molecule	Species	Quantikine™ ELISA Kits (Catalog #)	DuoSet™ ELISA Development Systems (Catalog #)
Common gamma chain/ IL-2 Rγ	Human		DY284
IL-2 Rα/CD25	Human	DR2A00	DY223
	Mouse		DY2438
IL-7 Rα/CD127	Mouse		DY747
IL-15 Rα	Human		DY6924
	Mouse		DY551

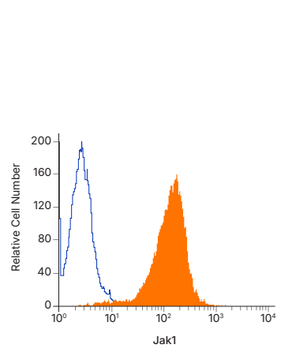
For More Information

Scan the QR Code or Visit

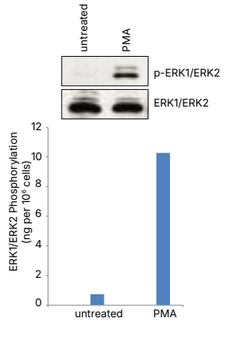
rndsystems.com/products/ELISAs

Antibodies & ELISA Kits for Detecting Intracellular Signaling Molecules Activated by Common Cytokine Receptor γ-Chain Family Cytokines

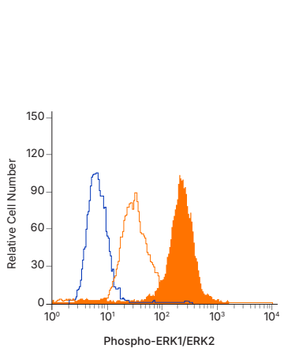
Common cytokine receptor γ-chain family cytokines activate three major signaling pathways that promote cellular survival and proliferation, the PI 3-K-Akt pathway, the Ras-MAPK pathway, and JAK-STAT pathways. Bio-Techne offers R&D Systems™ antibodies qualified for flow cytometry, immunocytochemistry, immunohistochemistry, and Western blot for detecting specific phosphorylated forms of a protein and/or the total protein. Additionally, we offer DuoSet™ IC ELISA Development Systems. DuoSet™ IC ELISAs provide a format for measuring total or phosphorylated molecules in cell lysates by sandwich ELISA.



Intracellular Detection of Jak1 by Flow Cytometry. The Jurkat human leukemic T cell line was stained with a Rat Anti-Human/Mouse/Rat Jak1 Monoclonal Antibody (Catalog # MAB4260; filled histogram) or a Rat IgG2B Isotype Control (Catalog # MAB0061; open histogram), followed by a PE-conjugated Goat Anti-Rat IgG Secondary Antibody (Catalog # F0105B).



Quantification of PMA-induced ERK1/ERK2 Phosphoryation using the DuoSet IC ELISA Kit. Cell lysates prepared from HeLa human cervical epithelial carcinoma cells that were either untreated or treated with 200 nM PMA for 20 minutes were assessed for ERK1 (T202/Y204)/ERK2 (T185/Y187) phosphorylation using the Human/Mouse/Rat Phospho-ERK1 (T202/Y204)/ERK2 (T185/Y187) DuoSet IC ELISA (Catalog # DYC1018B; bar graph). The results obtained from the DuoSet IC ELISA are consistent with the relative levels of phosphorylated ERK1/2 detected in the same lysates by Western blot using an Anti-Human/Mouse/Rat Phospho-ERK1 (T202/Y204)/ERK2 (T185/Y187) Antigen Affinity-purified Polyclonal Antibody (Catalog # AF1018) and an Anti-Human/Mouse/Rat ERK1/ERK2 Monoclonal Antibody (Catalog # MAB1576).



Intracellular Detection of Phospho-ERK1/2 by Flow Cytometry. The Jurkat human leukemic T cell line, untreated (open histogram, orange outline) or treated with PMA (filled histogram), was stained with a Rabbit Anti-Human/Mouse/Rat Phospho-ERK1 (T202/Y204)/ERK2 (T185/Y187) Antigen Affinity-purified Polyclonal Antibody (Catalog # AF1018) or a Rabbit IgG Control (Catalog # AB-105-C; open histogram, blue outline), followed by a Fluorescein-conjugated Goat Anti-Rabbit IgG Secondary Antibody (Catalog # F0112). To facilitate intracellular staining, the cells were fixed with paraformaldehyde and permeabilized with ice-cold methanol.

For More Information

Scan the QR Code or Visit

rndsystems.com/research-area/common-gamma-chain-receptor-family

Select Antibodies for Detecting Intracellular Signaling Molecules Activated by Common Cytokine Receptor γ-Chain Family Cytokines

Unconjugated Antibodies			
Molecule	**Species**	**Clone**	**Catalog # (Applications)**
Akt Pan	Human/Mouse/Rat	281046	MAB2055 (FC, ICC/IF, SW, WB)
Phospho-Akt (S473) Pan Specific	Human/Mouse	545007	MAB887 (SW, WB)
	Human/Mouse/Rat	Polyclonal	AF887 (FC, IHC, SW, WB)
Akt1	Human/Mouse/Rat	Polyclonal	AF1775 (SW, WB)
	Human	302407	MAB17751 (FC, ICC/IF)
Phospho-Akt1 (T308)	Human	658320	MAB7419 (ICC/IF, WB)
Akt2	Human/Mouse/Rat	Polyclonal	AF23151 (IHC, SW, WB)
	Human	302501	MAB23152 (FC, IHC)
Akt3	Human	199822	MAB14631 (FC)
ERK1	Human/Mouse/Rat	Polyclonal	AF1575 (IHC, WB)
	Human	250603	MAB1940 (IHC, WB)
ERK1/2	Human/Mouse/Rat	Polyclonal	AF1576 (SW, WB)
	Human/Mouse/Rat	216703	MAB1576 (IHC, WB)
Phospho-ERK1 (T202/Y204)/ ERK2 (T185/Y187)	Human/Mouse/Rat	Polyclonal	AF1018 (FC, IHC, SW, WB)
	Human/Mouse/Rat	269434	MAB1018 (FC, ICC/IF, SW, WB)
ERK2	Human/Mouse/Rat	191801	MAB1230 (IHC, SW, WB)
GRB2	Human/Mouse/Rat	Polyclonal	AF3846 (IHC, WB)
GRB2 (SH2 Domain)	Human	669604	MAB38461 (IHC, WB)
GSK-3α	Human	288901	MAB2986 (ICC/IF)
Phospho-GSK-3α (S21)	Human/Mouse/Rat	Polyclonal	AF4125 (IHC, WB)
GSK-3α/β	Human/Mouse/Rat	Polyclonal	AF2157 (FC, ICC/IF, WB)
Phospho-GSK-3α/β (S21/S9)	Human/Mouse/Rat	Polyclonal	AF1590 (FC, ICC/IF, WB)
GSK-3β	Human/Mouse/Rat	272536	MAB2506 (FC, WB)
	Human	272535	MAB25061 (ICC/IF)
Phospho-GSK-3β (S9)	Human	609739	MAB25062 (FC, ICC/IF, WB)
IRS1	Human/Mouse/Rat	Polyclonal	AF3978 (IHC, WB)
	Human	395601	MAB39781 (ICC/IF)
Phospho-IRS1 (Y612)	Human	738662	MAB7314 (WB)
Phospho-IRS1 (S616)	Human	738710	MAB39783 (WB)
Phospho-IRS1 (Y1179)	Human	744353	MAB7455 (ICC/IF, WB)
IRS2	Human	676415	MAB6347 (WB)
Jak1	Human/Mouse/Rat	413104	MAB4260 (FC, ICC/IF, IHC, WB)
Jak3	Human	452524	MAB46991 (FC, ICC/IF)

Unconjugated Antibodies			
Molecule	**Species**	**Clone**	**Catalog # (Applications)**
Phospho-MEK1 (T386)	Human	Polyclonal	PPS076 (WB)
MEK2	Human/Mouse/Rat	300317	MAB2855 (ICC/IF, WB)
p70 S6 Kinase	Human/Mouse/Rat	Polyclonal	AF8962 (FC, IHC, SW, WB)
	Human/Mouse/Rat	215247	MAB8962 (FC, IHC, WB)
Phospho-p70 S6 Kinase (T229)	Human	1015B	MAB8964 (ICC/IF, WB)
Phospho-p70 S6 Kinase (T389)	Human	1045C	MAB8963 (ICC/IF, WB)
Phospho-p70 S6 Kinase (T421/ S424)	Human/Mouse/Rat	Polyclonal	AF8965 (SW, WB)
PDK-1	Human/Mouse/Rat	650308	MAB864 (ICC/IF, WB)
PI 3-Kinase p85α	Human/Mouse/Rat	572106	MAB2998 (SW, WB)
PI 3-Kinase p85β	Human	572001	MAB6777 (ICC/IF, WB)
PI 3-Kinase p110β	Human	269020	MAB2686 (WB)
PI 3-Kinase p110γ	Human	304103	MAB2999 (WB)
PI 3-Kinase p110δ	Human	275144	MAB2687 (WB)
PI 3-Kinase C2β	Human	Polyclonal	AF7249 (ICC/IF, WB)
Raf-1	Human/Mouse/Rat	563002	MAB4540 (IHC, WB)
SOS2	Human	Polyclonal	AF6260 (WB)
STAT1	Human	246523	MAB1490 (FC, ICC/IF)
	Human	655210	MAB14901 (WB)
STAT1 p91	Human/Mouse	Polyclonal	PAF-ST1 (IP, WB)
Phospho-STAT1 (Y701)	Human/Mouse	Polyclonal	AF2894 (FC, SW, WB)

Application Key: B/N Blocking/Neutralization ChIP Chromatin Immunoprecipitation E ELISA FC Flow Cytometry ICC/IF Immunocytochemistry/Immunofluorescence IHC Immunohistochemistry IP Immunoprecipitation SW Simple Western WB Western Blot

Proteome Profiler™ Antibody Arrays from R&D Systems

R&D Systems™ Proteome Profiler™ Antibody Arrays can be used to simultaneously profile the levels of multiple analytes in a single sample. They allow researchers to maximize data collection and save time by eliminating the need for multiple Western blot experiments. Arrays are developed using chemiluminescence and require no specialized equipment. Our portfolio consists of a wide selection of different antibody arrays including one for determining the relative levels of phosphorylated kinases, and several for assessing the levels of specific human and mouse cytokines in a single sample.

Kit	Catalog #
Proteome Profiler Human Phospho-Kinase Antibody Array Kit	ARY003C
Proteome Profiler Human Cytokine Antibody Array Kit	ARY005B
Proteome Profiler Human XL Cytokine Antibody Array Kit	ARY022B
Proteome Profiler Mouse Cytokine Antibody Array Kit	ARY006
Proteome Profiler Mouse XL Cytokine Antibody Array Kit	ARY028

Contact Us

Global info@bio-techne.com, bio-techne.com/find-us/distributors
North America TEL 800 343 7475
Europe // Middle East // Africa TEL +44 (0)1235 529449
China info.cn@bio-techne.com, TEL 400.821.3475

6905399945_1018

bio-techne® | Global Developer, Manufacturer, and Supplier of High-Quality Reagents, Analytical Instruments, and Precision Diagnostics.

INCLUDES R&D Systems™ Novus Biologicals™ Tocris Bioscience™ ProteinSimple™ ACD™ ExosomeDx™ Asuragen® Lunaphore™