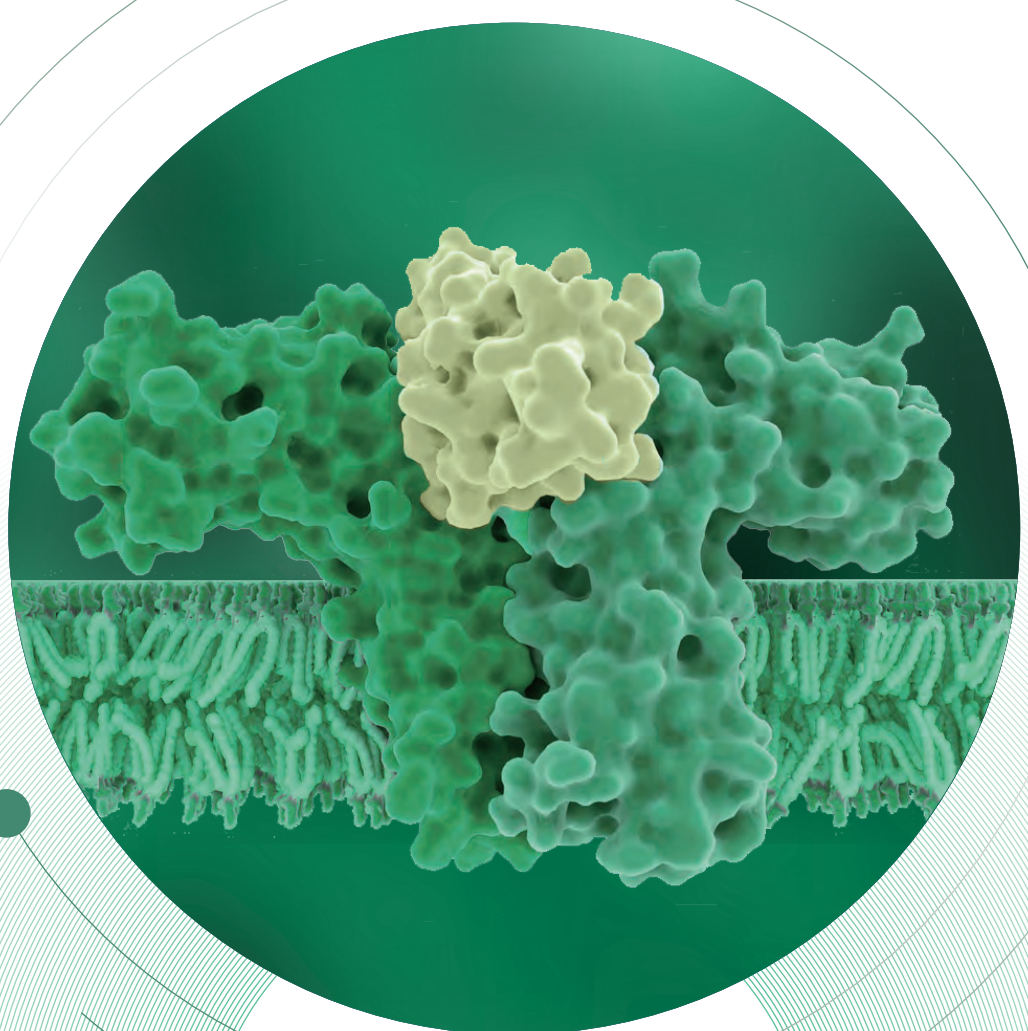
Sino Biological

Common Gamma Chain Cytokines and Receptors



γc Cytokine Family & Receptors

The common gamma-chain cytokines signal through cytokine receptors that consist of the common cytokine receptor γ chain (γ c/CD132/IL-2Rγ). This family includes at least six short-chain cytokines: IL-2, IL-4, IL-7, IL-9, IL-15, and IL-21.

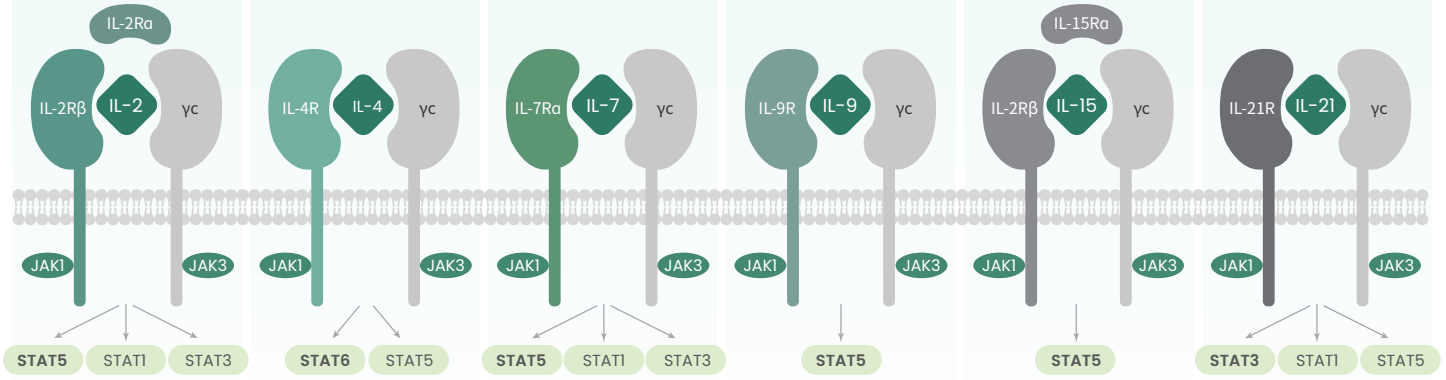
Besides IL-2Rγ, the γc family cytokine receptors include IL-2Rβ (CD122), IL-4R (CD124), IL-7R (CD127), IL-9R (CD129), and IL-21R. The γc subunit binds with these different cytokine-specific receptor subunits to form unique heterodimeric receptors for IL-4, IL-7, IL-9, and IL-21, or heterotrimeric receptors for IL-2 or IL-15, respectively. This cytokine family generally activates three major signaling pathways (PI3K-Akt, RAS-MAPK, and JAK-STAT) to exert their central roles in regulating the development, survival, proliferation, differentiation, and function of cells in both the innate and adaptive immune systems.

Cytokine produced by:

IL-2	IL-4	IL-7	IL-9	IL-15	IL-21
T cells and DCs	T cells, NKT cells, eosinophils and mast cells	stromal cells, epithelial cells and fibroblasts	T cells	monocytes, DCs and epithelial cells	CD4+ T cells and NKT cells

Receptor expressed by:

T cells, B cells and NK cells	T cells, B cells, NK cells, mast cells and basophils	T cells, pre-B cells and DCs	T cells, mast cells, epithelial cells and eosinophils	T cells and NK cells	T cells, B cells, NK cells and DCs



- Treg development
- Promotes T- and NK-cell proliferation
- Enhances B-cell function
- Induces AICD
- Promotes Th1, Th2, and Th9 differentiation and antagonizes Th17 and Tfh differentiation

- B-cell differentiation
- Ig isotype switching
- Th2 differentiation
- Th9 differentiation
- Activates macrophages

- T-cell development
- B-cell development in mice
- Treg development
- Memory T-cell development
- T-cell homeostasis

- Th9 differentiation
- Antitumor
- Mucus production
- Mast-cell proliferation

- NK development, expansion, and survival
- Memory CD8+ T-cell development
- Antagonizes Th17 differentiation

- Enhances antitumor activity of CD8+ T cells and NK cells
- Promotes Th17 and Tfh differentiation
- Antagonizes Th9 differentiation, B-cell differentiation, and Ig production

Figure 1: The γ c cytokine family (IL-2, IL-4, IL-7, IL-9, IL-15, and IL-21) and the composition of their unique cytokine receptors.

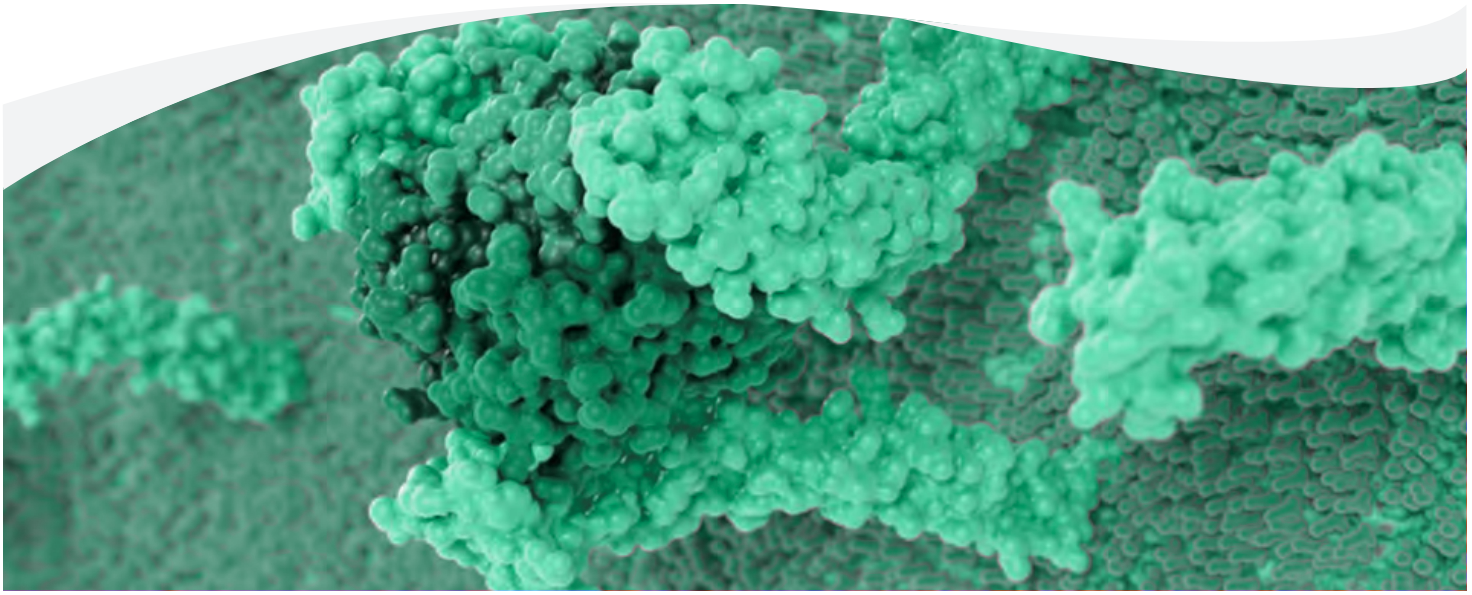
Reference: 10.3389/fimmu.2019.00263;
10.1101/cshperspect.a028449

Currently, designer cytokines targeting γc cytokine family have shown significant therapeutic potential in allergy, immunodeficiency, autoimmunity, and cancer.

Table 1: Clinical trials involving gamma-chain cytokines

Drug	Company	Cytokine	Phases	Indications	Immunotherapy combinations
ALKS 4230	Alkermes, Inc.	IL-2	I, II, III	Advanced solid tumors	Anti-PD-1
FAP-IL2v	Hoffmann-La Roche	IL-2	I, II	Advanced solid tumors	Anti-PD-1, anti-PD-L1, CXCR4 antagonist, anti-CD40, adenosine receptor antagonist, anti-TIGIT, IL-6R inhibitor
GI-101	GI Innovation, Inc.	IL-2	I, II	Advanced solid tumors	Anti-PD-1
hu14.18-IL2	Apeiron Biologics AG	IL-2	I, II	Melanoma	Anti-PD-1, anti-CTLA-4
L19-IL2	Philogen S.p.A.	IL-2	II, III	Advanced solid tumors	L19-TNFα
NKTR-214	Nektar Therapeutics	IL-2	I, II, III	Advanced solid tumors	Anti-PD-1, anti-CTLA-4, TLR7/8 agonist, DNA cancer vaccines, Flt3L, poly ICLC
RO7284755	Hoffmann-La Roche	IL-2	I	Advanced solid tumors	Anti-PD-L1
THOR-707	Sanofi	IL-2	I, II	Advanced solid tumors	Anti-PD-1
NT-I7/GX-I7 (efineptakin alfa)	NeoImmuneTech, Inc./Genexine, Inc.	IL-7	I, II	Advanced solid tumors, lymphoma	Anti-PD-1, anti-PD-L1, CD19 CART cells
N-803	ImmunityBio, Inc.	IL-15	I, II, III	Advanced solid tumors, acute myeloid leukemia	Anti-PD-1, anti-PD-L1, anti-CTLA-4, NK cell adoptive transfers, ab-drug conjugate, anti-PD-L1/anti-TGFβ, DNA vaccines, autologous cancer vaccine, antigen vaccines, anti-VEGF, anti- VEGFR-2, anti-EGFR, anti-CD274
NKTR-255	Nektar Therapeutics	IL-15	I, II	Myeloma, lymphoma, HNSCC	Anti-CD38, anti-CD20

Reference: 10.4110/in.2022.22.e5

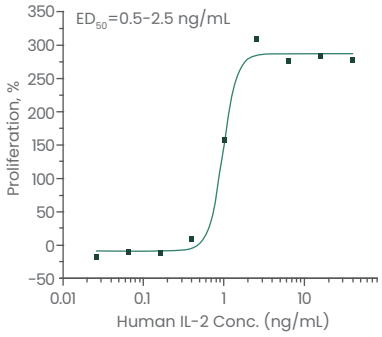


IL-2 & Receptor

Interleukin 2 (IL-2) is a pleiotropic cytokine central to the regulation of T-cell responses, and plays critical roles in a wide range of immune-modulatory actions. IL-2 receptor (IL-2R) is a trimeric receptor that consists of IL-2Rα, IL-2Rβ and the γc where signaling is ultimately mediated through IL-2Rβ and the γc. The β and γ chains are shared between IL-2 and IL-15 receptor complexes, while the γ chain is a shared receptor component for IL-2, IL-4, IL-7, IL-9, IL-15, and IL-21. Recent studies have recognized the IL-2/IL-2R signaling pathway as an important target for the treatment of various diseases, including cancer, infectious diseases, and autoimmune diseases.

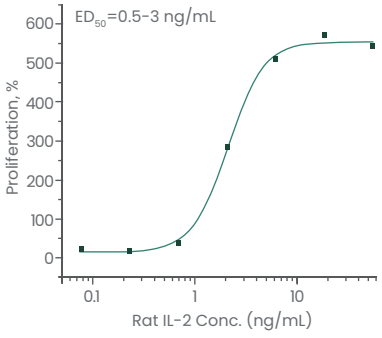
Featured IL-2 & Receptor Proteins

Human IL-2 Protein, HPLC-verified
Cat#: 11848-HNAH1-E



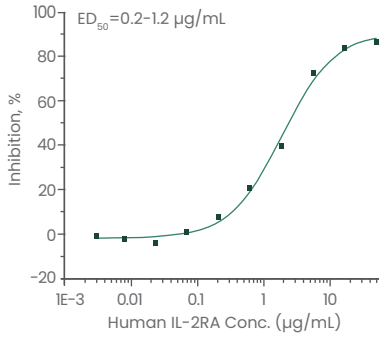
Cell proliferation assay using CTLL-2 mouse cytotoxic T cells

Rat IL-2 Protein
Cat#: 80075-RNAE



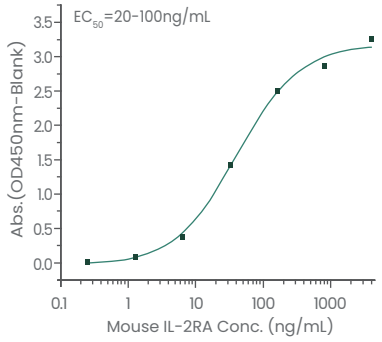
Cell proliferation assay using CTLL-2 cells

Human IL-2Rα Protein, HPLC-verified
Cat#: 10165-H08H



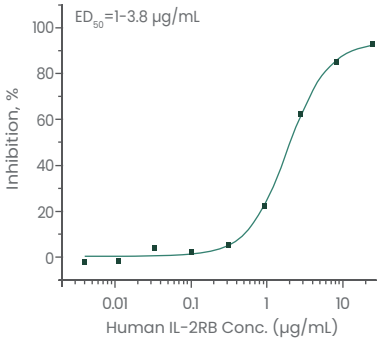
Ability to inhibit IL2-induced proliferation of M07e cells

Mouse IL-2Rα Protein
Cat#: 50292-M08H



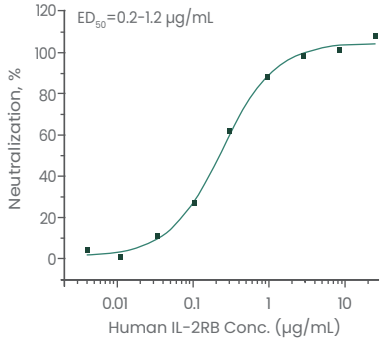
Immobilized IL-2RA Protein can bind IL2 Protein (Cat#: 11848-HNAE-B)

Human IL-2Rβ Protein
Cat#: 10696-H02H



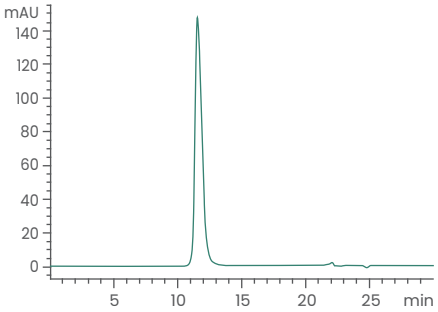
Ability to inhibit the IL-15-dependent proliferation of MO7e human megakaryocytic leukemic cells in the presence of human IL-15

Rhesus IL-2Rβ Protein
Cat#: 90328-C08H



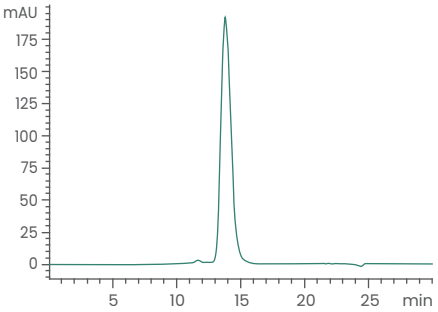
Ability to inhibit the IL-15-dependent proliferation of MO7e human megakaryocytic leukemic cells in the presence of human IL-15

Human IL-2Rγ Protein
Cat#: 10555-H02H



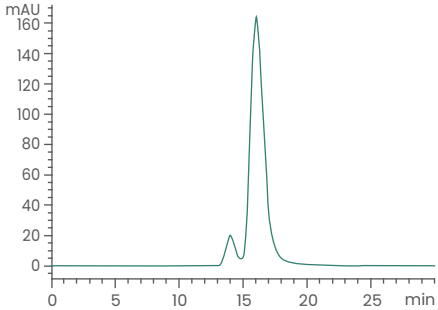
Purity: > 95 % as determined by SEC-HPLC

Mouse IL-2Rγ Protein
Cat#: 50087-M08H



Purity: > 95 % as determined by SEC-HPLC

Human IL-2Rβ & IL-2Rγ Heterodimer
Cat#: CT108-H08H



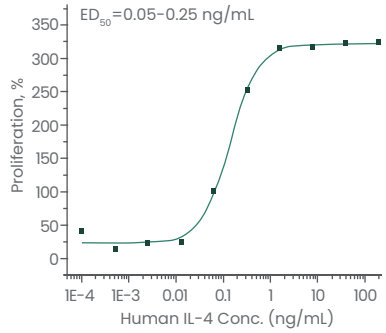
Purity: > 90 % as determined by SEC-HPLC

IL-4 & Receptor

IL-4 is a signature cytokine for Th2 responses that are essential for controlling the development, survival, and maturation of B cells and the proliferation and differentiation of Th2 T lymphocytes. There are two types of the IL-4 receptor. The type I IL-4R is predominantly expressed by hematopoietic cells, and consists of the IL-4Rα and γc subunits. The type II IL-4R can be expressed by non-hematopoietic cells, and consists of the IL-13Rα1 and IL-4Rα subunits. The IL-4/IL-4 receptor (IL4R) interaction plays a vital role in the immune system. It is a strong promoter of pro-metastatic phenotypes in epithelial cancer cells including enhanced migration.

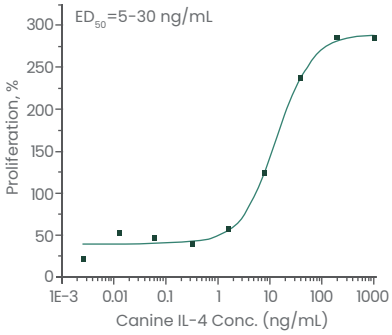
Featured IL-4 & Receptor Proteins

Human IL-4 Protein
Cat#: 11846-HNAE



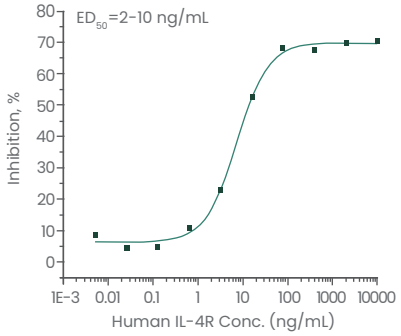
Cell proliferation assay using TF-1 human erythroleukemic cells

Canine IL-4 Protein
Cat#: 70021-DNAE



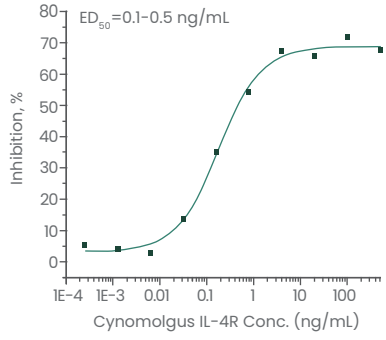
Cell proliferation assay using TF-1 human erythroleukemic cells

Human IL-4R Protein
Cat#: 10402-H08H



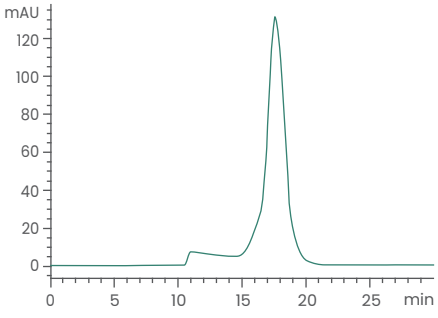
Ability to inhibit IL-4 dependent proliferation of TF-1 human erthroleukemic cells in the presence of IL-4.

Cynomolgus IL-4R Protein
Cat#: 90897-C08H



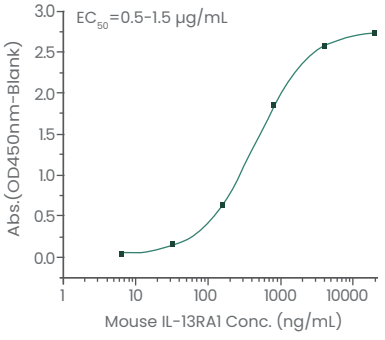
Ability to inhibit IL-4 dependent proliferation of TF-1 human erthroleukemic cells

Human IL-4Rα & IL-13Rα1 Heterodimer
Cat#: CT117-H08H



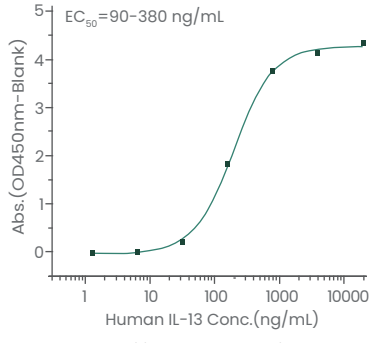
Purity: > 90 % as determined by SEC-HPLC

Mouse IL-13Rα1 Protein
Cat#: 50088-M08H



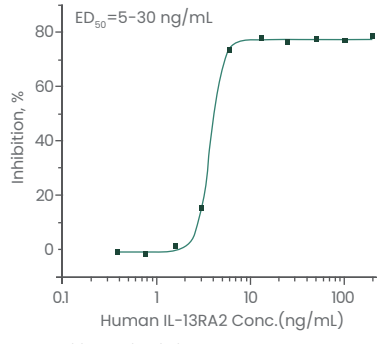
Immobilized IL-13RA1 can bind human IL-13

Cynomolgus IL-13Rα1 Protein
Cat#: 90864-C08H



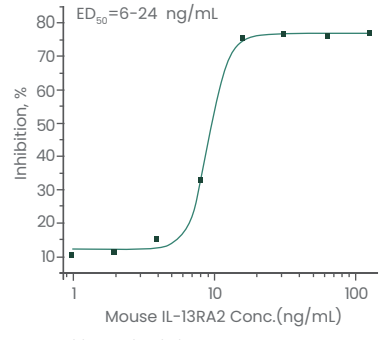
Immobilized IL-13 Protein (Cat#: 10369-H01H) can bind Cynomolgus IL-13RA1

Human IL-13Rα2 Protein
Cat#: 10350-H08H



Ability to inhibit IL13-dependent proliferation of TF-1 human erythroleukemic cells

Mouse IL-13Rα2 Protein
Cat#: 50061-M08H

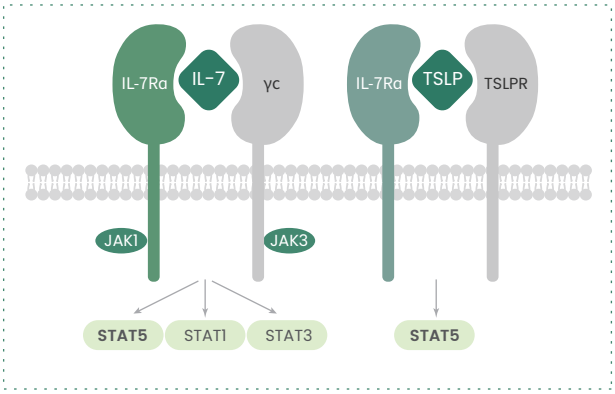


Ability to inhibit IL13-dependent proliferation of TF-1 human erythroleukemic cells

IL-7 & Receptor

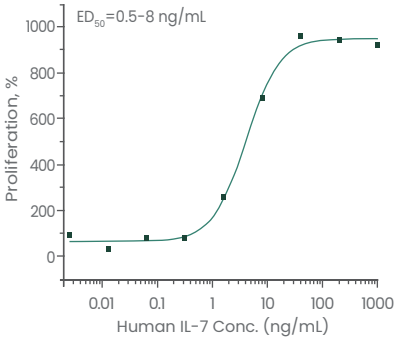
Interleukin-7 (IL-7) is a cytokine necessary for T and B cell development. Along with the receptor for IL-7, IL7Rα/CD127, IL-7 binds to the common gamma chain receptor (γc/IL2RG) to induce the Jak/STAT signaling cascade. Thymic stromal lymphopoietin (TSLP) also engages the IL7R, forming a heterodimer with the TSLP receptor (TSLPR/CRL2).

A lack of IL-7 causes immature immune cell arrest. Because of the pivotal role of IL-7 in immunity and the pathogenesis of cancer, therapeutics targeting IL-7 are being developed for various diseases, such as HIV infections, chronic infections, cancer, and aging.



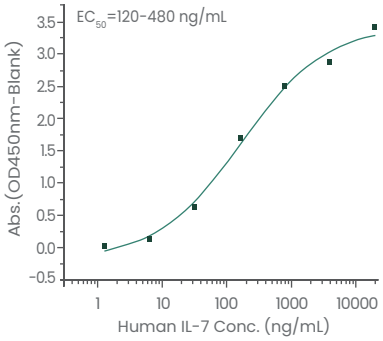
Featured IL-7 & Receptor Proteins

Human IL-7 Protein, HPLC-verified
Cat#: 11821-HNAE



Cell proliferation assay using anti-CD3 antibody activated human peripheral blood mononuclear cell

Human IL-7Rα Protein
Cat#: 10975-H02H



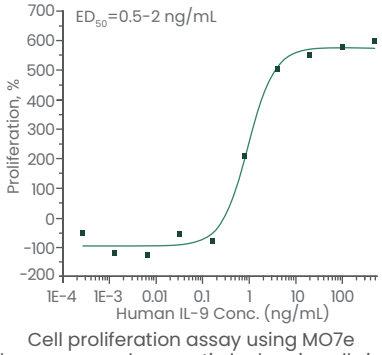
Immobilized IL-7 Protein (Cat#: 11821-HNAE) can bind IL-7RA

IL-9 & Receptor

IL-9 is produced by various CD4+ T cell subsets, mast cells, NKT cells, and type 2 innate lymphoid cells. IL-9 plays an important role in the growth of T cells, the proliferation and differentiation of mast cells, and the maturation of B cells. IL-9 signals through the γc and IL-9Rα, which is expressed on activated T cells, mast cells, and macrophages. IL-9/IL-9R axis can regulate transplant tolerance, promote anti-parasitic immunity, exacerbate allergy and autoimmunity, promote antitumor immunity, and enhance transformation and tumor growth.

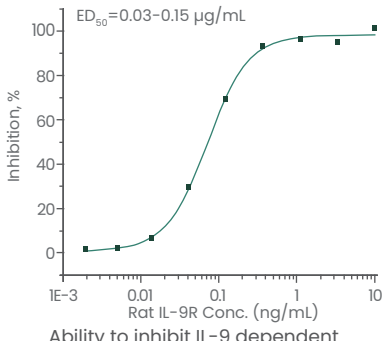
Featured IL-9 & Receptor Proteins

Human IL-9 Protein
Cat#: 11844-H08B



Cell proliferation assay using MO7e human megakaryocytic leukemic cells in the presence of human SCF

Rat IL-9R Protein
Cat#: 80077-R08H



Ability to inhibit IL-9 dependent proliferation of MC/9 mouse mast cells

IL-15 & Receptor

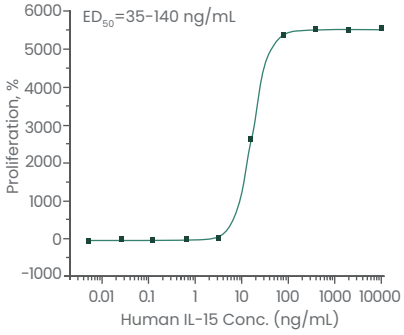
Interleukin-15 (IL-15) is a cytokine with pleiotropic functions in innate and adaptive immunity. IL-15 is widely produced in many cells and acts as a regulator of the immune response, especially in the induction and maintenance of T cell response. IL-15 has a high affinity to the receptor subunit IL-15Rα. The downstream signal is activated by the following binding to IL-2Rβ and γc chain.

IL-15 can induce TNF-α, IL-1β, and inflammatory chemokines, inhibit self-tolerance mediated by IL-2 mediated activation-induced cell death, and facilitate maintenance of CD8+ memory T-cell survival. A novel multimeric IL-15/IL-15Rα has been found to extend the serum half-life of IL15 and enhance the in vivo cytokine effect on IgG or T cell-engaging antibody-dependent cell-mediated cytotoxicities.

The multifaceted activity makes IL-15 a potential candidate in tumor immunotherapy.

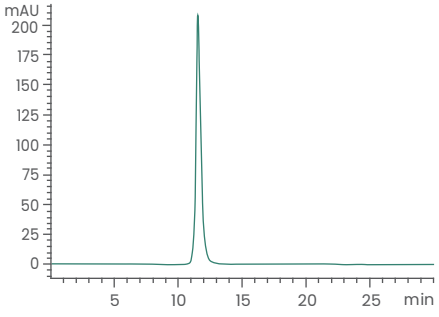
Featured IL-15 & Receptor Proteins

Human IL-15 Protein
Cat#: 10360-H07E



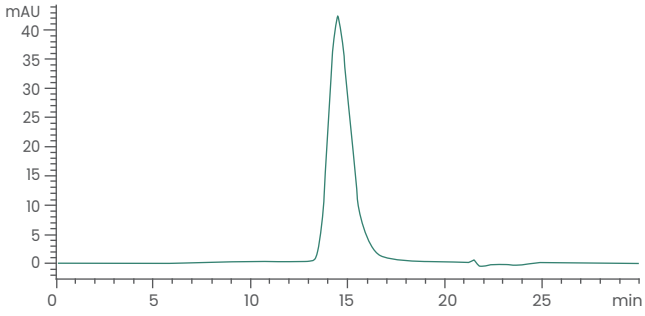
Cell proliferation assay using MO7e human megakaryocytic leukemic cells

Human IL-15Rα Protein
Cat#: 18366-H02H1



Purity: > 98 % as determined by SEC-HPLC

Mouse IL-15 & IL-15Rα Protein
Cat#: CT113-M08H



Purity: > 95 % as determined by SEC-HPLC

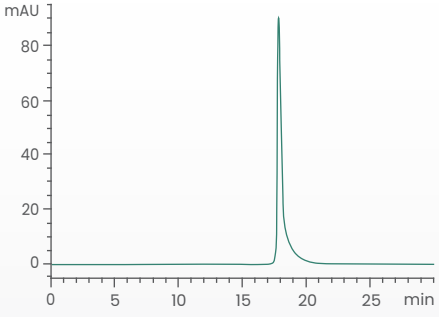
IL-21 & Receptor

IL-21 is a cytokine predominantly produced by CD4+ T cells and natural killer T (NKT) cells. The binding of IL-21 to IL-21R and the γc activates the JAK1 and JAK3 pathways, which subsequently activate the STATs, PI3K/Akt, and MAPK pathways. IL-21/IL-21R signaling is necessary for the proliferation and differentiation of T cells, B cells, natural killer (NK) cells, macrophages, and dendritic cells (DC). IL-21/IL-21R axis plays a crucial role in viral infections, cancer, and various immune diseases, such as inflammatory bowel diseases (IBD), rheumatoid arthritis, and type 1 diabetes.

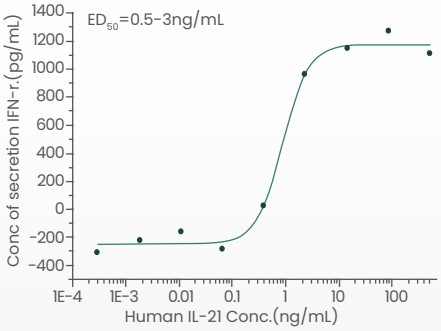
Featured IL-21 & Receptor Proteins

Human IL-21 Protein, HPLC-verified
Cat#: 10584-HNAE

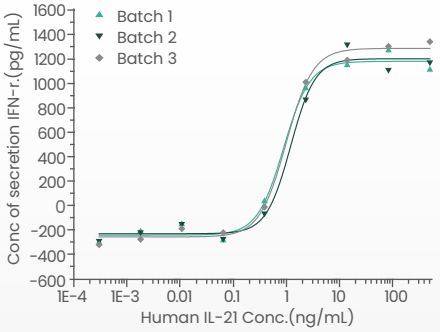
High-Purity | High Acitivty | Tag-free | HPLC-verified



Purity: > 95 % as determined by SEC-HPLC

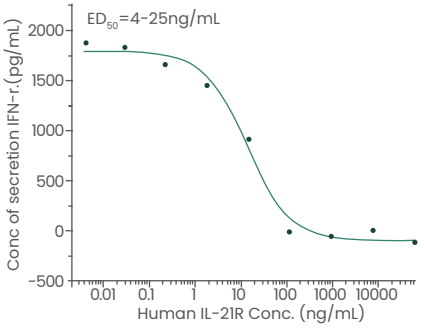


Ability to induce Interferon-gamma secretion by human natural killer lymphoma NK-92 cells



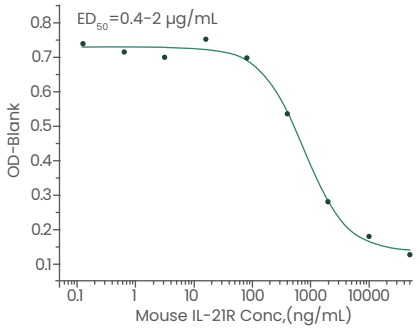
Batch-to-batch Consistency

Human IL-21R Protein
Cat#: 11483-H08H



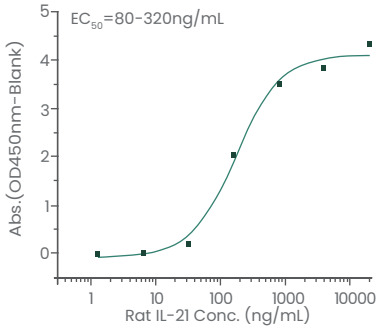
Ability to inhibit IL-21-induced Interferon gamma secretion by human natural killer lymphoma NK-92 cells

Mouse IL-21R Protein
Cat#: 51184-M08H



Ability to inhibit mouse IL-21-induced Interferon gamma secretion by human natural killer lymphoma NK-92 cells

Rat IL-21R Protein
Cat#: 80189-R08H



Immobilized Recombinant Rat IL-21 Protein(Cat#: 80200-RNAE) can bind Rat IL-21R

More γc Family & Receptor Proteins (Partial)

Cat#	Molecule	Species	Expressed Host	Purity	Activity	Tag
70014-DNAE	IL-2	Canine	E. coli	> 95%	Active	Native
10165-H27H-B	IL-2Rα	Human	HEK293 Cells	> 95%		C-AVI & His
90265-C08H	IL-2Rα	Cynomolgus	HEK293 Cells	> 95%		C-His
90265-C27H-B	IL-2Rα	Rhesus	HEK293 Cells	> 95%		C-AVI & His
10696-H08B	IL-2Rβ	Human	Baculovirus-Insect Cells	90% (by SEC-HPLC)	Active	C-His
50792-M08H	IL-2Rβ	Mouse	HEK293 Cells	> 90%		C-His
80340-R08H	IL-2Rβ	Rat	HEK293 Cells	> 95%		C-His
10555-H08H	IL-2Rγ	Human	HEK293 Cells	> 95%		C-His
50087-M02H	IL-2Rγ	Mouse	HEK293 Cells	> 90%		C-hFc
80197-R08H	IL-2Rγ	Rat	HEK293 Cells	> 99%		C-His
90119-K02H	IL-2Rγ	Rhesus	HEK293 Cells	> 95%		C-hFc
90119-K08H	IL-2Rγ	Rhesus	HEK293 Cells	> 95%		C-His
51084-M08B	IL-4	Mouse	Baculovirus-Insect Cells	> 95%	Active	C-His
10402-H02H	IL-4R	Human	HEK293 Cells	> 95%	Active	C-hFc
80198-R08H	IL-4R	Rat	HEK293 Cells	> 95%	Active	C-His
10943-H08H	IL-13Rα1	Human	HEK293 Cells	> 97%	Active	C-His
10943-H08H-B	IL-13Rα1	Human	HEK293 Cells	> 95%		C-His
10350-H08H-B	IL-13Rα2	Human	HEK293 Cells	> 85%	Active	C-His
70079-D02H	IL-13Rα2	Canine	HEK293 Cells	> 95%	Active	C-hFc
80204-R08H	IL-13Rα2	Rat	HEK293 Cells	> 85%	Active	C-His
50217-MNAE	IL-7	Mouse	E. coli	> 90%	Active	Native
10975-H08H	IL-7R	Human	HEK293 Cells	> 92%	Active	C-His
50090-M08H	IL-7R	Mouse	HEK293 Cells	> 85%		C-His
80083-R08H	IL-7R	Rat	HEK293 Cells	> 95%		C-His
CT114-H08H	IL-7Rα & IL-2Rγ	Human	HEK293 Cells	> 95%		C-His
51302-M08B	IL-9	Mouse	Baculovirus-Insect Cells	> 95%	Active	C-His
10360-HNCE	IL-15	Human	E. coli	> 95%	Active	N-cleavage
CT094-H02H	IL-15 & IL-15Rα	Human	HEK293 Cells	90% (by SEC-HPLC)	Active	C-hFc
70016-DNAE	IL-21	Canine	E. coli	> 97%	Active	Native
11483-H02H	IL-21R	Human	HEK293 Cells	> 90%	Active	C-hFc
51184-M02H	IL-21R	Mouse	HEK293 Cells	> 90%	Active	C-hFc
90315-C02H	IL-21R	Cynomolgus, Rhesus	HEK293 Cells	> 90%	Active	C-hFc

Antibodies for γ c Cytokine Family & Receptor (Partial)

Cat#	Antigen	Species	Application	Clonality	Label
11848-MM03-A	IL-2	Human	FCM	Mouse MAb	APC
11848-MM03-P	IL-2	Human	FCM	Mouse MAb	PE
11848-R011	IL-2	Human	ELISA	Rabbit MAb	
51061-R257	IL-2	Mouse	ELISA	Rabbit MAb	
51061-R300	IL-2	Mouse	FCM	Rabbit MAb	
51061-R300-F	IL-2	Mouse	FCM	Rabbit MAb	FITC
51061-R449-F	IL-2	Mouse	FCM	Rabbit MAb	FITC
80075-MM06-P	IL-2	Rat	FCM	Mouse MAb	PE
80075-MM10	IL-2	Rat	IHC-P	Mouse MAb	
10165-MM17-A	IL-2Rα	Human	FCM	Mouse MAb	APC
10165-MM17-C	IL-2Rα	Human	FCM	Mouse MAb	PerCP
10165-MM17-F	IL-2Rα	Human	FCM	Mouse MAb	FITC
10165-MM17-P	IL-2Rα	Human	FCM	Mouse MAb	PE
10165-R216-A	IL-2Rα	Human	FCM	Rabbit MAb	APC
10165-R216-C	IL-2Rα	Human	FCM	Rabbit MAb	PerCP
10165-R216-F	IL-2Rα	Human	FCM	Rabbit MAb	FITC
10165-R216-P	IL-2Rα	Human	FCM	Rabbit MAb	PE
50292-R049-A	IL-2Rα	Mouse	FCM	Rabbit MAb	APC
50292-R049-C	IL-2Rα	Mouse	FCM	Rabbit MAb	PerCP
50292-R049-F	IL-2Rα	Mouse	FCM	Rabbit MAb	FITC
50292-R049-P	IL-2Rα	Mouse	FCM	Rabbit MAb	PE
50292-R051-A	IL-2Rα	Mouse	FCM	Rabbit MAb	APC
50292-R051-C	IL-2Rα	Mouse	FCM	Rabbit MAb	PerCP
50292-R051-F	IL-2Rα	Mouse	FCM	Rabbit MAb	FITC
50292-R051-P	IL-2Rα	Mouse	FCM	Rabbit MAb	PE
50087-R005	IL-2Rγ	Mouse	ELISA,ELISA(Det)	Rabbit MAb	
50087-R005-H	IL-2Rγ	Mouse	ELISA	Rabbit MAb	HRP
50087-R011	IL-2Rγ	Mouse	ELISA(Cap),FCM,ICC/IF	Rabbit MAb	
50087-R011-P	IL-2Rγ	Mouse	FCM	Rabbit MAb	PE
11846-M401	IL-4	Human	WB	Mouse MAb	
11846-MM01-H	IL-4	Human	ELISA	Mouse MAb	HRP
11846-MM04	IL-4	Human	ELISA(Det)	Mouse MAb	
11846-MM04-B	IL-4	Human	ELISA	Mouse MAb	Biotin
11846-MM04-H	IL-4	Human	ELISA	Mouse MAb	HRP

Antibodies for γ c Cytokine Family & Receptor (Partial)

Cat#	Antigen	Species	Application	Clonality	Label
10402-MM01	IL-4R	Human	ELISA	Mouse MAb	
10402-R001	IL-4R	Human	Neutralization	Rabbit MAb	
10402-R001-H	IL-4R	Human	ELISA	Rabbit MAb	HRP
10402-R102	IL-4R	Human	ELISA	Rabbit MAb	
10402-R209	IL-4R	Human	FCM	Rabbit MAb	
10402-R209-A	IL-4R	Human	FCM	Rabbit MAb	APC
10402-R209-P	IL-4R	Human	FCM	Rabbit MAb	PE
10402-R401	IL-4R	Human	Neutralization	Rabbit MAb	
51180-R074	IL-4R	Mouse	ELISA	Rabbit MAb	
80198-R002	IL-4R	Rat	ELISA,FCM	Rabbit MAb	
80198-R002-A	IL-4R	Rat	FCM	Rabbit MAb	APC
80198-R002-P	IL-4R	Rat	FCM	Rabbit MAb	PE
11821-MM06	IL-7	Human	ELISA(Cap)	Mouse MAb	
50217-R040	IL-7	Mouse	ELISA	Rabbit MAb	
80329-R075	IL-7	Rat	ELISA	Rabbit MAb	
10975-MM12	IL-7R	Human	ELISA	Mouse MAb	
10975-R001-A	IL-7R	Human	FCM	Rabbit MAb	APC
10975-R001-F	IL-7R	Human	FCM	Rabbit MAb	FITC
10975-R001-P	IL-7R	Human	FCM	Rabbit MAb	PE
10975-R014-A	IL-7R	Human	FCM	Rabbit MAb	APC
10975-R014-F	IL-7R	Human	FCM	Rabbit MAb	FITC
10975-R014-P	IL-7R	Human	FCM	Rabbit MAb	PE
11844-R103	IL-9	Human	ELISA	Rabbit MAb	
80459-R030	IL-9	Rat	ELISA	Rabbit MAb	
80077-R238	IL-9R	Rat	ELISA	Rabbit MAb	
10360-R111-H	IL-15	Human	ELISA	Rabbit MAb	HRP
10360-R112	IL-15	Human	ELISA(Cap)	Rabbit MAb	
10584-R145	IL-21	Human	ELISA	Rabbit MAb	
50137-R012	IL-21	Mouse	ELISA	Rabbit MAb	
80200-R101	IL-21	Rat	ELISA	Rabbit MAb	
11483-R033	IL-21R	Human	ELISA	Rabbit MAb	

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