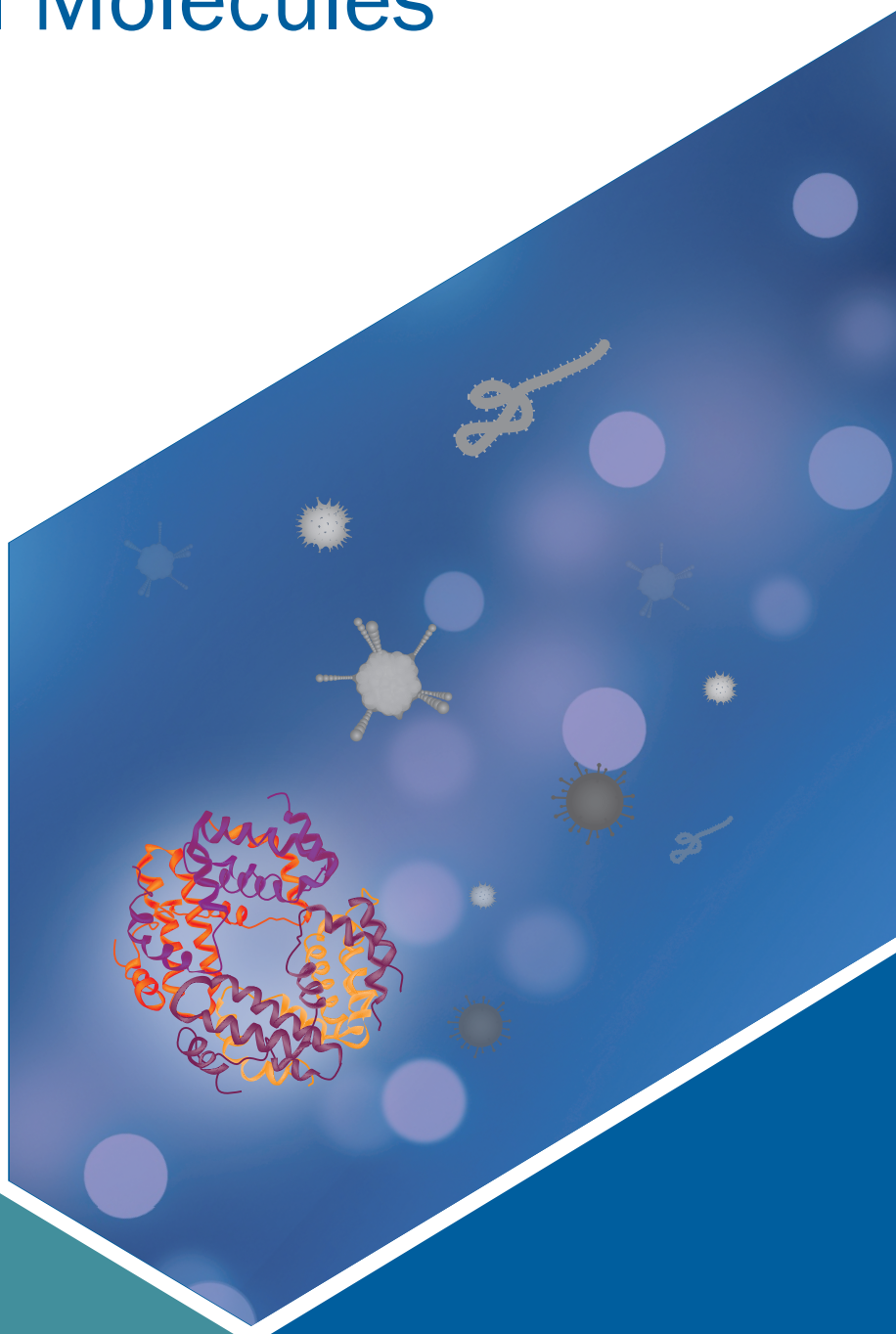
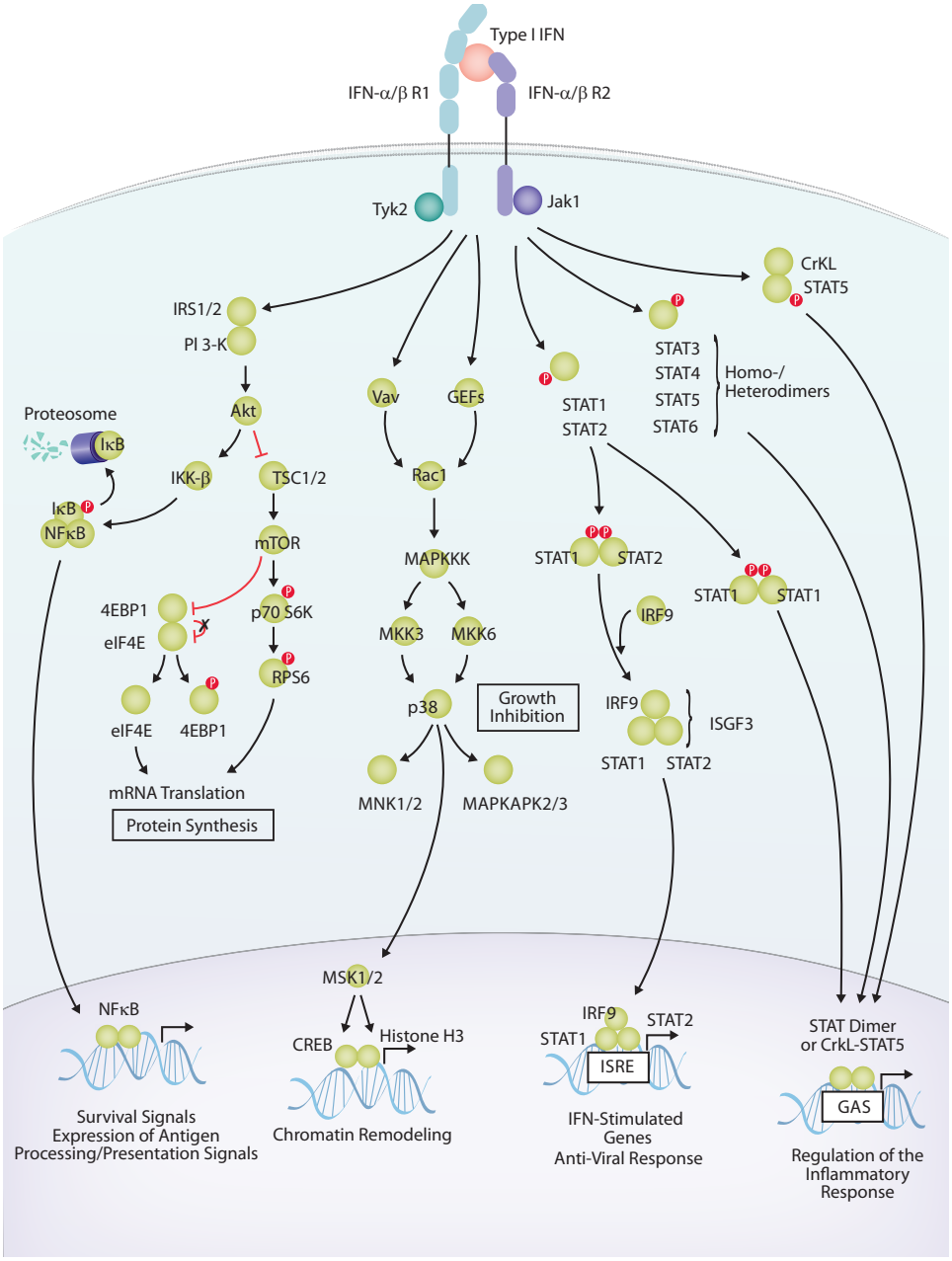
bio-techne®

Interferons and Anti-Viral Small Molecules



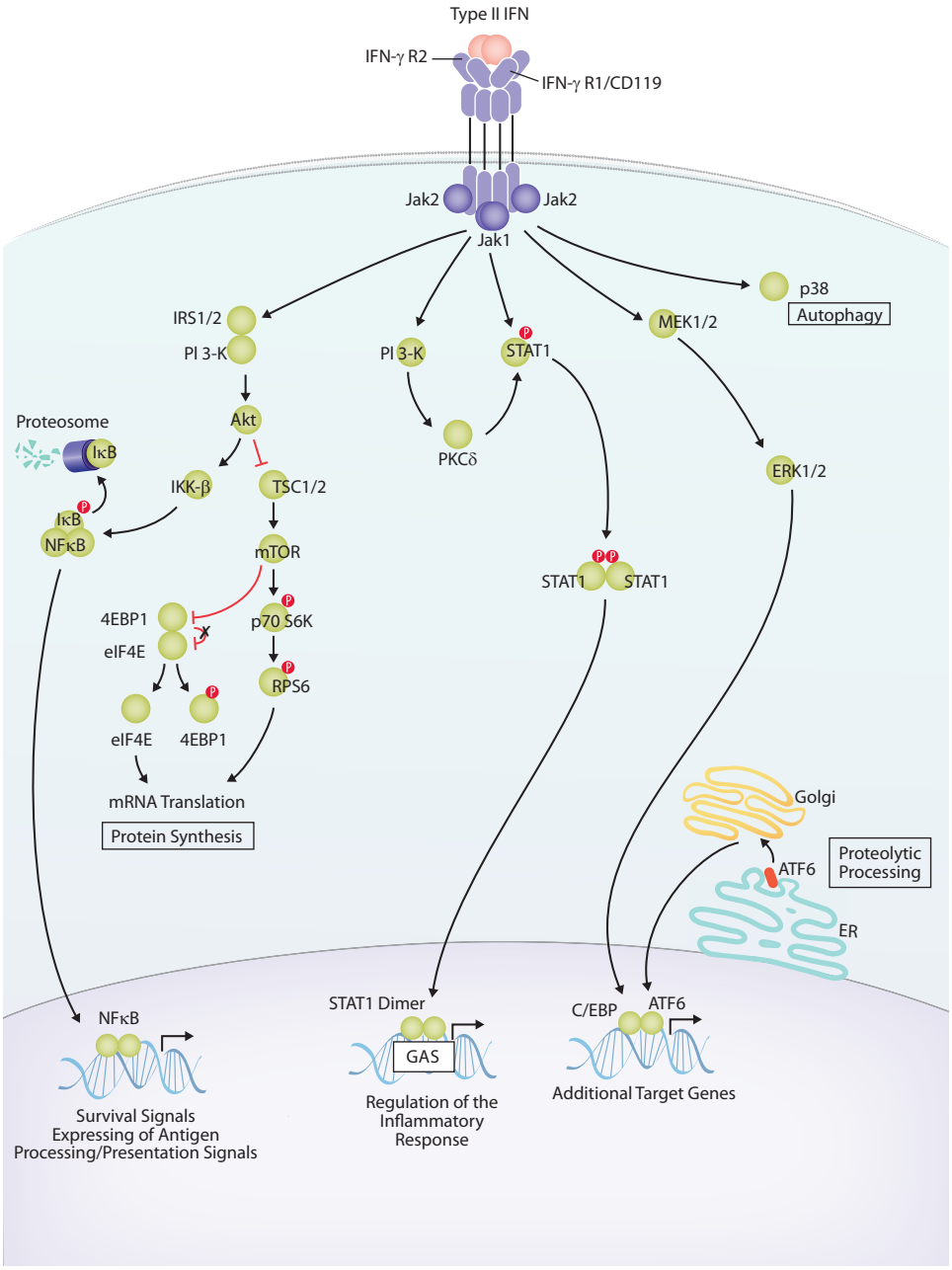
Type I Interferons

Type I interferons (IFNs) are produced following recognition of microbial products by cell surface and intracellular pattern recognition receptors. The type I IFN family consists of multiple IFN-α subtypes, IFN-β, IFN-δ, IFN-ε, IFN-κ, IFN-τ, IFN-ω, and IFN-ζ (limitin). IFN-α, IFN-β, IFN-ε, IFN-κ, and IFN-ω are all found in humans, while IFN-δ, IFN-τ, and IFN-ζ have only been described in pigs, cattle, and mice, respectively. No human homologues of these three type I interferon subclasses have been identified. All type I interferons have significant structural homology and bind to a common heterodimeric receptor consisting of the IFN-α/β RI and IFN-α/β R2 subunits, which are expressed on most cell types. Receptor engagement activates the IFN-α/β R1-associated Tyk2 protein tyrosine kinase and the IFN-α/β R2-associated Jak1 protein tyrosine kinase. These kinases subsequently regulate the phosphorylation and activation of different STAT proteins. Activated STAT proteins homo- or heterodimerize and translocate to the nucleus, where they promote the expression of numerous target genes. In addition, type I IFNs can activate the MAPK, PI 3-K-Akt, and NFκB signaling pathways. One transcriptional complex that is formed following stimulation by type I IFNs is the IFN-stimulated gene factor 3 (ISGF3) complex. This complex consists of phosphorylated STAT1, STAT2, and IRF9 and binds to IFN-stimulated response elements (ISREs) found in the promoters of numerous IFN-stimulated genes (ISGs). Other STAT homo- or heterodimers induced by type I IFNs bind to regulatory sequences in the promoters of target genes known as IFN-γ-activated sequence (GAS) sites. Binding of STAT proteins to either ISREs or GAS sites regulates the expression of several hundred ISGs, which mediate the anti-viral, anti-proliferative, and apoptotic effects of type I IFNs.



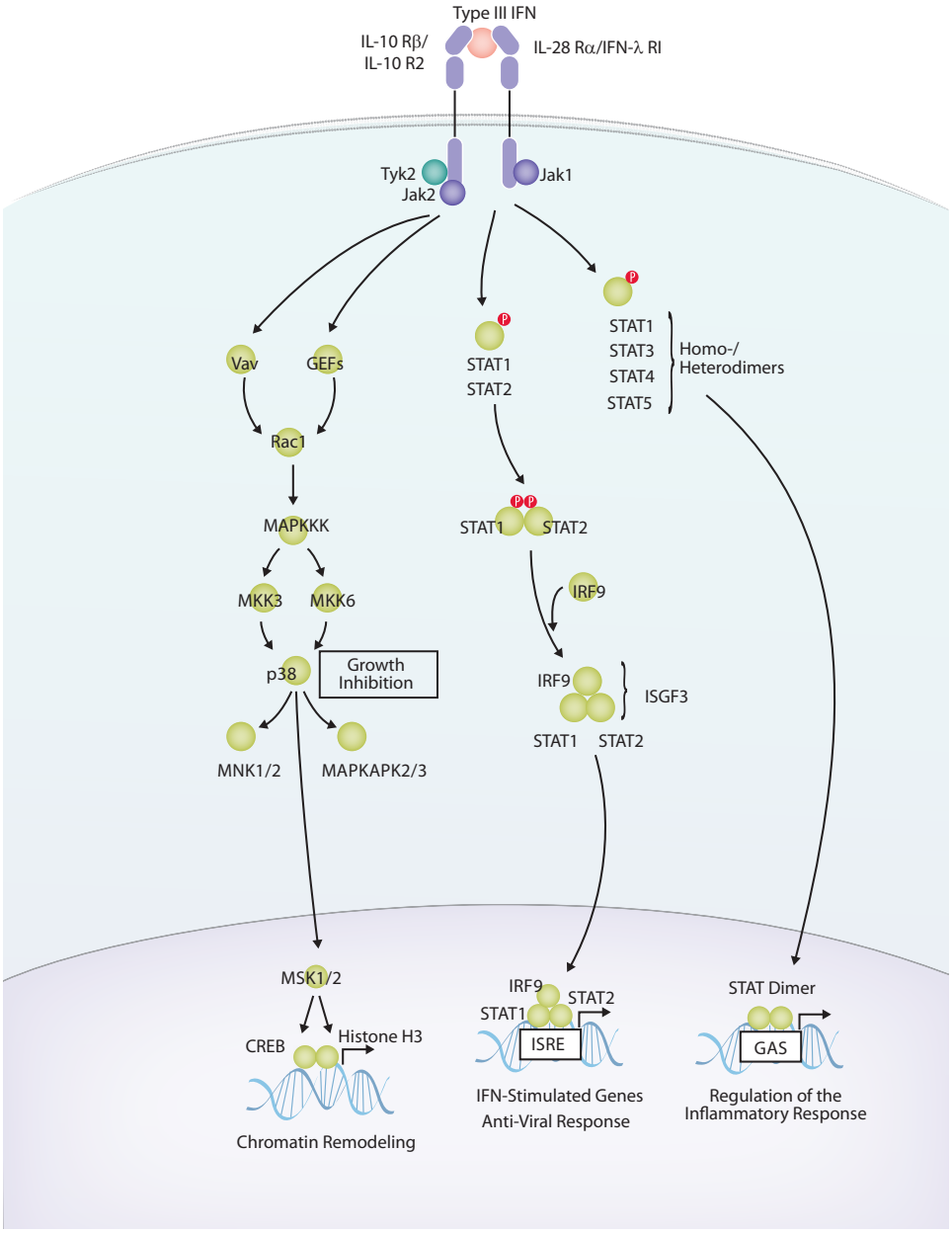
Type II Interferon

IFN-γ is the only type II interferon. While it does not share structural homology or a common receptor with the type I IFNs, it too has anti-viral and immunomodulatory properties. The biologically active form of IFN-γ is a noncovalently-linked homodimer. This homodimer binds to the extracellular domain of two IFN-γ R1/CD119 chains, which interact with IFN-γ R2 to form the functional IFN-γ receptor complex. The IFN-γ R1 subunits of the receptor complex are associated with Jak1, while the IFN-γ R2 subunits are associated with Jak2. Activation of Jak1 and Jak2 results in phosphorylation of the receptor and subsequent recruitment and phosphorylation of STAT1. STAT1 phosphorylation leads to its homodimerization and nuclear translocation. Once in the nucleus, STAT1 homodimers bind to IFN-γ-activated sequence (GAS) elements in the promoters of target genes to regulate their transcription. Many of the target genes that are induced by IFN-γ/STAT1 signaling are transcription factors that then drive the expression of secondary response genes. In addition, IFN-γ signaling can activate MAPK, PI 3-K-Akt, and NFκB signaling pathways to regulate the expression of a number of other genes. IFN-γ signaling plays a key role in host defense by promoting macrophage activation, upregulating the expression of antigen processing and presentation molecules, driving the development and activation of Th1 cells, enhancing natural killer cell activity, regulating B cell functions, and inducing the production of chemokines that promote effector cell trafficking to sites of inflammation. While IFN-γ has historically been known for its cytotoxic, cytostatic, and anti-tumor properties, multiple studies have also suggested that IFN-γ may also have context-dependent proliferative and pro-tumorigenic effects.



Type III Interferons

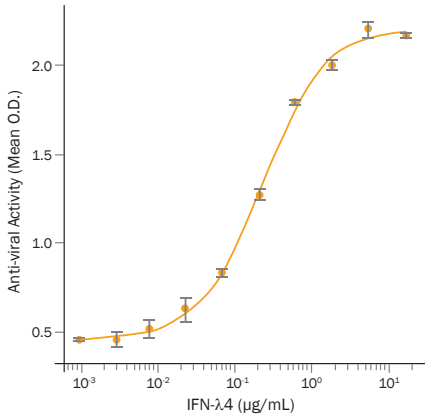
The type III interferon family consists of four proteins, IL-29/IFN-λ1, IL-28A/IFN-λ2, IL-28B/IFN-λ3, and IFN-λ4, which are distantly related to members of the IL-10 and type I IFN cytokine families. IL-29/IFN-λ1 is found only in humans and is 81% homologous to IL-28A/IFN-λ2 and IL-28B/IFN-λ3, which share 96% amino acid identity. IFN-λ4 was originally thought to be a pseudogene but it's since been found that a dinucleotide frameshift variant (TT or ΔG) can generate a functional IFN-λ4 protein. All type III IFNs bind to a receptor complex formed by the IL-28 Rα/IFN-λ R1 ligand-binding subunit and the IL-10 Rβ accessory chain. Like type I IFNs, type III IFNs activate Jak1 and Tyk2, leading to the phosphorylation and activation of STAT1 and STAT2. Phosphorylated STAT1 and STAT2 associate with IRF9 to form the ISGF3 complex, which subsequently translocates to the nucleus and regulates the expression of ISGs. In addition, IFN-λs can also induce Jak2 phosphorylation and activate other STAT family proteins, as well as MAPK signaling pathways. Type III IFNs have similar anti-viral, anti-proliferative, apoptotic, and immunomodulatory effects as the type I IFNs and typically induce a subset of the target genes that are induced by the type I IFN-α and -β proteins. As IL-28 Rα/IFN-λ R1 is primarily expressed on epithelial cells, it has been proposed that the type III IFNs may have specifically evolved to provide anti-viral protection at epithelial surfaces.



Recombinant Proteins

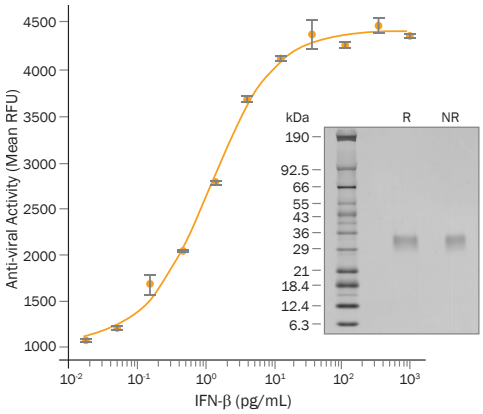
R&D Systems offers the widest selection of interferon proteins on the market. Recent additions to our protein portfolio include Recombinant Human and Mouse IFN-β and Recombinant Human IFN-λ4. We also offer Recombinant Viral B8R, a potent inhibitor of IFN-γ, Recombinant Viral B19R, an inhibitor of all type I interferons, and Recombinant Viral 136R, an inhibitor of both type I and type III interferons . Stringent production and purification standards ensure that R&D Systems® proteins will provide researchers with industry-leading bioactivity and lot-to-lot consistency.

New! Bioactive Recombinant Human IFN-λ4 Exclusively Available from R&D Systems

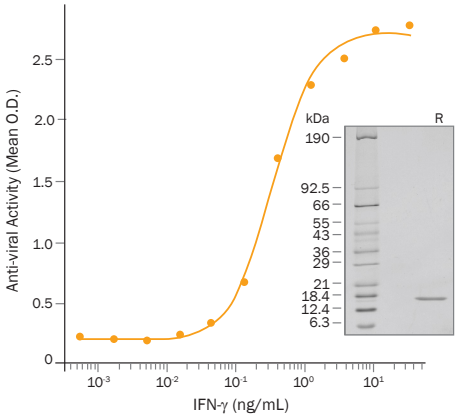


IFN-λ4 Inhibits EMCV-induced Cytopathy. The HepG2 human hepatocellular carcinoma cell line infected with encephalomyocarditis virus (EMCV) was treated with increasing concentrations of Recombinant Human IFN-λ4 (Catalog # 9165-IF) and EMCV-induced cytopathy was measured. The ED_{50} for this effect is typically 0.2–1.2 ug/mL.

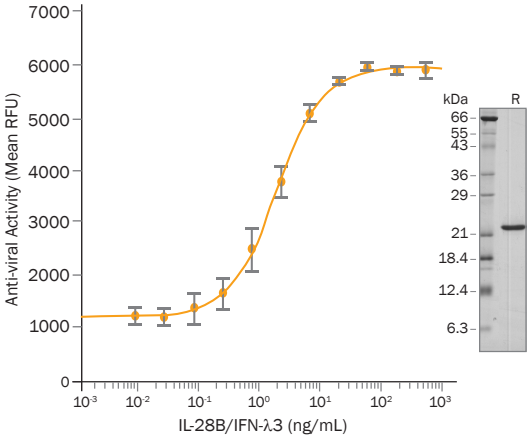
NEW! Bioactive Recombinant Mouse IFN-β



IFN-β Suppresses Viral Activity in Mouse Fibroblasts. L-929 mouse fibroblasts infected with encephalomyocarditis virus (EMCV) were treated with increasing concentrations of Recombinant Mouse IFN-β (Catalog # 8234-MB) and anti-viral activity was measured. The ED_{50} for this effect is typically 1–6 pg/mL. The purity of Recombinant Mouse IFN-β (Catalog # 8234-MB) was assessed by SDS-PAGE analysis under reducing (R) and non-reducing (NR) conditions and visualized by silver staining (inset).

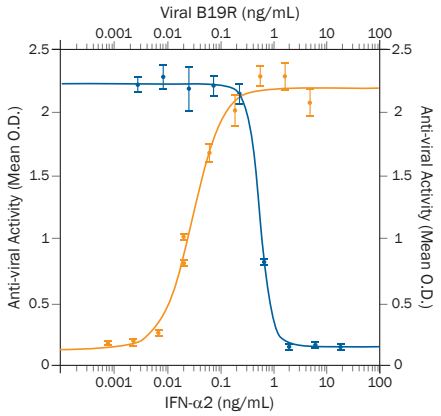


IFN-γ Inhibits EMCV-induced Cytopathy. The HeLa human cervical epithelial cell line infected with encephalomyocarditis virus (EMCV) was treated with increasing concentrations of Recombinant Human IFN-γ (Catalog # 285-IF) and EMCV-induced cytopathy was measured by crystal violet staining. The ED_{50} for this effect is typically 0.15–0.75 ng/mL. The purity of Recombinant Human IFN-γ (Catalog # 285-IF) was assessed by SDS-PAGE analysis under reducing (R) conditions and visualized by silver staining (inset).

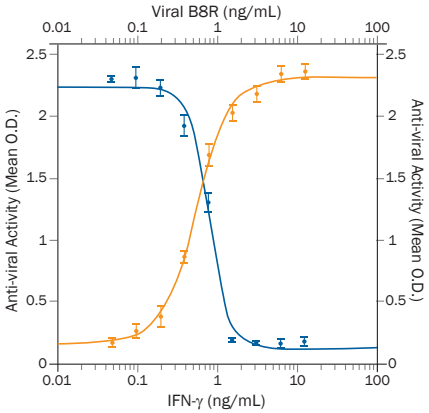


IL-28B/IFN-λ3 Inhibits EMCV-induced Cytopathy. The HepG2 human hepatocellular carcinoma cell line infected with encephalomyocarditis virus (EMCV) was treated with increasing concentrations of Recombinant Human IL-28B/IFN-λ3 (Catalog # 5259-IL) and EMCV-induced cytopathy was measured. The ED_{50} for this effect is typically 1–5 ng/mL. The purity of Recombinant Human IL-28B/IFN-λ3 (Catalog # 5259-IL) was assessed by SDS-PAGE analysis under reducing (R) conditions and visualized by silver staining (inset).

Viral IFN Inhibitors Available from R&D Systems



Viral B19R Inhibits Type I IFN-mediated Anti-Viral Activity. Recombinant Human IFN-α2 (Catalog # 11105-1) protects the HeLa human cervical epithelial cell line from encephalomyocarditis virus (EMCV)-mediated lysis (orange line). The protective effect elicited by 1 ng/mL Recombinant Human IFN-α2 is inhibited by treating the cells with increasing concentrations of the Type I IFN inhibitor, Recombinant Viral B19R (Catalog # 8185-BR; blue line). The ED_{50} for this effect is typically 0.3–1.8 ng/mL.



Viral B8R Inhibits IFN-γ-mediated Anti-Viral Activity. Recombinant Human IFN-γ (Catalog # 285-IF) protects the HeLa human cervical epithelial cell line from encephalomyocarditis virus (EMCV)-mediated lysis (orange line). The protective effect elicited by 10 ng/mL Recombinant Human IFN-γ is inhibited by treating the cells with increasing concentrations of the potent IFN-γ inhibitor, Recombinant Viral B8R (Catalog # 8225-BR; blue line). The ED_{50} for this effect is typically 0.5–3 ng/mL.

Type I Interferons		
Molecule	**Species**	**Catalog #**
Universal Type I IFN	Human	11200-1
		11200-2
IFN-α1	Human	11175-1
IFN-α2 (α2B)	Human	11105-1
IFN-α4a (αM1)	Human	11177-1
IFN-α4b (α4)	Human	11180-1
IFN-αA	Human	11101-1
		11101-2
IFN-αA (α2A)	Human	11100-1
IFN-αB2	Human	11115-1
IFN-αC	Human	11120-1
IFN-αD	Human	11125-1
IFN-αF	Human	11130-1
IFN-αG	Human	11135-1
IFN-αH2	Human	11145-1
IFN-αI	Human	11150-1
IFN-αJ1	Human	11160-1
IFN-αK	Human	11165-1
IFN-αWA	Human	11190-1
IFN-α1	Mouse	12105-1
IFN-α4	Mouse	12115-1
IFN-α11	Mouse	12125-1
IFN-α13	Mouse	12130-1
IFN-αA	Mouse	12100-1
IFN-β	Human	8499-IF
	Mouse	8234-MB
		12400-1
		12401-1
		12405-1
		12410-1
IFN-β1a	Human	11410-2
		11415-1
IFN-ε	Mouse	9147-ME

Type I Interferons		
Molecule	**Species**	**Catalog #**
IFN-κ	Mouse	8437-MK
IFN-ω	Human	11395-1
Limitin/IFN-ζ	Mouse	597-LM
		1535-LM
Type II Interferon		
IFN-γ	Human	285-IF
	Mouse	485-MI
Type III Interferons		
IFN-λ4	Human	9165-IF
IL-28A/IFN-λ2	Human	1587-IL
		8417-IL
	Mouse	4635-ML
IL-28B/IFN-λ3	Human	5259-IL
	Mouse	1789-ML
IL-29/IFN-λ1	Human	1598-IL

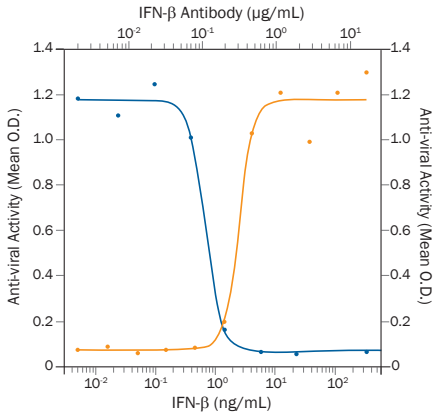
Interferon Receptors		
IFN-α/β R1	Human	245-AB
	Mouse	3039-AB
IFN-α/β R2	Human	4015-AB
	Mouse	1083-AB
IFN-γ RI	Human	673-IR
	Mouse	1026-GR
IFN-γ R2	Mouse	1185-GR
IL-10 Rβ	Human	874-RB
	Mouse	5368-RB
IL-28 Rα/IFN-λ R1	Human	5260-MR
	Mouse	5384-MR

Interferon Inhibitors		
B8R	Viral	8225-BR
B19R	Viral	8185-BR
136R/Y136	Viral	8976-BR

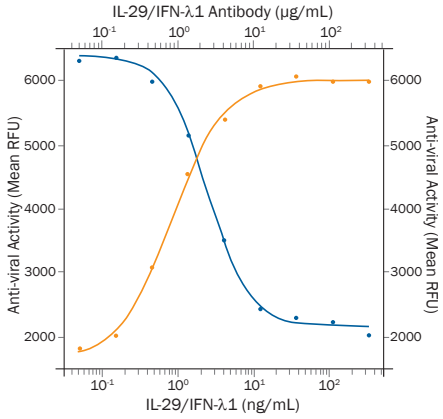
Antibodies for Interferons and Interferon Receptors

R&D Systems offers an unparalleled selection of unconjugated and fluorochrome-conjugated antibodies for interferons and interferon receptors that are qualified for blocking/neutralization, flow cytometry, immunocytochemistry (ICC), immunohistochemistry (IHC), and/or Western blot. All of our antibodies are designed to provide specificity and consistent performance and are 100% guaranteed to work in the applications and species listed on the R&D Systems website.

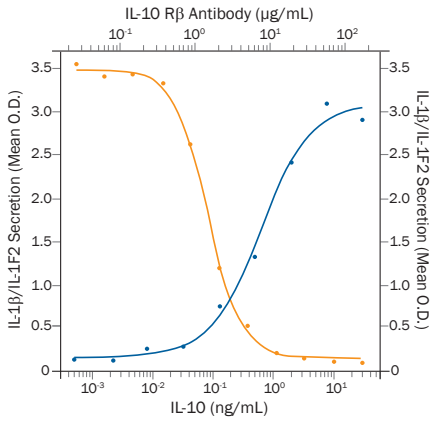
Antibodies for Blocking/Neutralization



IFN-β-mediated Inhibition of EMCV-induced Cytopathy and Neutralization using an Anti-Human IFN-β Antibody. The HeLa human cervical epithelial carcinoma cell line infected with encephalomyocarditis virus (EMCV) was treated with increasing concentrations of Recombinant Human IFN-β (Catalog # 8499-IF) and EMCV-induced cytopathy was measured by crystal violet staining (orange line). The inhibitory effect elicited by 10 ng/mL Recombinant Human IFN-β was neutralized by treating the cells with increasing concentrations of a Goat Anti-Human IFN-β Antigen Affinity-purified Polyclonal Antibody (Catalog # AF814; blue line). The ND_{50} is typically 0.05–0.2 µg/mL.

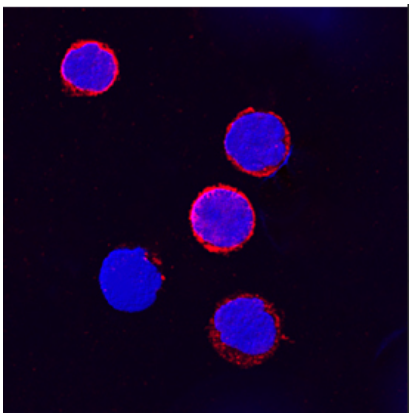


IL-29/IFN-λ1-mediated Inhibition of EMCV-induced Cytopathy and Neutralization using an Anti-Human IL-29/IFN-λ1 Antibody. The HepG2 human hepatocellular carcinoma cell line infected with encephalomyocarditis virus (EMCV) was treated with increasing concentrations of Recombinant Human IL-29/IFN-λ1 (Catalog # 1598-IL) and anti-viral activity was measured by Resazurin (Catalog # AR002; orange line). The inhibitory effect elicited by 40 ng/mL Recombinant Human IL-29/IFN-λ1 was neutralized by treating the cells with increasing concentrations of a Mouse Anti-Human IL-29/IFN-λ1 Monoclonal Antibody (Catalog # MAB15981; blue line). The ND_{50} is typically 1–4 µg/mL.

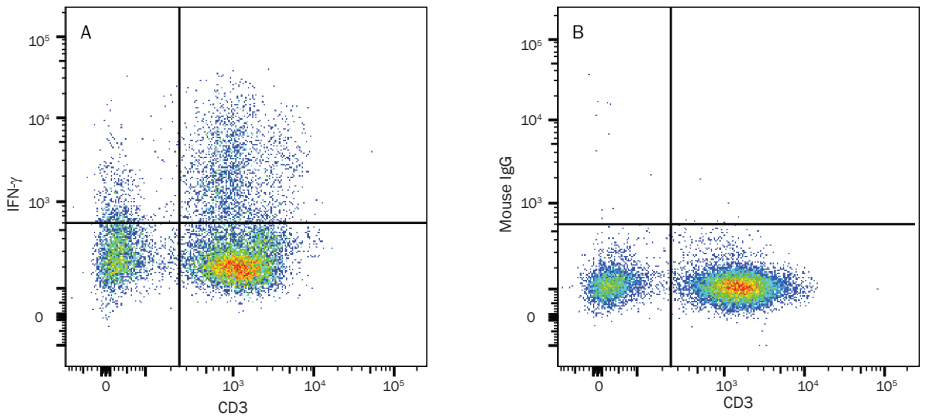


IL-10-mediated Inhibition of IL-1β secretion and Neutralization using an Anti-Human IL-10 Rβ Antibody. Human peripheral blood mononuclear cells activated with lipopolysaccharide (LPS) were treated with increasing concentrations of Recombinant Human IL-10 (Catalog # 217-IL). IL-1β/IL-1F2 secretion was measured using the Human IL-1β/IL-1F2 Quantikine® ELISA Kit (Catalog # DLB50; orange line). The inhibitory effect elicited by 0.25 ng/mL Recombinant Human IL-10 was neutralized by treating the cells with increasing concentrations of a Goat Anti-Human IL-10 Rβ Antigen Affinity-purified Polyclonal Antibody (Catalog # AF874; blue line). The ND_{50} is typically 2–6 µg/mL in the presence of 0.25 ng/mL LPS.

Antibodies for Immunocytochemistry or Flow Cytometry



Detection of IFN-γ R1/CD119 in Human Peripheral Blood Mononuclear Cells by Immunocytochemistry. IFN-γ R1/CD119 was detected in immersion-fixed human peripheral blood mononuclear cells using a Goat Anti-Human IFN-γ R1/CD119 Antigen Affinity-purified Polyclonal Antibody (Catalog # AF673) at 15 µg/mL for 3 hours at room temperature. Cells were stained using the NorthernLights™ 557-conjugated Anti-Goat IgG Secondary Antibody (Catalog # NL001; red) and counterstained with DAPI (blue). Specific staining was localized to the plasma membrane.



Detection of IFN-γ in Human Peripheral Blood Mononuclear Cells by Flow Cytometry. Human peripheral blood mononuclear cells were treated with 50 ng/mL PMA, 1 µg/mL ionomycin, and 3 µM monensin overnight and then stained with an APC-conjugated Mouse Anti-Human CD3ε Monoclonal Antibody (Catalog # FAB100A) and either (**A**) an Alexa Fluor® 488-conjugated Mouse Anti-Human IFN-γ Monoclonal Antibody (Catalog # IC285G) or (**B**) an Alexa Fluor® 488-conjugated Mouse IgG_{2B} Isotype Control (Catalog # IC0041G). To facilitate intracellular staining, the cells were fixed and permeabilized using the FlowX FoxP3 Fixation & Permeabilization Buffer Kit (Catalog # FC012).

R&D Systems® Antibodies for Research on Interferons and Interferon Receptors

Type I Interferons				
Molecule	**Species**	**Clone**	**Unlabeled Antibodies Catalog # (Applications)**	**Fluorochrome-labeled Antibodies Catalog # (Applications)**
IFN-α	Human	MMHA-2	21100-1 (B/N, E, WB)	
		MMHA-2	21100-2 (B/N, E, WB)	
		MMHA-6	21125-1 (B/N, E)	
		MMHA-8	21110-1 (B/N, E)	
		MMHA-9	21127-1 (B/N)	
		MMHA-11	21112-1 (B/N, E)	21112-3 (FC, IHC)
		MMHA-13	21116-1 (E)	
		MMHA-14	21129-1 (B/N)	
		MMHA-17	21118-1 (B/N, E)	
		Polyclonal	31101-1 (B/N)	
		Polyclonal	31100-1 (B/N)	
		Polyclonal	31130-1 (B/N)	
	Mouse	RMMA-1	22100-1 (B/N, E)	22100-3 (FC, IHC)
		Polyclonal	32100-1 (B/N)	
IFN-β	Human	76703R	MAB814R (B/N)	
		2036A	MAB8142 (ICC/IF)	
		Polyclonal	AF814 (B/N, WB)	
		76703	MAB814 (B/N, WB)	
		MMHB-1	21405-1 (E)	
		MMHB-3	21400-1 (B/N)	21400-3 (FC, IHC)
		MMHB-12	21450-1 (E)	
		MMHB-13	21455-1 (E)	
		MMHB-14	21460-1 (E)	
		MMHB-15	21465-1 (E)	
		MMHB-16	21470-1 (E)	
		Polyclonal	31410-1 (B/N)	
		Polyclonal	31401-1 (B/N)	
	Mouse	Polyclonal	32400-1 (B/N)	
		RMMB-1	22400-1 (E)	22400-3 (FC, IHC)
		Polyclonal	32401-1 (B/N)	
IFN-κ	Mouse	Polyclonal	AF5206 (SW, WB)	
IFN-ω	Human	OMG-4	21395-1 (B/N)	
Limitin/IFN-ζ	Mouse	Polyclonal	AF597 (B/N, IHC, WB)	
		183707	MAB5971 (B/N, E)	
		183727	MAB597 (WB)	
Type II Interferon				
Molecule	**Species**	**Clone**	**Unlabeled Antibodies Catalog # (Applications)**	**Fluorochrome-labeled Antibodies Catalog # (Applications)**
IFN-γ	Human	25718	MAB285 (B/N, ICC/IF)	IC2851S, T, V (FC)
		Polyclonal	AF-285-NA (B/N, ICC/IF, WB)	
		Polyclonal	AB-285-NA (B/N, WB)	
		K3.53	MAB2852 (B/N, E, WB)	
		25723	MAB2851 (B/N, FC, ICC/IF)	IC285A, C, F, G, P (FC)

Type III Interferons				
Molecule	**Species**	**Clone**	**Unlabeled Antibodies Catalog # (Applications)**	**Fluorochrome-labeled Antibodies Catalog # (Applications)**
IL-28A/IFN-λ2	Human	Polyclonal	AF1587 (B/N, ICC/IF, WB)	
		248526	MAB1587 (B/N)	
		248512	MAB15871 (E)	
	Mouse	Polyclonal	AF4635 (B/N, WB)	
		625616	MAB4635 (B/N)	
IL-28A/B (IFN-λ2/3)	Mouse	244716	MAB17892 (B/N, E)	
IL-28B/IFN-λ3	Human	247801	MAB15981 (B/N, E)	
		567143	MAB5259 (WB)	
	Mouse	244710	MAB1789 (B/N, WB)	
		Polyclonal	AF1789 (B/N, WB)	
IL-29/IFN-λ1	Human	247801	MAB15981 (B/N, E)	
		Polyclonal	AF1598 (B/N, WB)	
Interferon Receptors				
Molecule	**Species**	**Clone**	**Unlabeled Antibodies Catalog # (Applications)**	**Fluorochrome-labeled Antibodies Catalog # (Applications)**
IFN-α/β R1	Human	Polyclonal	AF245 (FC, WB)	
		85228	MAB245 (FC, WB)	FAB245A, C, F, N, P (FC)
	Mouse	Polyclonal	AF3039 (B/N, WB)	
IFN-α/β R2	Human	Polyclonal	AF4015 (WB)	
		Polyclonal	AF7014 (WB)	
	Mouse	Polyclonal	AF1083 (B/N, WB)	FAB1083A, F, P (FC)
		237526	MAB1083 (WB)	
IFN-γ R1/CD119	Human	92101	MAB6731 (B/N, FC, WB)	FAB673F, P (FC)
		Polyclonal	AF673 (B/N, ICC/IF, WB)	
		GIR208	MAB6732 (B/N)	
	Mouse	170911	MAB10262 (B/N, E)	
		1F1.93.2	MAB10261 (WB)	
		2E2.4	MAB1026 (WB)	FAB1026P (FC)
		Polyclonal	AF1026 (B/N, WB)	
IFN-γ R2	Human	Polyclonal	AF773 (B/N, FC, WB)	FAB773A, F (FC)
	Mouse	MOB47	MAB773 (B/N, FC, WB)	
		Polyclonal	AF1185 (B/N, WB)	
IL-10 Rβ	Human	Polyclonal	AF874 (B/N, FC, WB)	
		90220	MAB874 (B/N, FC, WB)	FAB874A, G, P (FC)
		90227	MAB8741 (WB)	
	Mouse	Polyclonal	AF5368 (FC, WB)	
		547324	MAB53681 (FC)	FAB53681A, C, G (FC)
IL-28 Rα/IFN-λ R1	Human	Polyclonal	AF5260 (FC, WB)	
		601106	MAB5260 (FC)	FAB5260P (FC)

ELISA Kits for Detecting IFNs and Soluble IFN Receptors

R&D Systems offers complete, ready-to-run Quantikine® Colorimetric Sandwich ELISA Kits and the more flexible DuoSet® ELISA Development Systems for detecting specific type I, type II, and type III IFNs or soluble IFN-γ R1. Quantikine® Kits are rigorously tested in-house to ensure that they provide the highest levels of specificity, accuracy, precision, and sensitivity in analyte quantification. DuoSet® ELISA Development Systems offer an economical alternative to Quantikine® Kits by providing all of the components necessary for a customer to develop their own working assay.

Quantikine® ELISA Kits

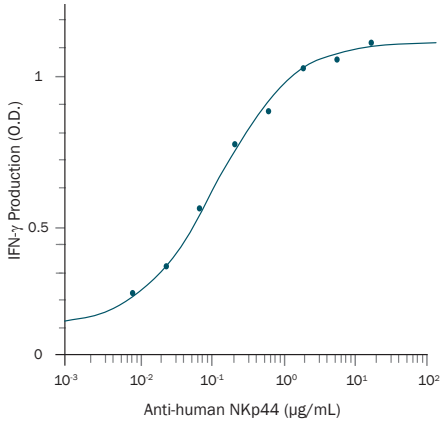
Features

- Complete, ready-to-use kits
- Exhaustively tested for superior quality and reproducibility
- Detailed protocol booklets
- Colorimetric detection

DuoSet® ELISA Development Systems

Features

- Provides sufficient reagents for five or fifteen 96-well plates
- Contains carefully selected and validated antibodies, reducing development time
- Includes mass-calibrated recombinant standard, reducing assay variability
- Can be adapted for use across multiple platforms



Detection of Anti-NKp44-induced IFN-γ Secretion by IL-2-activated Human Natural Killer Cells. Human peripheral blood natural killer (NK) cells were isolated using the MagCellect™ Human NK Cell Isolation Kit (Catalog # MAGH109). Isolated cells were treated with Recombinant Human IL-2 (Catalog # 202-IL) and the indicated concentrations of immobilized Goat Anti-Human NKp44 Antigen Affinity-purified Polyclonal Antibody (Catalog # AF2249). IFN-γ secretion was measured using the Human IFN-γ Quantikine® ELISA Kit (Catalog # DIF50).

Quantikine® ELISA Kits

Type II Interferon		
Molecule	**Species**	**Catalog #**
IFN-γ	Human	DIF50
	Mouse	MIF00
Type III Interferons		
IL-28B/IFN-λ3	Human	D28B00

DuoSet® ELISA Development Systems

Type I Interferons		
Molecule	**Species**	**Catalog #**
IFN-α	Human	41100-1
IFN-α MS	Human	41105-1
IFN-α Serum	Human	41110-1
IFN-α	Mouse	42120-1
IFN-β	Human	41410-1
	Mouse	42400-1
IFN-ω	Human	41395-1
Limitin/IFN-ζ	Mouse	DY597
Type II Interferon		
IFN-γ	Human	DY285
	Mouse	DY485
Type III Interferons		
IL-28A/IFN-λ2	Human	DY1587
IL-28B/IFN-λ3	Human	DY5259
IL-29/IFN-λ1	Human	DY7246
IL-29/IL-28B	Human	DY1598B
IL-28A/B	Mouse	DY1789B
Interferon Receptors		
IFN-γ R1	Human	DY673
	Mouse	DY1026

Multiplex Assays

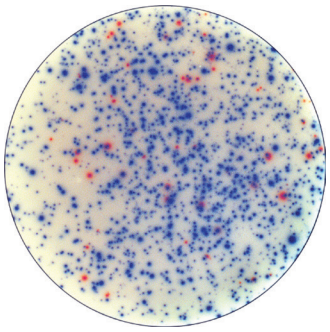
In addition to our single analyte ELISA Kits, R&D Systems also offers multiplex assay options for simultaneously detecting multiple target analytes in qualified sample types. These assays include the membrane-based Proteome Profiler™ Antibody Arrays and the bead-based Luminex® Assays and High Performance Assays. Several Proteome Profiler™ Antibody Arrays include IFN-γ as a target analyte and the Human Luminex® Assays offer IFN-γ R1, IFN-γ, IL-28A/IFN-λ2, and now IFN-β and IL-28B/IFN-λ3 on the menu of available target analytes for both the magnetic and polystyrene bead formats. Please visit our website at rndsystems.com/ProteomeProfiler or rndsystems.com/Luminex for more information on these assays.

ELISpot and FluoroSpot Kits for Detecting Interferon-Secreting Cells

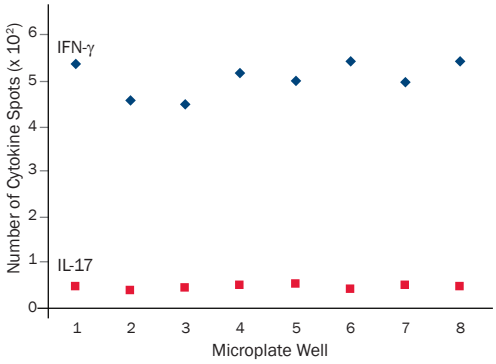
Microplate-based ELISpot Kits, FluoroSpot Kits, and ELISpot Development Modules for detecting cells secreting IFN-γ alone or cells secreting IFN-γ along with a second analyte are also available from R&D Systems. Complete ELISpot kits are ready-to-run and require no further development or refinement. These assays are highly sensitive and can quantitate actively secreting cells even when cell frequencies fall below 1 in 100,000. As an alternative to our complete kits, we also offer Mouse or Human IFN-γ ELISpot Development Modules, which provide a flexible, do-it-yourself format for ELISpot Development.

Features

- Our kits offer up to 20% greater sensitivity than the competition—measure responses with frequencies below 1 in 100,000 cells
- Brighter, crisper spots with less background noise
- Wide dynamic range of quantifiable spots: up to 1000 spots per well
- Positive control protein is provided
- Large kit selection including single analyte and dual-color ELISpot Kits



Detection of IFN-γ and IL-17 Secretion by Mouse Splenocytes using the Dual-Color ELISpot Kit. IFN-γ (blue spots) and IL-17 (red spots) were secreted from mouse splenocytes stimulated with PMA/Ca^{2+} ionomycin. Spots of cytokine secretion were visualized using the Mouse IFN-γ/IL-17 Dual-Color ELISpot Kit (Catalog # ELD5007).



Reproducibility in the Number of Cells Releasing Mouse IFN-γ or IL-17 in Multiple Trials. Mouse splenocytes, stimulated with PMA/Ca^{2+} ionomycin, were plated equally into eight wells of a microplate dish and assayed for IFN-γ and IL-17 secretion using the Mouse IFN-γ/IL-17 Dual-Color ELISpot Kit (Catalog # ELD5007). The number of blue spots (IFN-γ) and red spots (IL-17) in each well were counted using an ELISpot reader system and compared to determine the reproducibility of the results.

Molecule	Species	ELISpot/FluoroSpot Kit (Catalog #)
IFN-γ	Human	EL285*
	Mouse	EL485*
$CD4^+$/IFN-γ	Mouse	EL2019
$CD8\alpha^+$/IFN-γ	Human	EL3094
IFN-γ/Granzyme B	Human	ELD5818
	Human	ELD5818NL
	Mouse	ELD5819
	Mouse	ELD5819NL
IFN-γ/IL-2	Human	ELD4506
	Human	ELD4506NL
	Mouse	ELD5006
IFN-γ/IL-4	Human	ELD5008
	Human	ELD5008NL
	Mouse	ELD5217

Molecule	Species	ELISpot/FluoroSpot Kit (Catalog #)
IFN-γ/IL-5	Human	ELD7327
	Mouse	ELD7420
IFN-γ/IL-10	Human	ELD5505
	Human	ELD5505NL
IFN-γ/IL-13	Human	ELD7328
	Mouse	ELD7424
IFN-γ/IL-17	Human	ELD5219
	Human	ELD5219NL
	Mouse	ELD5007
	Mouse	ELD5007NL

* ELISpot Development Modules are also available for these analytes.

Tocris® Anti-Viral Small Molecules

Small Molecule	Description	Cat. #
18A	HIV cell entry blocker	5612
Abacavir	Reverse transcriptase inhibitor; antiretroviral	4148
Acetyl Pepstatin	Aspartic protease inhibitor; inhibits HIV-1/2 proteinases	5852
Acyclovir	Antiviral agent; active against herpes simplex viruses	2513
Aphidicolin	Antiviral; inhibits DNA polymerase α, δ, and ε	5736
API-2	Selective inhibitor of Akt/PKB signaling; antitumor; antiviral	2151
Arctigenin	Potent MEK1 inhibitor; antiproliferative and antiviral	1777
Arcyrialflavin A	Cdk4/Cyclin D1 inhibitor; inhibits human cytomegalovirus	2457
Azidothymidine	Selective reverse transcriptase inhibitor; antiretroviral	4150
Bay 55-9837	$VPAC_2$ agonist; reduces HIV-1 viral replication	2711
BMS 509744	ITK kinase inhibitor; attenuates establishment of HIV infection	5009
Caffeic acid phenethyl ester	Inhibitor of NFκB activation; antiviral agent	2743
Costunolide	Telomerase inhibitor; displays antiviral properties	2483
D609	Phosphatidyl choline-specific PLC inhibitor; antitumor agent	1437
DAPTA	CCR5 antagonist; selective antiviral for R5 tropic HIV-1 strains	2423
Dequelin	Anticancer and antiviral agent; pro-apoptotic	1770
Delavirdine	Non-nucleoside reverse transcriptase inhibitor	4149

Small Molecule	Description	Cat. #
DMXAA	mSTING agonist; antiviral	5601
FC 131	CXCR4 antagonist; displays anti-HIV activity	4320
Hypericin	Photosensitive antivrial; anticancer and antidepressant agent	1520
Imiquimod	Immunomodulator with antiviral and antitumor activity	3700
IT1t	Potent CXCR4 antagonist; blocks interaction with HIV envelope protein	4596
K-252c	PKC inhibitor; antiviral against strains of human cytomegalovirus	2287
Leukotriene B4	Lipid inflammatory mediator; antiviral towards DNA viruses, retroviruses	2307
Maraviroc	Selective CCR5 antagonist; inhibits HIV-1 cell entry	3756
MI 14	Potent and selective PI 4-kinase IIIb inhibitor	5604
Miglustat hydrochloride	Glycosyltransferase inhibitor; broad spectrum antiviral activity	3117
Mycophenolic acid	Inosine monophosphate dehydrogenase inhibitor; antiviral and antitumor	1505
NBD 556	CD4 mimetic; blocks HIV-1 cell entry	5811
Nelfinavir	Potent HIV-1 protease inhibitor	3766
PF 429242	Competitive inhibitor of SREBP site 1 protease; antiviral	3354
Resiquimod	TLR7 agonist; antiviral	4536
Ribavirin	Antiviral guanosine analog; blocks eIF4E activity	4501

Small Molecule	Description	Cat. #
Ritonavir	HIV-1 and HIV-2 protease inhibitor	5856
Ro 48-8071	Inhibits Ebola virus (EBOV) cell entry; OSC inhibitor	5389
Ro 5-3335	Core binding factor inhibitor; inhibits HIV-1 replication	4694
Rosmarinic acid	Anti-inflammatory, cytostatic, and antiviral; GPR35 agonist	0630
RWJ 21757	TLR7 agonist; displays antitumor and antiviral activity	2719
Saquinavir	HIV protease inhibitor	4418
Stavudine	Nucleoside analog; antiviral	4990
Suramin hexasodium salt	P2 purinergic antagonist; anticancer and antiviral agent	1472
Tenofovir	Selectively inhibits HIV reverse transcriptase	3666
WR 1065	p53 activator; exhibits broad spectrum antiviral activity	3356

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