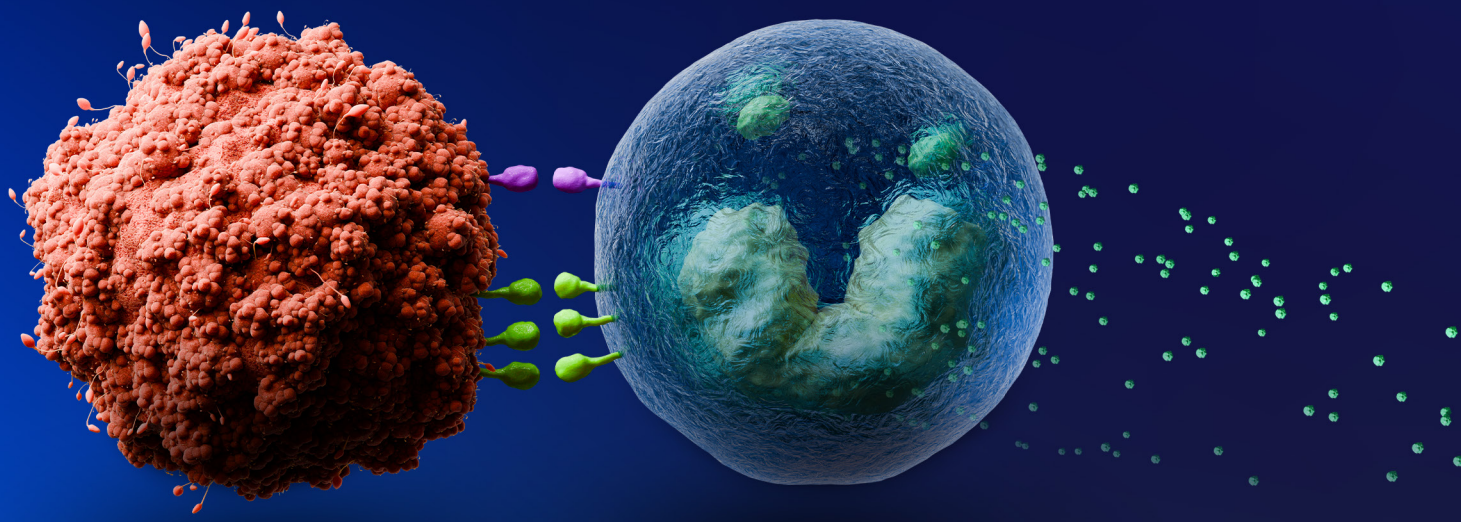
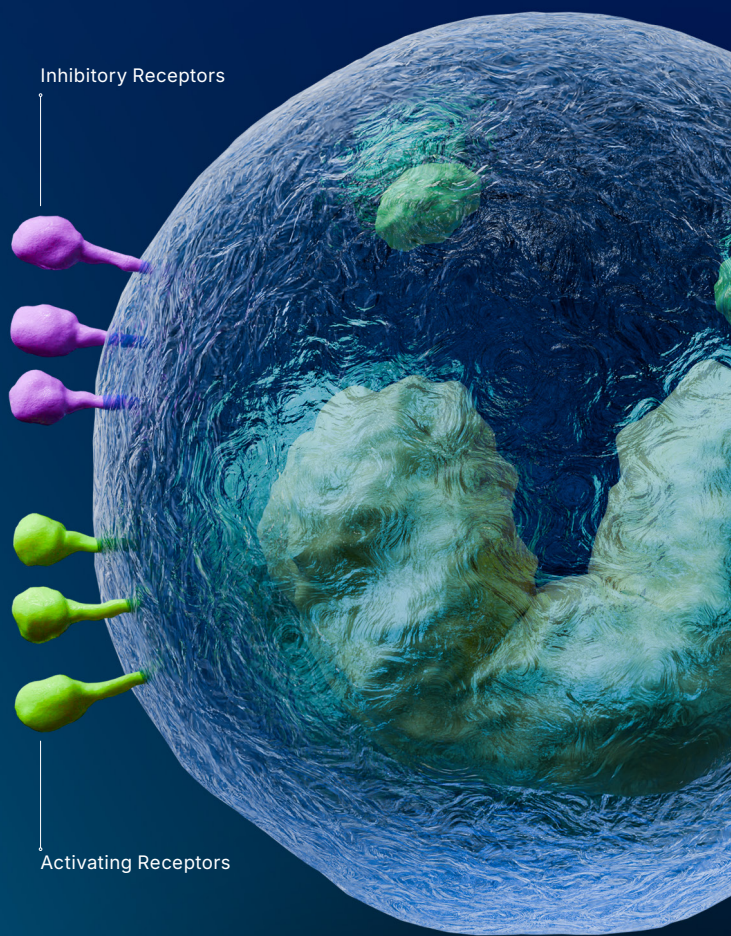
bio-techne® | R&D SYSTEMS

Products for Natural Killer Cell Research



Natural Killer Cells

Natural killer (NK) cells are innate lymphoid cells that function as both cytotoxic effector cells and initiators of the adaptive immune response. Their activation is regulated by multiple inhibitory and activating cell surface receptors including the human killer immunoglobulin-like receptors (KIRs), mouse Ly49 family receptors, CD94-NKG2 heterodimeric receptors, NKG2D, and the natural cytotoxicity receptors (NCRs). These receptors regulate NK cell activation by detecting abnormalities in cells that are associated with infection or malignant transformation, such as the loss of MHC class I expression or the elevated expression of specific stress-induced ligands. Once activated, NK cells secrete pro-inflammatory cytokines and trigger Perforin/Granzyme-induced target cell lysis. Their ability to specifically attack and eliminate stressed cells, while maintaining tolerance to normal, healthy cells has led to the compelling suggestion that NK cells may have therapeutic potential as anti-cancer agents. R&D Systems offers a wide selection of reagents for culturing and characterizing NK cells and investigating NK cell-tumor cell interactions including recombinant proteins, fluorochrome-conjugated antibodies, blocking/neutralization antibodies, and ELISA Kits.



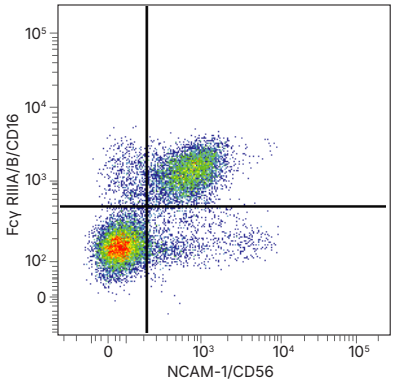
Scan the QR code or visit:
rndsystems.com/nkcells

Antibodies for Select Markers Commonly used to Identify NK Cells by Flow Cytometry

Human NK Cells	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #)							Unconjugated Antibodies (Applications)
	APC	Fluorescein	PE	PerCP	Alexa Fluor® 488	Alexa Fluor® 700	New Alexa Fluor® conjugates 405/594/647/750	
CD3	FAB100A	FAB100F	FAB100P	FAB100C	FAB100G	FAB100N	FAB100V/ FAB100T/ FAB100R/FAB100S	MAB100 (FA, FC, ICC/IF, IP)
CD56	FAB2408A		FAB2408P		FAB2408G	FAB2408N	FAB2408V/ FAB2408T/ FAB2408R/ FAB2408S	MAB2408 (E, FC, WB); MAB24081 (FC, IHC, WB); AF2408 (FC, ICC/IF, WB)
Fcγ RIIIA/B (CD16a/b)	FAB2546A	FAB2546F	FAB2546P	FAB2546C			FAB2546V/ FAB2546T/ FAB2546R/ FAB2546S	MAB2546 (FC)
IFN-γ	IC285A	IC285F	IC285P	IC285C	IC285G	IC285N	IC285V/IC285T/ IC285R/IC285S	MAB2851 (B/N, FC, ICC/IF)
Mouse NK Cells								
CD3	FAB4841A	FAB4841F	FAB4841P	FAB4841C	FAB4841G	FAB4841N	FAB4841V/ FAB4841T/ FAB4841R/ FAB4841S	MAB4841 (FA, FC, ICC/IF, IHC, IP)
CD27/TNFRSF7					FAB5741G	FAB5741N	FAB5741V/ FAB5741T/ FAB5741R/ FAB5741S	MAB5741 (FC)
CD161/NK1.1	FAB76141A				FAB76141G	FAB76141N	FAB76141V/ FAB76141T/ FAB76141R/ FAB76141S	MAB76141 (FC)
					FAB7614G	FAB7614N	FAB7614V/ FAB7614T/ FAB7614R/ FAB7614S	MAB7614 (FC)
IFN-γ	IC485A	IC485F	IC485P		IC485G	IC485N	IC485V/IC485T/ IC485R/IC485S	MAB485 (B/N, FC, WB)
Integrin α2/CD49b					FAB1740G	FAB1740N	FAB1740V/ FAB1740T/ FAB1740R/ FAB1740S	MAB1740 (FC); AF1740 (FC, ICC/IF, WB)
Integrin αM/CD11b	FAB1124A	FAB1124F	FAB1124P			FAB1124N	FAB1124V/ FAB1124T/ FAB1124R/ FAB1124S	MAB1124 (FC, ICC/IF, IHC, IP)
NKp46/NCR	FAB22252A		FAB22252P		FAB22252G	FAB22252N	FAB22252V/ FAB22252T/ FAB22252R/ FAB22252S	MAB22252 (FC)
		FAB2225F						AF2225 (FA, FC, WB)

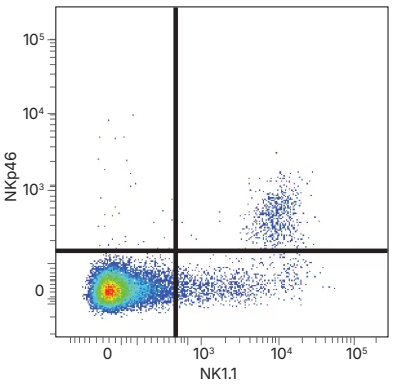
Application Key: B/N Blocking/Neutralization **E** ELISA **FA** Functional Assay **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/ Immunofluorescence **IHC** Immunohistochemistry **IP** Immunoprecipitation **WB** Western Blot

Identification of Human Natural Killer Cells by Flow Cytometry



Detection of $CD3^-$ $CD56^+CD16^{-/+}$ Human Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and a Fluorescein-conjugated Mouse Anti-Human Fcγ RIIIA/B/CD16 Monoclonal Antibody (Catalog # FAB2546F). Cells were gated on $CD3^-$ lymphocytes.

Identification of Mouse Natural Killer Cells by Flow Cytometry



Detection of NKp46+CD161+ Mouse Splenocytes by Flow Cytometry. Mouse splenocytes were stained with an APC-conjugated Rat Anti-Mouse NKp46/NCR1 Monoclonal Antibody (Catalog # FAB22252A) and an Alexa Fluor® 488-conjugated Rat Anti-Mouse CD161/NK1.1 Monoclonal Antibody (Catalog # FAB76141G).

Scan the QR code or visit:
rndsystems.com/nk-cell-markers

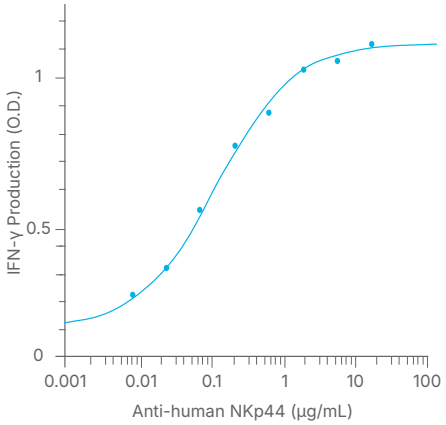
Natural Killer Cell Selection Kits

Kit	Catalog #
MagCellect™ Human NK Cell Isolation Kit	MAGH109
MagCellect™ Mouse NK Cell Isolation Kit	MAGM210

Select Recombinant Proteins for Culturing NK Cells

Molecule	Species	Catalog #
IL-2	Human	BT-002
	Mouse	402-ML
IL-12	Human	219-IL
	Mouse	419-ML
IL-15	Human	BT-015
	Mouse	447-ML
IL-18	Human	9124-IL
	Mouse	9139-IL
IL-21	Human	8879-IL
	Mouse	594-ML

IL-2, IL-12, and IL-15 are also available as GMP-grade proteins.



Detection of Anti-NKp44-induced IFN-γ Secretion from IL-2-activated Human NK Cells Enriched using the MagCellect Human NK Cell Isolation Kit. 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, 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 # DIF50C).

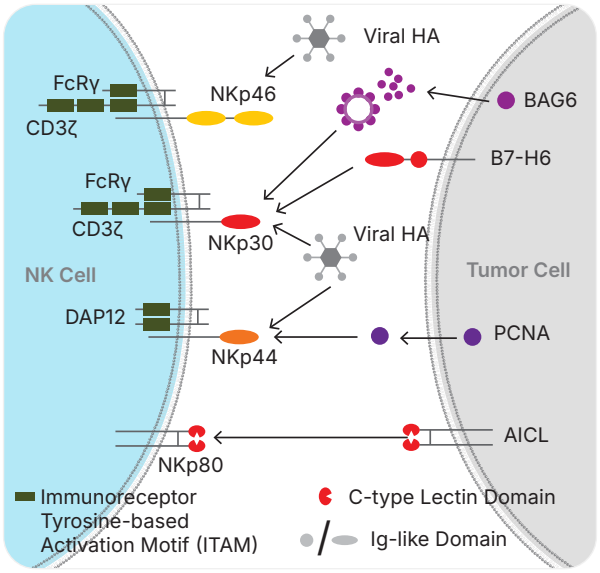
Scan the QR code or visit:
rndsystems.com/gmp

Select ELISAs and ELISpot Kits for Detecting Molecules Secreted by NK Cells

Molecule	Species	Quantikine® ELISA Catalog #	DuoSet® ELISA Catalog #	ELISpot Kit Catalog #	ELISpot Development Module Catalog #
GM-CSF	Human	DGM00	DY215		
	Mouse	MGM00	DY415		
Granzyme B	Human	DGZB00	DY2906	EL2906	SEL2906
	Mouse		DY1865	EL1865	SEL1865
IFN-γ	Human	DIF50C	DY285B	EL285	SEL285
	Mouse	MIF00	DY485	EL485	SEL485
IL-10	Human	D1000B	DY217B	EL217B	
	Mouse	M1000B	DY417	EL417	
TNF-α	Human	DTA00D	DY210		
	Mouse	MTA00B	DY410	EL410	

Natural Cytotoxicity Receptors

Natural cytotoxicity receptors (NCRs) are expressed almost exclusively by natural killer (NK) cells and play a central role in triggering their activation. In humans, NKp30 and NKp46 are constitutively expressed on resting and activated NK cells, while NKp44 expression is induced following activation. Most tumor-associated ligands of the NCR family are unknown, but recent research demonstrated that B7-H6, which is expressed on multiple tumor cell lines, binds to NKp30 and induces NK cell activation. R&D Systems offers a wide selection of flow cytometry antibodies to detect natural cytotoxicity receptors on human and mouse cells and the only fluorochrome-conjugated Anti-Human B7-H6 antibody on the market. Additionally, we offer bioactive Recombinant Human B7-H6 and NKp30 proteins. In-house studies have shown that immobilized recombinant B7-H6 protein binds to NKp30 and stimulates NK cell activation.

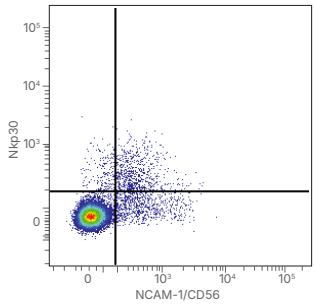


Products for Natural Cytotoxicity Receptors & Ligands

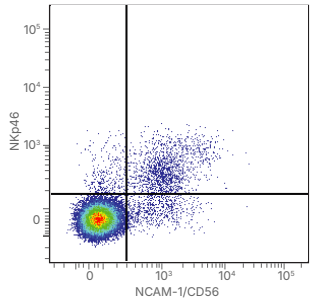
Antibodies

Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)					Unconjugated Antibodies (Applications)
		APC	Fluorescein	PE	Alexa Fluor® 488	Alexa Fluor® 700	
B7-H6	Human	FAB7144A			FAB7144G	FAB7144N	MAB7144 (FC)
NKp30	Human	FAB1849A		FAB1849P	FAB1849G	FAB1849N	MAB1849 (FA, FC); MAB18491 (FA); AF1849 (WB)
NKp44	Human	FAB22491A		FAB22491P	FAB22491G	FAB22491N	MAB22491 (FA, FC); MAB2249 (WB); AF2249 (FA, WB)
NKp46/NCR1	Human	FAB1850A	FAB1850F	FAB1850P	FAB1850G	FAB1850N	MAB1850 (FA, FC, ICC/IF, WB); AF1850 (ICC/IF, WB)
	Mouse	FAB22252A		FAB22252P	FAB22252G	FAB22252N	MAB22252 (FC)
			FAB2225F				AF2225 (FA, FC, WB); MAB2225 (WB)
NKp80/KLRF1	Human	FAB1900A		FAB1900P	FAB1900G	FAB1900N	MAB1900 (FC); AF1900 (FC, WB)

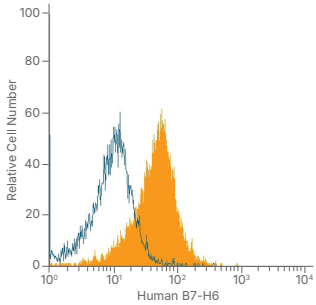
Application Key: B/N Blocking/Neutralization **E** ELISA FA Functional Assay **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **IP** Immunoprecipitation **WB** Western Blot



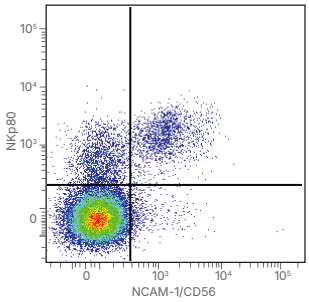
Detection of NKp30 on Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with an APC-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408A) and a PE-conjugated Mouse Anti-Human NKp30 Monoclonal Antibody (Catalog # FAB1849P).



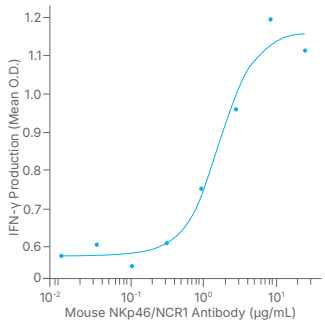
Detection of NKp46 on Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and a Fluorescein-conjugated Mouse Anti-Human NKp46 Monoclonal Antibody (Catalog # FAB1850F).



Detection of B7-H6 on HeLa Cells by Flow Cytometry. The HeLa human cervical epithelial carcinoma cell line was stained with an APC-conjugated Mouse Anti-Human B7-H6 Monoclonal Antibody (Catalog # FAB7144A; filled histogram) or an APC-conjugated Mouse IgG_1 Isotype Control (Catalog # IC002A; open histogram).



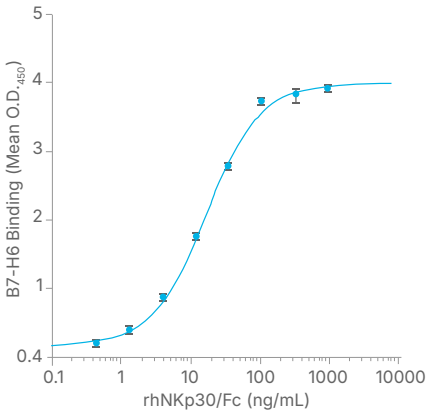
Detection of NKp80 on Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and an APC-conjugated Mouse Anti-Human NKp80 Monoclonal Antibody (Catalog # FAB1900A).



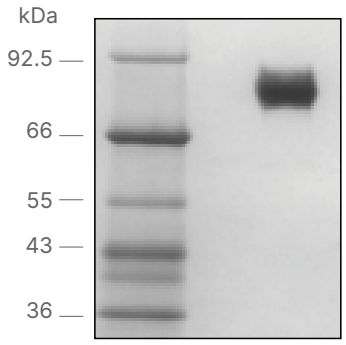
Mouse NKp46/NCR1 Antibody Induces IFN-γ Secretion from Activated Mouse Natural Killer Cells. Mouse natural killer cells were activated with Recombinant Mouse IL-2 (Catalog # 402-ML), Recombinant Mouse IL-12 (Catalog # 419-ML), and the indicated concentrations of Goat Anti-Mouse NKp46/NCR1 Antigen Affinity-purified Polyclonal Antibody (Catalog # AF2225). IFN-γ secretion was measured using the Mouse IFN-γ Quantikine ELISA Kit (Catalog # MIF00).

Recombinant Proteins

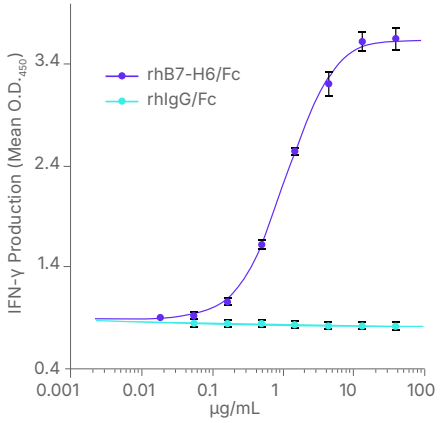
Molecule	Species	Catalog#
B7-H6	Human	7144-B7
NKp30	Human	1849-NK
NKp44	Human	2249-NK
NKp46	Human	1850-NK
	Mouse	2225-NK
NKp80	Human	1900-NK



Recombinant Human B7-H6 Binds to NKp30. Immobilized Recombinant Human B7-H6 Fc Chimera (Catalog # 7144-B7; 0.5 µg/mL) was incubated with increasing concentrations of Recombinant Human NKp30 Fc Chimera (Catalog # 1849-NK). The concentration of Recombinant Human NKp30 Fc Chimera that produces 50% of the optimal binding response was approximately 8–40 ng/mL.



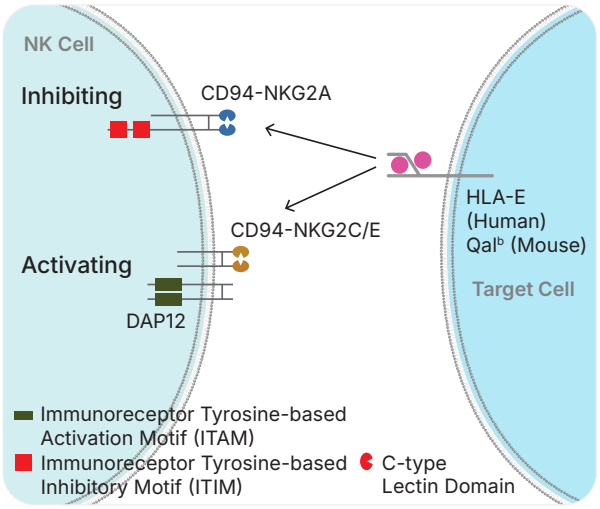
SDS-PAGE Analysis of Recombinant Human B7-H6 under Reducing Conditions. Recombinant Human B7-H6 Fc Chimera (Catalog # 7144-B7) was resolved by SDS-PAGE and visualized by silver staining under reducing conditions.



B7-H6 Induces IFN-γ Secretion from NK-92 Cells. The NK-92 human natural killer lymphoma cell line was incubated with the indicated concentrations of immobilized Recombinant Human B7-H6 Fc Chimera (Catalog # 7144-B7) or Recombinant Human IgG_1/Fc (Catalog # 110-HG) for 24 hours. IFN-γ secretion was measured using the Human IFN-γ Quantikine® ELISA Kit (Catalog # DIF50C). The ED_{50} for this effect is typically 0.6–3 µg/mL.

NKG2 Family Receptors

Human CD94-NKG2 heterodimeric receptors have either inhibitory or activating effects on natural killer (NK) cells depending on the NKG2 family member. CD94-NKG2C and CD94-NKG2E are both activating receptors, while CD94-NKG2A inhibits NK cell activation. Heterodimers of human CD94-NKG2A, C, or E recognize human leukocyte antigen (HLA)-E, while the corresponding mouse heterodimers recognize Qa1^{b}. R&D Systems exclusively offers fluorochrome-conjugated Anti-Human NKG2C antibodies, in addition to fluorochrome-conjugated Anti-Human CD94 and Anti-Human and Mouse NKG2A antibodies.

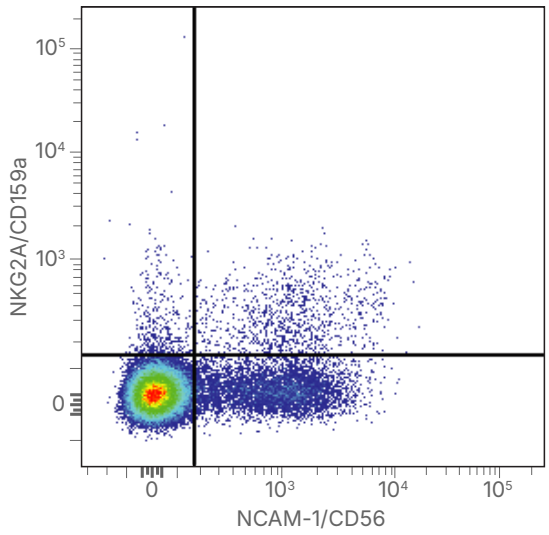


Products for NKG2 Family Recptors

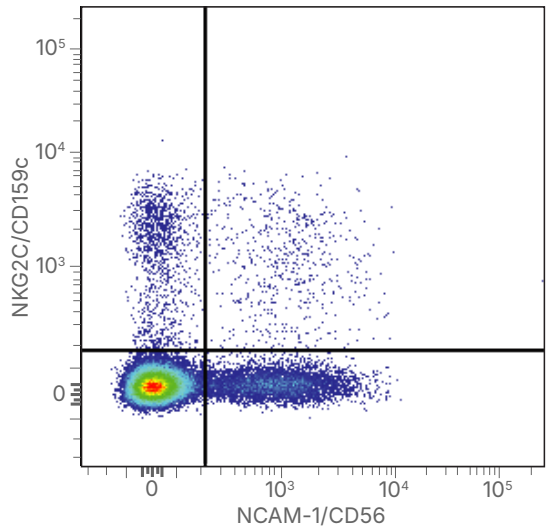
Antibodies

Molecule	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)						Unconjugated Antibodies (Applications)
	Species	APC	PE	Alexa Fluor® 488	Alex Fluor® 647	Alexa Fluor® 700	
CD94	Human	FAB1058A	FAB1058P	FAB1058G	FAB1058R	FAB1058N	MAB1058 (B/N, FC)
NKG2A	Human	FAB1059A	FAB1059P	FAB1059G	FAB1059R	FAB1059N	MAB1059 (FC)
	Mouse	FAB6867A	FAB6867P	FAB6867G	FAB6867R	FAB6867N	MAB6867 (FC)
NKG2C	Human	FAB138A	FAB138P	FAB138G	FAB138R	FAB138N	MAB138 (FC); MAB1381 (FC)

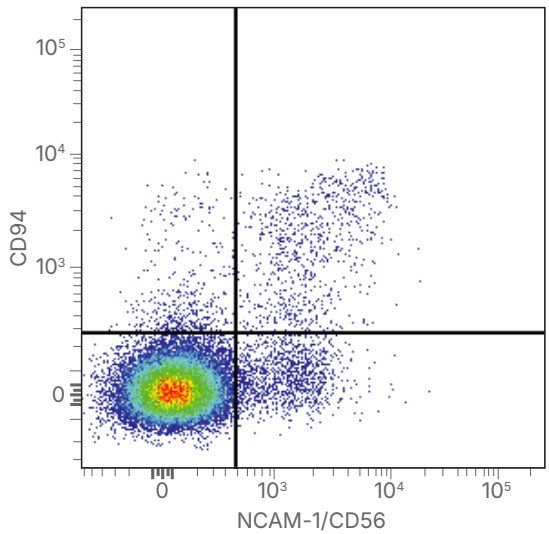
Application Key: B/N Blocking/Neutralization **E** ELISA FA Functional Assay **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/ Immunofluorescence **IHC** Immunohistochemistry **IP** Immunoprecipitation **WB** Western Blot



Detection of NKG2A/CD159a in Human Peripheral Blood Mononuclear Cells by Flow Cytometry. Human peripheral blood mononuclear cells were stained with an APC-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408A) and a PE-conjugated Mouse Anti-Human NKG2A/CD159a Monoclonal Antibody (Catalog # FAB1059P).



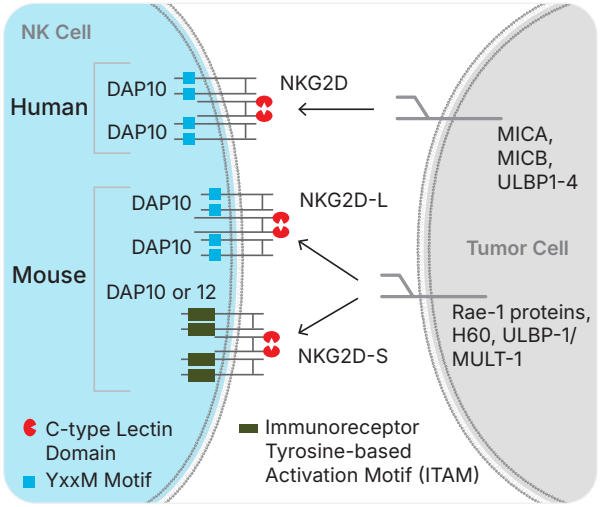
Detection of NKG2C/CD159c in Human Peripheral Blood Mononuclear Cells by Flow Cytometry. Human peripheral blood mononuclear cells were stained with an APC-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408A) and a PE-conjugated Mouse Anti-Human NKG2C/CD159c Monoclonal Antibody (Catalog # FAB138P).



Detection of CD94 in Human Peripheral Blood Mononuclear Cells by Flow Cytometry. Human peripheral blood mononuclear cells were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and an APC-conjugated Mouse Anti-Human CD94 Monoclonal Antibody (Catalog # FAB1058A).

NKG2D

NKG2D is a homodimeric, natural killer (NK) cell-activating receptor that is distantly related to the NKG2 family. It recognizes several tumor-associated and stess-induced ligands such as MICA, MICB, and ULBP1-6 in human and members of the Rae1 family, H60, and MULT-1/ULBP-1 in mouse. R&D Systems exclusively offers fluorochrome-conjugated antibodies for detecting tumor-associated NKG2D ligands, as well as fluorochrome-conjugated Anti-Human and Anti-Mouse NKG2D antibodies. Recombinant proteins and unconjugated blocking/neutralization antibodies are also available to investigate NK cell – tumor cell interactions and the effects of different tumor-associated ligands on NK cell activity.

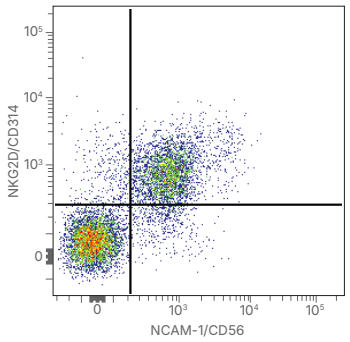


Products for NKG2D and NKG2D Ligands

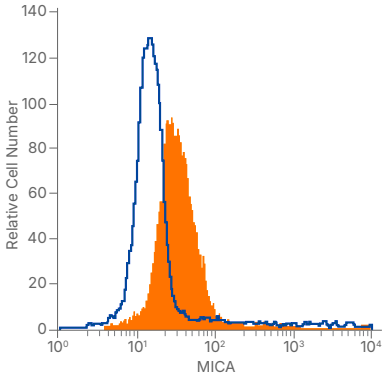
Antibodies

Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)				Unconjugated Antibodies (Applications)
		APC	PE	Alexa Fluor® 488	Alexa Fluor® 700	
NKG2D	Human	FAB139A	FAB139P	FAB139G	FAB139N	MAB139 (B/N, FA, FC, WB)
	Mouse		FAB1547P	FAB1547G	FAB1547N	MAB1547 (B/N, FC, WB)
H60	Mouse	FAB1155A	FAB1155P	FAB1155G	FAB1155N	MAB1155 (B/N, E, FC, WB)
MICA	Human	FAB1300A	FAB1300P	FAB1300G	FAB1300N	MAB1300 (B/N, FC, WB)
MICB	Human	FAB1599A	FAB1599P	FAB1599G	FAB1599N	MAB1599 (E, FC, WB)
MICA/B	Human	FAB13001A	FAB13001P	FAB13001G	FAB13001N	MAB13001 (B/N, FC, IHC)
Rae-1 Pan	Mouse	FAB17582A	FAB17582P	FAB17582G	FAB17582N	MAB17582 (FC)
Rae-1α/β/γ	Mouse			FAB1758G	FAB1758N	MAB1758 (B/N, FC)
Rae-1ε	Mouse			FAB1135G	FAB1135N	MAB1135 (B/N, FC)
ULBP-1	Human	FAB1380A	FAB1380P	FAB1380G	FAB1380N	MAB1380 (B/N, FC)
	Mouse	FAB2588A	FAB2588P	FAB2588G	FAB2588N	MAB2588 (FC)
ULBP-2/5/6	Human	FAB1298A	FAB1298P	FAB1298G	FAB1298N	MAB1298 (B/N, FC)
ULBP-3	Human	FAB1517A	FAB1517P	FAB1517G	FAB1517N	MAB1517 (B/N, FC)
ULBP-4/RAET1E	Human	FAB6285A	FAB6285P	FAB6285G	FAB6285N	MAB6285 (FC, IHC, WB)

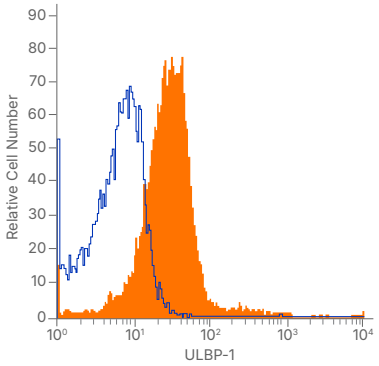
Application Key: B/N Blocking/Neutralization **E** ELISA **FA** Functional Assay **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **IP** Immunoprecipitation **WB** Western Blot



Detection of NKG2D in Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with an APC-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408A) and a PE-conjugated Mouse Anti-Human NKG2D/CD314 Monoclonal Antibody (Catalog # FAB139P). Cells were gated on CD3- lymphocytes.



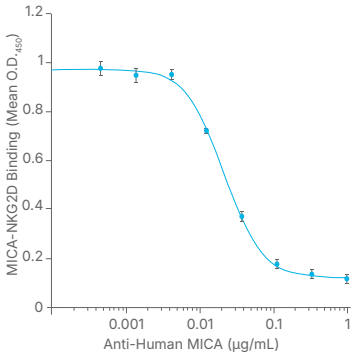
Detection of MICA on K562 Cells by Flow Cytometry. The K562 human chronic myelogenous leukemia cell line was stained with an Alexa Fluor® 488-conjugated Monoclonal Antibody (Catalog # FAB1300G; filled histogram) or Alexa Fluor 488-conjugated Mouse IgG2B Isotype Control (Catalog # IC0041G; open histogram).



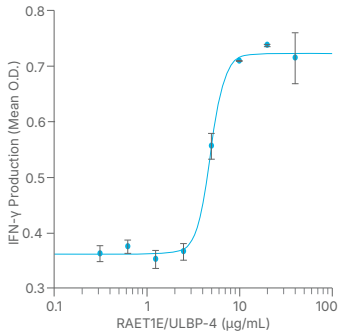
Detection of ULBP-1 on Jurkat Cells by Flow Cytometry. The Jurkat human acute T cell leukemia cell line was stained with an APC-conjugated Mouse Anti-Human ULBP-1 Monoclonal Antibody (Catalog # FAB1380A; filled histogram) or an APC-conjugated Mouse IgG_{2A} Isotype Control (Catalog # IC003A; open histogram).

Recombinant Proteins

Molecule	Species	Catalog #
NKG2D	Human	1299-NK
	Mouse	139-NK
H60	Mouse	1155-H6
MICA	Human	1300-MA
MICB	Human	1599-MB
Rae-1α	Mouse	1158-RA
Rae-1β	Mouse	1198-RA
Rae-1γ	Mouse	1136-RA
Rae-1δ	Mouse	1134-RA
Rae-1ε	Mouse	1135-RA
ULBP-1	Human	1380-UL
	Mouse	2588-MU
ULBP-2	Human	1298-UL
ULBP-3	Human	1517-UL
ULBP-4/RAET1E	Human	6285-UL
ULBP-5	Human	7149-UL
ULBP-6/RAET1L	Human	7485-UL



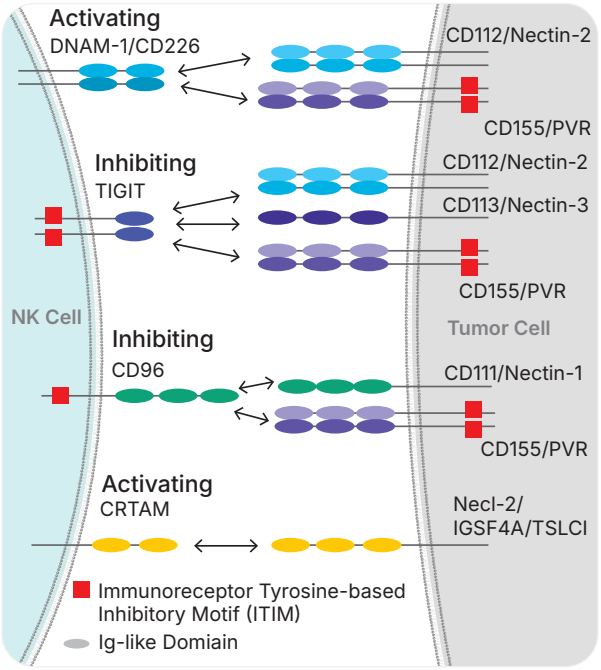
Neutralization of Recombinant Human MICA Binding to NKG2D. Binding of Recombinant Human MICA Fc Chimera (Catalog # 1300-MA; 50 ng/mL) to immobilized Recombinant Human NKG2D Fc Chimera (Catalog # 1299-NK; 2 µg/mL) was blocked with increasing concentrations of Mouse Anti-Human MICA Monoclonal Antibody (Catalog # MAB1300). 50% of the binding was blocked by 0.02–0.06 µg/mL of this antibody.



RAET1E/ULBP-4 Induces IFN-γ Secretion from NK-92 Cells. The NK-92 human natural killer lymphoma cell line was treated with increasing concentrations of immobilized Recombinant Human RAET1E/ULBP-4 (Catalog # 6285-UL). IFN-γ secretion was measured using the Human IFN-γ Quantikine ELISA Kit (Catalog # DIF50C).

Nectin and Nectin-like Binding Receptors

Natural killer (NK) cells and CD8+ T cells express the nectin and nectin-like binding receptors, DNAM-1/CD226, TIGIT, CRTAM, and CD96. DNAM-1/CD226 and TIGIT both bind to CD112/Nectin-2 and CD155/PVR, two proteins which are frequently up-regulated on tumor cells, but they have opposing effects on NK cell activity. DNAM-1/CD226 is expressed on resting NK cells and promotes NK cell activation, while TIGIT expression is elevated following NK cell activation and negatively regulates NK cell cytotoxicity. Additionally, CD96 competes with DNAM-1/CD226 for binding to CD155/PVR and inhibits IFN-γ production by NK cells, suggesting that blockade of the interactions between TIGIT and CD155/PVR and/or CD96 and CD155/PVR may have beneficial anti-tumor effects. As preliminary research has revealed the complexity of the interactions among these receptors and their involvement in tumor surveillance, the effects of these receptors on NK cells warrant further investigation. R&D Systems offers Recombinant Human or Mouse DNAM-1/CD226, TIGIT, CRTAM, CD155/PVR, Necl2/TSCL1, and Nectin-2/CD112, as well as fluorochrome-conjugated antibodies for all of these targets.



Products for Nectin and Nectin-like Binding Receptors and Ligands

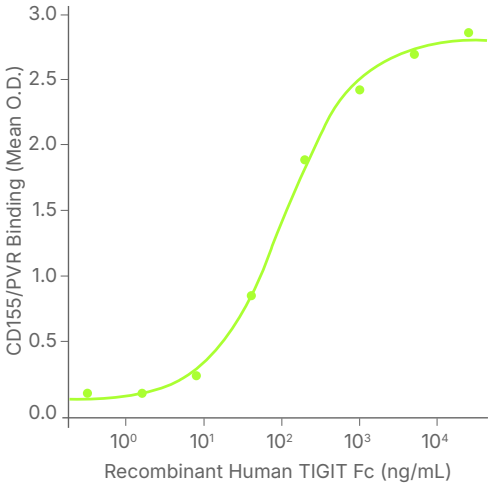
Antibodies

Receptors	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)					Unconjugated Antibodies (Applications)
		APC	Fluorescein	PE	Alexa Fluor® 488	Alexa Fluor® 700	
CD96	Mouse			FAB5690P	FAB5690G	FAB5690N	MAB5690 (FC)
CD96v2	Human	FAB6199A			FAB6199G	FAB6199N	MAB6199 (FC)
CRTAM	Human	FAB16951A		FAB16951P	FAB16951G	FAB16951N	MAB16951 (FC, WB)
DNAM-1/CD226	Human	FAB666A	FAB666F	FAB666P	FAB666G	FAB666N	MAB666 (B/N, FC, WB)
	Mouse				FAB4436G	FAB4436N	MAB4436 (FC)
TIGIT	Human	FAB7898A		FAB7898P	FAB7898G	FAB7898N	MAB7898 (FC)
	Mouse	FAB7267A			FAB7267G		AF7267 (FC)
Ligands							
CD155/PVR	Human	FAB25301A	FAB25301F	FAB25301P	FAB25301G	FAB25301N	MAB25301 (FC, ICC/IF, WB)
	Mouse			FAB6909P	FAB6909G	FAB6909N	MAB6909 (FC, ICC/IF, WB)
IGSF4A/ SynCAM1/Necl2	Mouse						AF1459 (WB)
Nectin-1	Human				FAB2880G	FAB2880N	MAB2880 (FC)
	Human/ Mouse						AF2880 (WB)
Nectin-2/CD112	Human	FAB2229A			FAB2229G	FAB2229N	AF2229 (WB)
	Mouse	FAB3869A		FAB3869P	FAB3869G	FAB3869N	MAB3869 (FC)
Nectin-3/CD113	Human						AF3064 (FC, IHC, WB)

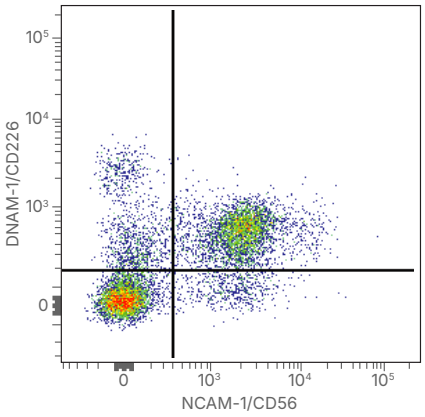
Applications Key: B/N - Blocking/Neutralization **FC** - Flow Cytometry **ICC/IF** - Immunocytochemistry/Immunofluorescence **IHC** - Immunohistochemistry **WB** - Western Blot

Recombinant Proteins

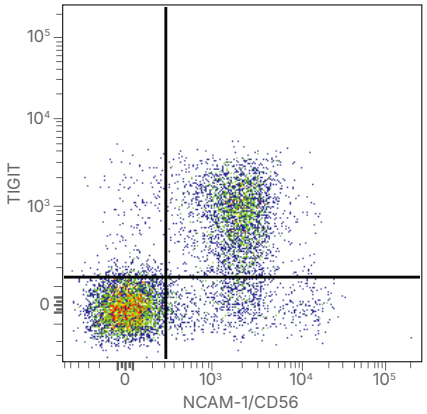
Molecule	Species	Catalog #
CD96	Mouse	5690-CD
CD155/PVR	Human	2530-CD
	Mouse	6909-CD
CRTAM	Human	1695-CR
	Mouse	3687-CR
DNAM-1/CD226	Human	666-DN
	Mouse	4436-DN
IGSF4A/ SyncCAM1/Necl2	Human	3519-S4
	Mouse	1459-S4
Nectin-1	Human	2880-N1
Nectin-2/CD112	Human	2229-N2
	Mouse	3869-N2
Nectin-3/CD113	Human	3064-N3
TIGIT	Human	7898-TGB
	Mouse	7267-TG



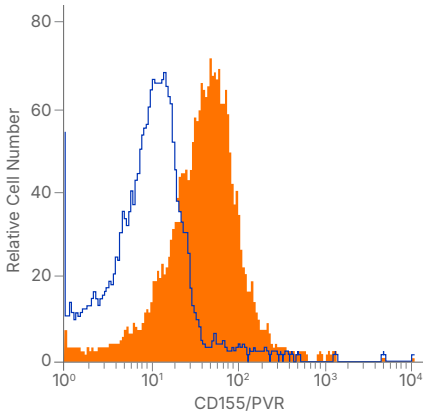
CD155/PVR Binds to TIGIT. Immobilized Recombinant Human CD155/PVR (Catalog # 2530-CD; 2.5 ug/mL) was incubated with increasing concentrations of Recombinant Human TIGIT (A103) Protein (Catalog # 7898-TGB). Recombinant Human TIGIT binds with an ED_{50} of 40-200 ng/mL.



Detection of DNAM-1/CD226 on Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and a Fluorescein-conjugated Mouse Anti-Human DNAM-1/CD226 Monoclonal Antibody (Catalog # FAB666F). Cells were gated on CD3- lymphocytes.



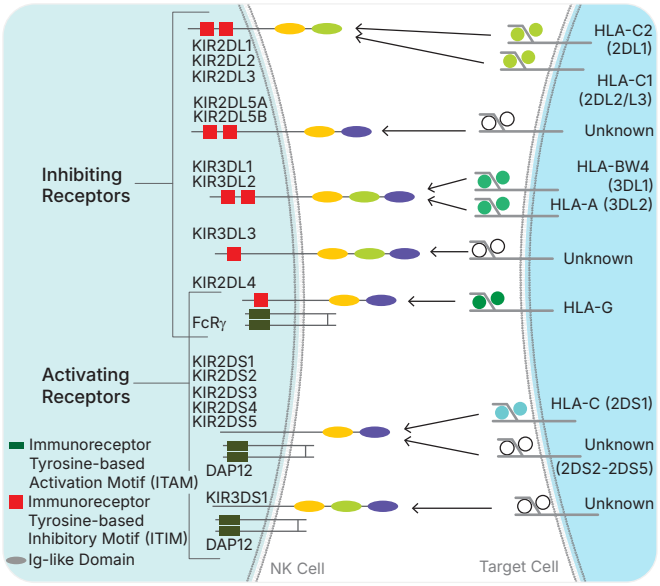
Detection of TIGIT on Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and an APC-conjugated Mouse Anti-Human TIGIT Monoclonal Antibody (Catalog # FAB7898A). Cells were gated on CD3- lymphocytes.



Detection of CD155/PVR on U937 Cells by Flow Cytometry. The U937 human histiocytic lymphoma cell line was stained with an APC-conjugated Mouse Anti-Human CD155/PVR Monoclonal Antibody (Catalog # FAB25301A; filled histogram) or an APC-conjugated Mouse IgG_1 Isotype Control (Catalog # IC002A; open histogram).

Killer Immunoglobulin-like Receptors

Killer immunoglobulin-like receptors (KIRs) are a highly polymorphic family of natural killer cell receptors that interact with MHC class I molecules and elicit inhibitory, activating, or dual signals. The high degree of sequence identity shared between KIR family members has led to difficulty in producing monoclonal antibodies with specificity for a single KIR family member. R&D Systems™ KIR antibodies have been rigorously tested in-house to maximize the selection of highly specific clones. Selected clones have either a confirmed lack of cross-reactivity with other KIR family members or minimal cross-reactivities that are reported on our data sheets.



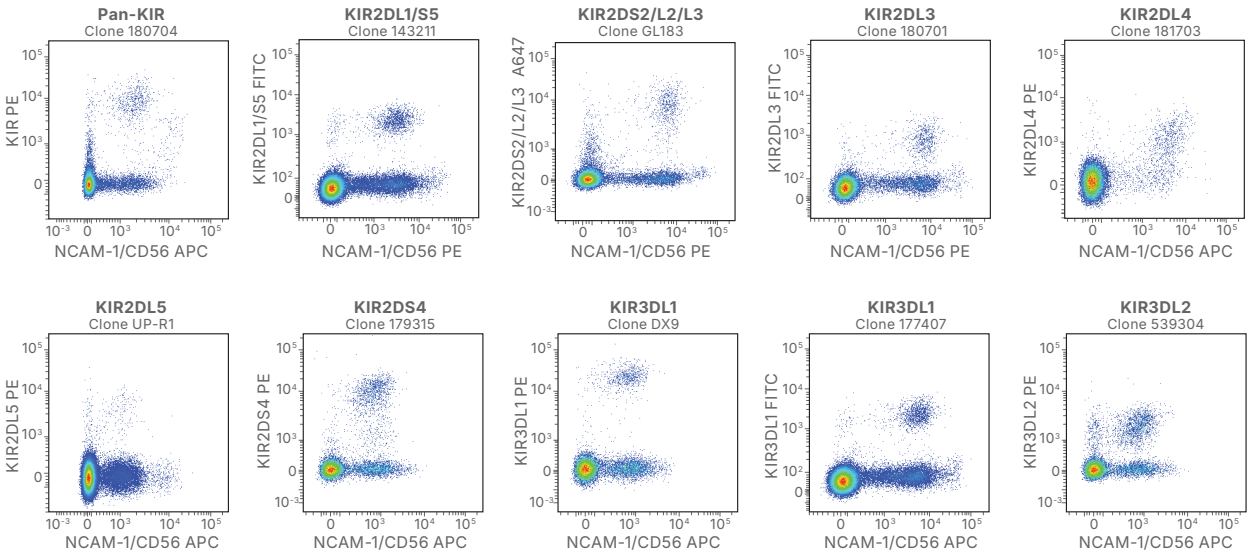
Products for Killer Immunoglobulin-like Receptors (KIRs)

Antibodies

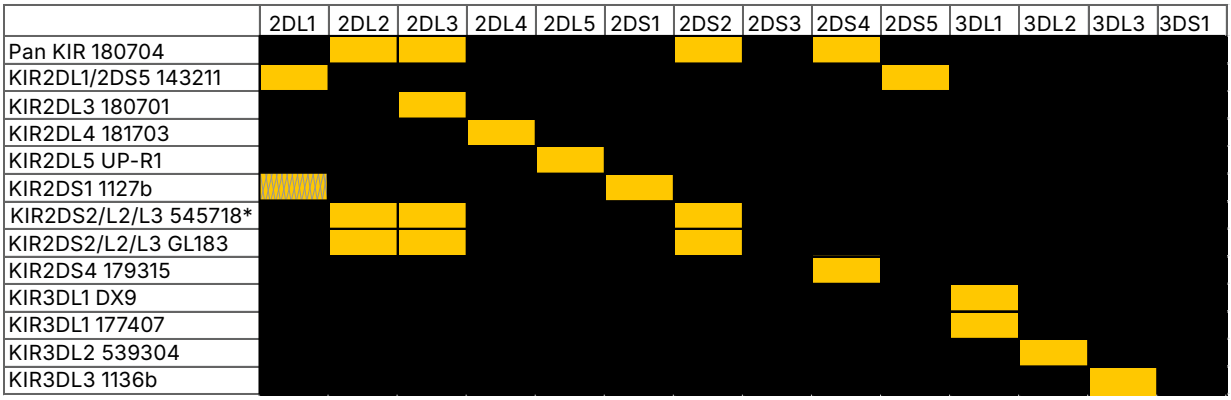
Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)					Unconjugated Antibodies (Applications)
		APC	Fluorescein	PE	Alexa Fluor® 488	Alexa Fluor® 700	
KIR pan/CD158	Human	FAB1848A	FAB1848F	FAB1848P	FAB1848G	FAB1848N	MAB1848 (FC)
Inhibitory receptors							
KIR2DL1/S5	Human	FAB1844A	FAB1844F	FAB1844P	FAB1844G	FAB1844N	MAB1844 (FC)
KIR2DL3	Human	FAB2014A	FAB2014F	FAB2014P	FAB2014G	FAB2014N	
KIR2DL4	Human			FAB2238P	FAB2238G	FAB2238N	MAB2238 (FA, FC)
KIR3DL1	Human	FAB1225A			FAB1225G	FAB1225N	MAB1225 (B/N, FC)
				FAB12251P	FAB12251G	FAB12251N	MAB12251 (FC)
KIR3DL2	Human	FAB2878A		FAB2878P	FAB2878G	FAB2878N	MAB2878 (FC)
KIR3DL3	Human			FAB8919P	FAB8919G	FAB8919N	MAB8919 (FC)
Activating receptors							
KIR2DL1/S5	Human	FAB1844A	FAB1844F	FAB1844P	FAB1844G	FAB1844N	MAB1844 (FC)
KIR2DL4	Human			FAB2238P	FAB2238G	FAB2238N	MAB2238 (FA, FC)
KIR2DS1	Human			FAB8887P	FAB8887G	FAB8887N	MAB8887 (FC)
KIR2DS4	Human	FAB1847A		FAB1847P	FAB1847G	FAB1847N	MAB1847 (FC, WB)

Application Key: B/N Blocking/Neutralization **E** ELISA **FA** Functional Assay **FC** Flow Cytometry
ICC/IF Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry
IP Immunoprecipitation **WB** Western Blot

R&D Systems KIR Antibodies are Rigorously Tested for the Selection of Highly Specific Clones



Staining of Primary Natural Killer Cells with Anti-KIR Antibodies. Primary natural killer cells from freshly isolated peripheral blood mononuclear cells (PBMCs) were stained with either an APC- or PE-conjugated NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408A or # FAB2408P) and a **(A)** PE-conjugated Mouse Anti-Human KIR/CD158 (Catalog # FAB1848P), **(B)** Fluorescein-conjugated Mouse Anti-Human KIR2DL1/CD158a (Catalog # FAB1844F), **(C)** Alexa Fluor® 647-conjugated Mouse Anti-Human KIR2DS2/L2/L3 **(D)** FITC-conjugated Mouse Anti-Human KIR2DL3/CD158b2 (Catalog # FAB2014F), **(E)** PE-conjugated Mouse Anti-Human KIR2DL4/CD158d (Catalog # FAB2238P)*, **(F)** PE-conjugated Mouse Anti-Human KIR2DL5/CD158f, **(G)** PE-conjugated Mouse Anti-Human KIR2DS4/CD158i (Catalog # FAB1847P), **(H)** PE-conjugated Mouse Anti-Human KIR3DL1, **(I)** Fluorescein-conjugated Mouse Anti-Human KIR3DL1, or **(J)** PE-conjugated Mouse Anti-Human KIR3DL2/CD158k (Catalog # FAB2878P). *KIR2DL4/CD158d staining was performed on IL-2-activated PBMCs. All plots are gated on live lymphocytes. Alexa Fluor® 647-conjugated Anti-KIR2DS2/L2/L3 and PE-conjugated Anti-KIR2DL5 monoclonal antibodies are from Novus Biologicals. All other antibodies are from R&D Systems.



Summary of the Confirmed Reactivities of KIR Antibodies on Primary NK Cells. Using a panel of transfectants and primary natural killer cells, R&D Systems anti-KIR monoclonal antibodies and KIR clones in development* were tested for cross-reactivity. The results are summarized in the map shown. The cross-hatched box for KIR2DS1 indicates allele-specific reactivity.

Recombinant Proteins

In addition to our KIR antibodies, R&D Systems offers a wide selection of recombinant KIR proteins that can be used to characterize natural killer cell – target cell interactions. These proteins are all developed and tested in-house to ensure purity, low endotoxin levels, and bioactivity.

Inhibitory Receptors

Molecule	Species	Catalog #
KIR2DL1	Human	1844-KR
KIR2DL2	Human	3015-KR
KIR2DL3	Human	2014-KR
KIR2DL4	Human	2238-KR
KIR2DL5	Human	6634-KR
KIR3DL1	Human	1225-KR
Activating Receptors		
KIR2DL4	Human	2238-KR
KIR2DS4	Human	1847-KR

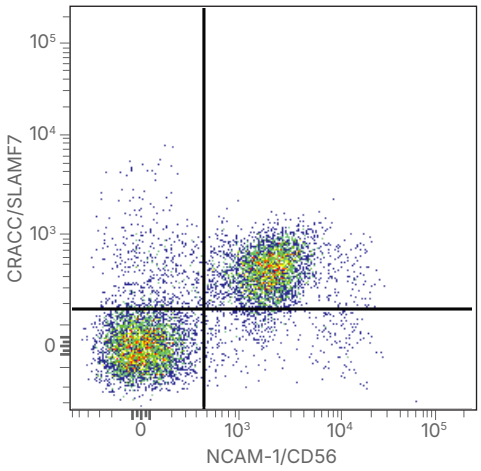
Other Select NK Cell Receptor/ Ligand Pairs

Antibodies

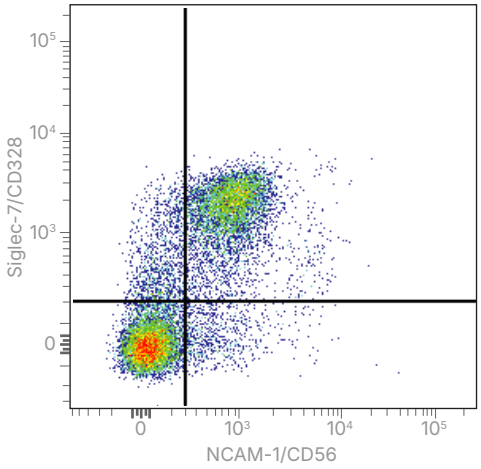
Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)					Unconjugated Antibodies (Applications)
		APC	Fluorescein	PE	Alexa Fluor® 488	Alexa Fluor® 700	
2B4/CD244/ SLAMF4	Human				FAB10393G	FAB10393N	MAB10393 (B/N, FC); AF1039 (E, FA, FC, IHC, WB)
	Mouse						AF1050 (FC, IHC, WB)
CD48/ SLAMF2	Human			FAB3644P	FAB3644G	FAB3644N	MAB3644 (FC, WB); MAB36441 (WB, ICC/IF); AF3644 (FC, WB)
	Mouse						MAB3327 (FC, WB); AF3327 (E, FC, ICC/IF, WB)
CD72	Mouse						MAB1279 (WB); AF1279 (ICC/IF, WB)
CD160	Human	FAB6700A		FAB6700P	FAB6700G		MAB6700 (FC); AF6177 (WB)
	Mouse						MAB3899 (WB); MAB38991 (ICC/IF); AF3899 (FC, ICC/IF)
CEACAM-1	Human	FAB2244A		FAB2244P	FAB2244G	FAB2244N	MAB2244 (FC, WB); MAB22441 (E, IHC, WB); AF2244 (IHC, WB)
	Mouse	FAB6480A		FAB6480P	FAB6480G	FAB6408N	MAB6480 (FC, IHC, WB); AF6480 (FC, IHC, WB)
CRACC/ SLAMF7	Human	FAB1906A		FAB1906P	FAB1906G	FAB1906N	MAB1906 (FC); AF1906 (WB)
	Mouse	FAB4628A			FAB46281G	FAB46281N	AF4628 (FC, WB); MAB4628 (WB); MAB46281 (FC)
KLRG1	Human				FAB70293G	FAB70293N	MAB70293 (FC, IHC)
	Mouse				FAB6944G	FAB6944N	MAB6944 (FC)
IL-2 Rβ	Human	FAB224A		FAB224P	FAB224G	FAB224N	MAB224 (B/N, FC, IHC); MAB2241 (WB); AF-224-NA (B/N, WB)
	Mouse				FAB5891G	FAB5891N	MAB589 (WB); MAB5891 (FC); AF589 (WB)
IL-12 Rβ1	Human	FAB839A	FAB839F	FAB839P	FAB839G	FAB839N	MAB839 (FC); AF839 (WB)
	Mouse			FAB1998P			AF1998 (WB)
IL-12 Rβ2	Human						MAB19591 (WB); AF1959 (B/N, WB)
	Human/ Mouse	FAB1959A		FAB1959P	FAB1959G		
	Mouse						MAB8650 (B/N)
IL-15 Rα	Human				FAB10900G	FAB10900N	MAB10900 (FC); MAB147 (WB); AF247 (B/N, FC, IHC, WB)
	Mouse	FAB5511A			FAB5511G	FAB5511N	MAB5511 (FC)
IL-18 Rα	Human	FAB840A		FAB840P	FAB840G	FAB840N	MAB840 (B/N, FC, ICC/IF, IHC); MAB8401 (WB); AF840 (B/N, FC, IHC, WB)
	Mouse	FAB1216A	FAB1216F		FAB1216G	FAB1216N	MAB1216 (FC, WB); MAB12161 (B/N, WB); AF856 (B/N, FC, WB)
IL-18 Rβ	Human		FAB118F	FAB118P	FAB118G	FAB118N	MAB118 (FC, WB); MAB1181 (B/N, WB); AF118 (B/N, WB)
	Mouse						AF199 (WB)
IL-21 R	Human			FAB9911P	FAB9911G	FAB9911N	MAB9911 (FC); MAB991 (WB); AF991 (FC, WB)
	Mouse						MAB5961 (WB); MAB596 (WB); AF596 (FC, ICC/IF, WB)

Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)					Unconjugated Antibodies (Applications)
		APC	Fluorescein	PE	Alexa Fluor® 488	Alexa Fluor® 700	
LAIR1	Human	FAB2664A		FAB2664P	FAB2664G	FAB2664N	MAB2664 (FC, WB); AF2664 (FC, WB)
LILRB1/ CD85j/ILT2	Human	FAB20171A	FAB20171F	FAB20171P	FAB20171G	FAB20171N	MAB20171 (FC, WB); MAB20172 (B/N, WB); MAB2017 (WB); AF2017 (B/N, FC, WB)
NKR-P1A/ KLRB1	Human				FAB7448G	FAB7448N	MAB7448 (FC)
NTB-A/ SLAMF6	Human	FAB19081A	FAB19081F	FAB19081P	FAB19081G	FAB19081N	MAB19081 (FC); MAB1908 (WB); AF1908 (WB)
	Mouse						MAB3986 (WB); AF3986 (FC, WB)
OCIL/ CLEC2d	Human	FAB3480A		FAB3480P			AF3480 (FC, WB)
	Mouse						AF3376 (WB)
PSGL1/CD162	Human			FAB9961P	FAB9961G	FAB9961N	MAB9961 (FC); MAB996 (B/N, FC); AF3345 (WB)
L-Selectin/ CD62L	Human				FAB728G	FAB728N	MAB728 (FC); AF728 (B/N, WB)
	Mouse		FAB5761F		FAB5761G	FAB5761N	MAB5761 (FC); MAB5762 (E, FC, WB); MAB576 (FC, WB); AF576 (WB)
Semaphorin 4D/CD100	Human			FAB74701P	FAB74701G	FAB74701N	MAB74701 (FC, WB); MAB7470 (ICC/IF)
	Mouse					FAB52351N	MAB52351 (FC); MAB5235 (WB); AF5235 (FC, IHC, WB)
Siglec-3/ CD33	Human	FAB1137A		FAB1137P	FAB1137G	FAB1137N	MAB1137 (FC, WB)
	Mouse						MAB2220 (WB); AF2220 (WB)
Siglec-7/ CD328	Human	FAB11381A		FAB11381P	FAB11381G	FAB11381N	MAB11381 (FC); MAB1138 (WB); AF1138 (B/N, FC, IHC, WB)
Siglec-9	Human	FAB1139A	FAB1139F	FAB1139P	FAB1139G	FAB1139N	MAB1139 (B/N, E, FC, WB); AF1139 (FC, ICC/IF, WB)

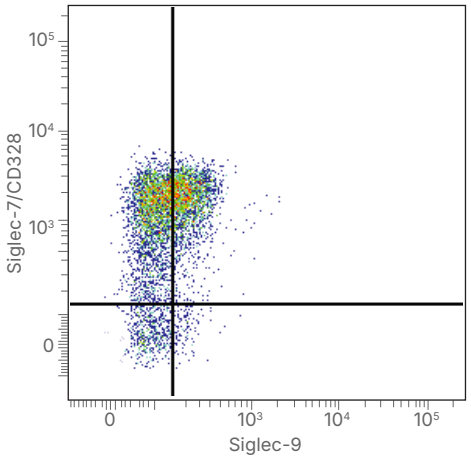
Application Key: B/N Blocking/Neutralization **E** ELISA **FA** Functional Assay **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/ Immunofluorescence **IHC** Immunohistochemistry **IP** Immunoprecipitation **WB** Western Blot



Detection of CRACC/SLAMF7 on Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and an APC-conjugated Mouse Anti-Human CRACC/SLAMF7 Monoclonal Antibody (Catalog # FAB1906A). Cells were gated on CD3- lymphocytes.



Detection of Siglec-7/CD328 on Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a PE-conjugated Mouse Anti-Human NCAM-1/CD56 Monoclonal Antibody (Catalog # FAB2408P) and an APC-conjugated Mouse Anti-Human Siglec-7/CD328 Monoclonal Antibody (Catalog # FAB11381A). Cells were gated on CD3- lymphocytes.



Detection of CD3⁻/CD56⁺/Siglec-7⁺/Siglec-9⁺ Human Peripheral Blood Lymphocytes by Flow Cytometry. Human peripheral blood lymphocytes were stained with a Fluorescein-conjugated Mouse Anti-Human Siglec-9 Monoclonal Antibody (Catalog # FAB1139F) and an APC-conjugated Mouse Anti-Human Siglec-7/CD328 Monoclonal Antibody (Catalog # FAB11381A) Cells were gated on CD3-CD56+ lymphocytes.

Recombinant Proteins

Molecule	Species	Catalog #
2B4/CD244/SLAMF4	Human	1039-2B
	Mouse	3514-2B
CD48/SLAMF2	Human	3644-CD
	Mouse	3327-CD
CD72	Human	5405-CD
CD160	Human	6177-CD
	Mouse	3899-CD
CEACAM-1	Human	2244-CM
CRACC/SLAMF7	Mouse	4628-SF
KLRG1	Mouse	6944-KR
LAIR1	Human	2664-LR
	Mouse	4016-LR
LILRB1/CD85j/ILT2	Human	2017-T2
NKR-P1A/KLRB1	Human	7448-CD
NTB-A/SLAMF6	Human	1908-NT
	Mouse	3986-NT
PSGL1	Human	3345-PS
	Mouse	7407-PS
L-Selectin/CD62L	Human	728-LS
	Mouse	576-LS
Semaphorin 4D/CD100	Human	7470-S4
	Mouse	5235-S4B
Siglec-3	Human	1137-SL
Siglec-7	Human	1138-SL
Siglec-9	Human	1139-SL

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