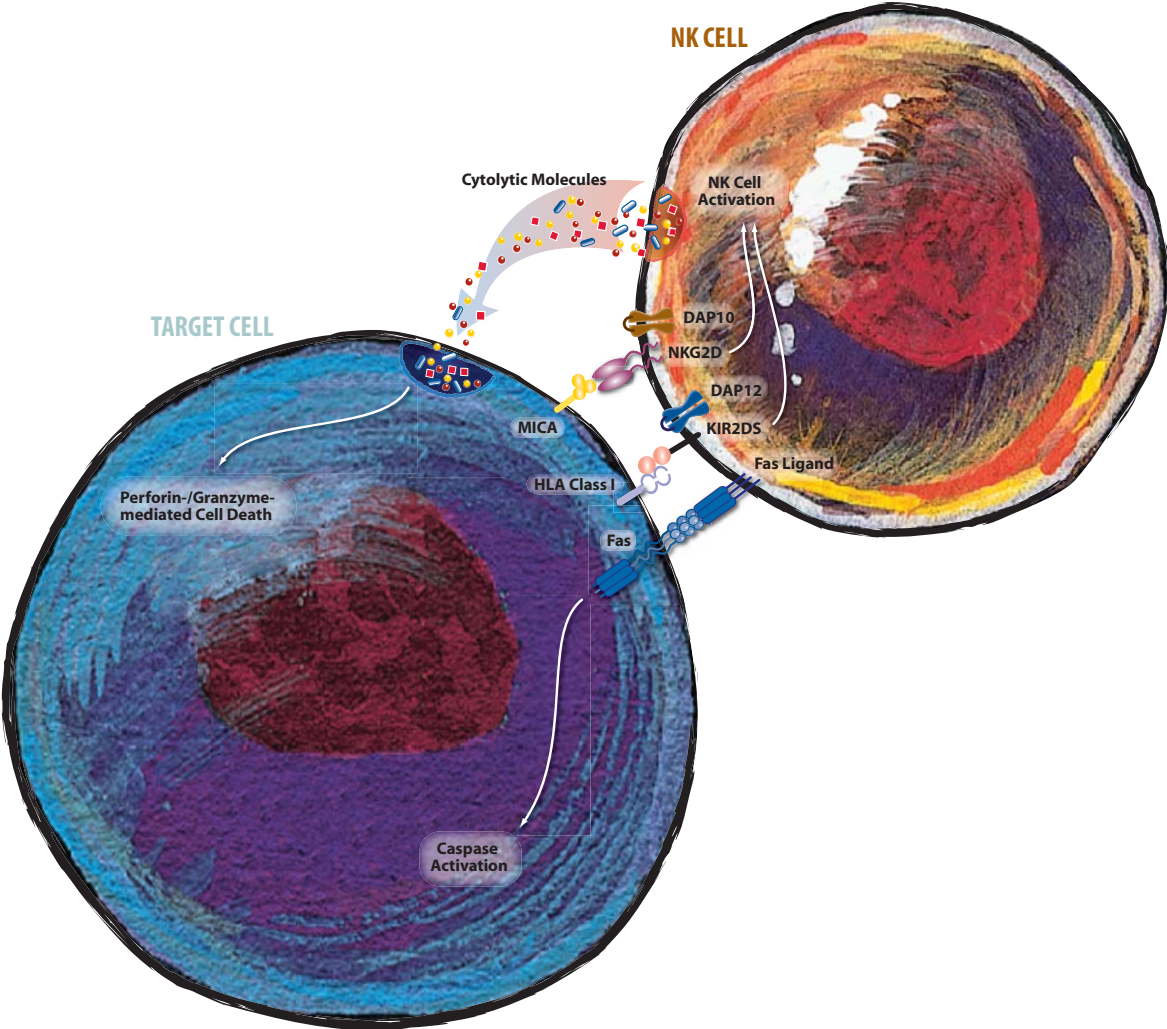


Natural Killer Cells



Natural Killer Cells

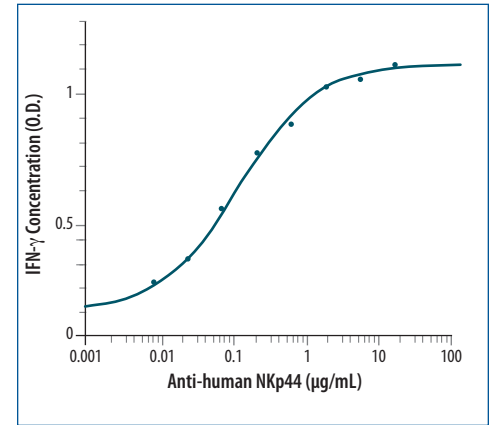
Development, Growth, & Phenotyping

Natural killer (NK) cells are lymphocytes of the innate immune system that function as both cytolytic effectors and regulators of immune responses. NK cells develop from hematopoietic stem cells primarily in the bone marrow and are educated to become self-tolerant by recognition of self MHC class I molecules. Mature NK cells migrate to peripheral lymphoid organs including the spleen, liver, and lymph nodes. They are activated upon detection of abnormalities in target cells such as the loss or down-regulation of MHC class I expression or the up-regulation of stress-induced ligands that occurs in response to infection or neoplastic transformation.

Several NK cell subsets have been described in mice and humans based on their phenotypic markers and functional capabilities. In mice, three different NK cell subsets have been identified: CD11b^{dim}CD27^{bright}, CD11b^{bright}CD27^{dim}, and CD11b^{bright}CD27^{bright} NK cells. These three subsets differ in their tissue distribution, cytokine production, and cytotoxicity. CD11b^{dim}CD27^{bright} cells are found primarily in the bone marrow and lymph nodes,

CD11b^{bright}CD27^{dim} cells are localized predominantly in the blood, spleen, lung, and liver, and CD11b^{bright}CD27^{bright} cells are widely distributed. Upon stimulation, CD27^{bright} NK cells produce higher levels of cytokines, are more cytotoxic, and show greater responsiveness to antigen-presenting cells than CD27^{dim} cells.

Comparisons between mouse and human NK cell subsets have been difficult due to the expression of different cell surface markers. In humans, NK cell subsets have been defined based on the expression levels of NCAM-1/CD56 and CD16 on CD3⁺ lymphocytes. CD56^{dim}CD16⁺ cells are found predominantly in the blood and spleen and are highly cytotoxic, while CD56^{bright}CD16⁻ NK cells are found in the lymph nodes and tonsils. CD56^{bright}CD16⁻ cells are potent cytokine producers, but have only weak cytotoxic potential prior to activation. Further characterization of NK cells in both mice and humans are active areas of research. R&D Systems offers a wide range of proteins, antibodies, cell selection kits, and ELISAs for NK cell research.



Detection of Anti-NKp44-induced IFN- γ Secretion from IL-2-activated Human NK Cells Enriched using the MagCelect Human NK Cell Isolation Kit. Human peripheral blood natural killer (NK) cells were isolated using the MagCelect 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 anti-human NKp44 polyclonal antibody (Catalog # AF2249). IFN- γ secretion was measured using the human IFN- γ Quantikine[®] ELISA Kit (Catalog # DIF50).

Products for NK Cell Research

DEVELOPMENT, GROWTH, & PHENOTYPING OF NK CELLS			
Molecule	Proteins	Antibodies	ELISAs/Kits
B220/CD45 R		M	
CD2		H M	
CD3		H M	H M R
CD8		H M F	H M R
CD27/TNFRSF7	H M	H M	M
CD43		H	
CD69		H M	
Common γ chain/IL-2 R γ	H M	H M	
Fc γ RIIIA/CD16a	H	H	
Fc γ RIIIA/B/CD16a/b	M	H M	
Fc γ RIIIB/CD16b	H	H	
IFN- γ	H M R P B Ca CR E F Pr	H M R P B Ca CR E F Pr	H M R P Ca CR F Pr
IL-2	H M R P B Ca CR E F	H M R B Ca CR E F P	H M R B Ca E F
IL-2 R α	H M R	H M R	H M
IL-2 R β	H	H M	
IL-7	H M	H M	H M
IL-7 R α /CD127	H M R	H M	M
IL-12	H M R Ca F P Pr	H M R P	H M
IL-15	H M	H M	H M

DEVELOPMENT, GROWTH, & PHENOTYPING OF NK CELLS			
Molecule	Proteins	Antibodies	ELISAs/Kits
IL-15 R α	H M	H M	M
IL-18/IL-1F4	H M R P Pr	H M R Ca P Pr	H M R
IL-21	M Ca	M	M
IL-21 R	H M	H M	
IL-27	H M	H M	H
Integrin α 2/CD49b		H M	
Integrin α 4/CD49d		H M	
Integrin α 5/CD49e		H M	
Integrin α L/CD11a		H	
Integrin α M/CD11b		H M	
Integrin α V/CD51		H	H
Integrin α X/CD11c		H M	
Integrin β 1/CD29		H M	
Integrin β 2/CD18		H M	
NCAM-1/CD56	H	H	H
SCF R/c-kit	H	H M	H
SSEA-1		H M	
TCCR/WSX-1	H M	H M	
TNF- α	H M R P B Ca CR E F GP Pr Rb	H M R P B Ca CR E F Pr	H M R P B Ca E F Pr

KEY: H Human M Mouse R Rat P Porcine B Bovine Ca Canine CR Cotton Rat E Equine F Feline GP Guinea Pig Pr Primate Rb Rabbit

NK Cell Functions

NK cells express a variety of receptors that transduce either activating or inactivating signals. Integration of these signals regulates NK cell effector functions including cytolytic activity and cytokine secretion. A combination of stimulatory signals from several co-activating receptors is required to overcome the steady-state balance between activating and inactivating signals. Activating NK cell receptors include members of the killer cell immunoglobulin-like receptor (KIR) family in humans or the Ly49 family in mice, natural cytotoxicity receptors such as NKp30, NKp44, and NKp46, and C-type lectin-like receptors such as CD94-NKG2C, CD94-NKG2E, and NKG2D. Receptors for MHC class I molecules that inhibit NK cell activation are important for self-tolerance. This group of receptors includes members of the KIR family in humans or the Ly49 family in mice, CD94-NKG2A, and members of the leukocyte immunoglobulin-like receptor/immunoglobulin-like transcript (LIR/ILT) family.

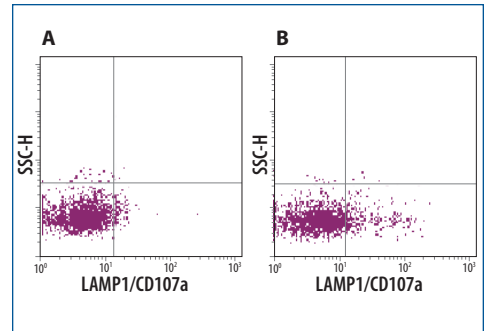
MOLECULES INVOLVED IN NK CELL ACTIVATION			
Molecule	Proteins	Antibodies	ELISAs/Kits
2B4/CD244/SLAMF4	H M	H M	H
Axl	H M	H M	H M
CD44	H	H Ca	H
CD48/SLAMF2	H M	H M	M
CD59		H	
CD59b		M	
CD155/PVR	H	H	
CD160		M	
CRACC/SLAMF7	M	H M	
DNAM-1	H M	H M	
Dtk	H M	H M	H M
GITR/TNFRSF18	H M	H M	H M
H60	M	M	M
KIR2DL4/CD158d	H	H	
KIR2DS4		H	
KIR3DS1	H		
Mer	H M	H M	H
MICA	H	H	H
MICA/B		H	
MICB	H	H	H
MULT-1	M	M	
Nectin-2/CD112	H M	H	
NKG2C/CD159c		H	
NKG2D/CD314	H M	H M	
NKp30/NCR3	H	H	
NKp44/NCR2	H	H	
NKp46/NCR1	H M	H M	
NKp80/KLRF1	H	H	
NTB-A/SLAMF6	H M	H M	
PILR-β	M	H M	
Rae-1		M	
Rae-1α	M		
Rae-1β	M		
Rae-1γ	M	M	
Rae-1δ	M		
Rae-1ε	M	M	
TLR4	H	H M	
TLR4/MD-2 Complex	H		
ULBP-1	H	H	
ULBP-2	H	H	
ULBP-3	H	H	

MOLECULES INVOLVED IN INHIBITING NK CELL ACTIVATION			
Molecule	Proteins	Antibodies	ELISAs/Kits
E-Cadherin	H M	H M	H M
N-Cadherin	H	H	
P-Cadherin	H M	H M	H M
CD94		H	
ILT2/CD85j	H	H	
ILT3/CD85k		H	
ILT4/CD85d	H	H	
ILT5/CD85a	H	H	
KIR2DL1		H	
KIR2DL3		H	
KIR3DL1	H	H	
KIR3DL2	H		
LAIR1	M	H	
LMIR1/CD300A		H M	
NKG2A/CD159a		H	
OCIL/CLEC2d		H M	
PILR-α	M	M	
Siglec-3/CD33	H	H M	
Siglec-7	H	H	H
Siglec-9	H	H	H

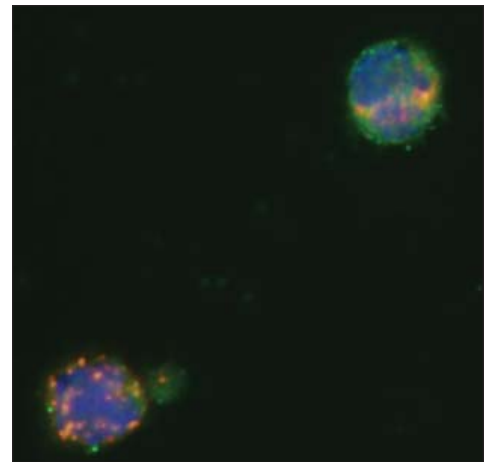
MOLECULES INVOLVED IN NK CELL CHEMOTAXIS			
Molecule	Proteins	Antibodies	ELISAs/Kits
CCR5		H	H
CCR7		H M	
CXCR1/IL-8RA		H	
CXCR3		H M	
CXCR4		H M F	H
EDG-1		H	
L-Selectin/CD62L	H M R	H M R	H M R

MOLECULES INVOLVED IN CELL KILLING			
Molecule	Proteins	Antibodies	ELISAs/Kits
Fas Ligand/TNFSF6	H M R	H M R	H M
Granulysin	H	H	
Granzyme B	H M	H M	H M
LAMP1/CD107a		H M	
TRAIL/TNFSF10	H M	H M	H

MOLECULES INVOLVED IN NK CELL SIGNALING			
Molecule	Proteins	Antibodies	ELISAs/Kits
DAP12		H	



Detection of Target Cell-induced NK Cell Degranulation following Isolation using the MagCelect Human NK Cell Isolation Kit. Human peripheral blood natural killer (NK) cells were isolated using the MagCelect Human NK Cell Isolation Kit (Catalog # MAGH109). Isolated cells were incubated alone (A) or with K562 human erythroleukemia cells, as an effector to target ratio of 2:1, for 3 hours (B). NK cell degranulation as indicated by translocation of LAMP1/CD107a to the cell membrane was analyzed using APC-conjugated anti-human LAMP1/CD107a monoclonal antibody (Catalog # IC4800A).



Detection of NKp46 and Granzyme B Expression in Human NK Cells Isolated using the MagCelect Human NK Cell Isolation Kit. Human peripheral blood natural killer (NK) cells were isolated using the MagCelect Human NK Cell Isolation Kit (Catalog # MAGH109). NKp46 was detected in isolated cells using anti-human NKp46 polyclonal antibody (Catalog # AF1850) followed by staining with NorthernLights™ 493-conjugated anti-goat secondary antibody (Catalog # NL003; green). Granzyme B was detected using anti-human Granzyme B monoclonal antibody (Catalog # MAB2906) followed by staining with NorthernLights 557-conjugated anti-mouse secondary antibody (Catalog # NL007; red). Nuclei were stained with DAPI (blue).

For more information, please visit our website at www.RnDSystems.com/go/NKcells



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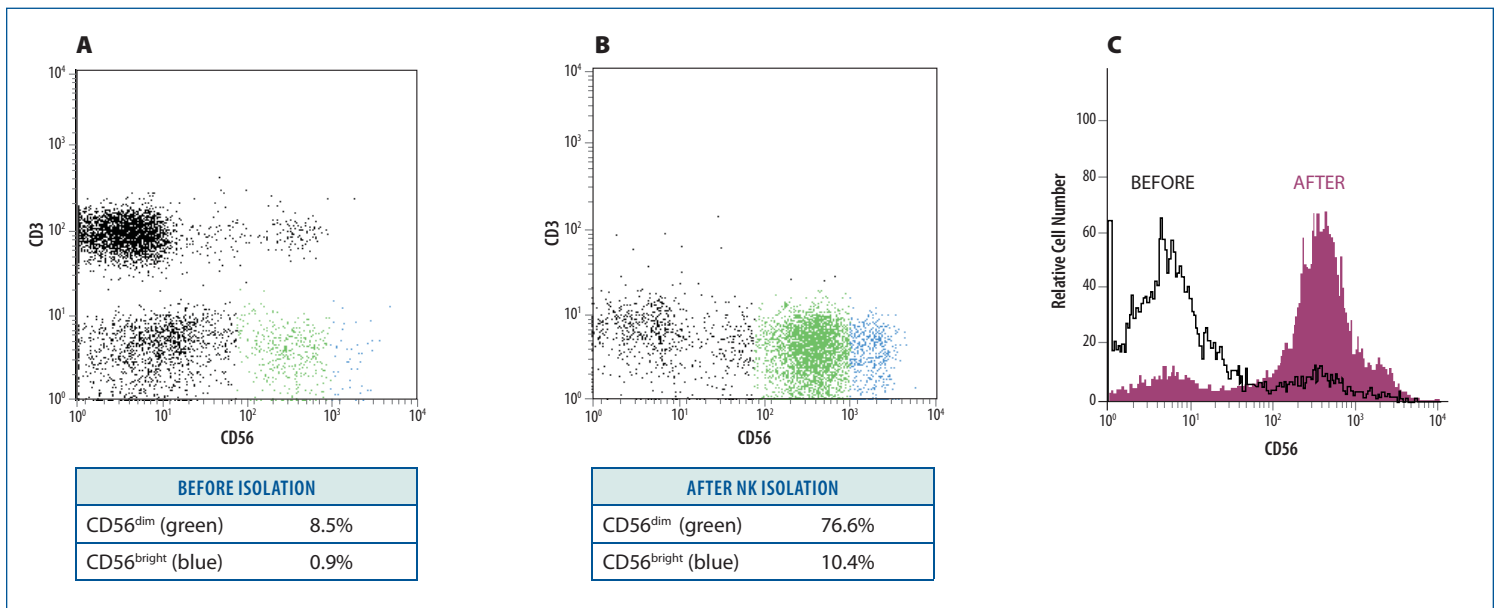
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FL094_NK cells_Dec

NK Cell Selection using MagCollect™ Kits

R&D Systems offers two new MagCollect Kits for mouse or human natural killer (NK) cell isolation. Both kits are designed to isolate NK cells using a negative selection protocol to remove unwanted cells from a mononuclear cell suspension. Unlike positive selection kits, the MagCollect kit leaves the enriched NK cell population untouched. The enriched NK cells can then be used for a variety of applications including tissue culture, immune status monitoring, and flow cytometry. The typical purity of the recovered NK cells ranges between 70-80% for the mouse kit and 80-90% for the human kit.

MAGCOLLECT KIT	CATALOG #
Human Natural Killer Cell Isolation Kit	MAGH109
Mouse Natural Killer Cell Isolation Kit	MAGM210



Enrichment of NK Cells from Peripheral Blood Mononuclear Cells using the MagCollect Human NK Cell Isolation Kit. The MagCollect Human NK Cell Isolation Kit (Catalog # MAGH109) was used to enrich for NK cells from a peripheral blood mononuclear cell suspension. Cells were double-stained with APC-conjugated anti-human CD3 monoclonal antibody (Catalog # FAB100A) and PE-conjugated anti-human NCAM-1/CD56 monoclonal antibody (Catalog # FAB2408P) before (A) and after (B) enrichment. CD56^{dim} cells are shown in green and CD56^{bright} cells are shown in blue. (C) Corresponding histograms of the CD56 staining before and after selection are shown.