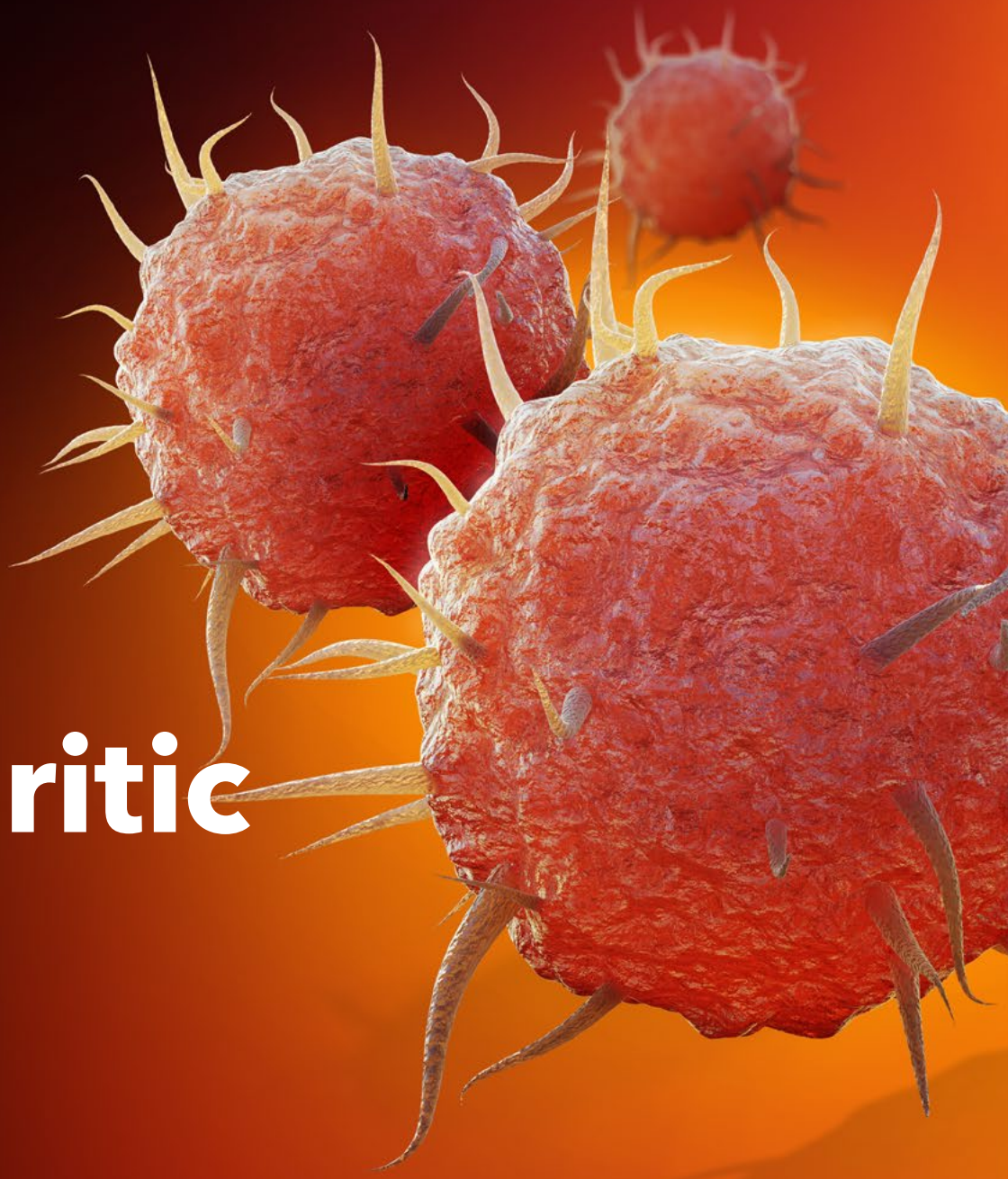

Dendritic Cells

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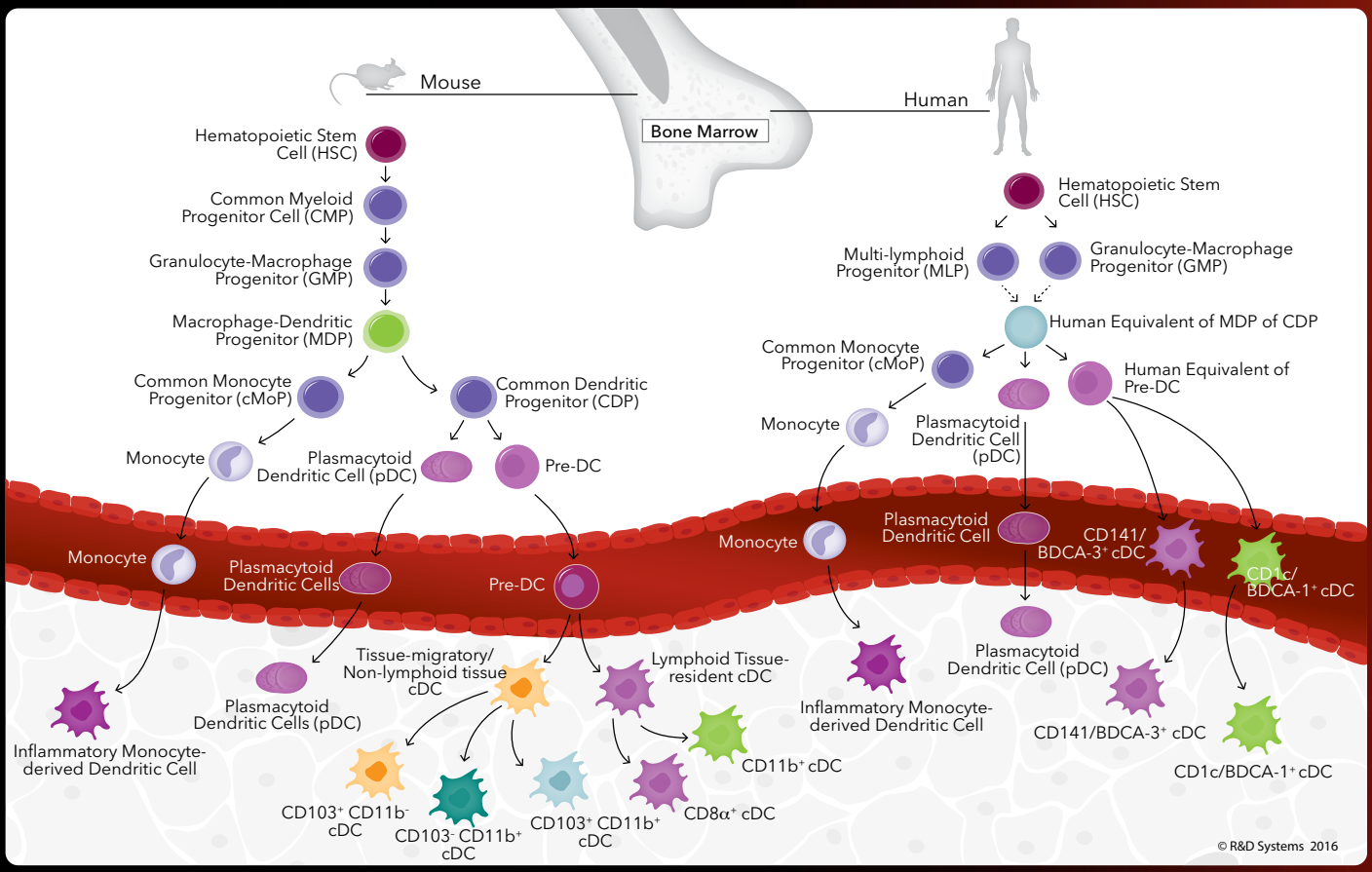
Dendritic Cells

Dendritic cells (DCs) are key mediators of the innate and adaptive immune responses due to their abilities to: 1) upregulate MHC molecules and costimulatory receptors upon pathogen recognition, 2) capture, process, and present antigens to naïve T cells, and 3) produce polarizing cytokines that promote pathogen-specific effector T cell differentiation and activation. In addition, DCs can promote self-tolerance by secreting tolerogenic cytokines that induce the differentiation of regulatory T cells. As a result of their capacity to regulate T cell responses, there is considerable interest in DCs as potential therapeutic targets.

With the exception of Langerhans cells which develop from precursor cells in the yolk sac and fetal liver, mouse dendritic cells develop from macrophage-dendritic cell precursors (MDPs) in the bone marrow. MDPs give rise to common monocyte progenitors (cMoPs) and common DC progenitors (CDPs). The CDPs subsequently give rise to plasmacytoid dendritic cells (pDCs) and pre-DCs (cDC progenitors), which migrate through the blood to lymphoid and non-lymphoid tissues where they differentiate into classical DC (cDC) subsets. In contrast to cDCs, monocyte-derived dendritic cells (MoDCs) arise from cMoPs that give rise to blood monocytes, which migrate to inflamed tissues, where they differentiate into MoDCs. In humans, both granulocyte-macrophage progenitors (GMPs) and multi-lymphoid progenitors (MLPs) have been suggested to have the potential to differentiate into a MDP- or CDP-like progenitor. These progenitors are subsequently thought to differentiate into DCs through pathways similar to what has been described in mouse.



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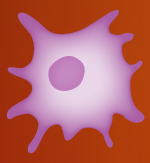
Dendritic Cell Subsets

While all DCs are capable of antigen presentation upon pathogen recognition, DCs are a heterogeneous cell population in terms of locations, phenotypes, and immunological functions. This plasticity allows DCs to differentially shape the immune response when presented with diverse pathogens. Most of our knowledge about different DC subsets has come from studies in mouse where several lymphoid tissue-resident and migratory DC subsets have been characterized. Mouse DC subsets include CD8α$^+$ and CD11b$^+$ lymphoid tissue-resident classical DCs (cDCs), CD103$^+$CD11b$^-$, CD103$^+$CD11b$^+$, and CD103$^-$CD11b$^+$ nonlymphoid tissue-resident/migratory cDCs, plasmacytoid DCs, Langerhans cells, and inflammatory monocyte-derived DCs (MoDCs). Due to significant differences in the cell surface markers expressed by mouse and human DCs, characterization of human DC subsets has been difficult. To date, human CD141/BDCA-3$^+$ cDCs and CD1c/BDCA-1$^+$ cDCs, have been found in the blood, spleen, and tonsils and are thought to correspond to mouse lymphoid tissue-resident CD8α$^+$ cDCs and CD11b$^+$ cDCs, respectively. Human CD1c/BDCA-1$^+$ DCs are the major cDC subset found in blood, while CD141/BDCA-3$^+$ cDCs are relatively rare. Additional human DC subsets that have been characterized include human plasmacytoid DCs, which are present in blood and lymphoid tissue, as well as CD1a$^+$CD14$^-$ and CD1a$^-$CD14$^+$ human dermal DCs and Langerhans cells.

Phenotypic Markers of Mouse Dendritic Cell Subsets

Lymphoid Tissue-resident DCs

CD8α$^+$ Classical DCs



Cell Surface Markers
CD4$^-$
CD8α$^+$
CD11c$^+$
CLEC9a$^+$
DC-SIGN/CD209$^-$
DEC-205/CD205$^+$
F4/80$^-$

IGSF4A/SynCAM1/Necl2$^+$
Integrin αM/CD11b$^-$
Langerin/CD207$^{+/-}$
MHC class II$^+$
SIRPα/CD172a$^-$
XCR1$^+$

Transcription Factors
Batf3$^+$
IRF4$^-$
IRF8$^+$

Secreted Molecules
IFN-γ$^+$
IL-12$^+$

Integrin αM/CD11b$^+$ Classical DCs

Cell Surface Markers
CD4$^{+/-}$
CD8α$^-$
CD11c$^+$
CLEC9a$^-$
DC-SIGN/CD209$^+$

DEC-205/CD205$^+$
F4/80$^+$
IGSF4A/SynCAM1/Necl2$^-$
Integrin αM/CD11b$^+$
Langerin/CD207$^-$
MHC class II$^+$
SIRPα/CD172a$^+$
XCR1$^-$

Secreted Molecules
IFN-γ$^+$
IL-2$^+$
IL-6$^+$

Plasmacytoid DCs

Cell Surface Markers
B220/CD45 R$^+$
Bst-2/PDCA-1$^+$
CD11c$^+$
CLEC9a$^+$
DC-SIGN/CD209$^+$
Integrin αM/CD11b$^-$

Ly6C$^+$
MHC class II$^+$
Siglec-H$^+$
TLR7$^+$
TLR9$^+$

Secreted Molecules
IFN-α$^+$
IFN-β$^+$
IL-6$^+$
IL-10$^-$
IL-12$^+$
TNF-α$^+$

Tissue-migratory/Non-lymphoid tissue Classical DCs

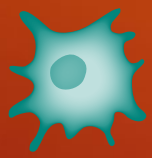
Integrin αE/CD103$^+$CD11b$^-$ Classical DCs

Cell Surface Markers
CD4$^-$
CD8$^-$
CD11c$^+$
CLEC9a$^+$
CX3CR1$^-$

DC-SIGN/CD209$^-$
DEC-205/CD205$^+$
EpCAM/TROP1$^-$
F4/80$^-$
Integrin αE/CD103$^+$
Integrin αM/CD11b$^-$
Langerin/CD207$^+$
MHC class II$^+$
SIRPα/CD172a$^-$
XCR1$^+$

Secreted Molecules
IL-12$^+$
IL-23$^+$

Integrin αE/CD103$^-$CD11b$^+$ Classical DCs



Cell Surface Markers
CD4$^-$
CD8$^-$
CD11c$^+$
CLEC9a$^-$
CX3CR1$^+$

EpCAM/TROP1$^-$
F4/80$^+$
Fcγ RI/CD64$^+$
Integrin αE/CD103$^-$
Integrin αM/CD11b$^+$
Langerin/CD207$^-$
MHC class II$^+$
SIRPα/CD172a$^+$
XCR1$^-$

Secreted Molecules
IL-6$^+$
IL-10$^+$
IL-23$^+$

Integrin αE/CD103$^+$CD11b$^+$ Classical DCs

Cell Surface Markers
CD4$^-$
CD8$^-$
CD11c$^+$

CLEC9a$^-$
CX3CR1$^-$
DC-SIGN/CD209$^+$
EpCAM/TROP1$^-$
F4/80$^-$
Integrin αE/CD103$^+$
Integrin αM/CD11b$^+$
Langerin/CD207$^-$
MHC class II$^+$
SIRPα/CD172a$^-$
XCR1$^-$

Additional Skin-resident DCs

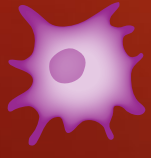
Langerhans Cells

Cell Surface Markers
CD11c$^+$
CLEC9a$^-$
DC-SIGN/CD209$^+$

DEC-205/CD205$^+$
EpCAM/TROP1$^+$
F4/80$^+$
Integrin αE/CD103$^-$
Integrin αM/CD11b$^+$
Langerin/CD207$^+$
MHC class II$^+$
SIRPα/CD172a$^+$

Inflammatory DCs

Inflammatory/Monocyte-derived DCs



Cell Surface Markers
CD11c^{int}
DC-SIGN/CD209$^+$
Integrin αM/CD11b$^+$

Ly6C$^+$
MHC class II$^+$

Secreted Molecules
IL-12$^+$
NO$^+$
TNF-α$^+$

Phenotypic Markers of Human Dendritic Cell Subsets

Blood & Lymphoid Tissue DCs

Thrombomodulin/CD141/BDCA-3$^+$ Classical DCs

Cell Surface Markers
Lin$^-$ (CD3$^-$, CD14$^-$, CD19$^-$, CD20$^-$, CD56$^-$)
CD1a$^-$
CD1c/BDCA-1$^-$
CD11c$^+$
CLEC9a$^+$
DEC-205/CD205^{high}
HLA-DR$^+$
IGSF4A/SynCAM1/Necl2$^+$
Integrin αM/CD11b^{low}
Thrombomodulin/CD141/BDCA-3$^+$
XCR1$^+$

Transcription Factors
Batf3$^+$
IRF4$^-$
IRF8$^+$

Secreted Molecules
IFN-β$^+$
IL-12$^+$

CD1c/BDCA-1$^+$ Classical DCs

Cell Surface Markers
Lin$^-$ (CD3$^-$, CD14$^-$, CD19$^-$, CD20$^-$, CD56$^-$)
CD1a$^-$
CD1c/BDCA-1$^+$
CD11c$^+$
HLA-DR$^+$
Integrin αM/CD11b^{low}
Thrombomodulin/CD141/BDCA-3$^{+/-}$

Secreted Molecules
IL-1β$^+$
IL-6$^+$
IL-10$^+$
IL-12$^+$
TNF-α$^+$

Plasmacytoid DCs

Cell Surface Markers
Lin$^-$ (CD3$^-$, CD14$^-$, CD19$^-$, CD20$^-$, CD56$^-$)
CD1a$^-$
CD11c^{low}
DLEC/CLEC4C/BDCA-2$^+$
HLA-DR$^+$
IL-3 Rα/CD123$^+$
Neuropilin-1/BDCA-4$^+$
TLR7$^+$
TLR9$^+$

Secreted Molecules
IFN-α$^+$
IFN-β$^+$
IL-6$^+$
IL-10$^-$
TNF-α$^+$

Skin Tissue DCs

CD1a$^+$ Dermal DCs

Cell Surface Markers
Lin$^-$ (CD3$^-$, CD14$^-$, CD19$^-$, CD20$^-$, CD56$^-$)
CD1a$^+$
CD1c/BDCA-1$^+$
CD11c$^+$
CD14$^-$
EpCAM/TROP1$^-$
HLA-DR$^+$
Integrin αM/CD11b^{high}
Langerin/CD207$^-$
SIRPα/CD172a$^+$

CD14$^+$ Dermal DCs

Cell Surface Markers
Lin$^-$ (CD3$^-$, CD19$^-$, CD20$^-$, CD56$^-$)
CD1a$^-$
CD1c/BDCA-1$^+$
CD11c$^+$
CD14$^+$
CD163$^-$
DC-SIGN/CD209$^+$
EpCAM/TROP1$^-$
HLA-DR$^+$
Langerin/CD207$^-$

Langerhans Cells

Cell Surface Markers
Lin$^-$ (CD3$^-$, CD14$^-$, CD19$^-$, CD20$^-$, CD56$^-$)
CD1a$^+$
CD1c/BDCA-1$^+$
CD11c$^+$
CD14$^-$
E-Cadherin$^+$
EpCAM/TROP1$^+$
HLA-DR$^+$
Integrin αM/CD11b$^{+/-}$
Langerin/CD207$^+$
SIRPα/CD172a$^+$

Inflammatory DCs

Inflammatory/Monocyte-derived DCs

Cell Surface Markers
Lin$^-$ (CD3$^-$, CD19$^-$, CD20$^-$, CD56$^-$)
CD1a$^+$
CD1c/BDCA-1$^+$
CD11c$^+$
CD14$^+$
Fcε RIα$^+$
Fcγ RI/CD64$^+$
HLA-DR$^+$
Integrin αM/CD11b$^{+/-}$
MMR/CD206$^+$
SIRPα/CD172a$^+$

Secreted Molecules
IL-23$^+$
iNOS$^+$
TNF-α$^+$

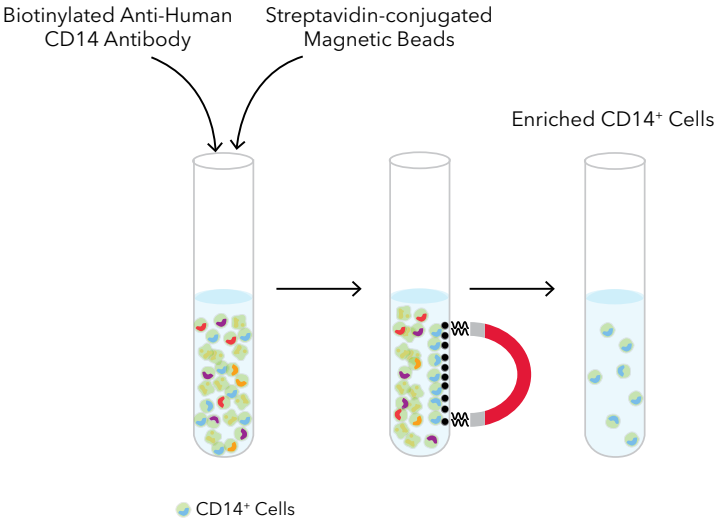
Products for Isolating CD14+ Monocytes and Generating Monocyte-derived Dendritic Cells *In Vitro*

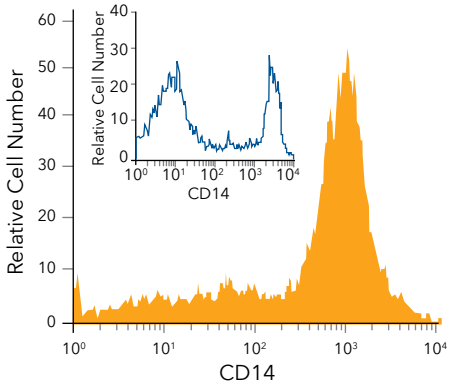
1. The MagCellect™ Human CD14+ Cell Isolation Kit is Used to Isolate Human CD14+ Monocytes

The MagCellect™ Human CD14+ Cell Isolation Kit is designed to separate CD14+ cells from other human leukocytes via a positive selection principle. The cells of interest are tagged with a biotinylated anti-human CD14 antibody followed by the addition of streptavidin ferrofluid. The tube containing the cell suspension is then placed in the MagCellect™ magnet and the cells tagged with magnetic nanoparticles migrate toward the tube wall, leaving the untagged cells in suspension. The cells remaining in suspension are removed by aspiration and the magnetically selected cells are removed from the magnet and resuspended in reaction buffer or media. Typical recovery ranges from 45–75% and the purity of the recovered CD14+ cells ranges from 90–97%.

Assay Principle

Enrichment of CD14+ Cells





Isolation of CD14+ Monocytes using the MagCellect™ Human CD14+ Cell Isolation Kit. Human CD14+ cells were isolated from Ficoll separated peripheral blood mononuclear cells using the MagCellect™ Human CD14+ Cell Isolation Kit (Catalog # MAGH105). All viable cells were stained before (inset) and after isolation using a PE-conjugated Anti-Human CD14 Monoclonal Antibody (R&D Systems, Catalog # FAB3832P).

R&D Systems™ MagCellect™ Human CD14+ Cell Isolation Kit Catalog # MAGH105
Kit Contents
Biotinylated Anti-Human CD14 Monoclonal Antibody (clone 134620)
Streptavidin Ferrofluid
10X Buffer

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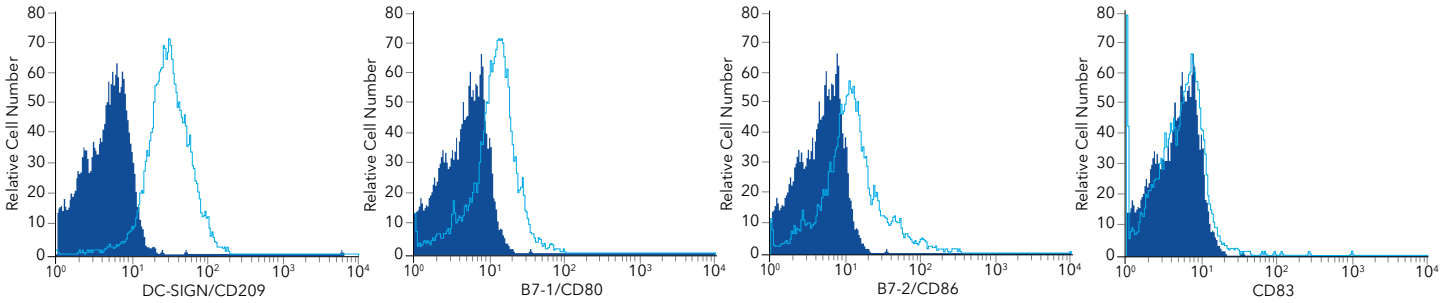
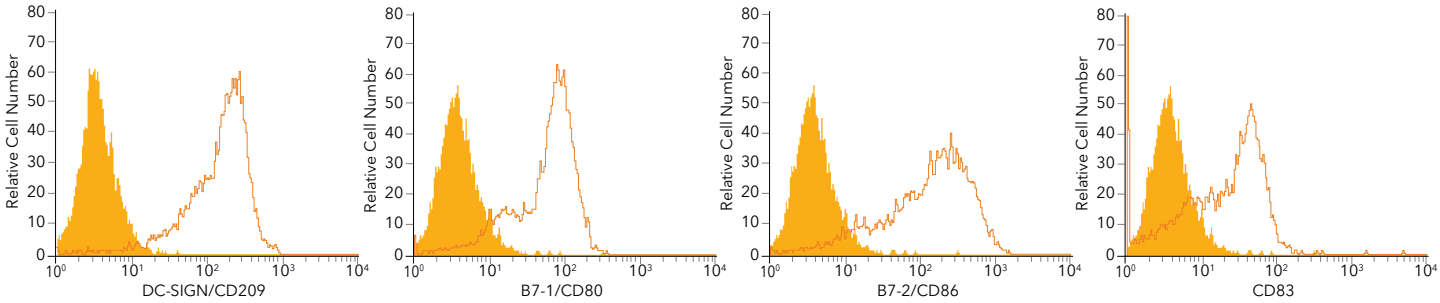
2. Monocyte-derived Dendritic Cells Are Generated from CD14+ Monocytes *Ex Vivo* Using the CellXVivo™ Human Monocyte-derived Dendritic Cell Differentiation Kit

The CellXVivo™ Human Monocyte-derived Dendritic Cell Differentiation Kit contains the media and cytokine components required to generate immature and mature dendritic cells from CD14+ peripheral blood mononuclear cells under serum-free conditions. Kit components include Serum-free Dendritic Cell Base Media, Recombinant Human IL-4, Recombinant Human GM-CSF, Recombinant Human TNF-α, and Reconstitution Buffer. Representative results obtained from the differentiation of CD14+ peripheral blood mononuclear cells using reagents provided in the CellXVivo™ Human Monocyte-derived Dendritic Cell Differentiation Kit are shown in the data figures below. In addition, we now offer a CellXVivo™ Mouse Dendritic Cell Differentiation Kit that contains all of the reagents necessary to efficiently and consistently generate immature and mature dendritic cells from mouse bone marrow cells. Data examples showing the morphology of immature mouse dendritic cells and the phenotypes of both immature and mature dendritic cells cultured in the Differentiation Media provided in the CellXVivo™ Kit are available at bio-techne.com.

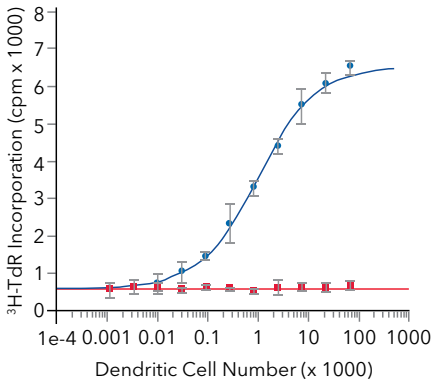
Immature Monocyte-derived Dendritic Cells



Mature Monocyte-derived Dendritic Cells



Phenotypic Analysis of Cultured Immature and Mature Monocyte-derived Dendritic Cells. The phenotypes of immature monocyte-derived dendritic cells (top, open histograms) cultured for seven days in complete serum-free dendritic cell base media provided in the CellXVivo™ Human Monocyte-derived Dendritic Cell Differentiation Kit (R&D Systems, Catalog # CDK004), and mature monocyte-derived dendritic cells (bottom, open histograms) grown under the same conditions for seven days and then treated with Recombinant Human TNF-α for an additional three days, were assessed by flow cytometry using Mouse Anti-Human DC-SIGN/CD209, B7-1/CD80, B7-2/CD86, and CD83 Monoclonal Antibodies (R&D Systems, Catalog # MAB161, MAB140, MAB141, MAB1774, respectively) or an appropriate isotype control antibody (filled histograms).



Mature Dendritic Cells Induce Proliferation of Allogeneic T Cells. Serial dilutions of mature monocyte-derived dendritic cells, grown in complete serum-free dendritic cell base media for seven days and then treated with Recombinant Human TNF-α for an additional three days using reagents provided in the CellXVivo™ Human Monocyte-derived Dendritic Cell Differentiation Kit (R&D Systems, Catalog # CDK004), were incubated with allogeneic (blue) or autologous (red) human T cells for three days. ^{3}H-thymidine (^{3}H-TdR) was added to the cultures for the final 18 hours and T cell proliferation was measured using a scintillation counter. Results are presented as the mean cpm of triplicates.

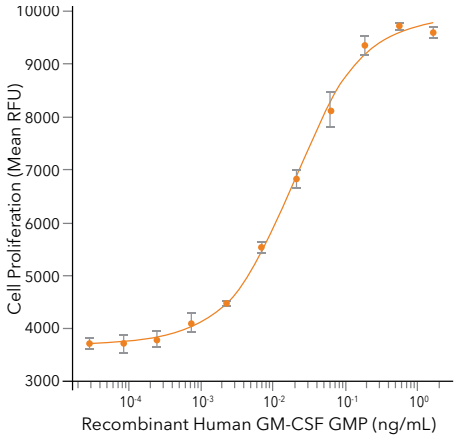
R&D Systems™ CellXVivo™ Human Monocyte-derived DC Differentiation Kit Cat. # CDK004
Kit Contents
Serum-Free Dendritic Cell Base Media
Recombinant Human IL-4
Recombinant Human GM-CSF
Recombinant Human TNF-α
Reconstitution Buffer 2

Learn More | bio-techne.com/t/dendritic-cell-differentiation-kits

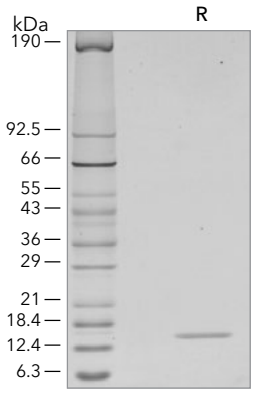
Growth Factors for Dendritic Cell Differentiation

In addition to our CellXVivo™ Human Monocyte-derived Dendritic Cell Differentiation Kit, R&D Systems also offers individually packaged recombinant human and mouse proteins for *in vitro* dendritic cell differentiation and culture. Our current portfolio includes recombinant proteins that we manufacture under standard conditions, along with Animal-Free™ and Animal Component-Free Process recombinant proteins, GMP-grade recombinant proteins, and custom protein development services.

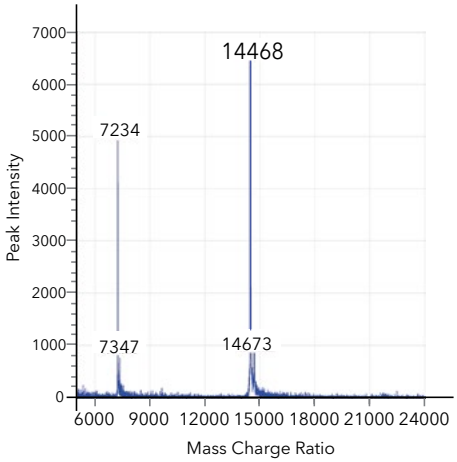
Molecule	Species	Source	Catalog #	Animal-Free or Animal Component-Free Process Proteins (Catalog #)	GMP-grade Proteins (Catalog #)
Flt-3 Ligand	Human	*E. coli*	BT-FT3L	BT-FT3L-AFL	BT-FT3L-GMP
	Human	NS0	308-FKN		
	Mouse	NS0	427-FL		
GM-CSF	Human	*E. coli*	215-GM	AFL215	215-GMP
	Human	CHO	7954-GM		
	Mouse	*E. coli*	415-ML	AFL415	
IL-4	Human	*E. coli*	BT-004	BT-004-AFL	BT-004-GMP
	Human	CHO	6507-IL		
	Mouse	*E. coli*	404-ML		
M-CSF	Human	*E. coli*	216-MC	AFL216	216-GMP
	Human	CHO	216-MCC		
	Mouse	*E. coli*	416-ML	AFL416	
Thrombopoietin	Human	*E. coli*	288-TPE		288E-GMP
	Human	NS0	288-TPN		
	Mouse	NS0	488-TO		
TNF-α (aa 77–233)	Human	*E. coli*	210-TA	AFL210	210-GMP
TNF-α (aa 87–233)	Human	*E. coli*	8599-TA		
TNF-α (aa 80–235)	Mouse	*E. coli*	410-MT	AFL410	
TNF-α (aa 84–235)	Mouse	*E. coli*	410-TRNC		



Bioactivity of GMP-grade Recombinant Human GM-CSF. The bioactivity of GMP-grade Recombinant Human GM-CSF (R&D Systems, Catalog # 215-GMP) was determined by measuring its ability to stimulate proliferation of the TF-1 human erythroleukemic cell line. The ED_{50} for this effect is 6–30 pg/mL.



Purity of GMP-grade Recombinant Human GM-CSF. The purity of GMP-grade Recombinant Human GM-CSF (R&D Systems, Catalog # 215-GMP) was analyzed by loading 1 µg of the protein onto a SDS-PAGE gel under reducing (R) conditions. The silver-stained gel shows a single band at 14 kDa. The purity of the protein was determined to be >97% as assessed by densitometry.



MALDI-TOF Analysis of GMP-grade Recombinant Human GM-CSF. GMP-grade Recombinant Human GM-CSF (R&D Systems, Catalog # 215-GMP) was analyzed by MALDI-TOF. The major peak corresponds to the calculated molecular mass of 14478 Da. The minor peak at 14673 Da is a matrix-associated artifact of MALDI-TOF.

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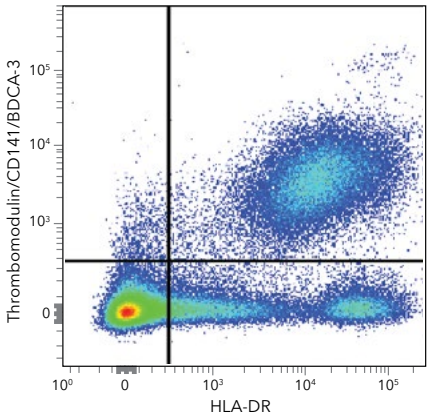
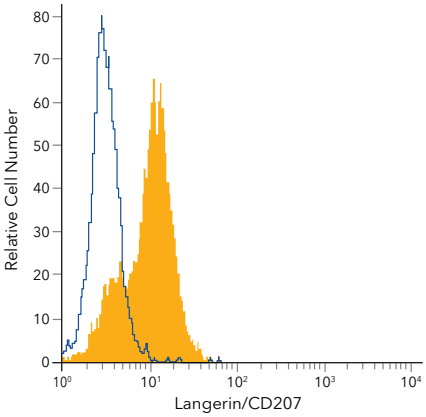
Fluorochrome-conjugated and Unlabeled Antibodies for Identifying and Characterizing Dendritic Cell Subsets

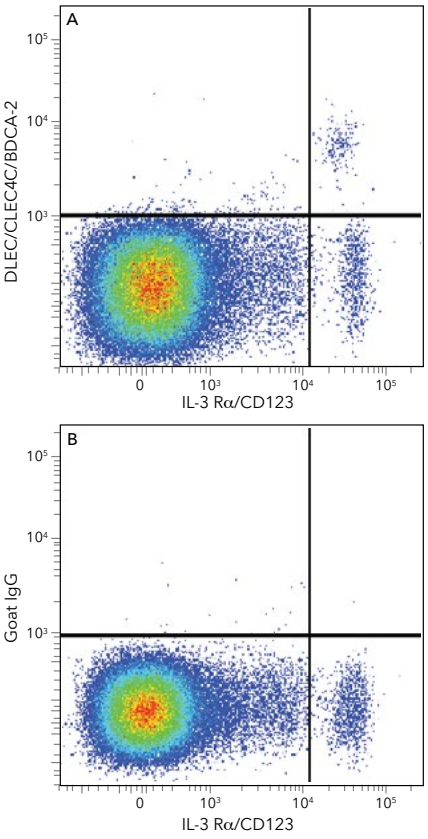
R&D Systems and Novus Biologicals together offer an unparalleled selection of fluorochrome-conjugated and unlabeled antibodies for the identification and characterization of human and mouse dendritic cell subsets. R&D Systems offers hundreds of world-renowned unique clones, many of which have been used to establish CD nomenclature through HLDA Workshops. This includes antibodies for seven new CD molecules designated at the HLDA10 conference on human myeloid and dendritic cell populations. In addition to our unique clones, Novus Biologicals offers an expansive collection of some of the most highly referenced antibody clones on the market. Most of these are conjugated to multiple different fluorochromes including a series of Alexa Fluor® and DyLight® dyes to provide a full range of options for multicolor experiments.



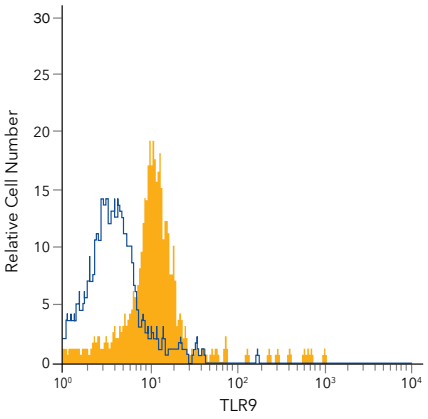
Detection of Thrombomodulin/CD141/BDCA-3 on Human Peripheral Blood Mononuclear Cells by Flow Cytometry. Human peripheral blood mononuclear cells were stained with a PE-conjugated Mouse Anti-Human Thrombomodulin/CD141/BDCA-3 Monoclonal Antibody (R&D Systems, Catalog # FAB3947P) and an APC-conjugated Mouse Anti-Human HLA-DR Monoclonal Antibody (R&D Systems, Catalog # FAB4869A). Quadrant markers were set based on internal control antibody staining.



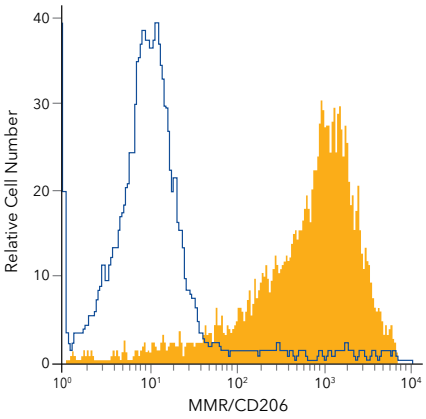
Detection of Langerin/CD207 in Human Langerhans Cells by Flow Cytometry. Human Langerhans cells were generated by treating CD14+ human peripheral blood mononuclear cells with Recombinant Human IL-4, Recombinant Human GM-CSF, and TGF-β for 6 days. Cells were subsequently stained with a PerCP-conjugated Mouse Anti-Human Langerin/CD207 Monoclonal Antibody (R&D Systems, Catalog # FAB2088C; filled histogram) or a PerCP-conjugated Mouse IgG_1 Isotype Control (R&D Systems, Catalog # IC002C; open histogram).



Detection of DLEC/CLEC4C/BDCA-2 on Human Peripheral Blood Mononuclear Cells by Flow Cytometry. Human peripheral blood mononuclear cells were stained with a PE-conjugated Mouse Anti-Human IL-3 Rα/CD123 Monoclonal Antibody (R&D Systems, Catalog # FAB301P) and either (**A**) an APC-conjugated Goat Anti-Human DLEC/CLEC4C/BDCA-2 Polyclonal Antibody (R&D Systems, Catalog # FAB1376A) or (**B**) an APC-conjugated Normal Goat IgG Control Antibody (R&D Systems, Catalog # IC108A).



Intracellular Staining of TLR9 in Human CD123+ Peripheral Blood Mononuclear Cells by Flow Cytometry. Human CD123+ peripheral blood mononuclear cells were stained with an Alexa Fluor 488-conjugated Sheep Anti-Human TLR9 Antigen Affinity-purified Polyclonal Antibody (R&D Systems, Catalog # IC7108G; filled histogram) or an Alexa Fluor 488-conjugated Sheep IgG Control Antibody (R&D Systems, Catalog # IC016G; open histogram). To facilitate intracellular staining, cells were fixed with Flow Cytometry Fixation Buffer (R&D Systems, Catalog # FC004) and permeabilized with Flow Cytometry Permeabilization/Wash Buffer I (R&D Systems, Catalog # FC005).



Detection of MMR/CD206 in Human Immature Dendritic Cells by Flow Cytometry. Human monocyte-derived immature dendritic cells were stained with an APC-conjugated Mouse Anti-Human MMR/CD206 Monoclonal Antibody (R&D Systems, Catalog # FAB25342A; filled histogram) or an APC-conjugated Mouse IgG_{2A} Isotype Control Antibody (R&D Systems, Catalog # IC003A; open histogram).

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Select Antibodies for Cell Markers Used to Identify and Characterize Human and Mouse Dendritic Cell Subsets

Positive and Negative Cell Surface Markers for DC Characterization

	Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)								Unlabeled Antibodies Catalog # (Applications)
			Clone	APC	Fluorescein	PE	PerCP	Alexa Fluor®		Additional Alexa Fluor® Conjugates	
								488	700	405/594/647/750	
◆	B220/CD45 R	Mouse	RA3-6B2	FAB1217A	FAB1217F	FAB1217P	FAB1217C	FAB1217G	FAB1217N	FAB1217V/FAB1217T/ FAB1217R/FAB1217S	MAB1217 (FC, ICC/IF, IP)
◆	Bst-2/PDCA-1	Mouse	44E9R	FAB8660A							MAB8660 (FC, ICC/IF)
◆	CD1a	Human	703217	FAB7076A		FAB7076P	FAB7076C	FAB7076G	FAB7076N		MAB7076 (FC, ICC/IF)
◆		Human	O10			NBP2-34697PE	NBP2-34697PCP	NBP2-34697AF488	NBP2-34697AF700	NBP2-34697AF405/ NBP2-34697AF647	NBP2-34313 (E, FC, ICC/IF, IHC, IP, WB)*
◆	CD1c/ BDCA-1	Human	Polyclonal	FAB5910A		FAB5910P					AF5910 (WB)
◆	CD3	Human	UCHT1	FAB100A	FAB100F	FAB100P	FAB100C	FAB100G	FAB100N	FAB100V/FAB100T/ FAB100R/FAB100S	MAB100 (FA, FC, ICC/IF, IP)
◆		Mouse	17A2	FAB4841A	FAB4841F	FAB4841P	FAB4841C	FAB4841G	FAB4841N	FAB4841V/FAB4841T/ FAB4841R/FAB4841S	MAB4841 (FA, FC, ICC/IF, IHC, IP)
◆		Mouse	145-2C11	NBP2-30149APC		NBP2-30149PE	NBP2-30149PCP	FAB484G	FAB484N	FAB484V/FAB484T/ FAB484R/FAB484S	NBP2-30151 (FC)*; MAB484 (Depl, FA, FA, IP)
◆	CD4	Human	11830	FAB3791A	FAB3791F	FAB3791P	FAB3791C	FAB3791G	FAB3791N	FAB3791V/FAB3791T/ FAB3791R/FAB3791S	MAB379 (FC, ICC/ IF, IHC)
◆		Human	RPA-T4	NBP2-27245	NBP2-27247	NBP2-27248	NBP2-27216PCP	NBP2-27216AF488	NBP2-27216AF700	NBP2-27216AF405/ NBP2-27216AF647	NBP2-25199 (B/N, FC, IHC, IV)*
◆		Mouse	GK1.5	FAB554A	FAB554F	FAB554P	FAB554C	FAB554G	FAB554N	FAB554V/FAB554T/ FAB554R/FAB554S	MAB554 (Depl, FA, FC, IHC, IP)
◆	CD8α	Human	37006	FAB1509A	FAB1509F	FAB1509P	FAB1509C	FAB1509G	FAB1509N	FAB1509V/FAB1509T/ FAB1509R/FAB1509S	MAB1509 (FC, ICC/IF)
◆		Human	C8/144B	NBP2-34588APC		NBP2-34588PE	NBP2-34588PCP	NBP2-34588AF488	NBP2-34588AF700	NBP2-34588AF405/ NBP2-34588AF647	NBP2-32836 (FC, ICC/IF, IHC, IP, WB)*
◆		Human	RPA-T8	NBP2-27246	NBP2-27235	NBP2-27237	NBP2-25195PCP	NBP2-25195AF488	NBP2-25195AF700	NBP2-25195AF405/ NBP2-25195AF647	NBP2-25195 (FC, IHC, IV)*
◆		Mouse	53-6.7	FAB116A	FAB116F	FAB116P	FAB116C	FAB116G		FAB116V/FAB116T/ FAB116R/FAB116S	MAB116 (Depl, FA, FC, ICC/IF, IP)
◆	CD11c	Human	ICRF 3.9	FAB1777A	FAB1777F	FAB1777P	FAB1777C		FAB1777N		MAB1777 (FC, IP); MAB17771 (WB)
◆		Human	BU15	NBP1-45018APC	NBP1-45015	NBP1-45018PE	NBP1-45018PCP	NBP1-45018AF488	NBP1-45018AF700	NBP1-45018AF405/ NBP1-45018AF647	NBP1-45018 (FC, IHC, IP)*
◆		Mouse	N418	FA-B69501A		FAB69501P	FAB69501C	FAB69501G	FAB69501N		MAB69501 (FC); MAB6950 (WB)
◆	CD14	Human	134620	FAB3832A	FAB3832F	FAB3832P	FAB3832C		FAB3832N	FAB3832V/FAB3832T/ FAB3832R/FAB3832S	MAB3832 (B/N, FC, WB)
◆		Human	M5E2	NB100-77758APC	NB100-77759	NB100-77758PE	NB100-77758PCP	NB100-77758AF488	NB100-77758AF700	NB100-77758AF405/ NB100-77758AF647	NB100-77758 (FC, ICC/IF, IHC)*
◆	CD19	Human	4G7-2E3	FAB4867A	FAB4867F	FAB4867P	FAB4867C		FAB4867N	FAB4867T/FAB4867R/ FAB4867S	MAB4867 (FC)
◆		Human	LT19	NB500-338APC		NB500-338PE	NB500-338PCP	NB500-338AF488	NB500-338AF700	NB500-338AF405/ NB500-338AF647	NB500-338 (FC, IP)
◆		Human	4G7		NBP1-79128	NBP1-79129					NBP1-50058 (FC, ICC/IF)
◆	CD20/MS4A1	Human	396444	FAB4225A	FAB4225F	FAB4225P			FAB4225N	FAB4225V	MAB4225 (FC)
◆		Human	2H7	NB100-64858APC		NB100-64858PE	NB100-64858PCP	NB100-64858AF488	NB100-64858AF700	NB100-64858AF405/ NB100-64858AF647	NB100-64858 (FC, IHC, IP)*

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◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

* In addition to the fluorochrome-conjugated forms listed, these antibodies are also available in one or more DyLight®-conjugated forms. DyLight conjugates include DyLight 350, 405, 405LS, 488, 550, 650, 680, 755. Please visit bio-techne.com for more information.

Select Antibodies for Cell Markers Used to Identify and Characterize Human and Mouse Dendritic Cell Subsets

Positive and Negative Cell Surface Markers for DC Characterization

	Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)								Unlabeled Antibodies Catalog # (Applications)
			Clone	APC	Fluorescein	PE	PerCP	Alexa Fluor®		Additional Alexa Fluor® Conjugates	
								488	700	405/594/647/750	
◆	CD163	Human	215927	FAB1607A		FAB1607P	FAB1607C	FAB1607G	FAB1607N		MAB1607 (FC, WB)
◆		Human	EDHu-1	NB110-40686APC		NB110-40686PE	NB110-40686PCP	NB110-40686AF488	NB110-40686AF700	NB110-40686AF405/ NB110-40686AF647	NB110-40686 (E, FC, ICC/IF, IHC, WB)*
◆	CLEC9a	Human	683409	FAB6049A		FAB6049P		FAB6049G	FAB6049N		MAB6049 (B/N, FC); AF6049 (B/N, IHC, WB)
◆		Mouse	7H11	FA-B67761A		FAB67761P					MAB67761 (FC, ICC/IF, WB); MAB6776 (IHC)
◆	CX3CR1	Mouse	Polyclonal	FAB5825A		FAB5825P		FAB5825G			AF5825 (FC, WB)
◆	DC-SIGN/ CD209	Human	120507	FAB161A	FAB161F	FAB161P	FAB161C		FAB161N		MAB161 (B/N, FC, ICC/IF, IHC, WB)
◆		Mouse	MMD3	FA-B83451A							MAB83451 (FC)
◆		Mouse	902404			FAB8345P					MAB8345 (FC)
◆	DEC-205/ CD205	Human	523203		FAB2047F						MAB2047 (FC); AF2047 (ICC/IF, WB)
◆		Mouse	561118	FAB5975A		FAB5975P					AF5975 (WB)
◆	DLEC/ CLEC4C/ BDCA-2	Human	Polyclonal	FAB1376A		FAB1376P					AF1376 (FC, IHC, WB)
◆	E-Cadherin	Human	180224	FA-B18381A		FAB18381P	FAB18381C	FAB18381G			MAB18381 (FC, IHC, WB)
◆		Human	67A4	NBP1-42793APC	NBP1-44694	NBP1-97558	NBP1-42793PCP	NBP1-42793AF488	NBP1-42793AF700	NBP1-42793AF405/ NBP1-42793AF647	NBP1-42793 (FC, ICC/IF, IHC, IP, WB)*
◆	EpCAM/ TROP1	Human	158206	FAB9601A	FAB9601F	FAB9601P	FAB9601C	FAB9601G	FAB9601N		MAB9601 (E, FC); MAB960 (ICC/IF, IHC, WB)
◆		Human	VU-1D9	NBP2-33078APC		NBP2-33078PE	NBP2-33078PCP	NBP2-33078AF488	NBP2-33078AF700	NBP2-33078AF405/ NBP2-33078AF647	NBP2-33051 (E, FC, ICC/IF, IHC, IP, WB)*
◆		Mouse	G8.8R			FAB8998P				FAB8998R	MAB8998 (FC)
◆	F4/80	Mouse	521204	FAB5580A		FAB5580P	FAB5580C				MAB5580 (FC, ICC/IF)
◆		Mouse	BM8		NB100-77700	NBP2-22134				NBP1-60140AF647	NBP1-60140 (FC, IHC, WB)*
◆		Mouse	CI-A3-1	NB600-404APC		NB600-404PE	NB600-404PCP	NB600-404AF488	NB600-404AF700	NB600-404AF405/ NB600-404AF647	NB600-404 (EM, FC, ICC/IF, IHC, IP, RIA, WB)*
◆	Fcε RIa	Human	773704	FAB6678A		FAB6678P	FAB6678C	FAB6678G			MAB6678 (B/N, FC)
◆	Fcγ RI/CD64	Human	276426	FA-B12571A	FAB12571F	FAB12571P	FAB12571C				MAB12571 (FC, WB)
◆		Human	10.1			FAB1257P					MAB1257 (FC, ICC/IF)
◆		Human	10.1	NB100-2709APC	NBP2-00120		NB100-2709PCP	FAB1257G	FAB1257N	FAB1257V/FAB1257T/ FAB1257R/FAB1257S	NB100-2709 (FC)*
◆		Mouse	290322	FA-B20741A		FAB20741P	FAB20741C	FAB20741G	FAB20741N		MAB20741 (FC); MAB2074 (WB)
◆	HLA-DR	Human	L203	FAB4869A	FAB4869F	FAB4869P	FAB4869C		FAB4869N	FAB4869V/FAB4869T/ FAB4869R/FAB4869S	MAB4869 (FC)
◆		Human	L243	NB100-77855APC	NB100-77856	NB100-77855PE	NB100-77855PCP	NB100-77855AF488	NB100-77855AF700	NB100-77855AF405/ NB100-77855AF647	NB100-77855 (FC, IHC, IP, WB)*
◆	IGSF4A/ SynCAM1/ Necl2	Mouse									AF1459 (WB)
◆	IL-3 Rα/ CD123	Human	32703	FAB301A		FAB301P	FAB301C	FAB301G	FAB301N		MAB301 (B/N, FC, ICC/IF, IHC, WB)
◆		Human	6H6	NB600-1185APC		NB600-1185PE	NB600-1185PCP	NB600-1185AF488	NB600-1185AF700	NB600-1185AF405/ NB600-1185AF647	NB600-1185 (FC, IHC, WB)*

	Molecule	Species	Fluorochrome-conjugated Antibodies for Flow Cytometry (Catalog #s)								Unlabeled Antibodies Catalog # (Applications)
			Clone	APC	Fluorescein	PE	PerCP	Alexa Fluor®		Additional Alexa Fluor® Conjugates	
								488	700	405/594/647/750	
◆	Integrin αE/ CD103	Mouse	Polyclonal	FAB1990A		FAB1990P		FAB1990G			AF1990 (FC, WB)
◆		Mouse	2E/7	NBP1-43024	NBP1-28124	NBP1-28126					NBP1-28123 (FC, IHC, IV, IP)
◆	Integrin αM/ CD11b	Human	238446	FA-B16991A		FAB16991P	FAB16991C	FAB16991G	FAB16991N	FAB16991V/ FAB16991T/ FAB16991R/ FAB16991S	MAB16991 (FC, ICC/IF, IHC)
◆		Human	ICRF44	FAB1699A		FAB1699P		FAB1699G			MAB1699 (FC, ICC/IF, IHC)
◆		Human / Mouse	M1/70.15			NB600-1327PE	NB600-1327PCP	NB600-1327AF488	NB600-1327AF700	NB600-1327AF405/ NB600-1327AF647	NB600-1327 (FC, ICC/IF, IHC, IP)*
◆		Mouse	M1/70	FAB1124A	FAB1124F	FAB1124P	FAB1124C		FAB1124N	FAB1124V/FAB1124T/ FAB1124R/FAB1124S	MAB1124 (FC, ICC/IF, IHC, IP)
◆	Langerin/ CD207	Human	343828	FAB2088A	FAB2088F	FAB2088P	FAB2088C				MAB2088 (FC, WB)
◆	Ly-6C	Mouse	HK1.4	NBP1-28046APC	NBP1-28047	NBP1-28046PE	NBP1-28046PCP	NBP1-28046AF488	NBP1-28046AF700	NBP1-28046AF405/ NBP1-28046AF647	NBP1-28046 (FC, IHC, IV)*
◆	Ly-6G/Ly-6C (Gr-1)	Mouse	RB6-8C5	FAB1037A	FAB1037F	FAB1037P	FAB1037C		FAB1037N	FAB1037V	MAB1037 (FC, ICC/IF, IHC, IP)
◆	MHC class II (I-A/I-E)	Mouse	M5/114.15.2	FAB6118A	FAB6118F						
◆	MMR/CD206	Human	685641	FA-B25342A		FAB25342P		FAB25342G			MAB25342 (FC, WB); MAB25341 (IHC, SW, WB); MAB2534 (ICC/IF)
◆	NCAM-1/ CD56	Human	301040	FAB2408A		FAB2408P					MAB2408 (E, FC, WB); MAB24081 (FC, IHC, WB)
◆		Human	123C3	NBP2-33132APC		NBP2-33132PE	NBP2-33132PCP	NBP2-33132AF488	NBP2-33132AF700	NBP2-33132AF405/ NBP2-33132AF647	NBP2-15184 (E, FC, ICC/IF, IHC, IP, SW, WB)*
◆	Neuropilin-1/ BDCA-4	Human	446921	FAB3870A	FAB3870F	FAB3870P	FAB3870C		FAB3870N		MAB3870 (FC); AF3870 (B/N, FC, IHC, WB)
◆	Siglec-H	Mouse	730407	FAB7319A		FAB7319P		FAB7319G			
◆	SIRPα/ CD172a	Human	602411	FAB4546A	FAB4546F	FAB4546P	FAB4546C				MAB4546 (FC, ICC/IF, WB)
◆		Mouse									AF7307 (WB)
◆	Thrombo-modulin/ CD141/ BDCA-3	Human	501733	FAB3947A	FAB3947F	FAB3947P					MAB3947 (E, FC, IHC); AF3947 (FC, IHC, IP, WB)
◆	TLR7	Human	533707			IC5875P	IC5875C	IC5875G			MAB5875 (FC)
◆		Hu-man/ Mouse	4G6	NBP2-25274APC		NBP2-27251	NBP2-25274PCP	NBP2-25274AF488	NBP2-25274AF700	NBP2-25274AF405/ NBP2-25274AF647	NBP2-27332 (FC, ICC/IF, WB)*
◆		Mouse									MAB7156 (WB)
◆	TLR9	Human	Polyclonal					IC7108G			AF3658 (FC, IHC); MAB3658 (FC)
◆		Human	eB72-1665	NBP1-43140APC		NBP1-43140PE	NBP1-43140PCP				NBP1-43140 (FC, IHC, IP, WB)*
◆		Human / Mouse	26C593.2	NBP2-24729APC	NBP2-24908	NBP2-24907	NBP2-24729PCP	NBP2-24729AF488	NBP2-24729AF700	NBP2-24729AF405/ NBP2-24729AF647	NBP2-24729 (E, FA, FC, ICC/IF, IHC, IP, IV, SW, WB)*
◆		Mouse	M9.D6	NBP1-43141APC	NBP1-43919	NBP1-43141PE	NBP1-43141PCP	NBP1-43141AF488	NBP1-43141AF700	NBP1-43141AF405/ NBP1-43141AF647	NBP1-43141 (FC, WB)*
◆		Mouse									MAB7960 (FC, ICC/IF)
◆	XCR1	Human	Polyclonal		FAB857F	FAB857P			FAB857N		AF857 (FC, ICC/IF, WB)
◆		Human	1097A			FAB8571P		FAB8571G			MAB8571 (FC)

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Secreted Molecules

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			Clone	APC	Fluorescein	PE	PerCP	Alexa Fluor®		
								488	700	
◆	IFN-α	Human	MMHA-11		21112-3					21100-1 (B/N, E, WB)
◆		Mouse	RMMA-1		22100-3					22100-1 (B/N, E)
◆	IFN-β	Human	MMHB-3		21400-3					MAB814 (B/N, WB)
◆		Mouse	RMMB-1		22400-3					32400-1 (B/N)
◆	IFN-γ	Human	25723	IC285A	IC285F	IC285P	IC285C	IC285G		MAB2851 (B/N, FC, ICC/IF); AF-285-NA (B/N, ICC/IF, WB)
◆		Human	25718							MAB285 (B/N, ICC/IF)
◆		Mouse	37895	IC485A	IC485F	IC485P			IC485N	MAB485 (B/N, FC, WB); AF-585-NA (B/N, ICC/IF, WB)
◆	IL-1β	Human	8516	IC201A	IC201F	IC201P	IC201C			MAB201 (B/N, FC, ICC/IF, WB); MAB601 (B/N, E, ICC/IF, WB); AF-201-NA (B/N, ICC/IF, WB)
◆		Human	1027B	IC8406A		IC8406P				
◆		Mouse	166931	IC4013A	IC4013F	IC4013P	IC4013C			MAB4012 (B/N, IP, WB); MAB4013 (FC); AF-401-NA (B/N, ICC/IF, IHC, SW, WB)
◆	IL-2	Human	5334		IC202F	IC202P				MAB202 (B/N, FC, ICC/IF); AF-202-NA (B/N, ICC/IF, WB)
◆		Mouse	JES6-5H4		IC402F	IC402P				MAB702 (B/N, E); AF-402-NA (B/N, WB)
◆	IL-6	Human	1936		IC206F	IC206P				MAB2061 (B/N, FC, ICC/IF); AF-206-NA (B/N, ICC/IF, WB)
◆		Human	903129	IC2062A		IC2062P		IC2062G		MAB2062 (FC)
◆		Mouse	MP520F3		IC406F	IC406P				MAB406 (B/N, E, WB); AF-406-NA (B/N, ICC/IF, WB)
◆	IL-10	Human	127107		IC2172F					MAB217 (B/N, WB); AF-217-NA (B/N, IHC, WB)
◆		Mouse	JES052A5 or Polyclonal							MAB417 (B/N, E, WB); AF-417-NA (B/N, WB); AF519 (B/N, ICC/IF, WB)
◆	IL-12/IL-35 p35	Human/ Mouse	27537	IC2191A	IC2191F	IC2191P	IC2191C			MAB1570 (FC, WB)
◆	IL-12	Human	Polyclonal							AF-219-NA (B/N, ICC/IF, WB)
◆		Mouse	Polyclonal							AF-419-NA (B/N, WB)
◆	IL-23 p19	Human	727753			IC17161P		IC17161G		MAB17161 (FC, WB); AF1716 (B/N, WB)
◆	IL-23	Mouse	320244	IC18871A		IC18871P				MAB1887 (E, WB)

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◆ Indicates an R&D Systems antibody

Human Myeloid Dendritic Cell Multi-color Flow Cytometry Kit

R&D Systems Human Myeloid Dendritic Cell Multi-color Flow Kit Catalog # FMC016
Kit Contents
APC-conjugated CD1c/BDCA-1 (polyclonal)
Fluorescein-conjugated CD11c (clone ICRF 3.9)
PE-conjugated Thrombomodulin/CD141/BDCA-3 (clone 501733)
PerCP-conjugated Fcγ RIII/CD16 (clone 245536)
APC-, Fluorescein-, PE-, PerCP-conjugated Isotype Controls
1X Staining Buffer

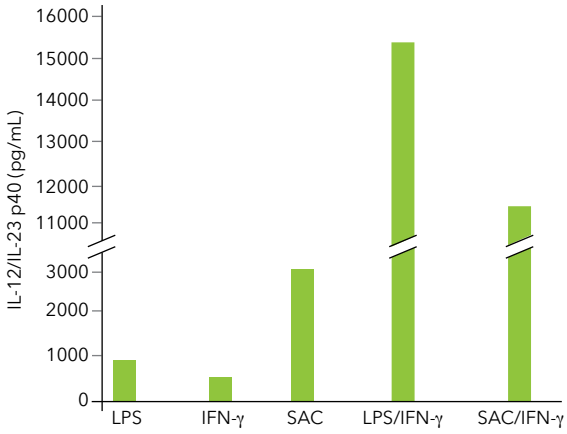
ELISA Kits for Detecting Factors Secreted by Dendritic Cell Subsets

R&D Systems offers complete, ready-to-run Quantikine™ Colorimetric Sandwich ELISA Kits and the more flexible DuoSet™ ELISA Development Systems for detecting molecules secreted by dendritic cells. Quantikine Kits are rigorously tested in-house to ensure that they provide the highest levels of specificity, accuracy, precision, and sensitivity in analyte quantification. When complete kits are not an option, DuoSet ELISA Development Systems offer an economical alternative 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



Measurement of IL-12/IL-23 p40 Levels using the Quantikine ELISA Kit. Human peripheral blood mononuclear cells were stimulated with lipopolysaccharide (LPS), Recombinant Human IFN-γ (Catalog # 285-IF). 0.0075% *Staphylococcus aureus* Cowan I (SAC), LPS and IFN-γ, or 0.0075% SAC and IFN-γ for 1.5 days. Aliquots of the cell culture supernatants were assayed using the Human IL-12/IL-23 p40 Quantikine ELISA Kit (R&D Systems, Catalog # DP400). Aliquots removed from the cells that had been treated with SAC, LPS and IFN-γ, or SAC and IFN-γ were diluted prior to the assay.

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

Learn More | bio-techne.com/reagents/elisa-kits

ELISpot & FluoroSpot Kits

In addition to our large selection of ELISA Kits, R&D Systems offers complete, microplate-based ELISpot and FluoroSpot Kits along with ELISpot Development Modules for detecting cytokine-secreting cells. Complete 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 ELISpot Development Modules, which provide a flexible, do-it-yourself format for ELISpot development.

R&D Systems ELISA Kits & ELISpot/FluoroSpot Kits for Detecting Factors Secreted by Dendritic Cell Subsets

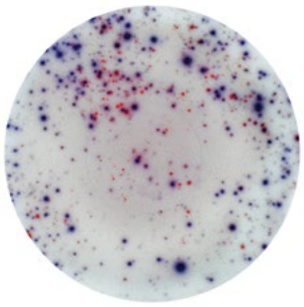
Molecule	Species	Quantikine ELISA (Catalog #)	Quantikine HS ELISA (Catalog #)	DuoSet or Other ELISA Kit (Catalog #)	ELISpot/FluoroSpot Kits and Development Modules
IFN-α	Human			41100-1	
	Human			41110-1	
	Mouse			42120-1	
IFN-β	Human			41410-1	
	Mouse			42400-1	
IFN-γ	Human	DIF50		DY285	EL285*
	Mouse	MIF00		DY485	EL485*
IL-1β/IL-1F2	Human	DLB50	HSLB00D	DY201	SEL201
	Mouse	MLB00C	HSLB00C	DY401	
IL-2	Human	D2050		DY202	EL202*
	Mouse	M2000		DY402	EL402*
IL-6	Human	D6050	HS600B	DY206	EL206
	Mouse	M6000B		DY406	EL406
IL-10	Human	D1000B	HS100C	DY217B	
	Mouse	M1000B		DY417	
IL-12 p70	Human	D1200	HS120	DY1270	
	Mouse	M1270		DY419	
IL-12/IL-23 p40	Human	DP400		DY1240	EL309
	Mouse	M1240		DY499	SEL499
	Mouse	MP400		DY2398	
TNF-α	Human	DTA00C	HSTA00D	DY210	SEL210
	Mouse	MTA00B		DY410	EL410

*Dual-Color ELISpot and FluoroSpot Kits are also available for this molecule. Go to bio-techne.com, search the molecule of interest, and filter on ELISpot and FluoroSpot Kits for more information.

Learn More | bio-techne.com/reagents/elispot-kits

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 and dual-color FluoroSpot Kits



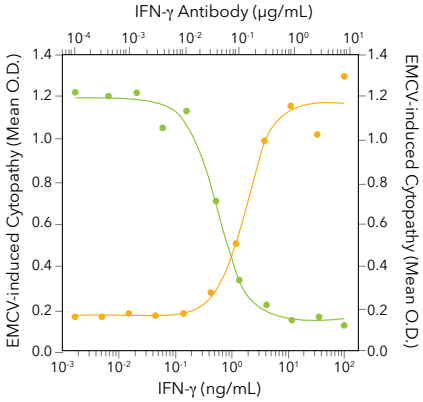
Detection of IFN-γ and IL-2 Secretion by Mouse Splenocytes. IFN-γ (blue spots) and IL-2 (red spots) were secreted from mouse splenocytes stimulated with PMA/Ca^{2+} ionomycin. Spots of cytokine secretion were visualized using the Mouse IFN-γ/IL-2 Dual-Color ELISpot Kit (R&D Systems, Catalog # ELD5006).

Multiplex Assays

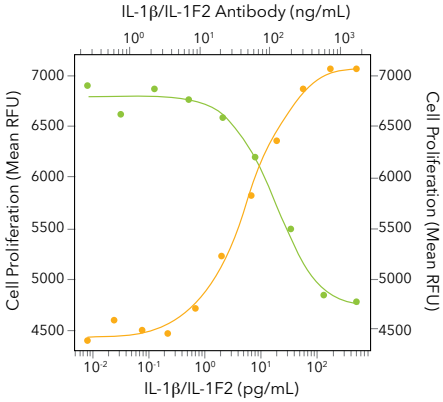
In addition to the single analyte ELISAs listed above, R&D Systems also offers multiplex assay options for simultaneously detecting multiple target analytes in qualified sample types. These assays include the membrane-based Proteome Profiler™ Antibody Arrays and the bead-based Luminex® Assays and High Performance Assays. Please visit our website at bio-techne.com/reagents/proteome-profiler-antibody-arrays or bio-techne.com/reagents/luminex-assays for more information on these products.

Proteins and Blocking/Neutralization Antibodies for Studying Factors Secreted by Dendritic Cell Subsets

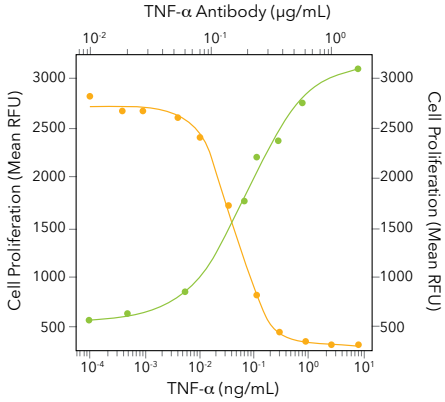
If you are interested in investigating the effects of cytokines secreted by dendritic cell subsets, R&D Systems offers recombinant proteins and antibodies for blocking/neutralization. Many of these antibodies are also qualified for additional applications including flow cytometry, immunocytochemistry, immunohistochemistry, and Western blot.



IFN-γ-mediated Inhibition of EMCV-induced Cytopathy and Neutralization using an Anti-Human IFN-γ Antibody. The HeLa human cervical epithelial carcinoma cell line infected with encephalomyocarditis virus (EMCV) was treated with increasing concentrations of Recombinant Human IFN-γ (R&D Systems, Catalog # 285-IF) and EMCV-induced cytopathy was measured by crystal violet staining (orange line). The inhibitory effect induced by 5 ng/mL Recombinant Human IFN-γ was neutralized by treating the cells with increasing concentrations of a Mouse Anti-Human IFN-γ Monoclonal Antibody (R&D Systems, Catalog # MAB285; green line). The ND_{50} is typically 0.02–0.06 µg/mL.



IL-1β-induced Proliferation and Neutralization using an Anti-Mouse IL-1β Antibody. The D10.G4.1 mouse helper T cell line was treated with increasing concentrations of Recombinant Mouse IL-1β/IL-1F2 (R&D Systems, Catalog # 401-ML) and cell proliferation was assessed (orange line). Proliferation stimulated by 50 pg/mL Recombinant Mouse IL-1β/IL-1F2 was neutralized by treating the cells with increasing concentrations of a Goat Anti-Mouse IL-1β/IL-1F2 Antigen Affinity-purified Polyclonal Antibody (R&D Systems, Catalog # AF-401-NA; green line). The ND_{50} is typically 0.05–0.25 µg/mL in the presence of concanavalin A (1.25 µg/mL).



TNF-α-induced Cytotoxicity and Neutralization using an Anti-Mouse TNF-α Antibody. The L-929 mouse fibroblast cell line was treated with increasing concentrations of Recombinant Mouse TNF-α (R&D Systems, Catalog # 410-MT) and cytotoxicity was assessed (orange line). The cytotoxic effect elicited by 0.25 ng/mL Recombinant Mouse TNF-α was neutralized by treating the cells with increasing concentrations of a Goat Anti-Mouse TNF-α Antigen Affinity-purified Polyclonal Antibody (R&D Systems, Catalog # AF-410-NA; green line). The ND_{50} is typically 0.1–0.4 µg/mL in the presence of the metabolic inhibitor actinomycin D (1 µg/mL).

R&D Systems Recombinant Proteins & Blocking/Neutralization Antibodies for Investigating the Effects of Factors Secreted by Dendritic Cell Subsets

		Proteins		Blocking/Neutralization Antibodies Catalog # (Applications)
Molecule	Species	Source	Catalog #	
IFN-α	Human	*E. coli*	11200-1	21100-1 (B/N, E, WB)
	Mouse	*E. coli*	12100-1	22100-1 (B/N, E)
IFN-β	Human	CHO	8499-IF	MAB814 (B/N, WB); 21400-1 (B/N)
	Mouse	HEK293	8234-MB	
IFN-γ	Human	*E. coli*	285-IF	MAB285 (B/N, ICC/IF); AF-285-NA (B/N, ICC/IF, WB)
	Mouse	*E. coli*	485-MI	MAB485 (B/N, FC, WB); AF-585-NA (B/N, ICC/IF, WB)
IL-1β/IL-1F2	Human	*E. coli*	201-LB	MAB201 (B/N, FC, ICC/IF, WB); AF-201-NA (B/N, ICC/IF, WB)
	Mouse	*E. coli*	401-ML	AF-401-NA (B/N, ICC/IF, IHC, SW, WB)
IL-2	Human	*E. coli*	202-IL	MAB202 (B/N, FC, ICC/IF); AF-202-NA (B/N, ICC/IF, WB)
	Mouse	*E. coli*	402-ML	MAB702 (B/N, E); AF-402-NA (B/N, WB)
IL-6	Human	*E. coli*	206-IL	MAB2061 (B/N, FC, ICC/IF); AF-206-NA (B/N, ICC/IF, WB)
	Human	HEK293	7270-IL	
	Mouse	*E. coli*	406-ML	MAB406 (B/N, E, WB); AF-406-NA (B/N, ICC/IF, WB)
IL-10	Human	*Sf*21(baculovirus)	217-IL	MAB217 (B/N, WB); AF-217-NA (B/N, IHC, WB)
	Human	*E. coli*	1064-IL	
	Human	*Sf*21(stably transfected)	217-ILB	
	Mouse	*E. coli*	417-ML	MAB417 (B/N, E, WB); AF-417-NA (B/N, WB)
IL-12	Human	*Sf*21(baculovirus)	219-IL	MAB219 (B/N, WB); AF-219-NA (B/N, ICC/IF, WB)
	Mouse	*Sf*21(baculovirus)	419-ML	AF-419-NA (B/N, WB)

Antibody Application Key: **B/N** Blocking/Neutralization **E** ELISA **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **SW** Simple Western **WB** Western blot

R&D Systems Recombinant Proteins & Blocking/Neutralization Antibodies for Investigating the Effects of Factors Secreted by Dendritic Cell Subsets

		Proteins		Blocking/Neutralization Antibodies Catalog # (Applications)
Molecule	Species	Source	Catalog #	
IL-12/IL-23 p40	Human	*Sf*21(baculovirus)	309-IL	MAB1510 (B/N); AF309 (B/N, WB)
	Mouse	*Sf*21(baculovirus)	499-ML	MAB4991 (B/N, E, WB)
TNF-α (aa 77–233)	Human	*E. coli*	210-TA	MAB610 (B/N, E, ICC/IF, WB); MAB2101 (B/N); AF-210-NA (B/N, ICC/IF, WB)
TNF-α (aa 87–233)	Human	*E. coli*	8599-TA	
TNF-α (aa 80–235)	Mouse	*E. coli*	410-MT	MAB4101 (B/N); AF-410-NA (B/N, E, FC, ICC/IF, WB)
TNF-α (aa 84–235)	Mouse	*E. coli*	410-TRNC	

Antibody Application Key: **B/N** Blocking/Neutralization **E** ELISA **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **SW** Simple Western **WB** Western blot

Antibodies for Research on Dendritic Cell Development

The factors involved in specifying the dendritic cell lineage and driving the differentiation of distinct dendritic cell subsets is an active area of investigation. Studies in mice have identified several transcription factors that are involved including PU.1, Ikaros, GFI-1, STAT3, STAT5, as well as the cell surface receptors, Flt-3, M-CSF R/CD115, GM-CSF R, and IL-4 Rα. Further research is necessary to define the broader network of factors that are required for dendritic cell differentiation and the development of specific human dendritic cell subsets.

Learn More | rndsystems.com/pathways/dendritic-cell-lineage-development-pathways

Select Antibodies from R&D Systems and Novus Biologicals for Research on Dendritic Cell Development

	Molecule	Species	Clone	Unlabeled Antibodies Catalog # (Applications)	Fluorochrome-conjugated Antibodies Catalog # (Applications)
◆	BATF3	Human	841702	MAB7437 (FC)	IC7437G (FC)
◆		Human	841702		FAB7437N, R, S, T, U, V (FC)
◆		Human	Polyclonal	AF7437 (ICC/IF, WB)	
◆	M-CSF R/CD115	Human	61708	MAB329 (FC)	FAB329A, F, N, P (FC)
◆		Human	61701	MAB3291 (B/N, WB)	
◆		Human	12-3A3-1B10	NBP1-43362 (FC, IHC, IP, WB)*	NBP1-43362AF405, AF488, AF647, AF700, APC, PE, PCP (FC)
◆		Mouse	460615	MAB3818 (FC)	FAB3818A, C, P (FC)
◆		Mouse	460630	MAB38181 (WB)	
◆		Mouse	AFS98	NBP1-43363 (B/N, FA, FC, IHC, WB)*	NBP1-43363AF405, AF488, AF647, AF700, APC, PE, PCP (FC)
◆	E4BP4/NFIL3	Human	714401	MAB8570 (FC)	
◆		Human	714401		FAB8570R, S, T, U, V (FC)
◆		Mouse	1218A	MAB8888 (FC)	IC8888P (FC)
◆	Flt-3/Flk-2	Human	66903	MAB812 (FC)	FAB812A, F, N, P (FC)
◆		Human	66907	MAB8121 (WB)	
◆		Human	7E8.2C8	NBP2-42210 (FC, IHC, WB)*	NBP2-42210AF405, AF488, AF647, AF700, APC, PE, PCP (FC)
◆		Mouse	113308	MAB7681 (FC, ICC/IF)	FAB7681A, P (FC)
◆		Mouse	113315	MAB768 (WB)	
◆		Mouse	AF2F10	NBP1-43352 (FA, FC, IP)*	NBP1-43352AF405, AF488, AF647, AF700, APC, PE, PCP (FC)
◆	GFI-1	Human	Polyclonal	AF3540 (ICC/IF, WB)	
◆	GM-CSF Rα	Human	31916	MAB706 (FC, WB)	FAB706A, P (FC)
◆		Mouse	698423	MAB6130 (B/N, FC, ICC/IF)	FAB6130A, G, N, P (FC)

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	Molecule	Species	Clone	Unlabeled Antibodies Catalog # (Applications)	Fluorochrome-conjugated Antibodies Catalog # (Applications)
◆	ID2	Human	Polyclonal	AF4660 (ICC/IF, WB)	
◆		Human/Mouse	Polyclonal	NBP1-88630 (ICC/IF, IHC, WB)	
◆	Ikaros	Human	Polyclonal	AF4984 (ChIP, FC, ICC/IF, SW, WB)	
◆		Human/Mouse	Polyclonal	NBP2-38242 (IHC, WB)	
◆	IL-4 Rα	Human	25463	MAB230 (B/N, FC, IHC, WB)	FAB230A, C, F, N, P (FC)
◆		Human	Polyclonal	AF6844 (ICC/IF)	
◆		Mouse	Polyclonal	AF530 (FC, WB)	FAB530F, P (FC)
◆	IRF2	Human	Polyclonal	AF4049 (SW, WB)	
◆		Human/Mouse	Polyclonal	AF4529 (WB)	
◆		Human/Mouse	Polyclonal	NBP1-89433 (ICC/IF, IHC, WB)	
◆	IRF4	Human	Polyclonal	AF5525 (IHC, WB)	
◆		Human/Mouse	503215	MAB5525 (IHC, WB)	
◆	IRF8	Human	809926	MAB5117 (IHC, SW, WB)	
◆	PU.1/Spi-1	Human	Polyclonal	AF5870 (FC, ICC/IF, WB)	IC5870F, P (FC)
◆		Human	732322	MAB5870 (FC, WB)	
◆		Human	732322		IC5870G, N, R, S, T, U, V (FC)
◆		Mouse	823123	MAB7124 (ICC/IF, WB)	
◆	RelB	Human	315206	MAB2698 (ICC/IF, IHC, WB)	
◆	STAT3	Human/Mouse	232209	MAB1799 (FC, ICC/IF, IP, WB)	IC1799F, P (FC)
◆		Human/Mouse	232209		IC1799G, N, R, S, T, U, V (FC)
◆		Human/Mouse	Polyclonal	AF1799 (ChIP, ICC/IF, IP)	
◆	STAT5a	Human/Mouse	251619	MAB2174 (ICC/IF, WB)	
◆		Human	251610	MAB21741 (FC, ICC/IF)	IC21741F, P (FC)
◆		Human	251610		IC21741G, N, R, S, T, U, V (FC)
◆	STAT5a/b Pan	Human/Mouse	Polyclonal	AF2168 (ChIP, SW, WB)	
◆	STAT5b	Human/Mouse	Polyclonal	AF1584 (FC, ICC/IF, IP, SW, WB)	
◆		Human	389215	MAB1584 (FC, WB)	IC1584A (FC)
◆		Human	389215		IC1584G, N, R, S, T, U, V (FC)
◆	Thrombopoietin R	Human	167639		FAB1016A, P (FC)
◆		Human	Polyclonal	AF1016 (B/N, WB)	
◆		Mouse	Polyclonal	AF1317 (WB)	

Antibody Application Key: **B/N** Blocking/Neutralization **E** ELISA **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **SW** Simple Western **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

Fluorochrome Key for FAB/IC Catalog Numbers Ending In: A: Allophycocyanin; **C**: PerCP; **F**: Fluorescein; **G**: Alexa Fluor® 488; **N**: Alexa Fluor®700; **P**: Phycoerythrin; **R**: Alexa Fluor® 647; **S**: Alexa Fluor® 750; **T**: Alexa Fluor® 594; **U**: Alexa Fluor® 350 **V**: Alexa Fluor® 405

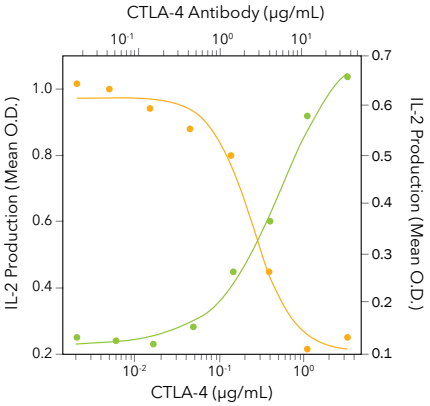
* In addition to the fluorochrome-conjugated forms listed, these antibodies are also available in one or more DyLight®-conjugated forms. DyLight conjugates include DyLight 350, 405, 405LS, 488, 550, 650, 680, 755. Please visit bio-techne.com for more information.

Products for Research on Dendritic Cell: T Cell Co-signaling

T cell activation requires two signals: 1) recognition of the antigenic peptide/major histocompatibility complex (MHC) by the T cell receptor (TCR) and 2) antigen-independent co-stimulation induced by interactions between co-signaling molecules expressed on antigen-presenting cells (APCs) and their T cell-expressed receptors. B7 family proteins are co-signaling molecules that interact with T cell-expressed immune receptors belonging to the CD28 family to yield both co-stimulatory and co-inhibitory signals. Integration of these signals contributes to the outcome and magnitude of a T cell response including the enhancement or suppression of T cell proliferation, differentiation, and/or cytokine secretion. Members of several other protein families including the butyrophilins and the TNF receptor superfamily have also been shown to regulate T cell co-signaling. Butyrophilins are a novel class of co-stimulatory/co-inhibitory molecules that are structurally related to the B7 family and appear to have similar immunomodulatory functions. The B7 family and other T cell co-stimulatory/ co-inhibitory molecules are of particular interest as multiple studies have shown that blockade of T cell co-inhibitory signaling can improve the anti-tumor immune response.

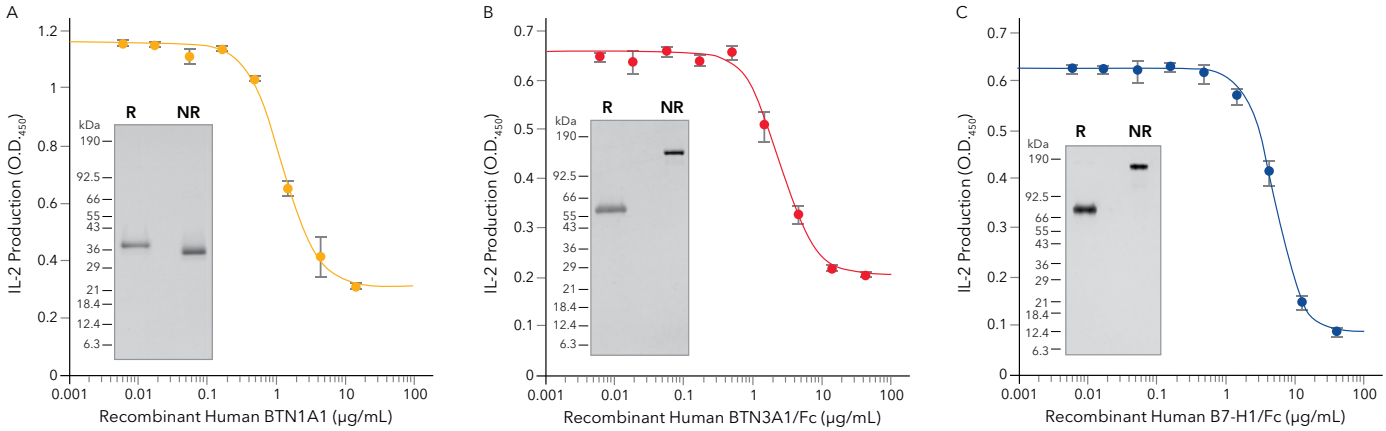
Learn More | rndsystems.com/pathways/t-cell-co-signaling-pathway-lig-recept-interactions

B7-CD28 Families



CTLA-4-mediated Inhibition of B7-1/CD80-induced IL-2 Secretion and Neutralization using an Anti-Mouse CTLA-4 Antibody. The Jurkat human acute T cell leukemia cell line was treated with 3 µg/mL Recombinant Human B7-1/CD80 Fc Chimera (R&D Systems, Catalog # 140-B1) and increasing concentrations of Recombinant Mouse CTLA-4 Fc Chimera (R&D Systems, Catalog # 434-CT). IL-2 secretion was measured using the Human IL-2 Quantikine ELISA Kit (R&D Systems, Catalog # D2050; orange line). Inhibition of Recombinant Human B7-1/CD80 Fc Chimera (3 µg/mL) activity elicited by 1 µg/mL Recombinant Mouse CTLA-4 Fc Chimera was neutralized by treating the cells with increasing concentrations of a Rat Anti-Mouse CTLA-4 Monoclonal Antibody (R&D Systems, Catalog # MAB434; green line). The ND_{50} is typically 2.5–10 µg/mL in the presence of PHA (10 µg/mL).

Butyrophilins



BTN1A1 and BTN3A1 Inhibit Anti-CD3-Induced IL-2 Production by Human T Cells in a Manner Similar to B7-H1/PD-L1. Human T cells were incubated with immobilized Mouse Anti-Human CD3ε Monoclonal Antibody (R&D Systems, Catalog # MAB100; 1 µg/mL) and the indicated concentrations of (**A**) Recombinant Human BTN1A1 (R&D Systems, Catalog # 8467-BT), (**B**) Recombinant Human BTN3A1/CD277 Fc Chimera (R&D Systems, Catalog # 8539-BT), or (**C**) Recombinant Human B7-H1/PD-L1 Fc Chimera (R&D Systems, Catalog # 156-B7). IL-2 secretion was measured in cell culture supernatants using the Human IL-2 Quantikine® ELISA Kit (R&D Systems, Catalog # D2050). The ED_{50} for this effect is typically 0.5–2.5 µg/mL for Recombinant Human BTN1A1, 1–5 µg/mL for Recombinant Human BTN3A1/CD277, and 2–10 µg/mL for Recombinant Human B7-H1/PD-L1. The purity of (**A**) Recombinant Human BTN1A1 (R&D Systems, Catalog # 8467-BT; 1 µg/lane), (**B**) Recombinant Human BTN3A1/CD277 (R&D Systems, Catalog # 8539-BT; 1 µg/lane), and (**C**) Recombinant Human B7-H1/ PD-L1 (R&D Systems, Catalog # 156-B7; 1 µg/lane) was assessed by SDS-PAGE analysis under reducing (R) and non-reducing (NR) conditions and visualized by silver staining (inset).

Select Products from R&D Systems for Studying Dendritic Cell: T Cell Co-Signaling Molecules

		Proteins		Antibodies	
Molecule	Species	Source	Catalog #	Unlabeled Antibodies Catalog # (Applications)	Fluorochrome-conjugated Antibodies Catalog # (Applications)
4-1BB	Human	NS0	838-4B	MAB838 (FC, WB); AF838 (E, FA, FC, ICC/IF, IHC, WB)	FAB838P (FC)
	Mouse	NS0	937-4B	MAB937 (E, FC, WB); MAB9372 (B/N, WB); AF937 (FA, FC, WB)	FAB937P (FC)
4-1BB Ligand	Human	*E. coli*	2295-4L	MAB2295 (FC, WB); AF2295 (FC, IHC, WB)	FAB2295A, P (FC)
	Mouse	NS0	1246-4L	MAB1246 (FC, WB); AF1246 (WB)	FAB1246F, P (FC)
B7-1/CD80	Human	NS0	140-B1	MAB140 (B/N, E, FC, IHC); AF140 (IHC, WB)	FAB140F, P (FC)
	Human	HEK293	9050-B1		
	Mouse	NS0	740-B1	MAB740 (IHC, WB); AF740 (B/N, E, FC, ICC/IF, WB)	
	Mouse	NS0	9014-B1		
B7-2/CD86	Human	NSO	141-B2	MAB141 (B/N, FC, WB); AF-141-NA (B/N, FC, IHC, WB)	FAB141A, C, F, N, P, R, T (FC)
	Human	HEK293	9090-B2		
	Human	CHO	7625-B2		
	Mouse	*Sf*21 (baculovirus)	741-B2	MAB741 (B/N, FC, WB); AF-441-NA (B/N, WB)	FAB741A, C, G, P (FC)
B7-H1/PD-L1	Human	NS0	156-B7	MAB1561 (FC, IHC); AF156 (B/N, IHC, WB)	FAB1561A, C, G, N, P, R, T, V (FC)
	Human	HEK293	9049-B7		
	Mouse	NS0	1019-B7	MAB1019 (WB); MAB9078 (FC); AF1019 (FC, IHC, WB)	FAB1019A, F (FC); FAB9078R, T (FC)
	Mouse	NS0	9048-B7		
B7-H2/ICOS Ligand	Human	NS0	165-B7	MAB165 (B/N, FC); MAB1651 (B/N, WB); AF165 (FC, WB)	FAB165A, C, P (FC)
	Human	HEK293	8206-B7		
	Mouse	NS0	158-B7	MAB158 (FC); AF158 (ICC/IF, WB)	FAB158A, P (FC)
	Mouse	NS0	8127-B7		
B7-H3	Human	NS0	2318-B3	MAB1027 (FC, WB); AF1027 (FC, IHC, SW, WB)	FAB1027A, F, N, P, V, T (FC)
	Human	NS0	1949-B3		
	Human	NS0	1027-B3		
	Mouse	NS0	1397-B3	AF1397 (B/N, WB)	
B7-H4	Human	NS0	6576-B7	MAB6576 (FC)	FAB6576P, R (FC)
	Human	HEK293	8870-B7		
	Mouse	NS0	2154-B7	MAB2154 (FC, WB); AF2154 (FC, WB); 4206-B7	FAB2154A, G, P (FC)
	Mouse	NS0			
B7-H5/VISTA/PD-1H	Human	NS0	7126-B7	MAB71261 (FC, ICC/IF); MAB7126 (WB);	FAB71261A, G, N, P, R, S, T, V (FC)
	Human	NS0	9057-B7		
	Mouse	NS0	7005-B7	MAB7126 (WB); MAB70051 (ICC/IF, WB); AF7005 (ICC/IF, WB);	FAB7005A, G, (FC)
B7-H7/HHLA2	Human	HEK293	8084-B7	MAB80841 (B/N, ICC/IF); MAB8084 (ICC/IF)	FAB80841R, T (FC)
BTN1A1/Butyrophilin	Human	NS0	8467-BT		
	Mouse	NS0	8540-BT	AF4765 (WB)	
BTN2A1/Butyrophilin 2A1	Human	HEK293	9058-BT		
BTN2A2/Butyrophilin 2A2	Human	HEK293	8918-BT	AF8645 (IHC, WB)	
	Mouse	NS0	8997-BT	AF4917 (WB)	
BTNL2/Butyrophilin-like 2	Mouse	NS0	8605-BT	AF5236 (WB)	
BTN3A1/CD277	Human	HEK293	8539-BT	MAB7136 (FC); AF7136 (WB)	FAB7136A, G, P (FC)

Antibody Application Key: **B/N** Blocking/Neutralization **E** ELISA **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **SW** Simple Western **WB** Western blot

Fluorochrome Key for FAB/IC Catalog Numbers Ending In: A: Allophycocyanin; **C**: PerCP; **F**: Fluorescein; **G**: Alexa Fluor® 488; **N**: Alexa Fluor®700; **P**: Phycoerythrin; **R**: Alexa Fluor® 647; **S**: Alexa Fluor® 750; **T**: Alexa Fluor® 594; **U**: Alexa Fluor® 350 **V**: Alexa Fluor® 405

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Select Products from R&D Systems for Studying Dendritic Cell: T Cell Co-Signaling Molecules

		Proteins		Antibodies	
Molecule	Species	Source	Catalog #	Unlabeled Antibodies Catalog # (Applications)	Fluorochrome-conjugated Antibodies Catalog # (Applications)
CD27	Human	NS0	382-CD	MAB382 (B/N, FC, WB); AF382 (B/N, FC, IHC, SW, WB)	FAB382A, F, P (FC)
	Mouse	NS0	574-CD	MAB5741 (E, FC, ICC/IF); MAB574 (WB)	FAB5741A, P (FC)
CD27 Ligand	Human			MAB2738 (ICC/IF, WB); AF2738 (FC, WB)	
	Mouse	NS0	783-CL	MAB783 (B/N, E); AF783 (B/N, WB)	FAB783P (FC)
CD28	Human	NS0	342-CD	MAB342 (FA, FC, WB); AF-342-PB (FA, FC, ICC/IF, WB)	FAB342P (FC)
	Mouse	NS0	483-CD	MAB4832 (FC); MAB4831 (WB); AF483 (WB)	FAB4832A, G, P (FC)
CD30	Human	NS0	6126-CD	MAB229 (FA, FC, WB); MAB2291 (WB); AF229 (FA, ICC/IF, WB)	FAB229F, P (FC)
	Mouse	NS0	852-CD	MAB8521 (E, WB); AF852 (FA, ICC/IF, WB)	
CD30 Ligand	Human	NS0	1028-CL	MAB1028 (B/N, FC); MAB774 (WB); AF1028 (FC, WB)	FAB1028A, P (FC)
	Mouse	NS0	732-CL	MAB732 (E, WB); AF732 (B/N, WB)	FAB732A (FC)
CD40	Human	NS0	1493-CD	MAB6321 (FA, FC, ICC/IF); MAB6322 (B/N, WB); AF632 (FA, WB)	FAB6321A, P (FC)
	Mouse	NS0	1215-CD	MAB440 (FA, FC, IP); MAB4401(E, FC, WB); AF440 (ICC/IF, WB)	FAB440F (FC)
CD40 Ligand	Human	*E. coli*	6245-CL	MAB617 (B/N, FC, IHC, WB); MAB6171 (WB); AF617 (FC, WB)	FAB617A, C, F, P (FC)
	Human	*E. coli*	2706-CL		
	Human	HEK293	6420-CL		
	Mouse	CHO	8230-CL	MAB1163 (B/N, FC); AF1163 (B/N, ICC/IF, WB)	FAB1163A, F, P (FC)
CD58/LFA-3	Human	NS0	1689-CD	MAB1689 (FC, WB); AF1689 (B/N, IHC, WB)	FAB1689A (FC)
CTLA-4	Human	*Sf* 21 (baculovirus)	325-CT	MAB325 (WB); AF-386-PB (FC, ICC/IF, WB)	FAB386A, P (FC)
	Human	CHO	7268-CT		
	Mouse	NS0	434-CT	MAB434 (B/N, FC, WB); AF476 (E, WB)	FAB434A, F, P (FC)
GITR	Human	NS0	689-GR	MAB689 (B/N, E, FC, WB); AF689 (B/N, FC, IHC, WB)	FAB689A, F, G, N, P (FC)
	Mouse	NS0	524-GR	MAB5241 (FC, WB); AF524 (WB)	FAB5241A, F, P (FC)
GITR Ligand	Human	*Sf* 21 (baculovirus)	694-GL	MAB6942 (B/N, E, FC); MAB6941 (B/N, FC); AF694 (B/N, FC, WB)	FAB6941A, C, F, N, P (FC)
	Human	CHO	6987-GL		
	Mouse	NS0	2177-GL	MAB2177 (B/N, E); MAB21772 (WB)	
ICOS	Human	NS0	169-CS	MAB6975 (FC); AF169 (IHC, WB)	FAB6975A, P (FC)
	Mouse	*Sf* 21 (baculovirus)	168-CS	MAB168 (FC); AF168 (B/N, WB)	FAB168A, P (FC)
LILRA2/CD85h/ILT1	Human	HEK293	9040-T4	MAB6364 (FC)	FAB6364A (FC)
LILRA4/CD85g/ILT7	Human	NS0	8914-T4	MAB6287 (FC)	FAB6287A, F, P (FC)
LILRA6/CD85b/ILT8	Human	HEK293	9088-T4	MAB8656 (FC)	FAB8656A (FC)
LILRB1/CD85j/ILT2	Human	NS0	2017-T2	MAB20171 (FC, WB); MAB20172 (B/N, WB); AF2017 (B/N, FC, WB)	FAB20171A, F, P (FC)
	Human	HEK293	8989-T2		
LILRB2/CD85d/ILT4	Human	NS0	2078-T4	MAB2078 (B/N, FC, WB); AF2078 (B/N, FC, WB)	FAB2078A, C, F, N, P (FC)
	Human	HEK293	8429-T4		
LILRB3/CD85a/ILT5	Human	HEK293	9159-T5	MAB1806 (FC, WB)	FAB1806A, G, N, P (FC)
	Human	NS0	1806-T5		
LILRB4/CD85k/ILT3	Human	NS0	8488-T4	MAB24251 (FC, WB)	FAB24251A, F, P (FC)
	Mouse	NS0	9095-T4		
LILRB5/CD85c/LIR-8	Human	NS0	8487-T4	MAB3065 (WB); AF3065 (FC, WB)	
OX40/TNFRSF4	Human	NS0	3388-OX	MAB3388 (FC, WB); AF3388 (FC, WB)	FAB3388A, F, P (FC)
	Mouse	NS0	1256-OX	AF1256 (FA, WB)	FAB1256P (FC)

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		Proteins		Antibodies	
Molecule	Species	Source	Catalog #	Unlabeled Antibodies Catalog # (Applications)	Fluorochrome-conjugated Antibodies Catalog # (Applications)
OX40 Ligand	Human	NS0	1054-OX	MAB10541 (B/N, FC, ICC/IF); MAB1054 (WB); AF1054 (B/N, WB)	FAB10541A, C, P (FC)
	Mouse	NS0	1236-OX	MAB1236 (B/N, WB); MAB12362 (E, WB); AF1236 (B/N, ICC/IF, WB)	FAB1236F, P (FC)
PD-1	Human	NS0	1086-PD	MAB1086 (WB); MAB10861 (FC); AF1086 (B/N, E, FC, IHC, WB)	FAB7115G, P (FC)
	Human	HEK293	8986-PD		
	Mouse	NS0	1021-PD	MAB7738 (FC); AF1021 (FC, IHC, WB)	FAB7738A, G, P (FC); FAB1021F, P (FC)
	Mouse	NS0	9047-PD		
PD-L2/B7-DC	Human	NS0	1224-PL	MAB1224 (FC, IHC, WB); AF1224 (B/N, IHC, WB)	FAB1224A, G, P (FC)
	Human	HEK293	9075-PL		
	Mouse	NS0	1022-PL	MAB1022 (FC, WB); AF1022 (B/N, FC, IHC, WB)	FAB1022F, P (FC)
	Mouse	NS0	9107-PL		
SLAM/CD150	Human	NS0	164-SL	MAB1642 (FC, WB); MAB164 (WB); AF164 (FC, WB)	FAB1642F, P (FC)
	Mouse	NS0	4330-SL	MAB4330 (E, FC); AF4330 (FC, WB)	FAB4330F (FC)

Antibody Application Key: **B/N** Blocking/Neutralization **E** ELISA **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **SW** Simple Western **WB** Western blot

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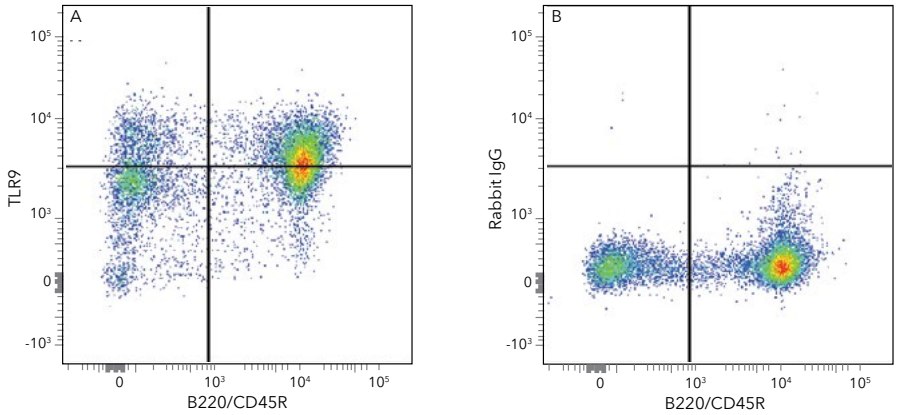
Products for Studying Toll-like Receptors, C-type Lectin Receptors, and Scavenger Receptors

Dendritic cells express multiple pattern recognition receptors on their surface or in endosomal compartments that recognize specific pathogen-associated molecules and initiate the innate and adaptive immune response. These receptors include Toll-like receptors (TLRs), C-type lectin receptors (CLRs), and scavenger receptors. Signaling pathways activated downstream of these receptors on dendritic cells result in cytokine secretion, antigen presentation, $CD4^+$ or $CD8^+$ T cell priming, and a pathogen-specific T cell response.



Detection of TLR9 in Mouse Splenocytes by Flow Cytometry. Mouse splenocytes were stained with an APC-conjugated Rat Anti-Mouse B220/CD45R Monoclonal Antibody (R&D Systems, Catalog # FAB1217A) and either a **(A)** Rabbit Anti-Mouse TLR9 Monoclonal Antibody (R&D Systems, Catalog # MAB7960) or **(B)** Normal Rabbit IgG Control (R&D Systems, Catalog # AB-105-C), followed by a PE-conjugated Anti-Rabbit IgG Secondary Antibody (R&D Systems, Catalog # F0110).

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Select Antibodies from R&D Systems and Novus Biologicals for Studying Toll-like Receptors, C-type Lectin Receptors, and Scavenger Receptors

	Molecule	Species	Clone	Unconjugated Antibodies Catalog # (Applications)	Fluorochrome-conjugated Antibodies Catalog # (Applications)
◆	CD36/SR-B3	Human	255606	MAB19551 (FC); MAB19552 (IHC, SW, WB); AF1955 (SW, WB)	FAB19551A, F, P (FC)
◆		Human	255606		FAB19551G, N, R, S, T, U, V (FC)
◆		Mouse	324205	MAB25191 (FC, IHC); MAB2519 (WB); AF2519 (E, FC, WB)	FAB25191A (FC)
◆		Mouse	324205		FAB25191G, N, R, S, T, U, V (FC)
◆	Dectin-1	Human	259931	MAB1859 (B/N, FC, ICC/IF); AF1859 (B/N, WB)	FAB1859A, C, F, N, P (FC)
◆		Human	259931		FAB1859G, R, S, T, U, V (FC)
◆		Mouse	218820	MAB17561 (B/N, FC); AF1756 (B/N, FC, WB)	FAB17561A, C, G, N, P (FC)
◆		Mouse	218820		FAB17561R, S, T, U, V (FC)
◆	Dectin-2/ CLEC-6A	Human	545943	MAB3114 (FC); AF3114 (FC, WB)	FAB3114A, F, N, P (FC)
◆		Human	545943		FAB3114G, R, S, T, U, V (FC)
◆		Mouse	Polyclonal	MAB1525 (WB); AF1525 (WB)	FAB1525A (FC)
◆	LOX-1	Human	331212	MAB1798 (B/N, FC, WB); MAB17981 (B/N, E); AF1798 (B/N, IHC, WB)	FAB1798A, C, G, P (FC)
◆		Human	331212		FAB1798G, N, R, S, T, U, V (FC)
◆		Mouse	214012	MAB1564 (FC, WB); MAB15641 (E); AF1564 (B/N, WB)	FAB1564P (FC)
◆		Mouse	214012		FAB1564G, N, R, S, T, U, V (FC)
◆	MARCO	Human	Polyclonal	AF7586 (WB)	
◆		Mouse	579511	AF2956 (WB)	FAB2956A, F, P (FC)
◆	SR-AI/MSR	Human	351615	MAB2708 (FC, WB); MAB27081 (B/N, WB); AF2708 (B/N, WB)	FAB2708A, N, P (FC)
◆		Human	351615		FAB2708G, R, S, T, U, V (FC)
◆		Mouse	268318	MAB1797 (FC, WB); AF1797 (B/N, WB)	FAB1797A, F, P (FC)
◆		Mouse	268318		FAB1797G, N, R, S, T, U, V (FC)
◆	SREC-I/SCARF1	Human	373606	MAB2409 (FC, WB); AF2409 (B/N, FC, WB)	
◆		Human	373606		FAB2409G, N, S, T, U, V (FC)
◆	TLR1	Human	Polyclonal	AF1484 (FC, WB)	FAB1484A, P (FC)
◆		Mouse	Polyclonal	AF1475 (FC, WB)	FAB1475P (FC)
◆		Mouse	285923	MAB1475 (WB)	
◆		Human/Mouse	Polyclonal	NB100-56563 (FC, IHC, WB)	
◆	TLR2	Human	383936	MAB2616 (B/N, FC)	FAB2616A, C, F, N, P (FC)
◆		Human	Polyclonal	AF2616 (E, FC, WB)	
◆		Human	TL2.1	NB100-56722 (B/N, FA, FC, ICC/IF, IHC, IP)*	NB100-56726AF405, AF488, AF647, AF700, PCP, NB100-56058, NBP2-24909 (FC)
◆		Human/Mouse	T2.5	NBP1-42362 (FC, IHC, IP)	NBP2-30096 (FC)
◆		Mouse	203325	MAB1530 (FC)	FAB1530A, F (FC)
◆		Mouse	Polyclonal	AF1530 (WB)	
◆		Mouse	11G5	NBP2-27165 (FC, WB)*	NBP2-27166AF647, AF700, APC, PE, PCP, NBP2-27165AF405, AF488 (FC)
◆	TLR3	Human	512505	MAB1487 (WB)	
◆		Human	Polyclonal	AF1487 (WB)	IC1487A (FC)
◆		Human/Mouse	40C1285.6	NBP2-24875 (FC, ICC/IF, IHC, IP, WB)*	NBP2-24875AF405, AF488, AF647, AF700, APC, PCP, NBP2-24899, NBP2-24902 (FC)
◆		Human/Mouse	TLR3.7		NBP1-49623, NBP2-00250 (FC)
◆		Mouse	313129	MAB3005 (WB)	IC3005A, P (FC)
◆		Mouse	Polyclonal	AF3005 (WB)	

Antibody Application Key: **B/N** Blocking/Neutralization **E** ELISA **FC** Flow Cytometry **ICC/IF** Immunocytochemistry/Immunofluorescence **IHC** Immunohistochemistry **SW** Simple Western **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

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Molecule	Species	Clone	Unconjugated Antibodies Catalog # (Applications)	Fluorochrome-conjugated Antibodies Catalog # (Applications)
TLR4	Human	610029	MAB14782 (WB)	
	Human	610017	MAB14783 (IHC)	
	Human	610015	MAB6248 (FC)	FAB6248A, C, F, N, P (FC)
	Human	Polyclonal	AF1478 (B/N, FC, ICC/IF, IHC, WB)	
	Human	HTA125	NB100-56723 (B/N, FC, FC, ICC/IF, IP, IV)*	NB100-56727AF405, AF647, AF700, APC, PCP, NBP2-24897, NB100-56059, NB100-56062 (FC)
	Human/Mouse	76B357.1	NB100-56566 (FC, ICC/IF, IHC, ChIP, WB)*	NBP2-27149AF405, AF488, AF647, AF700, APC, PCP, NB100-55951, NBP2-27149PE (FC)
	Mouse	267518	MAB2759 (FC, ICC/IF)	FAB2759A, P (FC)
	Mouse	1203B	MAB27591 (FC, ICC/IF)	
	Mouse	MTS510	NB100-56560 (FC, IP)*	NBP2-24865AF405, AF488, AF647, AF700, PCP, NBP2-24450, NBP2-24741 (FC)
TLR5	Human	624915	MAB6704 (FC, IHC)	FAB6704G (FC)
	Human/Mouse	85B152.5	NBP1-97728 (FC, WB)*	NBP1-97728AF405, AF488, AF647, AF700, APC, NB200-571, NBP2-24959 (FC)
	Human/Mouse	19D759.2	NBP2-24787 (FC, IHC, WB)*	NBP2-24787AF405, AF488, AF647, AF700, APC, PCP, NBP2-24784, NBP2-24783 (FC)
TLR6	Human	86B1153.2	NB100-56536 (FC, IHC)*	NBP100-56536AF405, AF488, AF647, AF700, APC, PCP, NBP2-24971, NBP2-24969 (FC)
	Human	hPer6	NBP1-43142 (FC, WB)*	NBP1-43142APC, PCP, PE (FC)
	Human	TLR6.127	NBP1-51493 (FC, ICC/IF, IHC, IP)	
	Mouse	418601	MAB1533 (FC)	FAB1533A, P (FC)
	Mouse	Polyclonal	AF1533 (WB)	
TLR7	Human	533707	MAB5875 (FC)	IC5875C, G, P (FC)
	Human/Mouse	4G6	NBP2-27332 (FC, ICC/IF, WB)*	NBP2-25274AF405, AF488, AF647, AF700, APC, PCP, NBP2-27251 (FC)
	Human/Mouse	Polyclonal	NBP2-24906 (FC, ICC/IF, IHC, WB)	
	Mouse	726606	MAB7156 (WB)	
TLR8	Human	935166	MAB8999 (FC)	
	Human/Mouse	44C143	NBP2-24917 (FC, IHC, SW, WB)*	NBP2-24917AF405, AF488, AF647, AF700, APC, PCP, NBP2-24972, NBP2-24817 (FC)
	Human/Mouse	Polyclonal	NBP1-77203 (E, ICC/IF, WB)	
TLR9	Human	229106	MAB3658 (FC)	
	Human	eB72-1665	NBP1-43140 (FC, IHC, IP, WB)*	NBP1-43140APC, PE, PCP (FC)
	Human	Polyclonal	AF3658 (FC, IHC)	IC7108G (FC)
	Human/Mouse	26C593.2	NBP2-24729 (E, FA, FC, ICC/IF, IHC, IP, IV, SW, WB)*	NBP2-24729AF405, AF488, AF647, AF700, APC, PCP, NBP2-24908, NBP2-24907 (FC)
	Mouse	1138D	MAB7960 (FC, ICC/IF)	
	Mouse	M9.D6	NBP1-43141 (FC, WB)*	NBP1-43141AF405, AF488, AF647, AF700, APC, PE, PerCP, NBP1-43919 (FC)
TLR10	Human	670719	MAB6619 (WB)	
	Human	3C10C5	NBP1-70343 (FC)*	NBP2-27214AF405, AF488, AF647, AF700, APC, PCP, NBP2-27244
TLR11	Mouse	786404	MAB7640 (FC)	IC7640A, P (FC)
TLR12	Mouse	1229C	MAB8086 (FC, WB)	IC8086P, R (FC)
TLR13	Mouse	Polyclonal	NBP2-246539 (FC, WB)	

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