

R&D Systems

Myeloid-derived Suppressor Cells

Myeloid-derived suppressor cells (MDSCs) are a heterogeneous population of early myeloid progenitors, immature granulocytes, macrophages, and dendritic cells at different stages of differentiation. These cells are of great interest because they have the capacity to suppress both the cytotoxic activities of natural killer (NK) and NKT cells, and the adaptive immune response mediated by CD4⁺ and CD8⁺ T cells.¹ While the mechanism of NK cell inhibition is not currently well-understood, multiple pathways are responsible for MDSC-mediated T cell suppression including: 1) production of arginase 1/ARG1 and 2) upregulation of nitric oxide synthase 2 (NOS2).² ARG1 and NOS2 metabolize L-arginine and either together, or separately, block translation of the T cell CD3 ζ chain, inhibit T cell proliferation, and promote T cell apoptosis. Additionally, MDSCs secrete immunosuppressive cytokines and induce regulatory T cell development.³ In mice, MDSCs are broadly defined as CD11b⁺Gr-1/Ly-6G⁺ cells, but the relative expression level of Ly-6G and Ly-6C identifies two specific subsets.⁴ Additional markers that distinguish these two subsets are shown in Figure 1. Human MDSCs commonly express Siglec-3/CD33 and lack lineage markers and HLA-DR, but heterogeneous expression of CD14 and CD15 suggest that multiple subsets may exist.^{5,6}

MDSCs are induced by pro-inflammatory cytokines and are found in increased numbers in infectious and inflammatory pathological conditions. They accumulate in the blood, bone marrow, and secondary lymphoid organs of tumor-bearing mice and their presence in the tumor microenvironment has been suggested to have a causative role in promoting tumor-associated immune suppression.³ In addition, significant increases in the number of MDSCs have been observed in cancer patients.^{6,7} Although it is now evident that MDSCs may serve as a target for preventing tumor progression, further characterization is necessary to determine how MDSCs can be identified, how they accumulate and function, and effective mechanisms by which they can be inhibited. R&D Systems offers a wide range of reagents useful for the characterization and functional analysis of MDSCs.

References

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Figure 1. Mouse MDSC Subsets

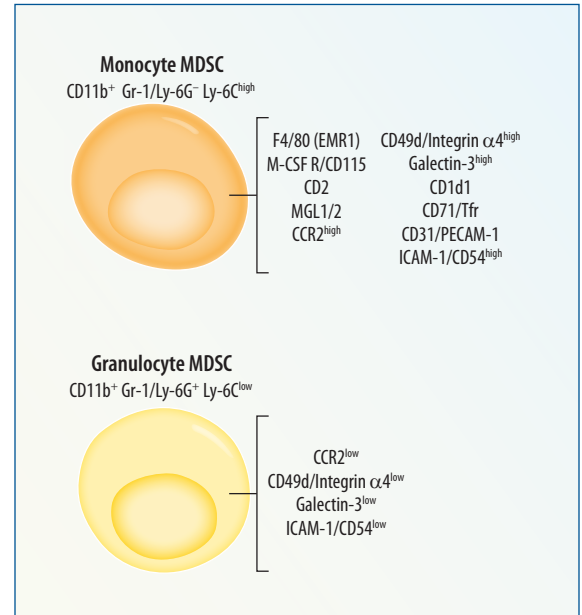
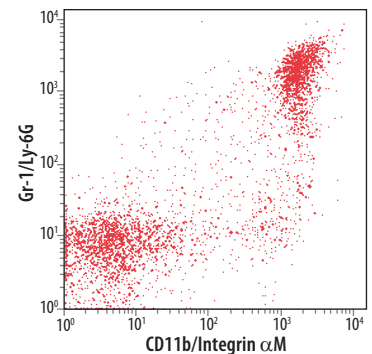


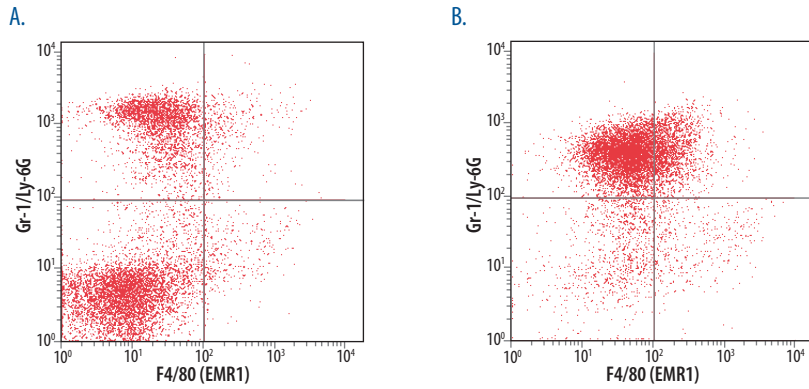
Figure 2.



Analysis of CD11b and Gr-1/Ly-6G Expression on Mouse Bone Marrow-derived Cells by Flow Cytometry. Bone marrow-derived cells from a Balb/c mouse were stained using PE-conjugated anti-mouse CD11b/Integrin α M monoclonal antibody (Catalog # FAB1124P) and APC-conjugated anti-mouse Gr-1/Ly-6G monoclonal antibody (Catalog # FAB1037A).

For more information on MDSCs,
please visit our website at
www.RnDSystems.com/go/MDSC

Figure 3.



Detection of F4/80 and Gr-1/Ly-6G Expression on an Enriched Population of Myeloid-derived Suppressor Cells. Bone marrow-derived cells from a Balb/c mouse were stained with PE-conjugated anti-mouse F4/80 (EMR1) monoclonal antibody (Catalog # FAB5580P) and APC-conjugated anti-mouse Gr-1/Ly-6G monoclonal antibody (Catalog # FAB1037A) before (A) and after (B) magnetic enrichment for myeloid-derived suppressor cells.

MDSC - Positive Markers			
MOLECULE	RECOMBINANT & NATURAL PROTEINS	ANTIBODIES	ELISAs
B7-1/CD80	H M R	H M R	H M
B7-H1/PD-L1	H M	H M	
C5a R1		H	
CCR2		H	
CD1d1	M		
CD2		H M	
CD11a/Integrin α L		H	
CD11b/Integrin α M		H M	
CD31/PECAM-1	H M P	H M P	
CD43		H	
CD44	H	H Ca	
CD49d/Integrin α 4		H M	
CD62L/L-Selectin	H M R	H M R	H M R
CD71/Tfr	H	H	H
F4/80 (EMR1)		M	
Galectin-3	H M	H M	H M
gp130	H M R	H M	H M
Gr-1/Ly-6G		M	
ICAM-1/CD54	H M R	H M R	H M R
IL-1 RI	H M R	H M	H
IL-4 R α	H M	H M	
IL-6 R α	H M	H M	
M-CSF R	H M	H M	H
MGL1	M	M	
MGL1/2		M	
MGL2	M	M	
PSGL-1	H	H	

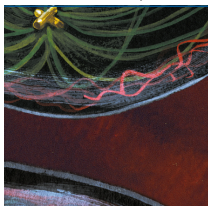
MDSC - Positive Markers, continued			
MOLECULE	RECOMBINANT & NATURAL PROTEINS	ANTIBODIES	ELISAs
Siglec-3/CD33	H	H M	
VEGF R1/Flt-1	H M	H M	H M
VEGF R2/KDR/Flk-1	H M	H M	H M
MDSC - Negative Markers			
B7-2/CD86	H M R	H M R	R
B7-H4	M	M	
CD11c/Integrin α X		H	
CD14	H M	H M P	H
CD21	H	H	
CD23/Fc ϵ RII	H M	H	H
CD34		R P Ca	
CD35	H	H	
CD40/TNFRSF5	H M	H M	M
HLA-DR		H	
Sca-1/Ly6		M	
SCF R/c-kit	H	H M	H

MDSC Intracellular Signaling Factors			
MOLECULE	RECOMBINANT & NATURAL PROTEINS	ANTIBODIES	ELISAs
Arginase 1/ARG1	H	H M R	
COX-2		H M	
iNOS		H	H
NF- κ B		H M	
STAT1		H M	H M
STAT3		H M R	H M
STAT6		H M R	H M

MDSC Cytokines & Growth Factors			
MOLECULE	RECOMBINANT & NATURAL PROTEINS	ANTIBODIES	ELISAs
GM-CSF	H M R P Ca F	H M R P Ca F	H M R Ca F
IFN- γ	H M R P B Ca CR E FRM	H M R P B Ca CR E FRM	H M R P B Ca CR E F Pr
IL-1 β /IL-TF2	H M R P Ca CR E FRM	H M R P Ca CR E F	H M R P F
IL-6	H M R P Ca CR E F	H M R P Ca CR E F	H M R P Ca F
IL-10	H M R P Ca CR E F GPV	H M R P Ca CR E F V	H M R P Ca E F
IL-12	H M R P Ca F RM	H M R P Ca	H M
IL-13	H M R Ca RM	H M R	H M
M-CSF	H M	H M R	H M
Prostaglandin E2/PGE ₂			Ms
S100A8		H M	
S100A9		H M	
TGF- β		Ms	
TGF- β 1	H P	H Ms	H M R P Ca
TGF- β 1, 2, 3		Ms	
TGF- β 1.2	H	Ms	
TGF- β 1/1.2		Ms	
TGF- β 2	H P	Ms	H
TGF- β 2/1.2		Ms	
TGF- β 3	H	Ms	H
TGF- β 5	A	Ms	
VEGF	H M R Ca F Z	H M R Ca Z	H M R Ca

KEY: H Human M Mouse R Rat A Amphibian B Bovine Ca Canine CR Cotton Rat E Equine F Feline GP Guinea Pig Ms Multi-species P Porcine Pr Primate RM Rhesus/Macaque V Virus Z Zebrafish

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