Miltenyi Biotec

CD49b (DX5) MicroBeads
mouse

Order No. 130-052-501

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1. Description

Components	2 mL CD49b (DX5) MicroBeads, mouse: MicroBeads conjugated to monoclonal anti-mouse NK cell (DX5; isotype: rat IgM; clone: DX5) antibody.
Size	For 2×10^9 total cells, up to 200 separations.
Product format	CD49b (DX5) MicroBeads are supplied as a suspension containing stabilizer and 0.05% sodium azide.
Storage	Store protected from light at 4–8 °C. Do not freeze. The expiration date is indicated on the vial label.

1.1 Principle of MACS® separation

First the CD49b$^+$ cells are magnetically labeled with CD49b (DX5) MicroBeads. Then the cell suspension is loaded onto a MACS® Column which is placed in the magnetic field of a MACS Separator. The magnetically labeled CD49b$^+$ cells are retained on the column. The unlabeled cells run through and this cell fraction is depleted of CD49b$^+$ cells. After removal of the column from the magnetic field, the magnetically retained NK cells can be eluted as the positively selected cell fraction.

1.2 Background and product applications

Mouse CD49b (DX5) MicroBeads were developed for the isolation of mouse NK cells from single-cell suspensions of lymphoid and non-lymphoid tissue, as well as from peripheral blood or body fluids. The MicroBeads were formerly called Anti-NK Cell (DX5) MicroBeads. CD49b is expressed on NK cells and a small population of T cells ($CD4^+CD3^+TCR\alpha\beta^+$). These cells can be depleted prior to NK cell enrichment by using CD90 (Thy1.2) MicroBeads or CD5 MicroBeads. CD49b is less mouse strain-specific than other NK cell markers (e.g. NK1.1) and is expressed by the most common inbred mouse strains.

Examples of applications

- Isolated NK cells were used for the evaluation of NK cell cytotoxicity in normal and immunodeficient mice *in vitro*[1] or after adoptive transfer *in vivo*.[2]
- Isolation of NK cells to study their role in experimental mouse models of immune-mediated liver injury[3] or chronic infection with parasitic helminths[4].

1.3 Reagent and instrument requirements

- Buffer (degassed): Prepare a solution containing PBS (phosphate buffered saline) pH 7.2, 0.5% BSA (bovine serum albumin) and 2 mM EDTA by diluting MACS BSA Stock Solution (# 130-091-376) 1:20 in autoMACS™ Rinsing Solution (# 130-091-222). Keep buffer cold (4–8 °C).

  ▲ **Note:** EDTA can be replaced by other supplements such as anticoagulant citrate dextrose formula-A (ACD-A) or citrate phosphate dextrose (CPD). BSA can be replaced by other proteins such as gelatine, mouse serum or fetal calf serum. Buffers or media containing Ca^{2+} or Mg^{2+} are not recommended for use.

- MACS Columns and MACS Separators: CD49b$^+$ cells can be enriched by using MS, LS or XS Columns (positive selection). CD49b (DX5) MicroBeads can be used for depletion of CD49b$^+$ cells on LD, CS or D Columns. Cells which strongly express CD49b can also be depleted using MS, LS or XS Columns. Positive selection or depletion can also be performed by using the autoMACS Separator.

Column	max. number of labeled cells	max. number of total cells	Separator
Positive selection			
MS	10^7	2×10^8	MiniMACS, OctoMACS, VarioMACS, SuperMACS
LS	10^8	2×10^9	MidiMACS, QuadroMACS, VarioMACS, SuperMACS
XS	10^9	2×10^{10}	SuperMACS
Depletion			
LD	10^8	5×10^8	MidiMACS, QuadroMACS, VarioMACS, SuperMACS
CS	2×10^8		VarioMACS, SuperMACS
D	10^9		SuperMACS
Positive selection or depletion			
autoMACS	2×10^8	4×10^9	autoMACS

▲ **Note:** Column adapters are required to insert certain columns into VarioMACS™ Separator or SuperMACS™ Separator. For details, see MACS Separator data sheets.

- (Optional) Fluorochrome-conjugated CD49b antibodies, e.g. CD49b (DX5)-FITC (# 130-091-814), CD49b (DX5)-PE (# 130-091-816) or CD49b (DX5)-APC (# 130-091-813).
- (Optional) PI (propidium iodide) or 7-AAD for flow cytometric exclusion of dead cells.
- (Optional) Pre-Separation Filters (# 130-041-407) to remove cell clumps.

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2. Protocol

2.1 Sample preparation

Prepare a single-cell suspension from lymphoid organs, non-lymphoid tissue or peripheral blood using standard methods (see "General Protocols" in the User Manuals or visit www.miltenyibiotec.com).

▲ Dead cells may bind non-specifically to MACS MicroBeads. In case of high numbers of dead cells we recommend to remove dead cells by density gradient centrifugation or using the Dead Cell Removal Kit (# 130-090-101).



2.2 Magnetic labeling

▲ Work fast, keep cells cold, and use pre-cooled solutions. This will prevent capping of antibodies on the cell surface and non-specific cell labeling.

▲ Volumes for magnetic labeling given below are for up to 10^7 total cells. When working with fewer than 10^7 cells, use the same volumes as indicated. When working with higher cell numbers, scale up all reagent volumes and total volumes accordingly (e.g. for 2×10^7 total cells, use twice the volume of all indicated reagent volumes and total volumes).

▲ For optimal performance it is important to obtain a single-cell suspension before magnetic separation. Pass cells through 30 µm nylon mesh (Pre-Separation Filters # 130-041-407) to remove cell clumps which may clog the column.

1. Determine cell number.
2. Centrifuge cell suspension at 300×g for 10 minutes. Pipette off supernatant completely.
3. Resuspend cell pellet in 90 µL of buffer per 10^7 total cells.
4. Add 10 µL of CD49b (DX5) MicroBeads per 10^7 total cells.
5. Mix well and incubate for 15 minutes at 4–8 °C.

   ▲ **Note:** Working on ice may require increased incubation times. Higher temperatures and/or longer incubation times lead to non-specific cell labeling.
6. (Optional) Add a fluorochrome-conjugated CD49b antibody according to manufacturer's recommendation, and incubate for 5 minutes at 4–8 °C.
7. Wash cells by adding 1–2 mL of buffer per 10^7 cells and centrifuge at 300×g for 10 minutes. Pipette off supernatant completely.
8. Resuspend up to 10^8 cells in 500 µL of buffer.

   ▲ **Note:** For higher cell numbers, scale up buffer volume accordingly.

   ▲ **Note:** For depletion with LD Columns, resuspend cell pellet in 500 µL of buffer for up to 1.25×10^8 cells.
9. Proceed to magnetic separation (2.3).



2.3 Magnetic separation

▲ Choose an appropriate MACS Column and MACS Separator according to the number of total cells and the number of CD49b$^+$ cells (see table in section 1.3).

Magnetic separation with MS or LS Columns

1. Place column in the magnetic field of a suitable MACS Separator (see "Column data sheets").
2. Prepare column by rinsing with appropriate amount of buffer:
   MS: 500 µL LS: 3 mL.
3. Apply cell suspension onto the column.
4. Collect unlabeled cells which pass through and wash column with appropriate amount of buffer. Perform washing steps by adding buffer three times, each timeonce the column reservoir is empty.
   MS: 3×500 µL LS: 3×3 mL.
   Collect total effluent. This is the unlabeled cell fraction.
5. Remove column from the separator and place it on a suitable collection tube.
6. Pipette appropriate amount of buffer onto the column. Immediately flush out fraction with the magnetically labeled cells by firmly applying the plunger supplied with the column.
   MS: 1 mL LS: 5 mL.

   ▲ **Note:** To increase the purity of the magnetically labeled fraction, it can be passed over a new, freshly prepared column.

Magnetic separation with XS Columns

For instructions on the column assembly and the separation, refer to the "XS Column data sheet".

Depletion with LD Columns

1. Place LD Column in the magnetic field of a suitable MACS Separator (see "LD Column data sheet").
2. Prepare column by rinsing with 2 mL of buffer.
3. Apply cell suspension onto the column.
4. Collect unlabeled cells which pass through and wash column with 2×1 mL of buffer. Collect total effluent. This is the unlabeled cell fraction.

Depletion with CS Columns

1. Assemble CS Column and place it in the magnetic field of a suitable MACS Separator (see "CS Column data sheet").
2. Prepare column by filling and rinsing with 60 mL of buffer. Attach a 22G flow resistor to the 3-way-stopcock of the assembled column (see "CS Column data sheet").
3. Apply cell suspension onto the column.
4. Collect unlabeled cells which pass through and wash column with 30 mL buffer from the top. Collect total effluent. This is the unlabeled cell fraction.

Depletion with D Columns

For instructions on column assembly and separation, refer to the "D Column data sheet".

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Magnetic separation with the autoMACS™ Separator

▲ Refer to the "autoMACS™ User Manual" for instructions on how to use the autoMACS Separator.

1. Prepare and prime autoMACS Separator.
2. Place tube containing the magnetically labeled cells in the autoMACS Separator. For a standard separation, choose following separation programs:

   Positive selection: "Possel"

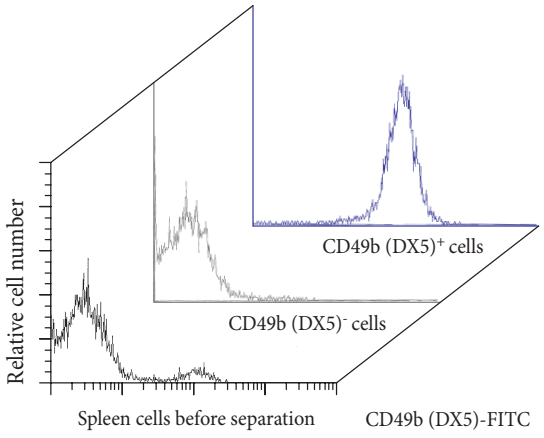
   Depletion: "Depletes"

   ▲ **Note:** Program choice depends on the isolation strategy, the strength of magnetic labeling and the frequency of magnetically labeled cells. For details see autoMACS User Manual: "autoMACS Cell Separation Programs".
3. When using the program "Possel", collect positive fraction (outlet port "pos1"). This is the purified CD49b$^+$ cell fraction.

   When using the program "Depletes", collect unlabeled fraction (outlet port "neg1"). This is the CD49b$^-$ cell fraction.

3. Example of a separation using CD49b (DX5) MicroBeads

NK cells were isolated from a mouse spleen cell suspension using CD49b (DX5) MicroBeads, a MiniMACS™ Separator and an MS Column. The cells are fluorescently stained with CD49b (DX5)-FITC (# 130-091-814). Cell debris and dead cells were excluded from the analysis based on scatter signals and PI fluorescence.



4. References

1. Tomasello, E; Desmoulins, P-O; Chemin, K; Guia, S; Cremer, H; Ortaldo, J; Love, P; Kaiserlian, D; Vivier, E (2000) Combined Natural Killer Cell and Dendritic Cell Functional Deficiency in KARAP/DAP12 Loss-of-Function Mutant Mice. Immunity 13: 335–364. [945]
2. Shi, FD; Takeda, K; Akira, S; Sarvetnick, N; Ljunggren, HG (2000) IL-18 Directs Autoreactive T Cells and Promotes Autodestruction in the Central Nervous System Via Induction of IFN-γ by NK Cells. J. Immunol. 165: 3099–3104. [1021]
3. Mühlen KA, Schümann J, Wittke F, Stenger S, van Rooijen N, van Kaer L, Tiegs G (2004) NK cells but not NKT cells, are involved in Pseudomonas aeruginosa exotoxin a-induced hepatotoxicity in mice. J. Immunol. 172: 3034–3041. [4274]
4. Hsieh GC, Loukas A, Wahl AM, Bhatia M, Wang Y, et al. (2004) A secreted protein from the human hookworm *necator americanus* binds selectively to NK cells and induces IFN-γ production. J. Immunol. 173: 2699–2704. [4275]

Refer to **www.miltenyibiotec.com** for all data sheets and protocols. Miltenyi Biotec provides technical support worldwide. Visit www.miltenyibiotec.com/local to find your nearest Miltenyi Biotec contact.

Warnings

Reagents contain sodium azide. Under acidic conditions sodium azide yields hydrazoic acid, which is extremely toxic. Azide compounds should be diluted with running water before discarding. These precautions are recommended to avoid deposits in plumbing where explosive conditions may develop.

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