Miltenyi Biotec

REAlease® Anti-TCRγ/δ MicroBead Kit
human

Order no. 130-133-676

Contents

1. Description

This product is for research use only.

Components	**1 mL REAlease Anti-TCRγ/δ-Biotin, human** **5 mL REAlease Anti-Biotin MicroBeads (Anti-TCRγ/δ, human)** **4 mL REAlease Bead Release Reagent (50×)** **4 mL REAlease Release Reagent** **4 mL REAlease Stop Reagent**
Capacity	For 10^9 total cells, up to 100 separations.
Product format	REAlease Stop Reagent is supplied in buffer containing 0.05% sodium azide. All other reagents are supplied in buffer containing stabilizer and 0.05% sodium azide.
Storage	Store protected from light at +2 to+8 °C. Do not freeze. The expiration date is indicated on the vial label.

1.1 Principle of the REAlease MACS Separation

The REAlease Technology relies on recombinantly engineered antibody fragments to label specific cell surface markers. The fragments are developed to have low affinity for epitopes. However, when fragments are multimerized as a REAlease Biotin Complex (i.e., REAlease Anti-TCRγ/δ-Biotin) they bind to epitopes with high avidity. REAlease Technology can control the multimer/monomer state of antibody fragments. With this technology a controlled label release is possible where monomerized antibody fragments dissociate from the cell surface, enabling users to obtain bead- and label-free cells.

First, the target cells in a peripheral blood mononuclear cell (PBMC) population are labeled with REAlease Anti-TCRγ/δ-Biotin (REAlease Biotin Complex). Subsequently, REAlease Anti-Biotin MicroBeads (Anti-TCRγ/δ, human) bind to REAlease Biotin Complex. Then, the cell suspension is loaded onto a MACS Column, which is placed in the magnetic field of a MACS Separator. The magnetically labeled cells are retained within the column. The unlabeled non-target cells flow through; this cell fraction is thus depleted of TCRγ/δ^+ cells. After removing the column from the magnetic field, the target cells are eluted using the REAlease Bead Release Reagent, which simultaneously removes the MicroBeads from the cell. Finally, during the subsequent incubation with the REAlease Release Reagent, the REAlease Biotin Complex monomerizes and dissociates from the cell surface leaving the cells free of all labels.

1.2 Background information

The REAlease Anti-TCRγ/δ MicroBead Kit, human has been developed for positive selection TCRγ/δ^+ cells from peripheral blood mononuclear cells (PBMCs). TCRγ/δ^+ T cells express TCRγ/δ instead of TCRα/β and are characterized by their HLA-independent antigen recognition. TCRγ/δ^+ T cells comprise 1–5% of T cells in the blood.

The REAlease Anti-TCRγ/δ MicroBead Kit, human is an indirect magnetic labeling system that allows to obtain cells free of MicroBeads and REAlease Biotin Complex.

1.3 Applications

- Positive selection of cells expressing human TCR γ/δ
- Isolation of TCR γ/δ-expressing T cells from PBMCs which need to be label-free

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1.4 Reagent and instrument requirements

- Separation buffer: Prepare a solution containing phosphate-buffered saline (PBS), pH 7.2, 0.5% bovine serum albumin (BSA), and 2 mM EDTA by diluting MACS BSA Stock Solution (# 130-091-376) 1:20 with autoMACS Rinsing Solution (# 130-091-222). Use buffer at room temperature (+19 to 25 °C). Store buffer cold (+2 to+8 °C). Degas buffer before use, as air bubbles could block the column.

  ▲ **Note:** BSA can be replaced by other proteins such as human serum albumin, human serum, or fetal bovine serum (FBS). Buffers or media containing Ca^{2+} or Mg^{2+} are not recommended for use.

- REAlease Bead Release buffer: Prepare a 1:50 dilution of REAlease Bead Release Reagent (50×), e.g., for 1 mL add 20 µL of REAlease Bead Release Reagent to 980 µL of separation buffer.

  ▲ **Note:** Use freshly prepared buffer the same day. Store at room temperature.

  ▲ **Note:** Prepare 1 mL per MS Column and 5 mL per LS Column.

- MACS Columns and MACS Separators: TCRγ/δ$^+$ cells can be enriched by using MS or LS Columns. Positive selection can also be performed by using the MultiMACS™ Cell24 Separator Plus or autoMACS Columns on the autoMACS NEO Separator.

Column	Max. number of labeled cells	Max. number of total cells	Separator
Positive selection			
MS	10^7	2×10^8	MiniMACS, OctoMACS, SuperMACS II
LS	10^8	2×10^9	MidiMACS, QuadroMACS, SuperMACS II
	10^8	10^9	MultiMACS Cell24 Separator Plus
autoMACS	2×10^8	4×10^9	autoMACS NEO Separator

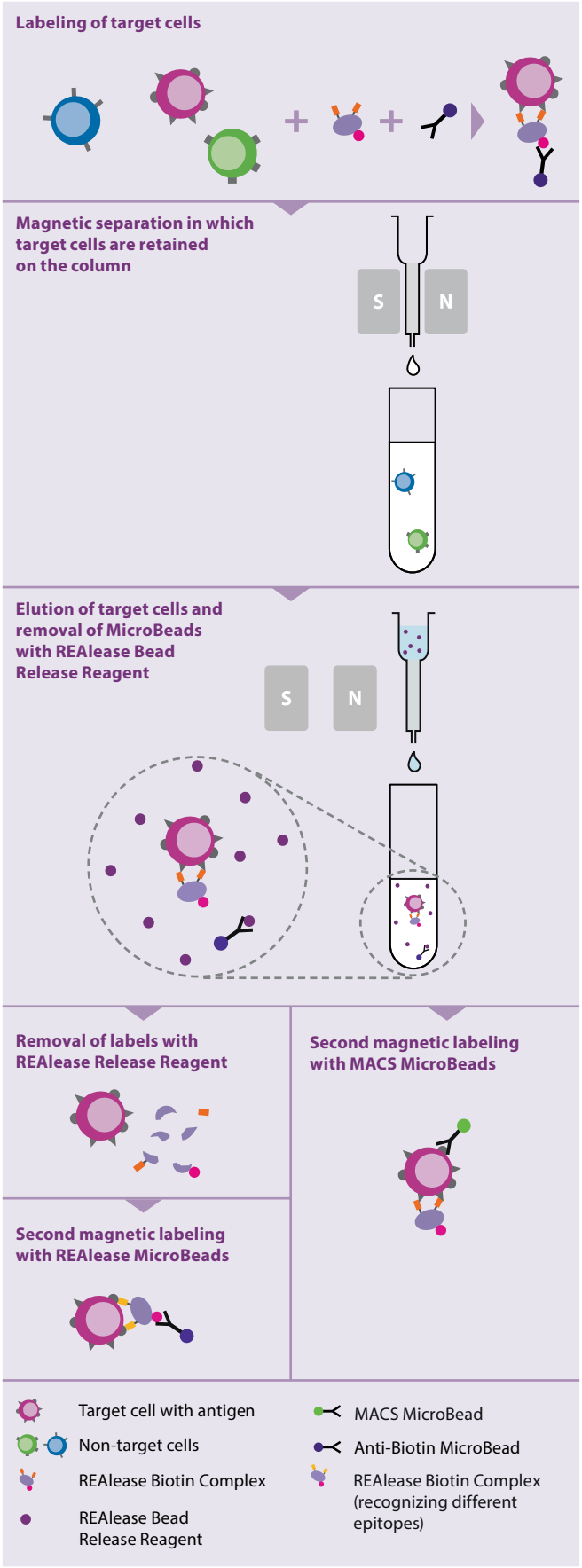
  ▲ **Note:** Column adapters are required to insert certain columns into SuperMACS™ II Separators. For details refer to the respective MACS Separator data sheet.

  ▲ **Note:** If separating with LS Columns and the MultiMACS Cell24 Separator Plus use the Single-Column Adapter. Refer to the user manual for details.

- (Optional) Fluorochrome-conjugated TCRγ/δ antibodies for flow cytometric analysis, e.g., TCRγ/δ Antibody, anti-human, FITC. For more information about antibodies refer to www.miltenyibiotec.com/antibodies.
- (Optional) Propidium Iodide Solution (# 130-093-233) or 7-AAD Staining Solution (# 130-111-568) for flow cytometric exclusion of dead cells.
- (Optional) Pre-Separation Filters (30 µm) (# 130-041-407) to remove cell clumps.

2. Protocol

2.1 Protocol overview



2.2 Sample preparation

When working with anticoagulated peripheral blood or buffy coat, peripheral blood mononuclear cells (PBMCs) should be isolated by using a MACS PBMC Isolation Kit or by density gradient centrifugation, for example, using Ficoll-Paque™.

▲ **Note:** To remove platelets after density gradient separation, resuspend cell pellet in buffer and centrifuge at 200×g for 10–15 minutes at +20 °C. Carefully aspirate supernatant. Repeat washing step.

For details refer to the data sheet or the protocols section at www.miltenyibiotec.com/protocols.

2.3 Magnetic labeling

▲ Cells can be labeled with MACS MicroBeads using the autolabeling function of the autoMACS NEO Separator. For more information refer to section 2.5.

▲ The recommended incubation temperature is at room temperature (+19 to +25 °C).

▲ 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 labeling. Pass cells through 30 µm nylon mesh (Pre-Separation Filters (30 µm), # 130-041-407) to remove cell clumps which may clog the column. Moisten filter with buffer before use.

1. Determine cell number.
2. Centrifuge cell suspension at 300×g for 10 minutes. Aspirate supernatant completely.
3. Resuspend cell pellet in 40 µL of separation buffer per 10^7 total cells.
4. Add 10 µL of REAlease Anti-TCRγ/δ-Biotin, human per 10^7 total cells.
5. Mix well and incubate for 5 minutes.
6. Add 50 µL of REAlease Anti-Biotin MicroBeads (Anti-TCRγ/δ, human) per 10^7 total cells.
7. Mix well and incubate for 5 minutes.
8. (Optional) Add staining antibodies, e.g., TCRγ/δ Antibody-FITC, and incubate for 5 minutes in the dark in the refrigerator (+2 to+8 °C).

   ▲ **Note:** These staining antibodies cannot be removed from the cells.
9. Dilute up to 5×10^7 cells in a total volume of 500 µL with separation buffer.

   ▲ **Note:** For volumes larger than 500 µL a dilution is not needed.
10. Proceed to magnetic separation (2.4).

2.4 Magnetic separation and removal of magnetic labeling

▲ Choose an appropriate MACS Column and MACS Separator according to the number of total cells and the number of TCRγ/δ$^+$ cells. For details refer to the table in section 1.4.

▲ Always wait until the column reservoir is empty before proceeding to the next step.

▲ The recommended incubation temperature is at room temperature (+19 to +25 °C).

Magnetic separation with MS or LS Columns

1. Place column in the magnetic field of a suitable MACS Separator. For details refer to the respective MACS Column data sheet.
2. Prepare column by rinsing with the appropriate amount of separation buffer:

   MS: 500 µL LS: 3 mL
3. Apply cell suspension onto the column. Collect flow-through containing unlabeled cells.
4. Wash column with the appropriate amount of separation buffer. Collect unlabeled cells that pass through and combine with the flow-through from step 3.

   MS: 3×500 µL LS: 3×3 mL

   ▲ **Note:** Perform washing steps by adding buffer aliquots as soon as the column reservoir is empty.
5. Remove column from the separator and place it on a suitable collection tube.
6. Pipette the appropriate amount of REAlease Bead Release buffer (prepared by REAlease Bead Release Reagent (50×), refer to chapter 1.4) onto the column. Immediately flush out target cells by firmly pushing the plunger into the column.

   MS: 1 mL LS: 5 mL
7. Mix well and incubate for 10 minutes.
8. Cells are now free from MicroBeads and ready for analysis and downstream applications.
9. (Optional) Proceed either to
   - 2.6 Removal of REAlease Complex and second magnetic labeling with REAlease MicroBeads

     or proceed to
   - 2.7 Second magnetic labeling with MACS MicroBeads.

Magnetic separation with the MultiMACS Cell24 Separator Plus

Refer to the the MultiMACS Cell Separator Plus user manual for instructions on how to use the MultiMACS Cell24 Separator Plus.

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2.5 Magnetic labeling and separation using autoMACS Separators

▲ Refer to the user manual and the short instructions for instructions on how to use the autoMACS Separators.

▲ Buffers used for operating the autoMACS Separators should have a temperature of ≥ +10 °C.

▲ Place tubes in the following Chill Rack positions:

position A = sample, position B = unlabeled (negative) fraction, position C = labeled (positive) fraction, position D = MicroBead-free target cells.

2.5.1 Magnetic labeling and separation using the autoMACS NEO Separator

▲ The autoMACS NEO Separator enables stage loading to extend column capacity for selected reagents, minimizing the need to divide larger samples.

▲ For more information on selecting alternative separation programs, stage loading–compatible reagents, autolabeling-compatible reagents, and the minimal and maximal volumes for each reagent and Chill Rack, refer to www.miltenyibiotec.com/automacs-neo-sample-processing.

Fully automated magnetic labeling and separation

1. Prepare and prime the instrument.
2. Place the Chill Rack and MACS Reagent Rack 8 on the MACS MiniSampler S.
3. Select the same Chill Rack and MACS Reagent Rack 8 in the **Experiment** tab. An experiment is created automatically.
4. Tap to select sample position(s).
5. To assign a reagent to each sample, tap **Scan reagent** and scan the reagent barcode. Alternatively, tap on a free position of the MACS Reagent Rack 8 for selection out of the reagent list.
6. Unscrew the lids from the reagent vials and place the vials onto the designated positions on the MACS Reagent Rack 8.
7. Tap **Place reagent(s) on reagent rack** button in the dialog box.
8. Automated labeling is set automatically if autolabeling is supported and a reagent rack is selected. Alternatively, tap **Labeling** in the reagent placement dialog and select **Auto**.
9. Tap **Sample volume** in the **Sample process** pane and enter the sample volume. Tap the return key.
10. Tap **Run** to start the separation process.

2.6 (Optional) Removal of the REAlease Complex and second magnetic labeling with REAlease MicroBeads

▲ The recommended incubation temperature is at room temperature (+19 to +25 °C).

▲ For second magnetic labeling with MACS Anti-Biotin MicroBeads proceed through all steps of chapter 2.6.

2.6.1 Removal of the REAlease Complex

1. Centrifuge cell suspension at 300×g for 10 minutes. Aspirate supernatant completely.
2. Resuspend cell pellet in appropriate amount of separation buffer:

   MS: 1 mL LS: 5 mL
3. Add an appropriate amount of REAlease Release Reagent:

   MS: 20 µL LS: 100 µL
4. Mix well and incubate for 5 minutes.
5. Cells are now free from REAlease Complex and MicroBeads and are ready for analysis or downstream applications.
6. (Optional) For second magnetic labeling with REAlease MicroBeads continue with 2.6.2.

2.6.2 Second magnetic labeling with REAlease MicroBeads

1. Centrifuge cell suspension at 300×g for 10 minutes. Aspirate supernatant completely.
2. Resuspend cell pellet in 40 µL of REAlease Stop Reagent per 10^7 total cells.
3. Mix well.
4. Proceed with steps 4–9 of chapter 2.3 Magnetic labeling.

   ▲ **Note:** For best recovery and purity of cells, the amount of MACS MicroBeads for the second positive labeling may need optimization as the starting frequency of target cells may be different from a PBMC sample.

2.7 (Optional) Second magnetic labeling with MACS MicroBeads

▲ For second magnetic labeling with MACS Anti-Biotin MicroBeads proceed through all steps of chapter 2.6.

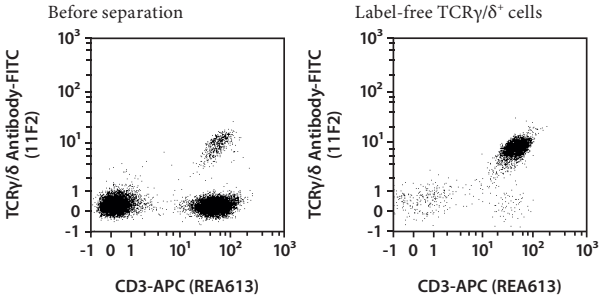
1. Centrifuge cell suspension at 300×g for 10 minutes. Aspirate supernatant completely.
2. Add the recommended amount of MACS MicroBeads to label the cells magnetically for the second marker. For details refer to the respective MACS MicroBeads data sheet.

   ▲ **Note:** For best recovery and purity of cells, the amount of MACS MicroBeads for the second positive labeling may need optimization as the starting frequency of target cells may be different from a PBMC sample.

3. Example of a separation using the REAlease Anti-TCRγ/δ MicroBead Kit, human

TCRγ/δ$^+$ cells were isolated from human PBMCs using the REAlease Anti-TCRγ/δ MicroBead Kit, MS Columns, and a MiniMACS™ Separator. Cells were fluorescently stained with TCRγ/δ Antibody-FITC and analyzed by flow cytometry using the MACSQuant® Analyzer X. Cell debris and dead cells were excluded from the analysis based on scatter signals and propidium iodide fluorescence.
The TCRγ/δ$^+$ cell content of the isolated fraction is typically 94.5 ± 3.23% (mean ± SD).

A) Cell purity

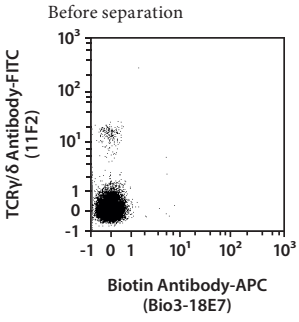


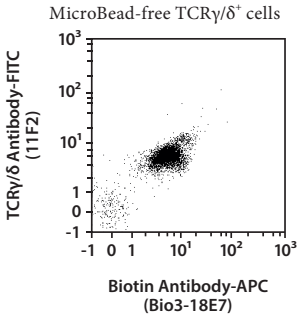
B) Bead-free cells: efficiency of REAlease Anti-Biotin MicroBeads release

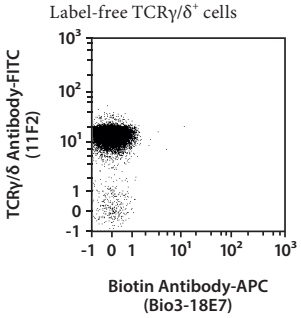
Release efficiency was higher than 90% for the REAlease Anti-Biotin MicroBeads (TCRγ/δ, human). The efficiency was determined by re-applying the isolated cells to a second MACS Column. The ratio between the numbers of cells in the flow-through and the total number of cells applied to the second column allowed us to calculate the efficiency of magnetic labeling removal.

C) Label-free cells: REAlease Biotin Complex release

The efficient removal of all labels was shown by using Biotin Antibody-APC to analyze the cells by flow cytometry for the presence of REAlease Biotin Complex. Directly after isolation, the cells showed staining of biotin ("MicroBead-free TCRγ/δ$^+$ cells"), whereas the label-free TCRγ/δ$^+$ cells after the REAlease Biotin Complex release were negative for biotin similar to the non-labeled cells before separation.







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