



Miltenyi Biotec

Discover diversity

T cell research

Powerful cell separation

Optimized cell expansion

Precise flow cytometry

Comprehensive cell culture

Products for T cell research from Miltenyi Biotec

Progress assured

Miltenyi Biotec provides over 1000 innovative products for biomedical and life science studies. The product portfolio includes instruments and reagents for sample preparation,

cell separation, cell analysis, cell culture, and molecular studies. Miltenyi Biotec is committed to developing new, leading-edge products for the biomedical researcher.



MACS® Sample Preparation

The gentleMACS™ Dissociator, the gentleMACS Octo Dissociator, and Tissue Dissociation Kits are ideal tools for the automated preparation of single-cell suspensions from tissues.

- Fast, gentle, and effective tissue dissociation or homogenization
- Highly reproducible results
- Optimized programs for various applications
- High level of user safety, sterile sample handling

MACS Cell Separation

The autoMACS® Pro Separator is a benchtop automated cell sorter for the isolation of virtually any cell type from any species using MACS MicroBeads and MicroBead Kits.

- Walk-away – fully automated cell labeling and cell sorting
- Flexible – automated or manual labeling of up to six samples in a single run
- Versatile – isolate any T cell type and subset



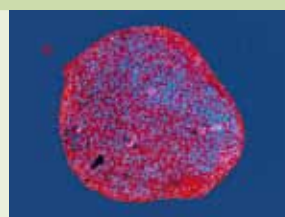
MACS Cell Analysis

The MACSQuant® Instruments are leading biomedical science into a new era of flow cytometry.

- Compact benchtop design with nine or ten optical parameters
- Absolute cell counting (volumetric)
- Automated sample processing: from a single tube to 96-well plates
- Broad spectrum of monoclonal antibodies, fluorochromes, and kits

MACS Cell Culture

- Media for immune cells, stem cells, and standard cell culture
- Recombinant MACS Cytokines up to GMP grade
- Reagents for stimulation and expansion of specific cell populations



MACSmolecular

- Protein isolation and detection
- mRNA purification and amplification
- cDNA synthesis and labeling
- microRNA analysis
- Microarray technology
- Genomics services

Products for the isolation of human T cells

Human T cells



CD3 MicroBeads
130-050-101
Whole Blood CD3 MicroBeads
130-090-874

CD2 MicroBeads
130-091-114
Pan T Cell Isolation Kit
130-096-535

CD6 MicroBeads
130-091-264

CD4⁺ T cells



CD4 MicroBeads
130-045-101
Whole Blood CD4
MicroBeads
130-090-877
CD4⁺ T Cell
Isolation Kit
130-096-533

Treg cells



CD4⁺CD25⁺ Regulatory
T Cell Isolation Kit
130-091-301
CD4⁺CD25⁺CD127^{dim/-}
Regulatory T Cell Isolation Kit II
130-094-775
CD25⁺CD49d⁻ Regulatory
T Cell Isolation Kit
130-094-551
CD4⁺CD25⁺CD45RA⁺
Regulatory T Cell Isolation Kit
130-093-631
CD25 MicroBeads II
130-092-983
CD127 MicroBead Kit
130-094-945

DN T cells



Double-negative
T Cell Isolation Kit
130-092-614

CD8⁺ T cells



CD8 MicroBeads
130-045-201
Whole Blood CD8
MicroBeads
130-090-878
CD8⁺ T Cell Isolation Kit
130-096-495

γ/δ⁺ T cells



Anti-TCRγ/δ
MicroBead Kit
130-050-701
TCRγ/δ⁺ T Cell
Isolation Kit
130-092-892

NKT cells



CD3⁺CD56⁺
NKT Cell Isolation Kit
130-093-064
Anti-iNKT MicroBeads
130-094-842

Activated T cell subsets



CD25 MicroBeads II
130-092-983
CD30 MicroBeads
130-051-401
Pre-selection of CD4⁺ T cells with:
CD4⁺ T Cell Isolation Kit
130-096-533
CD4 MultiSort Kit
130-055-101

CD69 MicroBead Kit II
130-092-355
CD154 MicroBead Kit
130-092-658

CD137 MicroBead Kit
130-093-476
Pre-selection of CD8⁺ T cells with:
CD8⁺ T Cell Isolation Kit
130-096-495
CD8 MultiSort Kit
130-055-201



CD4⁺ T cell subsets

CD4⁺ RTE



CD4⁺ Recent Thymic Emigrant Isolation Kit
130-094-299

Naive CD4⁺ T cells



Naive CD4⁺ T Cell Isolation Kit II
130-094-131

Pre-selection with:
CD4⁺ T Cell Isolation Kit
CD62L MicroBeads
130-091-758
CD45RA MicroBeads
130-045-901
CD45RO MicroBeads
130-046-001

Skin-homing T cells



CD4⁺CLA⁺ T Cell Isolation Kit
130-092-435

Pre-selection with:
Anti-CLA MicroBead Kit
130-092-464

Memory CD4⁺ T cells



Memory CD4⁺ T Cell Isolation Kit
130-091-893

TEM cells



CD4⁺ Effector Memory T Cell Isolation Kit
130-094-125

TCM cells



CD4⁺ Central Memory T Cell Isolation Kit
130-094-302

Th1 cells



IFN- γ Secretion Assay – Cell Enrichment and Detection Kit (PE)
130-054-201

Th2 cells



CD294 (CRTH2) MicroBead Kit
130-091-274
IL-4 Secretion Assay – Cell Enrichment and Detection Kit (PE)
130-054-101

Th17 cells



IL-17 Secretion Assay – Cell Enrichment and Detection Kit (PE)
130-094-542

CD8⁺ T cell subsets

Naive CD8⁺ T cells



Naive CD8⁺ T Cell Isolation Kit
130-093-244

Pre-selection with:
CD8⁺ T Cell Isolation Kit
CD45RA MicroBeads
130-045-901
CD45RO MicroBeads
130-046-001

Memory CD8⁺ T cells



CD8⁺ Memory T Cell Isolation Kit
130-094-412

TEMRA cells



CD8⁺CD45RA⁺ Effector T Cell Isolation Kit
130-094-485

Cytotoxic T cells



CD8⁺CD57⁺ T Cell Isolation Kit
130-093-396

Effector T cells



CD27 MicroBeads
130-051-601

Color code for the use of MACS[®] MicroBeads

- Positive selection (labeling of target cells)
- Depletion (labeling for removal of an unwanted cell type)
- Isolation of untouched cells using a depletion cocktail
- Isolation of cells directly from whole blood
- Sequential separation (combination of depletion of non-target cells and positive selection)

For mouse T cells see inside back cover.



Discover T cell diversity with Miltenyi Biotec

Unique tools and ingenious workflow solutions

The degree of diversity within T cell differentiation pathways has raised an important issue in modern T cell immunology: the question of whether a particular subset of T cells can be regarded as terminally differentiated or not. The extent to which some cells are fixed from a differentiation point of view or whether they retain a degree of plasticity is a major topic of discussion at this time.

Diversity is also a feature of the Miltenyi Biotec portfolio for T cell research. Sophisticated separation products enable the isolation of an array of different T cell types. Advanced analytical reagents and equipment lead to a detailed insight into the function of many different cell types, while our cell culture solutions provide ideal conditions for stimulation, expansion, and culture of T cells.

MACS® MicroBeads

MACS Technology is based on MACS MicroBeads, manual or automated MACS Separators, and MACS Columns. MACS MicroBeads are superparamagnetic particles with a diameter of approximately 50 nanometers and are composed of a biodegradable matrix. This means it is not necessary to remove the particles before carrying out downstream studies as they do not alter structure, function, or activity of the labeled cell and are not known to interfere with subsequent tests.

- Specific monoclonal antibody conjugates
- Colloidal for easy handling
- Short incubation times
- Non-toxic, biodegradable

Benefits of MACS Technology

- Optimal recovery and excellent purity
- Easy separation of large numbers of cells or rare cells
- Fast, convenient, and reliable
- Gentle to cells
- Automated separation with the autoMACS® Pro Separator
- Compatible with flow cytometry and the MACSQuant® Instruments
- State-of-the-art technology from bench to bedside

Contents

The optimal cell separation approach	4
Your way forward	
Front-line human T cell research	5
Isolation of CD3 ⁺ , CD4 ⁺ , and CD8 ⁺ T cells	
The human T cell subset of your choice	6
Isolate naive and memory T cells	
Leading mouse T cell research	7
Isolation of Pan T cells, CD4 ⁺ , and CD8 ⁺ T cell subsets	
Unsurpassed and unmatched	8
Untouched isolation of mouse CD4 ⁺ , CD8 ⁺ , and pan T cells	
Progressive regulatory T cell research	9
Isolate human Treg cells and subsets	
Convenience and analytical power	10
Flow cytometric analysis of human Treg cells	
Purely functional Treg cells	11
Study human Treg cell function with convenient assays	
Advancing mouse Treg cell research	12
Isolate and expand mouse Treg cells	
Discover diversity	13
Products for T cell differentiation and stimulation	
Secretion is the key	14
Isolation of cytokine-secreting T cells	
PepTivator® Peptide Pools: more than just a peptide	15
Activate and expand T cells specifically	
Ideal culture conditions for reliable results	16
Products for T cell stimulation, expansion, and culture	
References	17
More than 14,500 studies used Miltenyi Biotec products	
Order information	20
Place your order by fax, phone, or online!	

The optimal cell separation approach

Your way forward

Positive selection

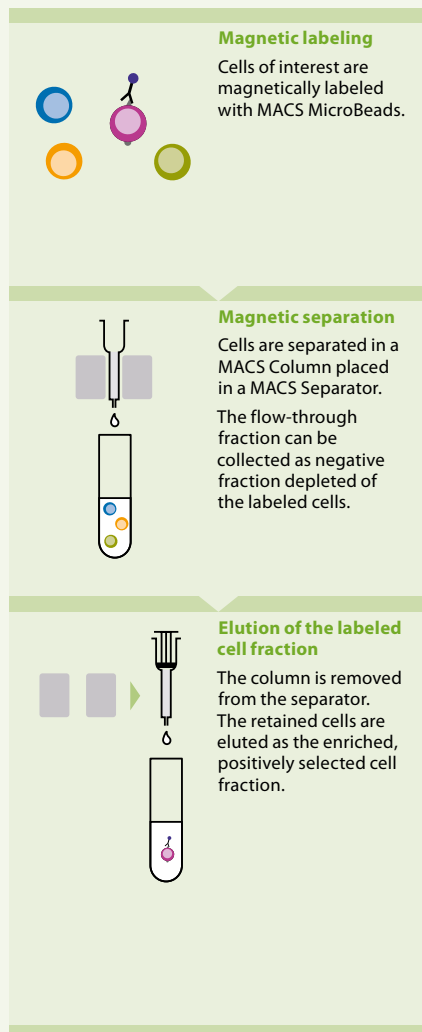


Figure 1: Positive selection means that the desired target cells are magnetically labeled and isolated as the magnetically retained fraction.

Use positive selection:

- for most specific labeling,
- for fast performance with best recovery,
- if no subsequent separation step is necessary.

Untouched isolation

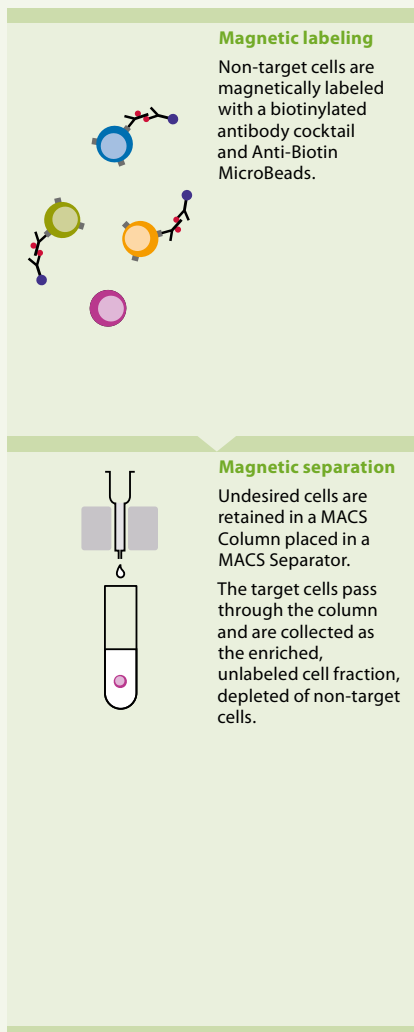


Figure 2: Untouched isolation is performed by depletion of undesired cells. Non-target cells are magnetically labeled and eliminated from the cell mixture. The non-labeled, untouched cell fraction contains the target cells.

Untouched isolation is recommended:

- for removal of unwanted cells,
- if isolated cells are to be separated according to a second marker,
- if binding of an antibody to target cells is not desired.

Sequential sorting: Depletion followed by positive selection

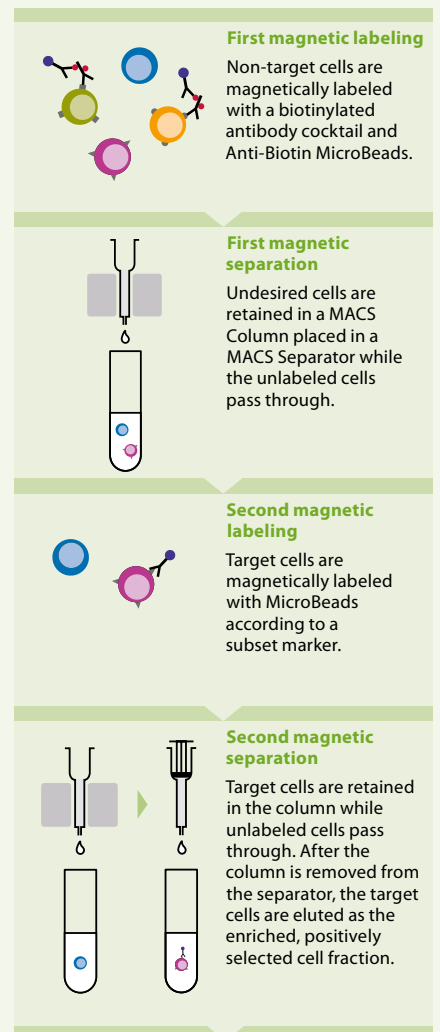


Figure 3: Cell subsets are isolated by first depleting the non-target cells and then positively selecting the cell subsets of interest.

Sequential sorting is the method of choice:

- if undesired cells in the suspension also express the marker that will be used for positive selection of the target cells.

Front-line human T cell research

Isolation of CD3⁺, CD4⁺, and CD8⁺ T cells

The classical T cell types can be isolated either by positive selection or depletion of undesired cells (untouched isolation), depending on the specific needs of the researcher.

- Convenient and reliable
- Fast and easy to use
- Excellent purity and unmatched recovery

Positive selection: the method of choice

CD3, CD4, and CD8 MicroBeads allow the straightforward direct isolation of highly pure CD3⁺ (fig. 4), CD4⁺, and CD8⁺ T cells, respectively.

The unique MACS MicroBeads allow positive selection of the target cells either manually or automatically with the easy-to-use autoMACS Pro Separator.

Applications for positive T cell selection with MicroBeads include:

- co-culture with dendritic cells¹,
- proliferation assays^{2,3},
- isolation of T cells from lung tissue⁴,
- cytotoxicity assays⁵,
- cytokine analysis⁶,
- gene expression profiling⁷,
- isolation of non-activated CD3⁺ T cells⁸.

Untouched isolation: unmatched recovery

The **CD4⁺ T Cell Isolation Kit, human** and the **CD8⁺ T Cell Isolation Kit, human** are designed for the isolation of untouched cells by effective removal of non-CD4⁺ (fig. 5) or non-CD8⁺ cells and non-T cells as well.

The **Pan T Cell Isolation Kit** allows the isolation of large numbers of untouched T cells with high purity.

T cells isolated with human isolation kits have been used for various studies, such as

- transfection experiments^{9,10},
- HIV research¹¹,
- analysis of signaling pathways¹².

Products for the isolation of human T cells

Product	Separation strategy
CD3 MicroBeads	Positive selection
CD4 MicroBeads	Positive selection
CD8 MicroBeads	Positive selection
Pan T Cell Isolation Kit	Untouched isolation
CD4 ⁺ T Cell Isolation Kit	Untouched isolation
CD8 ⁺ T Cell Isolation Kit	Untouched isolation

For a comprehensive product list and ordering information refer to page 20.

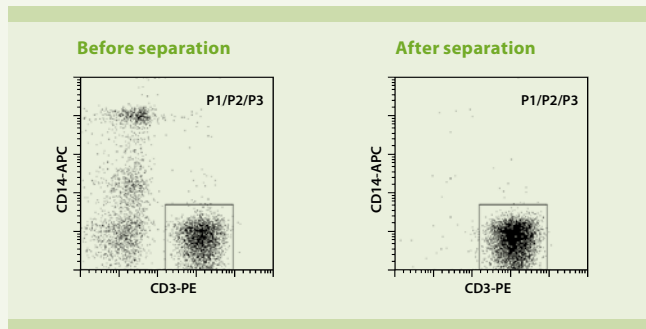


Figure 4: Isolation of CD3⁺ T cells from human PBMCs using CD3 MicroBeads. Aliquots of cells before and after the separation were stained with the MC CD3 Pan T Cell Cocktail and analyzed by flow cytometry.

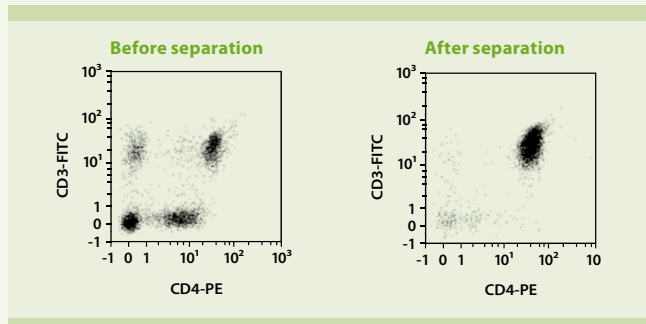


Figure 5: Isolation of untouched CD4⁺ T cells from human PBMCs using the CD4⁺ T Cell Isolation Kit. Cells were fluorescently stained with CD3-FITC and CD4-PE and analyzed by flow cytometry using the MACSQuant Analyzer.

The human T cell subset of your choice

Isolate naive and memory T cells

Research diversity: naive and memory T cells

Several developmental stages of T cells can be distinguished on the basis of their expression levels of CD197 (CCR7) and CD45 isoforms:

Naive T cells are CD45RA⁺CCR7⁺.

Central memory T cells (T_{CM}) are CD45RO⁺CCR7⁺.

Effector memory T cells (T_{EM}) are CD45RO⁺CCR7⁻.

Effector memory RA T cells (T_{EMRA}) are CD45RA⁺CCR7⁻.

Miltenyi Biotec provides innovative reagents for the isolation of distinct T cell subpopulations and so creates a firm foundation for further investigations into their immunological role.

The Naive CD4⁺ T Cell Isolation Kit II, human and the Naive CD8⁺ T Cell Isolation Kit, human

- Fast and efficient isolation of untouched naive T cells from human PBMCs (fig. 6)
- Untouched naive CD4⁺ T cells were routinely isolated with >96% purity¹³.

The Memory CD4⁺ T Cell Isolation Kit, human and the CD8⁺ Memory T Cell Isolation Kit, human

- Robust isolation of either CD4⁺ or CD8⁺ memory T cells from human PBMCs

Human naive CD4⁺ and Memory CD4⁺ T Cell Isolation Kits have been used for:

- differentiation assays^{14,15},
- the isolation of T cells from rheumatoid arthritis patient samples^{16,17},
- studies on naive T helper cell activation¹⁸,
- functional studies of DCs¹⁹,
- the isolation of specific subsets, such as CCR8^{+/-} cells²⁰.

Products for the isolation of human T cell subsets

Product	Separation strategy
Naive CD4 ⁺ T Cell Isolation Kit II	Untouched isolation
Memory CD4 ⁺ T Cell Isolation Kit	Untouched isolation
CD4 ⁺ Effector Memory T Cell Isolation Kit	Untouched isolation
CD4 ⁺ Central Memory T Cell Isolation Kit	Depletion and positive selection
Naive CD8 ⁺ T Cell Isolation Kit	Depletion and positive selection
CD8 ⁺ Memory T Cell Isolation Kit	Untouched isolation
CD8 ⁺ CD45RA ⁺ Effector T Cell Isolation Kit	Depletion and positive selection

For a comprehensive product list and ordering information refer to page 20.

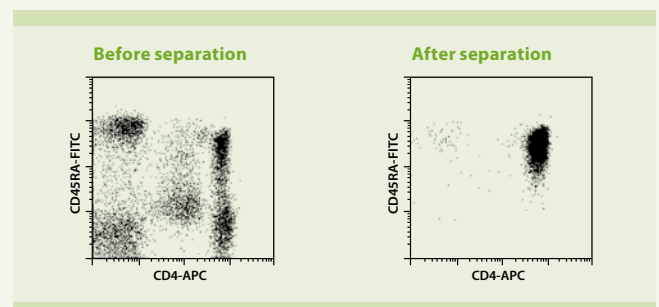


Figure 6: Isolation of naive CD4⁺ T cells from human PBMCs using the Naive CD4⁺ T Cell Isolation Kit II. Cells were fluorescently stained with CD45RA-FITC and CD4-APC and analyzed by flow cytometry.

Leading mouse T cell research

Isolation of Pan T cells, CD4⁺, and CD8⁺ T cell subsets

Greater options for positive selection – tried and tested

Miltenyi Biotec has a broad portfolio of reagents to aid the immunologist in the study of mouse T cell populations. Efficient sample preparation with the gentleMACS™ Dissociator combined with the mouse-specific reagents result in rapid isolation and unmatched recovery.

Several specific MicroBeads are available for mouse T cell markers.

CD3ε MicroBead Kit, mouse

- Depletion of thymocytes, mature T lymphocytes, and natural killer T (NKT) cells (fig. 7)

CD90.1 MicroBeads, mouse and rat

- CD90.1 (Thy1.1) is a pan T cell marker for mouse strains AKR/J, PL, and FVB/N (fig. 8).
- No cross-reaction with CD90.2 (Thy1.2)

CD90.2 MicroBeads, mouse

- CD90.2, (Thy1.2) is a pan T cell marker for the most common inbred mouse strains including BALB/c, DBA, CBA/J, C3H, C57BL/6, NZB/-, S3L.
- No cross-reaction with CD90.1 (Thy1.1)

CD90.1 and CD 90.2 MicroBeads have been developed for the isolation of T cells (fig. 8) that can then be used in adoptive transfer experiments and for the positive selection of functional T cells.

CD90.2 MicroBeads, mouse, CD4 (L3T4) MicroBeads, mouse and CD8a (Ly-2) MicroBeads, mouse have been used for:

- adoptive transfer experiments^{21,24},
- T cell proliferation assays^{21,23},
- studies on a GvHD model²²,
- co-culture with dendritic cells²³.

Products for the isolation of mouse T cells

Product	Separation strategy
CD90.1 MicroBeads	Positive selection
CD90.2 MicroBeads	Positive selection
CD3ε MicroBead Kit	Depletion
CD4 (L3T4) MicroBeads	Positive selection
CD8a (Ly-2) MicroBeads	Positive selection

For a comprehensive product list and ordering information refer to page 21.

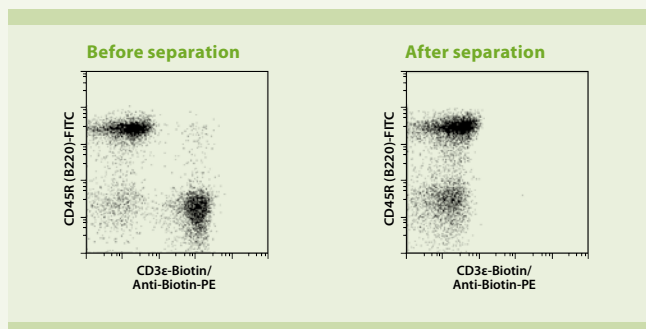


Figure 7: Depletion of CD3ε⁺ cells from a cell suspension of dissociated mouse spleen. A single-cell suspension from mouse spleen was prepared using the program m_spleen_01 on the gentleMACS Dissociator. CD3ε⁺ cells were depleted from this single-cell suspension using the CD3ε MicroBead Kit. Cells were fluorescently stained with CD45R (B220)-FITC and Anti-Biotin-PE and flow cytometrically analyzed using the MACSQuant Analyzer.

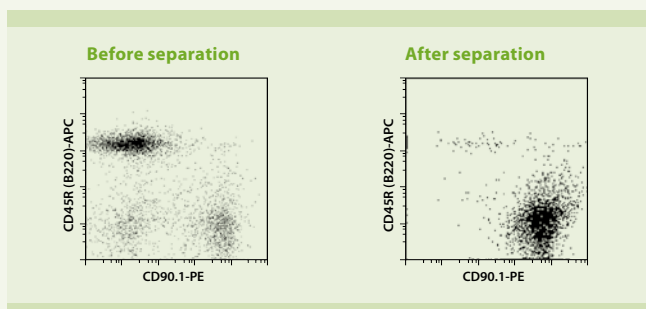


Figure 8: Isolation of mouse CD90.1⁺ cells. CD90.1⁺ cells were isolated from a single-cell suspension of mouse spleen using CD90.1 MicroBeads. Cells were fluorescently stained with CD90.1-PE and CD45R (B220)-APC and analyzed using the MACSQuant Analyzer.

Unsurpassed and unmatched

Untouched isolation of mouse CD4⁺, CD8⁺, and pan T cells

The next generation for untouched isolation

New kits for untouched isolation of mouse T cells are now available for CD4⁺, CD8⁺, and complete T cell populations (fig. 9). They additionally include CD11c, CD105, and Anti-MHC class II antibodies.

These kits enable:

- isolation of cells from spleen and lymph nodes with ease and efficiency,
- fast untouched isolation within 45 minutes,
- excellent purity with an improved antibody cocktail,
- untouched isolation with unmatched recovery,
- removal of dendritic cell contamination.

Mouse T cell isolation kits have been used for following applications:

- adoptive transfer experiments²⁵⁻²⁸,
- T cell proliferation assays²⁶,
- co-culture with dendritic cells^{27,28},
- cytokine analysis²⁹.

Isolation of naive T cell subpopulations

T cells from spleen and lymph nodes can be isolated with the **CD4⁺CD62L⁺ T Cell Isolation Kit II** (fig. 10) by combining depletion and positive selection. The depletion cocktail has been refined and includes the addition of a CD25 and an Anti-TCR γ/δ antibody.

Mouse naive CD4⁺CD62L⁺CD25⁻ T cells were used for:

- differentiation assays³⁰,
- *in vitro* polarization and analysis of cytokine production³¹,
- studies on the regulation of calcium influx³².

Products for the isolation of mouse T cells

Product	Separation strategy
Pan T Cell Isolation Kit II	Untouched isolation
CD4 ⁺ T Cell Isolation Kit II	Untouched isolation
CD8a ⁺ T Cell Isolation Kit II	Untouched isolation
CD4 ⁺ CD62L ⁺ T Cell Isolation Kit II	Depletion and positive selection

For a comprehensive product list and ordering information refer to page 21.

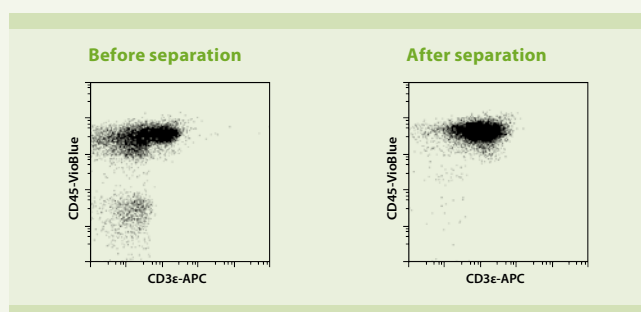


Figure 9: Isolation of pan T cells from a cell suspension of dissociated mouse spleen. A single-cell suspension from mouse spleen was prepared using the program m_spleen_01 on the gentleMACS Dissociator. T cells were isolated from this single-cell suspension using the Pan T Cell Isolation Kit II. Cells were fluorescently stained with the MC CD90.2 T Cell Cocktail, mouse as well as with CD3ε-APC and analyzed by flow cytometry using the MACSQuant Analyzer.

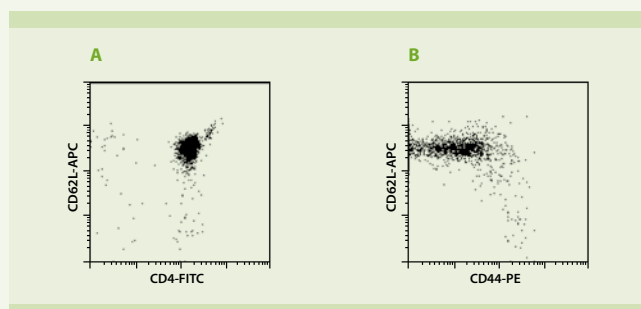


Figure 10: Isolation of CD4⁺CD62L⁺ T cells from a mouse spleen cell suspension using the CD4⁺CD62L⁺ T Cell Isolation Kit II. Isolated cells were fluorescently stained with CD4-FITC and CD62L-APC for detection of naive T cells (A) and with CD62L-APC and CD44-PE for detection of central memory T cells (B).

Progressive regulatory T cell research

Isolate human Treg cells and subsets

Fast Treg isolation with unmatched recovery

Miltenyi Biotec provides a number of kits for the isolation of human Treg cells by MACS Technology. The isolated Treg cells can then be used for functional analysis, e.g., in a suppression assay using the Treg Suppression Inspector.

The **CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, human** is a convenient way to positively select CD4⁺CD25⁺ Treg cells with high expression levels of FoxP3. Additionally, the non-magnetically labeled CD4⁺CD25⁻ T cells can be used for functional analysis with the Treg Suppression Inspector^{33,34}.

Treg cells isolated with the CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, human have been used to investigate their role:

- in autoimmune diseases³⁵, antitumor immunity^{33,36,37}, allergy³⁸, infectious diseases³⁹,
- after dendritic cell vaccination³⁴.

CD4⁺CD25⁺CD127^{dim/-} Regulatory T Cell Isolation Kit II

CD127 is expressed on the majority of mature T cells. However, it is absent on Treg cells and its expression is inversely correlated with FoxP3 expression^{40,41}.

- The CD4⁺CD25⁺CD127^{dim/-} Regulatory T Cell Isolation Kit II (fig. 11) allows enhanced recoveries of Treg cells.
- Excellent purity and recovery of FoxP3⁺ cells^{42,43}
- Suitable for *in vitro* expansion

The convenient route to Treg subsets

CD4⁺CD25⁺CD45RA⁺ Regulatory T Cell Isolation Kit

Treg cells isolated from the CD45RA⁺ naive T cell compartment have been shown to be optimal for *in vitro* expansion and maintain their FoxP3⁺ phenotype and their suppressive function^{44,45}.

CD25⁺CD49d⁻ Regulatory T cell Isolation Kit

The CD49d marker can be used to deplete contaminating effector T cells, which only transiently express FoxP3 and CD25⁴⁶. This kit allows the isolation of memory / effector Treg cells.

Products for the isolation of human Treg cell subsets

Product	Separation strategy
CD4 ⁺ CD25 ⁺ Regulatory T Cell Isolation Kit	Depletion and positive selection
CD4 ⁺ CD25 ⁺ CD127 ^{dim/-} Regulatory T Cell Isolation Kit II	Depletion and positive selection
CD25 ⁺ CD49d ⁻ Regulatory T Cell Isolation Kit	Depletion and positive selection
CD4 ⁺ CD25 ⁺ CD45RA ⁺ Regulatory T Cell Isolation Kit	Depletion and positive selection
CD25 MicroBeads II	Positive selection
CD127 MicroBead Kit	Depletion

For a comprehensive product list and ordering information refer to page 20.

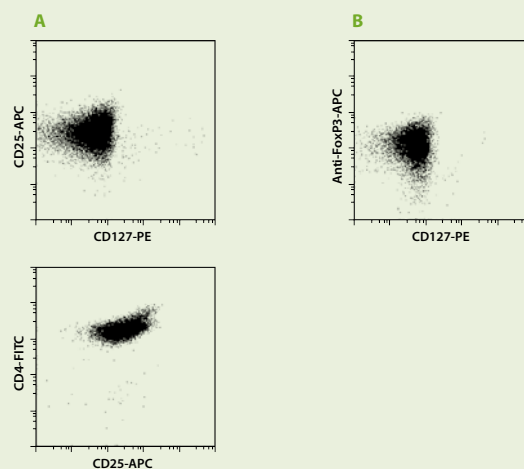


Figure 11: Isolation of CD4⁺CD25⁺CD127^{dim/-} regulatory T cells from human PBMCs using the CD4⁺CD25⁺CD127^{dim/-} Regulatory T Cell Isolation Kit II. Isolated cells were fluorescently stained with CD4-FITC, CD25-APC, and CD127-PE (A), or CD4-FITC, CD127-PE and Anti-Fox-P3-APC (B) and analyzed by flow cytometry using the MACSQuant Analyzer. Gating was performed according to CD4 expression (except for the CD25-APC versus CD4-FITC dot plot).

Convenience and analytical power

Flow cytometric analysis of human Treg cells

Capitalize on the inspiration of discovery with innovative products from Miltenyi Biotec. We offer convenient and powerful tools for in-depth insight into regulatory T cell pathways, not only with unique instruments like the MACSQuant Analyzer for trailblazing flow cytometry, but also with an array of antibodies and fluorochromes for staining surface and intracellular markers.

Surface and intranuclear staining

Treg Detection Kits (PE or APC) for human include antibodies and reagents for detection of Treg cells by flow cytometry (fig. 12). The kits contain a special FoxP3 Staining Buffer Set, FcR Blocking Reagent, and optimized protocols.

- Cell surface staining of CD4 and CD25
- Intranuclear staining of FoxP3

Detection of Treg cell surface markers

Miltenyi Biotec's product portfolio is continuously expanding to include tools for new relevant markers, e.g., the **CD127 antibody** that defines the Treg cell population with even greater precision (fig. 13). CD127 is not present on Treg cells and its expression inversely correlates with FoxP3 expression^{40,41}. Staining of human CD4⁺ T lymphocytes with CD4, CD25, and CD127 enables the analysis of regulatory T cells.

The **MACSQuant Instruments** lead science into a new era of automated flow cytometry with powerful and innovative features to facilitate successful research.

- Compact benchtop design with nine or ten optical parameters
- Absolute cell counting (volumetric)
- Automated sample processing: from a single tube to 96-well plates
- Sensitive rare cell analysis using novel enrichment column
- Powerful MACSQuantify™ Software with specialized analysis templates
- Automated calibration and compensation

Miltenyi Biotec also offers an extensive range of tools to give the scientist an ever-expanding portfolio of fluorochromes and standard protocols for multiparametric analyses.

Selected antibodies and kits for human Treg cell analysis

Product	Clone	Isotype
Anti-FoxP3	3G3	Mouse IgG1
FoxP3 Staining Buffer Set		
Treg Detection Kit (CD4/CD25/CD127)		
Treg Detection Kit (CD4/CD25/FoxP3)		
Anti-GITR	DT5D3	Mouse IgG1
CD4 (VIT4)	VIT4	Mouse IgG2a
CD25	4E3	Mouse IgG2b
CD39	MZ18-23C8	Mouse IgG1
CD49d	MZ18-24A9	Mouse IgG2b
CD127	MB15-18C9	Mouse IgG2a

For a comprehensive overview of antibodies, visit www.miltenyibiotec.com/antibodies.

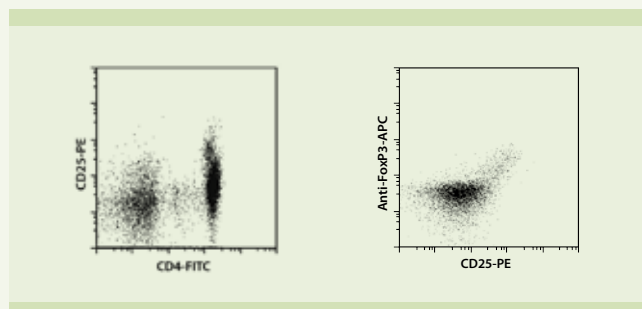


Figure 12: Human PBMCs stained with the Treg Detection Kit (APC). Cells were analyzed by flow cytometry using the MACSQuant Analyzer. For the dot plot that shows CD25-PE and Anti-FoxP3-APC staining, gating was performed according to CD4 expression.

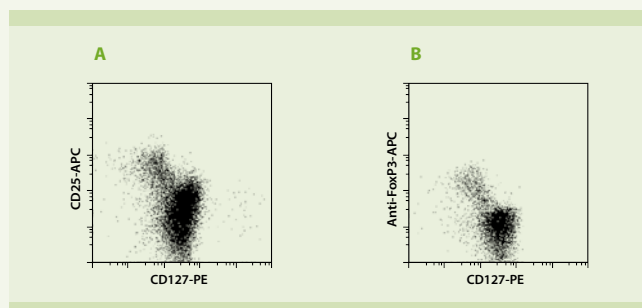


Figure 13: Detection of Treg cells. PBMCs were fluorescently stained with CD4-FITC, CD25-APC, and CD127-PE (A), or CD4-FITC, CD127-PE, and Anti-FoxP3-APC (B) and analyzed by flow cytometry using the MACSQuant Analyzer. Gating was performed according to CD4 expression.

Purely functional Treg cells

Study human Treg cell function with convenient assays

Determine the suppressor function of Treg cells

The **Treg Suppression Inspector, human** offers the ideal solution for the functional analysis of human Treg cells. It is based on the principle of Anti-Biotin MACSiBead™ Particles as a T cell-stimulating reagent and suppression of proliferation by Treg cells⁴⁷. The Treg Suppression Inspector stimulates the proliferation of responder T cells (CD4⁺CD25⁻ or CD4⁺ T cells or PBMCs). Co-culture of Treg cells with T responder cells in the presence of the Treg Suppression Inspector results in reduced proliferation of the T responder cells due to the suppressive function of the Treg cells (fig. 14).

Used to characterize Treg cell suppression activity:

- in antitumor immunity⁴⁸,
- after dendritic cell vaccination⁴⁹.

Expand your options

The **Treg Expansion Kit, human** is based on MACSiBead Particles for the expansion of human Treg cells after isolation with the CD4⁺CD25⁺CD127^{dim/-} or the CD4⁺CD25⁺CD45RA⁺ Regulatory T Cell Isolation Kits. The kit is designed to efficiently expand Treg cell populations and to maintain FoxP3 expression (fig. 15). Optimal expansion of Treg cells is accomplished by using pre-loaded MACSiBead Particles and Treg cells at a bead-to-cell ratio of 4:1 and recombinant interleukin 2 (rIL-2) at a concentration of 500 U/mL.

- Expanded Treg cells maintain their FoxP3 expression (fig. 15) and suppressor activity.
- Long-term culture with CD4⁺CD25⁺CD127^{dim/-} or CD4⁺CD25⁺CD45RA⁺ cells is easily achieved.
- Suitable also for culture with rapamycin
- Pre-loaded, ready-to-use MACSiBead Particles
- Can be combined with functional assays, such as the Treg Suppression Inspector, human.

Products for the functional analysis or expansion of human Treg cells

Product	Configuration
Treg Suppression Inspector	2.5 mL, 5×10 ⁷ MACSiBead Particles
Treg Expansion Kit	2 mL, 4×10 ⁷ MACSiBead Particles
Treg Expansion Kit	2×2 mL, 8×10 ⁷ MACSiBead Particles

For a comprehensive product list and ordering information refer to page 21.

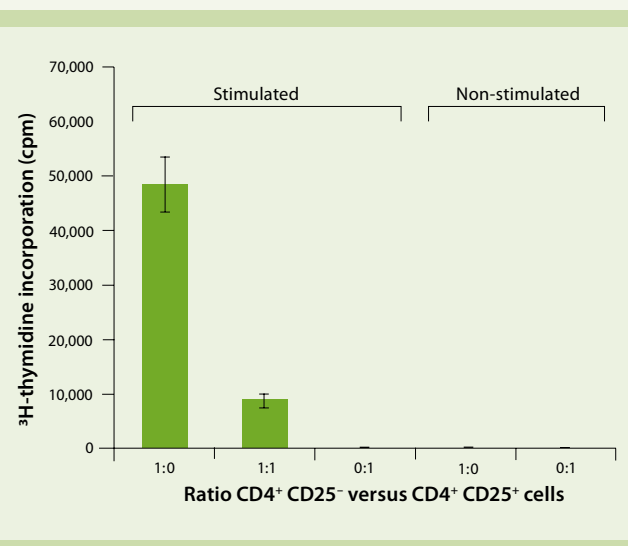


Figure 14: Functional analysis of Treg cells using the Treg Suppression Inspector. Human Treg cells, isolated with the CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, were co-cultured with CD4⁺CD25⁻ responder T cells at different ratios. For T cell stimulation, the Treg Suppression Inspector was added to the culture. As controls, Treg and responder T cells alone were cultured without any stimulus. Proliferation of T cells was determined by measuring ³H-thymidine incorporation.

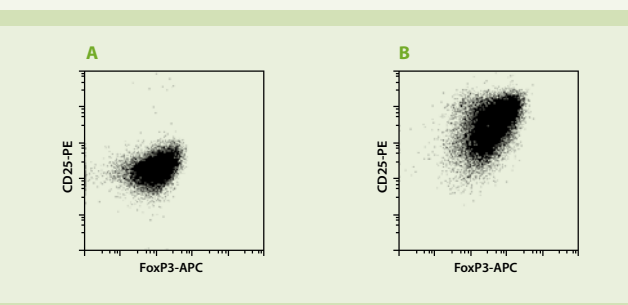


Figure 15: Expansion of human Treg cells with the Treg Expansion Kit. Isolated CD4⁺CD25⁺CD127^{dim/-} Treg cells before (A) and after 14 days of expansion (B) were analyzed by flow cytometry by using the MACSQuant Analyzer. Gating was performed according to CD4 expression.

Advancing mouse Treg cell research

Isolate and expand mouse Treg cells

Isolation of mouse Treg cells

The **CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, mouse** has been developed for the convenient positive selection of CD4⁺CD25⁺ regulatory mouse T cells from single-cell suspensions of spleen (fig. 15) and lymph nodes.

- Fast
- Excellent recovery
- High purity

Treg cells isolated with the CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, mouse have been used in various mouse models for:

- adoptive transfer⁵⁰,
- autoimmunity^{51,52},
- melanoma⁵³,
- *in vitro* suppression assays⁵⁴.

Mouse Treg cell expansion

The Treg Expansion Kit is designed for the efficient expansion of mouse Treg cells. This kit sustains FoxP3 expression in expanded Treg cells that were previously isolated with the CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, mouse. The Treg Expansion Kit is based on MACSiBead Particles pre-loaded with CD3 and CD28 antibodies. Optimal expansion of Treg cells is accomplished by using pre-loaded MACSiBead Particles and Treg cells at a bead-to-cell ratio of 3:1 and recombinant interleukin 2 (rIL-2) at a concentration of 2,000 U/mL.

Products for the isolation of mouse Treg cells

Product	Separation strategy
CD4 ⁺ CD25 ⁺ Regulatory T Cell Isolation Kit	Depletion and positive selection
CD25 MicroBead Kit	Positive selection

Products for the expansion of mouse Treg cells

Product	Configuration
Treg Expansion Kit	2 mL, 1.2×10 ⁸ MACSiBead Particles

Selected antibodies and kits for mouse Treg cell analysis

Product	Clone	Isotype
Anti-FoxP3	3G3	Mouse IgG1
FoxP3 Staining Buffer Set		
Treg Detection Kit (CD4/CD25/FoxP3)		
CD4	GK1.5	Rat IgG2b
Anti-GITR	DTA-1	Rat IgG2b
CD25-PE	7D4	Rat IgM

For ordering information refer to pages 21/22.
For a comprehensive overview of antibodies, visit www.miltenyibiotec.com/antibodies.

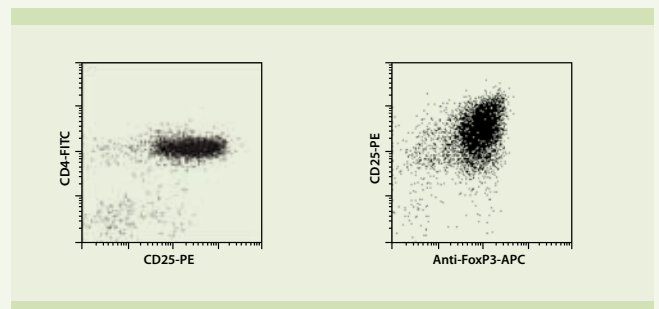


Figure 15: Treg cells isolated from mouse spleen using the CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, mouse. Cells were stained with CD25-PE and CD4-FITC or Anti-FoxP3-APC and analyzed by flow cytometry.

Discover diversity

Products for T cell differentiation and stimulation

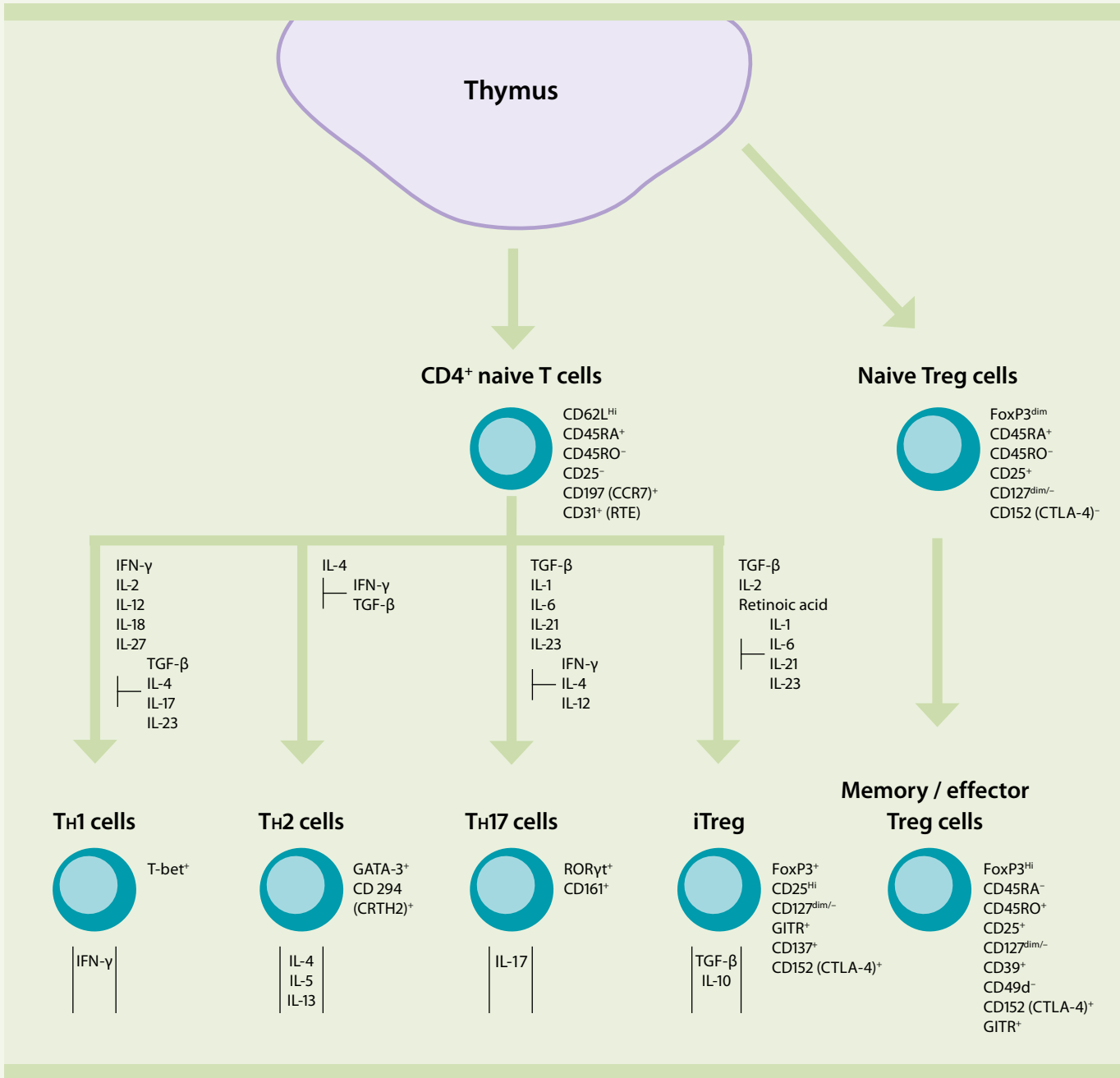


Figure 16: T cell differentiation pathways. Differentiation-inducing or -inhibiting factors are indicated next to the arrows. Cytokines that are secreted by Th1, Th2, Th17, or iTreg cells are shown underneath the respective cells. Surface markers and transcription factors that are expressed by these cells are shown to the right. For more information on cytokines and antibodies visit www.miltenyibiotec.com/cytokines and www.miltenyibiotec.com/antibodies, respectively.

Secretion is the key

Isolation of cytokine-secreting T cells

MACS Cytokine Secretion Assays—unique sensitivity

MACS Cytokine Secretion Assays are designed for highly sensitive detection as well as optional enrichment of viable cytokine-secreting cells.

- Unmatched sensitivity by enrichment of viable secreting cells
- Increased sensitivity of detection down to one cell in a million
- Isolation of T helper cell subsets
- Functionality assured
- Double staining possible, such as for IL-17 and IFN- γ

The Cytokine Secretion Assay can be used for the isolation of different T cell subsets such as TH1 (IFN- γ), TH2 (IL-4), TH17 (IL-17), and IL-10-secreting Tr1 cells.

The **IFN- γ Secretion Assay, human** has been utilized for:

- generation of influenza-specific cytotoxic T lymphocytes⁵⁵.

The **IL-17 and IFN- γ Secretion Assays, human** have been used for double staining to:

- analyze the relationship and functionality of the TH17 and TH1 subsets⁵⁶.

The **Mouse IL-17 Secretion Assays** have been utilized for:

- the analysis of TH17 stability⁵⁷,
- studies on a mouse EAE model⁵⁸.

The **IL-10 Secretion Assay, human** has been used for:

- enumeration of Tr1 cells in patients with autoimmune skin disease⁵⁹,
- characterization of allergen-specific Tr1 cells⁶⁰,
- studies on the effect of allergen exposure on Tr1 cells⁶¹,
- studies on memory T cell subsets⁶².

The **Mouse IL-10 Secretion Assay** has been used for:

- the study of transplantation tolerance with isolated Tr1 cells⁶³.

Miltenyi Biotec also offers a range of cytokine-specific antibodies for intracellular cytokine staining of human and mouse cells. For a comprehensive list of Cytokine Secretion Assays refer to pages 20/21.

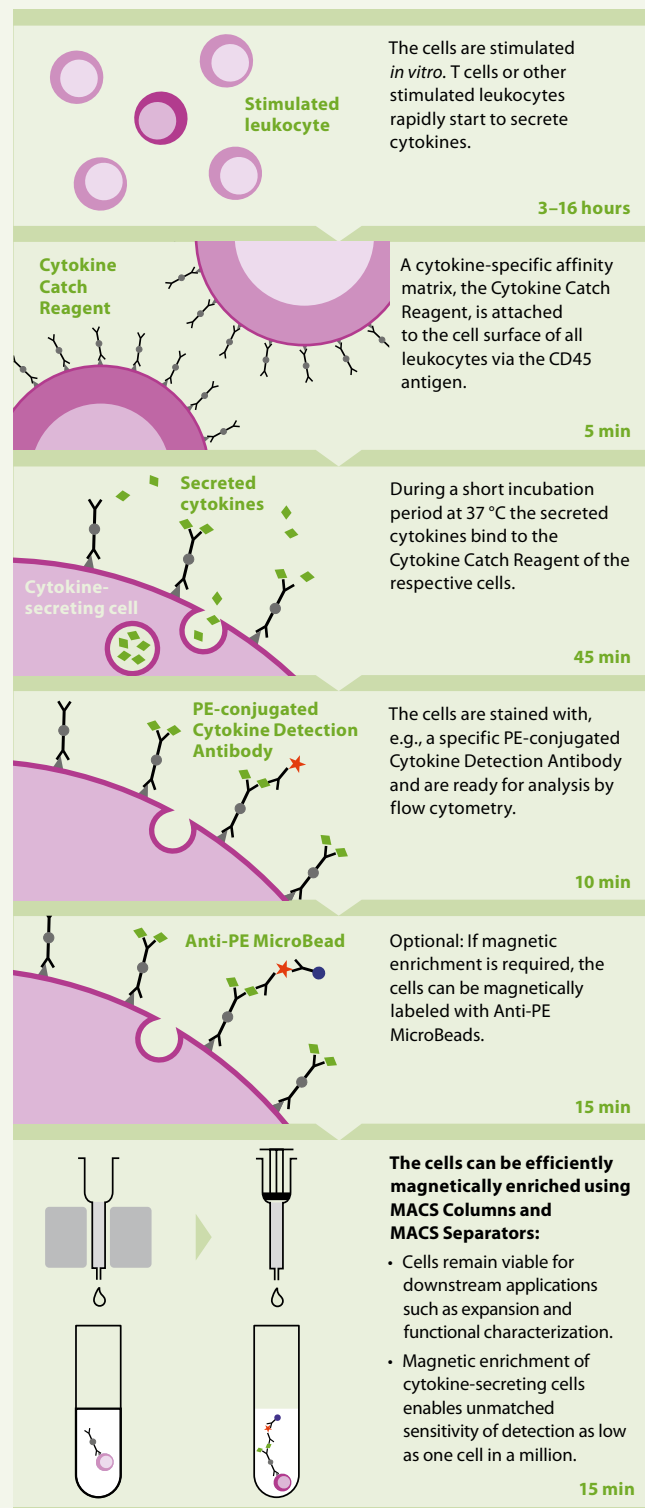


Figure 17: Cytokine secretion assays – the principle

PepTivator® Peptide Pools: more than just a peptide

Activate and expand T cells specifically

PepTivator® Peptide Pools

Antigen-specific stimulation can be achieved with the new **PepTivator Products** from Miltenyi Biotec: high-quality peptide pools for the stimulation of antigen-specific human T cells *in vitro*.

- Effective and specific restimulation of human T cells
- 15-mer peptides with 11-amino acid overlaps to cover the complete sequence
- Available for HCMV (fig. 18), EBV, AdV antigens, and others
- Optimized for stimulation of CD4⁺ and CD8⁺ T cells
- Easy reconstitution: no DMSO required
- Available in two formats for the stimulation of 10⁸ and 10⁹ cells, respectively
- Ongoing development with regular additions to the portfolio

Miltenyi Biotec is proud to introduce **MACS GMP PepTivator Products** manufactured in our dedicated facility in Teterow, Germany under strict GMP-controlled conditions. Products are issued with batch-specific certification to ensure consistency in quality.

- Designed to be used in the development of clinical research applications.
- HCMV pp65 and AdV5 hexon currently available as high-quality GMP products.

HCMV pp65 is also available in the form of **CMV pp65 – Recombinant Protein** that can be used for re-stimulation of antigen-specific T cells.

Please refer to page 22 for a list of selected PepTivator Peptide Pools. For a complete product list, visit www.miltenyibiotec.com/peptivator.

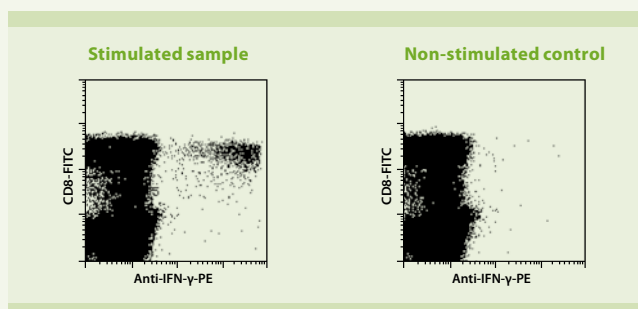


Figure 18: Stimulation of T cells with PepTivator – CMV IE-1. Human PBMCs from a CMV⁺ donor were restimulated for 6 hours with 20 µL/mL of reconstituted PepTivator – CMV IE-1 or incubated without antigen. After 2 hours, 1 µg/mL brefeldin A was added. Cells were fixed, permeabilized, and intracellularly stained with Anti-IFN-γ-PE. T cells were counterstained with CD8-FITC.



Ideal culture conditions for reliable results

Products for T cell stimulation, expansion, and culture

Reliable and reproducible T cell activation and expansion

The MACSiBead Particle is the secret of these highly efficient kits for the homogenous *in vitro* activation and/or expansion of T cells. **Anti-Biotin MACSiBead Particles** loaded with biotinylated antibodies are used to mimic antigen-presenting cells and activate resting T cells from single-cell suspensions. The flexible antibody-binding capacity of Anti-Biotin MACSiBead Particles makes them a valuable user-defined tool for stimulating T cells in culture.

The **T Cell Activation/Expansion Kit, human** and the **T Cell Activation/Expansion Kit, mouse**

- Efficient activation and expansion of CD4⁺ and CD8⁺ T cells in single-cell suspensions (fig. 19)
- Homogenous activation
- Customizable

These kits have been used:

- to differentiate naive and memory T cells in combination with cytokines^{64,65},
- for clonal expansion of cytotoxic T cells⁶⁶.

MACS Cytokines

MACS Cytokines have been optimized for cell culture, differentiation studies, and biological investigations and are available in three different formats.

MACS GMP Cytokines

- GMP manufacturing
- Superior quality and regulatory compliance for clinical research

Premium grade

- Guaranteed purity, greater than 97%
- Endotoxin levels below 1 EU/μg

Research grade

- Sterile-filtered, stringent control standards
- Standard quality for biomedical research laboratories

The biological activity of GMP and premium grade cytokines are calibrated against internationally recognized standards (NIBSC).

Products for the activation and expansion of T cells

Product	Configuration
T Cell Activation/Expansion Kit, human	2 mL, 4×10 ⁸ MACSiBead Particles
	0.4 mL CD2-Biotin
	0.4 mL CD3-Biotin
T Cell Activation/Expansion Kit, mouse	2 mL, 4×10 ⁸ MACSiBead Particles
	0.4 mL CD3-Biotin
	0.4 mL CD28-Biotin

For a comprehensive product list and ordering information refer to pages 21/22. For the complete cytokine portfolio please visit www.miltenyibiotec.com/cytokines.

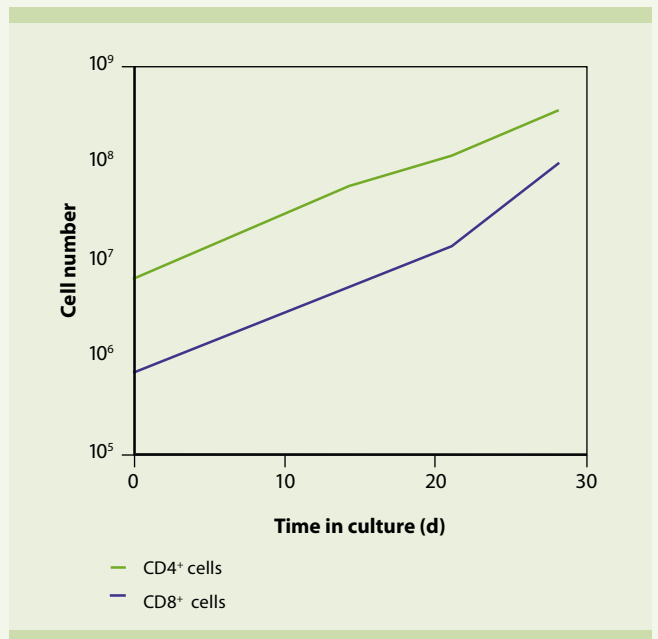


Figure 19: Kinetics of human T cell expansion. Anti-Biotin MACSiBead Particles loaded with CD2, CD3, and CD28 antibodies were used to stimulate PBMCs. Similar expansion rates were observed for CD4⁺ and CD8⁺ T cells during 28 days of co-culture.

References

More than 14,500 studies used Miltenyi Biotec products

Human CD3, CD4, or CD8 MicroBeads (p. 5)

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4. Freeman *et al.* (2010) Cytotoxic potential of lung CD8⁺ T cells increases with chronic obstructive pulmonary disease severity and with *in vitro* stimulation by IL-18 or IL-15. *J. Immunol.* 184: 6504–6513.

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Human CD4⁺, CD8⁺, or Pan T Cell Isolation Kits (p. 5)

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Naive and memory T cell subsets (p. 6)

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18. Fernandez-Sesma *et al.* (2006) Influenza virus evades innate and adaptive immunity via the NS1 protein. *J. Virol.* 80: 6295–6304.

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Mouse CD90.2, CD4 (L3T4), or CD8a (Ly-2) MicroBeads (p. 7)

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References

More than 14,500 studies used Miltenyi Biotec products

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Mouse CD4⁺, CD8⁺, or Pan T Cell Isolation Kits (p. 8)

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26. Miao *et al.* (2009) CD4⁺FOXP3⁺ regulatory T cells confer long-term regulation of factor VIII-specific immune responses in plasmid-mediated gene therapy-treated hemophilia mice. *Blood* 114: 4034–4044.

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Mouse CD4⁺CD62L⁺ T Cell Isolation Kit II (p. 8)

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CD4⁺CD25⁺CD127^{dim/-} Regulatory T Cell Isolation Kit, human (p. 9)

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CD4⁺CD25⁺CD45RA⁺ Regulatory T Cell Isolation Kit, human (p. 9)

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CD25⁺CD49d⁻ Regulatory T Cell Isolation Kit, human (p. 9)

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Treg Suppression Inspector (p. 11)

47. Kleinewietfeld *et al.* (2009) CD49d provides access to “untouched” human Foxp3⁺ Treg free of contaminating effector cells. *Blood* 113: 827–836.

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Mouse CD4⁺CD25⁺ Regulatory T Cell Isolation (p. 12)

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Order information

Place your order by fax, phone, or online!

Products for cell separation: human cells

Product	Capacity	Order no.
CD2 MicroBeads	10 ⁹ total cells	130-091-114
CD3 MicroBeads	10 ⁹ total cells	130-050-101
Whole Blood CD3 MicroBeads	40 mL whole blood	130-090-874
Pan T Cell Isolation Kit	10 ⁹ total cells	130-096-535
CD4 MicroBeads	10 ⁹ total cells	130-045-101
CD4 ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-096-533
Whole Blood CD4 MicroBeads	40 mL whole blood	130-090-877
CD4 MultiSort Kit	10 ⁹ total cells	130-055-101
CD4 ⁺ CD25 ⁺ Regulatory T Cell Isolation Kit	10 ⁹ total cells	130-091-301
CD4 ⁺ CD25 ⁺ CD127 ^{dim/-} Regulatory T Cell Isolation Kit II	10 ⁹ total cells	130-094-775
CD4 ⁺ CD25 ⁺ CD45RA ⁺ Regulatory T Cell Isolation Kit	2×10 ⁹ total cells	130-093-631
CD4 ⁺ CD49d ⁻ Regulatory T Cell Isolation Kit	10 ⁹ total cells	130-094-551
Memory CD4 ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-091-893
Naive CD4 ⁺ T Cell Isolation Kit II	10 ⁹ total cells	130-094-131
CD4 ⁺ Effector Memory T Cell Isolation Kit	10 ⁹ total cells	130-094-125
CD4 ⁺ Central Memory T Cell Isolation Kit	10 ⁹ total cells	130-094-302
CD4 ⁺ Recent Thymic Emigrant Isolation Kit	10 ⁹ total cells	130-094-299
CD6 MicroBeads	10 ⁹ total cells	130-091-264
CD8 MicroBeads	10 ⁹ total cells	130-045-201
CD8 ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-096-495
Whole Blood CD8 MicroBeads	40 mL whole blood	130-090-878
CD8 MultiSort Kit	10 ⁹ total cells	130-055-201
CD8 ⁺ CD57 ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-093-396
Naive CD8 ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-093-244
CD8 ⁺ Memory T Cell Isolation Kit	10 ⁹ total cells	130-094-412
CD8 ⁺ CD45RA ⁺ Effector T Cell Isolation Kit	2×10 ⁹ total cells	130-094-485
CD25 MicroBeads II	10 ⁹ total cells	130-092-983
CD27 MicroBeads	10 ⁹ total cells	130-051-601
CD28 MicroBead Kit	10 ⁹ total cells	130-093-247
CD30 MicroBeads	10 ⁹ total cells	130-051-401
CD45RA MicroBeads	10 ⁹ total cells	130-045-901

Products for cell separation: human cells

Product	Capacity	Order no.
CD45RO MicroBeads	10 ⁹ total cells	130-046-001
CD57 MicroBeads	10 ⁹ total cells	130-092-073
CD62L MicroBeads	10 ⁹ total cells	130-091-758
CD69 MicroBead Kit II	10 ⁹ total cells	130-092-355
CD127 MicroBead Kit	10 ⁹ total cells	130-094-945
CD137 MicroBead Kit	10 ⁹ total cells	130-093-476
CD154 MicroBead Kit	10 ⁹ total cells	130-092-658
CD294 (CRTH2) MicroBead Kit	10 ⁹ total cells	130-091-274
Anti-TCRγ/δ MicroBead Kit	10 ⁹ total cells	130-050-701
TCRγ/δ ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-092-892
Anti-iNKT MicroBeads	2×10 ⁹ total cells	130-094-842
Anti-CLA MicroBead Kit	10 ⁹ total cells	130-092-464
CD4 ⁺ CLA ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-092-435
Double-negative T Cell Isolation Kit	2×10 ⁹ total cells	130-092-614
CD3 ⁺ CD56 ⁺ NKT Cell Isolation Kit	2×10 ⁹ total cells	130-093-064
IFN-γ Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-054-201
IL-2 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-090-488
IL-4 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-054-101
IL-10 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-090-435
IL-17 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-094-542
TNF-α Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-091-269

Products for cell separation: non-human primate cells

Product	Capacity	Order no.
CD2 MicroBeads	10 ⁹ total cells	130-091-113
CD3 MicroBead Kit	10 ⁹ total cells	130-092-012
Pan T Cell Isolation Kit	10 ⁹ total cells	130-091-993
CD4 MicroBeads	10 ⁹ total cells	130-091-102
CD4 ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-092-144
CD4 ⁺ CD25 ⁺ Regulatory T Cell Isolation Kit	10 ⁹ total cells	130-092-984
CD8 MicroBead Kit	10 ⁹ total cells	130-091-112
CD8 ⁺ T Cell Isolation Kit	10 ⁹ total cells	130-092-143
CD25 MicroBeads	10 ⁹ total cells	130-091-095



Products for cell separation: mouse cells

Product	Capacity	Order no.
Pan T Cell Isolation Kit II	10 ⁹ total cells	130-095-130
CD3ε MicroBead Kit	10 ⁹ total cells	130-094-973
CD4 (L3T4) MicroBeads	2×10 ⁹ total cells	130-049-201
CD4 ⁺ T Cell Isolation Kit II	10 ⁹ total cells	130-095-248
CD4 ⁺ CD25 ⁺ Regulatory T Cell Isolation Kit	10 ⁹ total cells	130-091-041
CD4 ⁺ CD62L ⁺ T Cell Isolation Kit II	10 ⁹ total cells	130-093-227
CD5 (Ly-1) MicroBeads	2×10 ⁹ total cells	130-049-301
CD8a (Ly-2) MicroBeads	2×10 ⁹ total cells	130-049-401
CD8a ⁺ T Cell Isolation Kit II	10 ⁹ total cells	130-095-236
CD25 MicroBead Kit	10 ⁹ total cells	130-091-072
CD62L (L-selectin) MicroBeads	2×10 ⁹ total cells	130-049-701
CD90.1 MicroBeads	2×10 ⁹ total cells	130-094-523
CD90.2 MicroBeads	2×10 ⁹ total cells	130-049-101
CD154 Enrichment and Detection Kit	10 ⁹ total cells	130-093-129
TCR γ/δ ⁺ T Cell Isolation Kit	2×10 ⁹ total cells	130-092-125
Mouse IFN-γ Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-090-517
Mouse IL-2 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-090-492
Mouse IL-4 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-090-515
Mouse IL-10 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-090-490
Mouse IL-17 Secretion Assay – Cell Enrichment and Detection Kit	50 tests with 10 ⁷ total cells	130-094-213

Products for cell separation: rat cells

Product	Capacity	Order no.
Anti-T Cell (OX52) MicroBeads	10 ⁹ total cells	130-090-320
CD4 MicroBeads	10 ⁹ total cells	130-090-319
CD8a MicroBeads	10 ⁹ total cells	130-090-318
CD90.1 MicroBeads	2×10 ⁹ total cells	130-094-523
CD134 (OX40) MicroBeads	10 ⁹ total cells	130-090-497
Anti-TCRγ/δ MicroBeads	10 ⁹ total cells	130-090-496

Products for T cell stimulation: human cells

Product	Clone, isotype	Conjugate	Capacity	Order no.
Anti-GITR – functional grade, human	DT5D3, mouse IgG1	pure	0.5 mg in 0.5 mL	130-093-052
Anti-Biotin MACSiBead Particles, cell culture grade			4×10 ⁸ MACSiBead Particles in 2 mL	130-092-357
T Cell Activation/Expansion Kit			4×10 ⁸ MACSiBead Particles in 2 mL	130-091-441
Treg Suppression Inspector			5×10 ⁷ MACSiBead Particles in 2.5 mL	130-092-909
Treg Expansion Kit			4×10 ⁷ MACSiBead Particles in 2 mL	130-095-345
Treg Expansion Kit			8×10 ⁷ MACSiBead Particles in 2×2 mL	130-095-353
CytoStim			200 µL for stimulation of 10 ⁸ total cells	130-092-172
CytoStim			1 mL for stimulation of 5×10 ⁸ total cells	130-092-173
CD2 – functional grade	LT2, mouse IgG2b	Biotin	100 µg in 1 mL	130-093-376
CD3 – functional grade	OKT3, mouse IgG2A	Biotin	100 µg in 1 mL	130-093-377
		pure	100 µg in 1 mL	130-093-387
CD28 – functional grade	15E8, mouse IgG1	Biotin	100 µg in 1 mL	130-093-386
		pure	100 µg in 1 mL	130-093-375
CD40 – functional grade, human	HB14, mouse IgG1	pure	100 µg in 1 mL	130-094-133
CMV pp65 Recombinant Protein			200 µL for stimulation of 10 ⁸ total cells	130-091-824
			2×1 mL for stimulation of 10 ⁹ total cells	130-091-823

For contact details please see back cover.

Order information

Place your order by fax, phone, or online!

Products for T cell stimulation: human cells

Product	6 nmol/peptide for stimulation of 10 ⁸ cells	60 nmol/peptide for stimulation of 10 ⁹ cells
PepTivator Adv5 Hexon	130-093-495	130-093-496
PepTivator CMV IE-1	130-093-493	130-093-494
PepTivator CMV pp65	130-093-438	130-093-435
PepTivator EBV BZLF1	130-093-611	130-093-612
PepTivator EBV EBNA-1	130-093-613	130-093-614
PepTivator EBV LMP1	130-095-930	130-095-931
PepTivator EBV LMP2A	130-094-615	130-094-616
PepTivator HPV16 E6	130-095-997	130-095-998
PepTivator HPV16 E7	130-095-999	130-096-000
PepTivator HPV18 E6	130-096-005	130-096-006
PepTivator HPV18 E7	130-095-996	130-096-007
PepTivator gp100/Pmel17	130-094-449	130-094-450
PepTivator MAGE-A1	130-095-382	130-095-383
PepTivator MAGE-A3	130-095-384	130-095-385
PepTivator MAGE-A4	130-095-386	130-095-387
PepTivator Melan-A/MART-1	130-094-597	130-094-477
PepTivator NY-ESO-1	130-095-380	130-095-381
PepTivator Survivin 1	130-094-444	130-094-443
PepTivator Tyrosinase	130-094-445	130-094-446
PepTivator WT1	130-095-916	130-095-918

Products for T cell stimulation: non-human primate cells

Product	Clone, isotype	Conjugate	Capacity	Order no.
T Cell Activation/Expansion Kit			4×10 ⁸ MACSiBead Particles in 2 mL	130-092-919
CytoStim			200 µL for stimulation of 10 ⁸ total cells	130-094-447
			1 mL for stimulation of 5×10 ⁸ total cells	130-094-442
CD40 – functional grade, human	HB14, mouse IgG1	pure	100 µg in 1 mL	130-094-133

Products for T cell stimulation: mouse cells

Product	Clone, isotype	Conjugate	Capacity	Order no.
Anti-DO11.10 TCR – functional grade	KJ1-26, mouse IgG2a	pure	1 mg in 0.5 mL	130-095-379
Anti-GITR – functional grade	DTA-1, rat IgG2b	pure	1 mg in 0.5 mL	130-092-656
		pure	100 µg in 1 mL	130-092-655
CD3ε – functional grade	145-2C11, hamster IgG1	Biotin	100 µg in 1 mL	130-093-179
		pure	500 µg in 1 mL	130-092-973
CD28 – functional grade	37.51, hamster IgG2	Biotin	100 µg in 1 mL	130-093-183
		pure	100 µg in 1 mL	130-093-182
CD40 – functional grade	FGK45.5, rat IgG2a	pure	1 mg in 0.5 mL	130-093-023
		pure	100 µg in 1 mL	130-093-022
CD127 – functional grade	A7R34, rat IgG2a	pure	1 mg in 0.5 mL	130-094-828
CD279 (PD-1) – functional grade	HA2-7B1, rat IgG2b	pure	500 µg in 1 mL	130-094-944
T Cell Activation/Expansion Kit			4×10 ⁸ MACSiBead Particles in 2 mL	130-093-627
Treg Expansion Kit			1.2×10 ⁸ MACSiBead Particles in 2 mL	130-095-925

Color code for the use of MACS® MicroBeads

- Positive selection (labeling of target cells)
- Depletion (labeling for removal of an unwanted cell type)
- Isolation of untouched cells using a depletion cocktail
- Isolation of cells directly from whole blood
- Sequential separation (combination of depletion of non-target cells and positive selection)

For contact details please see back cover.

Products for the isolation of mouse T cells

Mouse T cells



CD3 ϵ MicroBead Kit
130-094-973
CD90.1 MicroBeads
130-094-523

CD90.2 MicroBeads
130-049-101
CD5 (Ly-1) MicroBeads
130-049-301

Pan T Cell Isolation Kit II
130-095-130

CD4⁺ T cells



CD4 (L3T4) MicroBeads
130-049-201
CD4⁺ T Cell
Isolation Kit II
130-095-248

Treg cells



CD4⁺CD25⁺Regulatory
T Cell Isolation Kit
130-091-041
CD25 MicroBead Kit
130-091-072
CD62L (L-selectin) MicroBeads
130-049-701

CD8⁺ T cells



CD8a (Ly-2) MicroBeads
130-049-401
CD8a⁺ T Cell Isolation Kit II
130-095-236

γ/δ ⁺ T cells



TCR γ/δ ⁺ T Cell Isolation Kit
130-092-125

T cell subsets

Naive CD4⁺ T cells



CD4⁺CD62L⁺
T Cell Isolation Kit II
130-093-227

Memory CD4⁺ T cells



Pre-selection with:
CD4⁺ or CD8⁺
T Cell Isolation Kit II

CD62L (L-selectin)
MicroBeads
130-049-701
CD62L (L-selectin)
MicroBeads
130-049-701

Activated T cells



CD25 MicroBead Kit
130-091-072
CD154 Enrichment
and Detection Kit (PE)
130-093-129

Th1 cells



Mouse IFN- γ Secretion
Assay – Cell Enrichment and
Detection Kit (PE)
130-090-517

Th2 cells



Mouse IL-4 Secretion
Assay – Cell Enrichment
and Detection Kit
(PE) # 130-090-515

Th17 cells



Mouse IL-17 Secretion Assay
– Cell Enrichment and
Detection Kit (PE)
130-094-213

For human T cells see inside front cover.



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