



Miltenyi Biotec

Immune cell activation and expansion



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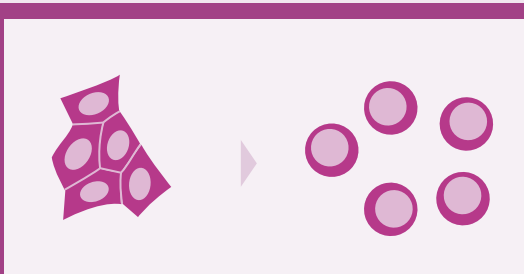
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MACS® Technology

Since its introduction in 1989, MACS® Technology has become the gold standard for cell separation. Nowadays, Miltenyi Biotec stands for

more than cell separation, offering more than 1000 innovative research products for biomedical research and life sciences.

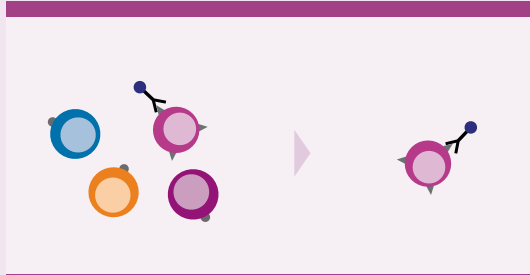
The MACS Research Product portfolio includes instruments and reagents for sample preparation, cell separation, cell analysis, cell culture, and molecular biology.



MACS Sample Preparation

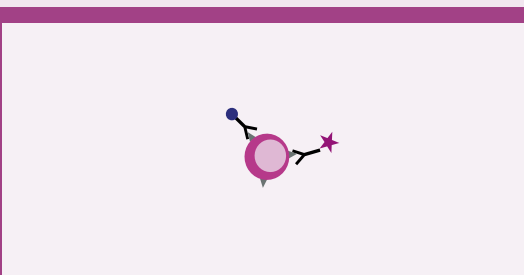
The quality of an experiment strictly depends on the quality of the sample preparation.

Miltenyi Biotec offers innovative instruments and reagents for fast and gentle sample preparation.



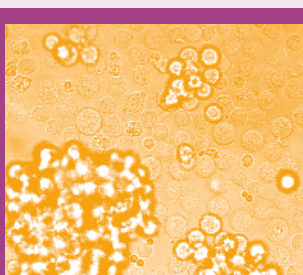
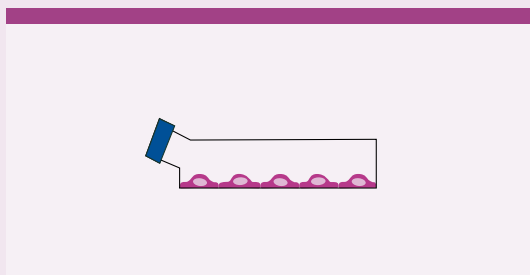
MACS Cell Separation

A large panel of MACS MicroBeads and Cell Isolation Kits is available for the isolation of virtually any cell type. The cells can be separated manually or in an automated fashion. The autoMACS™ Pro Separator has been designed for walk-away cell sorting of multiple samples.



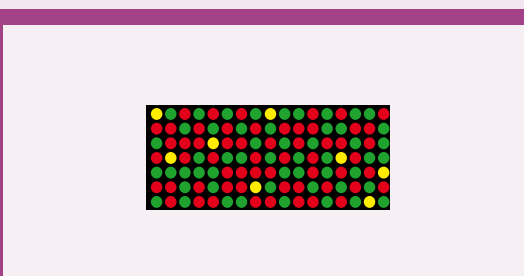
MACS Cell Analysis

Miltenyi Biotec provides a large panel of antibodies for immune cell research. The innovative MACSQuant™ Analyzer is an extremely compact, easy-to-use instrument for multicolor flow cytometric analysis. The MACSQuant™ Analyzer is fully automated and enables absolute cell count.



MACS Cell Culture

The product portfolio for cell culture includes specially developed media, reagents for polyclonal activation and antigen-specific stimulation of T cells, and a multitude of cytokines for various applications.



MACSmolecular

Miltenyi Biotec provides products for analytical protein isolation and detection, mRNA purification and amplification, cDNA synthesis and labeling, microRNA analysis, as well as microarray technologies and instrumentation. The portfolio includes genomics services, such as gene expression and microRNA analysis microarrays, array-CGH, and bioinformatics.

Introduction

Reliable and effective methods for the activation and expansion of immune cells are of great importance for their detailed and accurate downstream analysis. This is particularly important for studies on the function of T cells and natural killer (NK) cells.

Unlike magnetic cell separation with MACS® MicroBeads, separation with larger magnetic particles tends to result in cell activation. Taking advantage of this phenomenon, Miltenyi Biotec has developed large micron-sized particles for cell stimulation—MACSiBead™ Particles.

These particles loaded with appropriate antibodies can be used for T cell activation by mimicking antigen-presenting cells (fig. 1). Moreover, NK cell activation and particularly expansion is accomplished through antibody-mediated crosslinking of activating receptors by antibody-loaded MACSiBead Particles.

Miltenyi Biotec provides a variety of complete kits that are designed for the easy and efficient activation and expansion of T cells (fig. 2) or NK cells.

Furthermore, the flexible antibody loading of MACSiBead Particles allows a wide variety of user-defined cell stimulations.

Miltenyi Biotec also offers unique reagents for both the antigen-independent activation and the stimulation through antigen-dependent mechanisms of human T cells. Polyclonal activation of human T cells can be achieved by the antibody-based reagent CytoStim, which can be used as a positive control to induce cytokine expression or expression of activation markers. Antigen-specific human CD4⁺ and CD8⁺ T cells can be stimulated using recombinant proteins or the PepTivator™ Products—high-quality peptide pools. Additionally, the portfolio includes a broad range of cytokines and growth factors with proven activity and consistent performance to support immune cell culture.

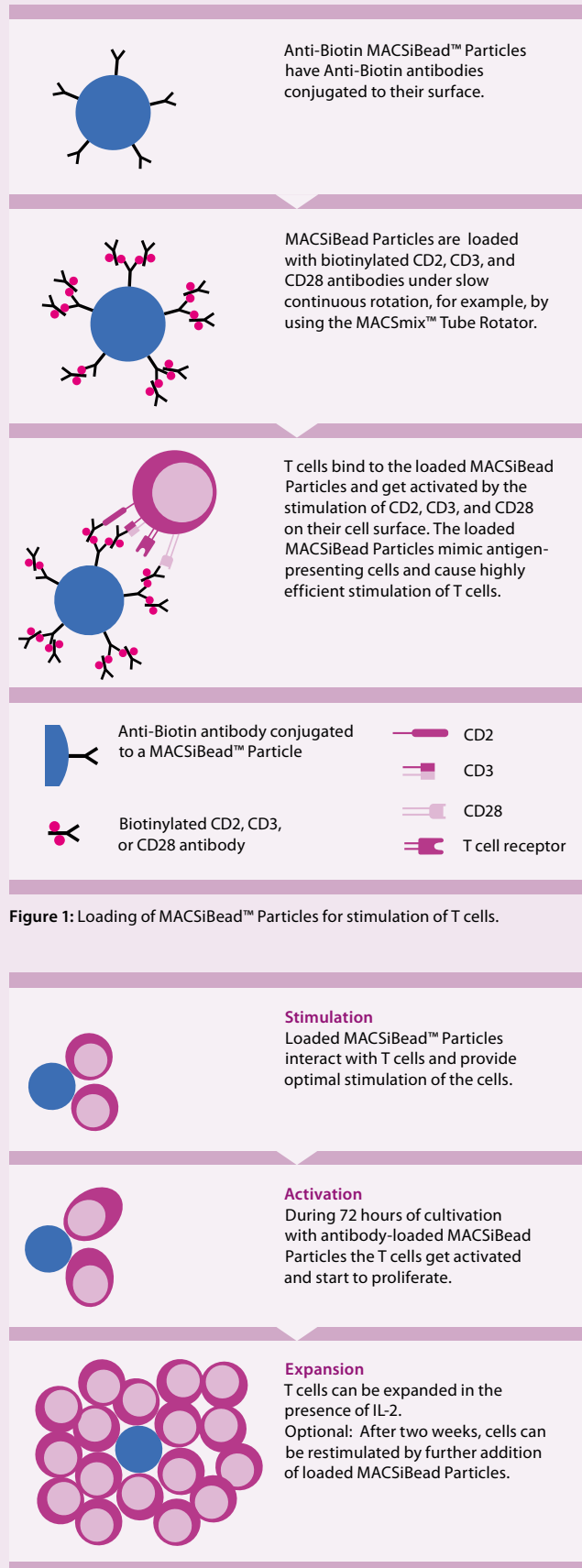


Figure 1: Loading of MACSiBead™ Particles for stimulation of T cells.

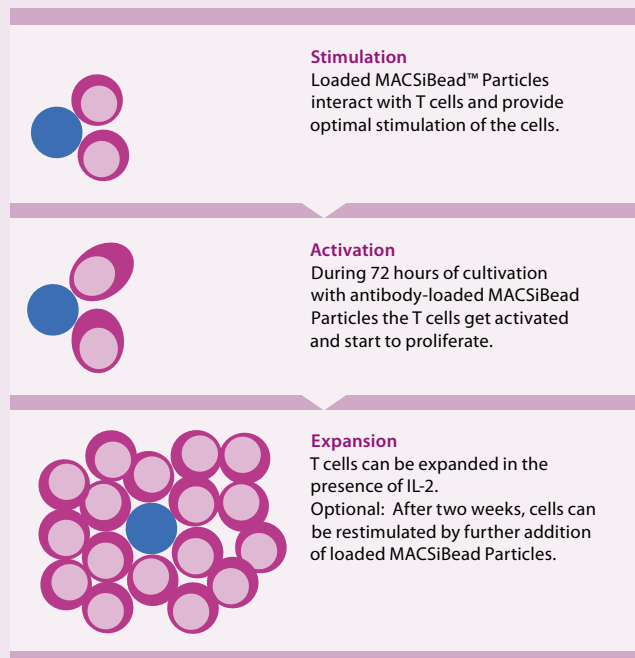


Figure 2: Principle of T cell activation and expansion with loaded MACSiBead Particles

Kits and reagents for cell stimulation

T Cell Activation / Expansion Kits

The T Cell Activation/Expansion Kit, human, is designed for the activation (fig. 3) and, if required, the expansion (fig. 4) of human T cells. The kit consists of Anti-Biotin MACSiBead™ Particles and biotinylated antibodies against human CD2, CD3, and CD28. Anti-Biotin MACSiBead Particles, loaded with biotinylated antibodies, are used to mimic antigen-presenting cells and activate resting T cells from PBMCs as well as purified T cells or Jurkat cells. T cell expansion is achieved by culturing and restimulation at day 14 of culture.

T Cell Activation and Expansion Kits are also available for non-human primate and mouse cells.

The T Cell Activation/Expansion Kit has been used for the activation of T cells prior to transduction¹, for downstream analysis of activated T cells², stimulation of naive T cells and investigation of their differentiation³, as well as for studies of the differential expression of EB13 in T cells upon *in vitro* stimulation⁴.

References

1. Urnov, F. D. *et al.* (2005) *Nature* 435: 646–651.
2. Lecureuil, C. *et al.* (2007) *Blood* 109: 3649–3657.
3. Acosta-Rodriguez, E. V. *et al.* (2007) *Nat. Immunol.* 8: 639–646.
4. Bardel *et al.* (2008) *J. Immunol.* 181: 6898–6905.

Product	Order no.
T Cell Activation/Expansion Kit, human	130-091-441
T Cell Activation//Expansion Kit, non-human primate	130-092-919
T Cell Activation and Expansion Kit, mouse	130-093-627

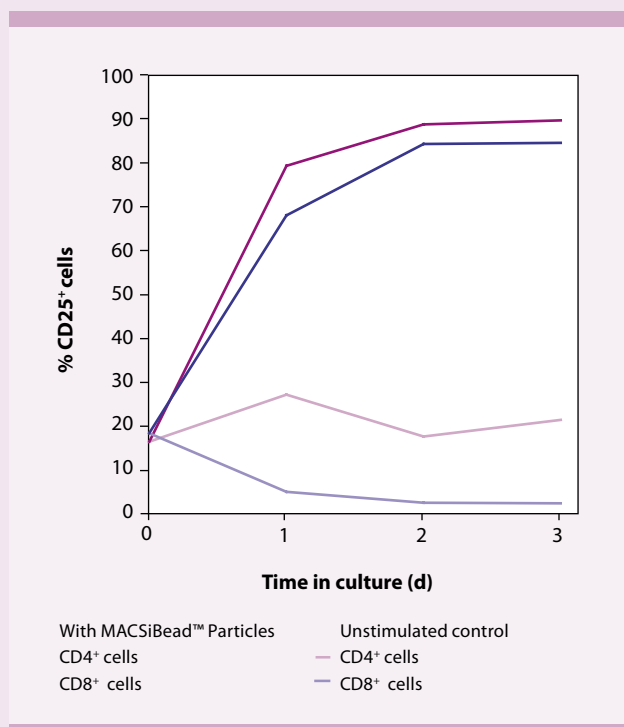


Figure 3: Kinetics of T cell activation was monitored during 72 hours of culture in the presence or absence of Anti-Biotin MACSiBead Particles loaded with biotinylated CD2, CD3, and CD28 antibodies. The expression of CD25 on human CD4⁺ and CD8⁺ T cells was analyzed by flow cytometry.

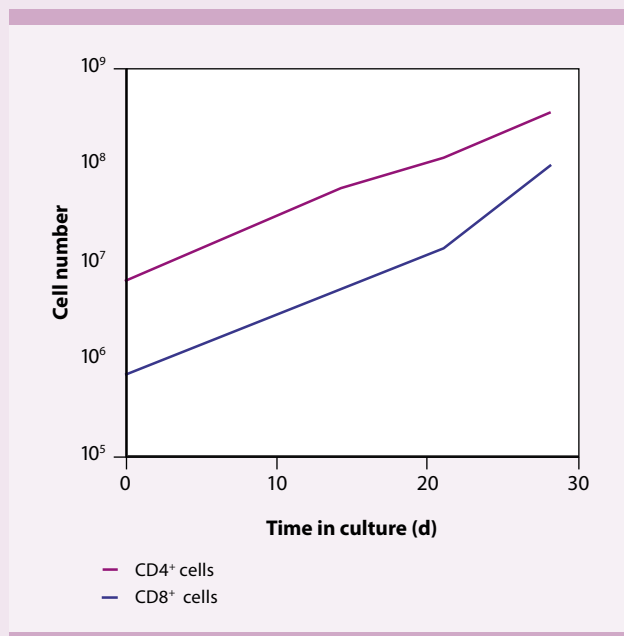


Figure 4: Kinetics of human T cell expansion was monitored during 28 days of co-culture with antibody-loaded Anti-Biotin MACSiBead Particles.

Kits and reagents for cell stimulation

Functional analysis of human Treg cells—the Treg Suppression Inspector

The Treg Suppression Inspector, human, allows the functional characterization of isolated human Treg cells by *in vitro* suppression assays. It is based on Anti-Biotin MACSiBead™ Particles that are optimally loaded with biotinylated CD2, CD3, and CD28 antibodies to be used as T cell stimulation reagent in Treg cell suppression assays¹⁻³. Culture of responder T cells (Tresp cells; CD4⁺CD25⁻ or CD4⁺ T cells) alone, in the presence of the Treg Suppression Inspector leads to proliferation of Tresp cells, whereas Treg cells alone show no significant proliferation. Coculture of Treg cells with Tresp cells in the presence of the Treg Suppression Inspector results in reduced proliferation of Tresp cells due to the suppressive function of Treg cells.

References

1. Stasi, R. *et al.* (2008) *Blood* 112: 1147–1150.
2. Beswick, E. J. *et al.* (2007) *Infect. Immun.* 75: 4334–4341.
3. Kleinewietfeld, M. *et al.* (2009) *Blood* 113: 827–836.

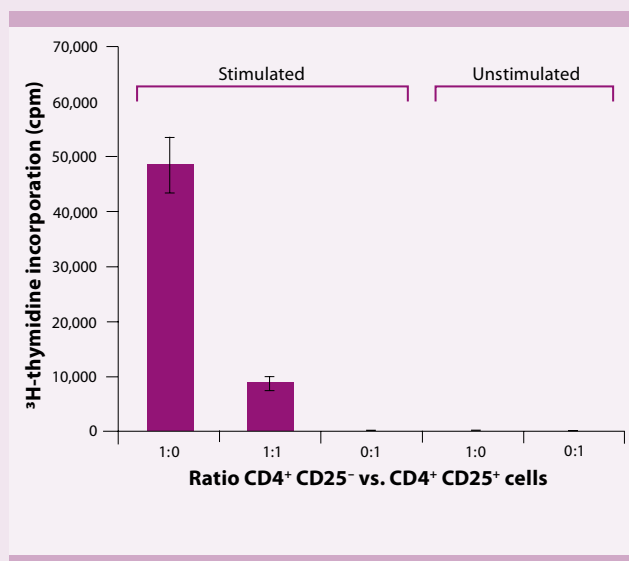


Figure 5: Treg suppression assay using the Treg Suppression Inspector. Human Treg cells, isolated with the CD4⁺CD25⁺ Regulatory T Cell Isolation Kit, human, were cocultured with CD4⁺CD25⁻ Tresp cells at different ratios. For T cell stimulation, the Treg Suppression Inspector was added to the culture. As controls, Treg and Tresp cells alone were cultured without any stimulus. Proliferation of T cells was determined by measuring ³H-thymidine incorporation.

Customized solutions for cell stimulation—Anti-Biotin MACSiBead™ Particles combined with antibodies for *in vitro* T cell activation

The flexible antibody loading of MACSiBead™ Particles makes them a valuable tool for user-defined cell stimulations. Anti-Biotin MACSiBead Particles, cell culture grade, in combination with selected biotinylated functional grade antibodies can be used to effectively stimulate human T cells. Using the appropriate antibodies, Anti-Biotin MACSiBead Particles also allow the stimulation of cells from the species of your choice.

A number of antibodies, for example, against CD3 and CD28, are available for cell culture and functional assays. In combination with the Anti-Biotin MACSiBead Particles the biotinylated antibodies are well-suited for activation and expansion of human or mouse T cells.

The reagents are free of azide and preservatives and endotoxin levels are below 0.01 ng/μg of protein.

Product	Conjugate	Size	Order no.
Anti-Biotin MACSiBead Particles, cell culture grade	n/a	2 mL	130-092-357
CD2 – functional grade, human	Biotin	100 μg in 1 mL	130-093-376
CD3 – functional grade, human	Biotin	100 μg in 1 mL	130-093-377
	pure	100 μg in 1 mL	130-093-387
CD28 – functional grade, human	Biotin	100 μg in 1 mL	130-093-386
	pure	100 μg in 1 mL	130-093-375
CD3ε – functional grade, mouse	Biotin	100 μg in 1 mL	130-093-179
	pure	500 μg in 1 mL	130-092-973
CD28 – functional grade, mouse	Biotin	100 μg in 1 mL	130-093-183
	pure	100 μg in 1 mL	130-093-182

Product	Order no.
Treg Suppression Inspector, human	130-092-909

NK Cell Activation / Expansion Kit

For activation of resting NK cells, the cells are usually cultured in medium supplemented with IL-2. This is sufficient for activation, but fails to significantly trigger proliferation. To overcome this drawback, Miltenyi Biotec has developed the new NK Cell Activation/Expansion Kit, human. The kit is based on antibody-loaded MACSiBead™ Particles, which lead to cross-linking of activating NK cell receptors. Efficient activation and expansion of human NK cells using the kit is easy: NK cells are incubated with MACSiBead Particles loaded with antibodies against CD2 and CD335(NKp46). No feeder cells or cell lines are required. Expansion rates of more than 100-fold within 3 weeks are possible, while standard procedures using IL-2 alone result in expansion rates of only 10- to 30-fold. NK cells expanded by using the NK Cell Activation/Expansion Kit can be used for a variety of applications, including evaluation of cytolytic activity, studies on gene expression, or functional studies.

Product	Order no.
NK Cell Activation/Expansion Kit, human	130-094-483

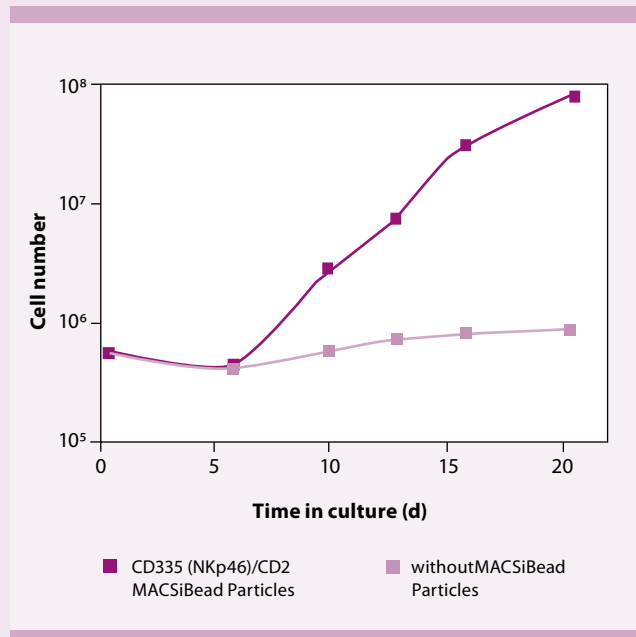


Figure 6: Kinetics of NK cell expansion. Anti-Biotin MACSiBead Particles were loaded with biotinylated CD2 and CD335 (NKp46) antibodies. NK cells were isolated using the NK Cell Isolation Kit, human, and expanded using one loaded Anti-Biotin MACSiBead Particle per two NK cells. NK cells were cultured in medium supplemented with 10% FCS and 500 IU/mL rIL-2 at an initial density of 10⁶ NK cells per mL. Cells were expanded for 3 weeks. For comparison, NK cells were cultured in medium supplemented with 10% FCS and 500 IU/mL rIL-2 alone.

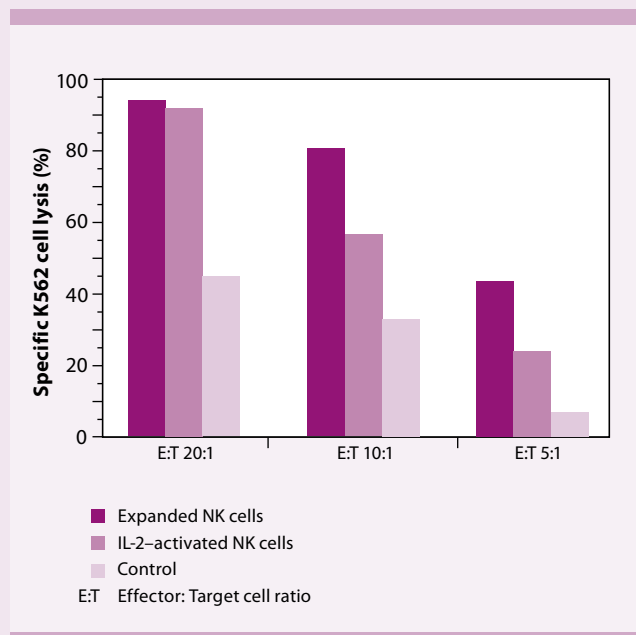


Figure 7: Cytotoxicity assay using purified human NK cells that were activated and expanded using the NK Cell Activation/Expansion Kit. After 2 weeks of culture in medium supplemented with 10% FCS and 500 IU/mL rIL-2, cytotoxicity of NK cells was determined by incubation with K562 target cells at different ratios. In addition, cells incubated in medium supplemented with 10% FCS and 500 IU/mL rIL-2 alone (IL-2-activated NK cells) and freshly isolated NK cells (control) were analyzed. Specific target cell lysis by NK cells was determined after 4 hours.

Kits and reagents for cell stimulation

CytoStim for polyclonal T cell stimulation

CytoStim is a non-toxic reagent that can be conveniently used as a positive control in T cell stimulation experiments. CytoStim is an appropriate alternative for, e.g., SEB and has been developed for the rapid and efficient restimulation of human effector/memory T cells. It is a bispecific antibody that acts in a similar fashion as a superantigen but independently of certain V β domains of the T cell receptor (TCR). It causes activation of T cells by cross-linking TCRs to MHC molecules of antigen-presenting cells (CD3–MHC class II). Upon stimulation with CytoStim, CD4⁺ and CD8⁺ T cells secrete cytokines or express activation markers on their cell surface within a few hours. Therefore, CytoStim is an excellent positive control for intracellular cytokine staining experiments or assays for antigen-specific T cell stimulation. CytoStim is suitable for rapid stimulation of T cells in fresh PBMCs, whole blood, or other leukocyte-containing single-cell suspensions from tissues.

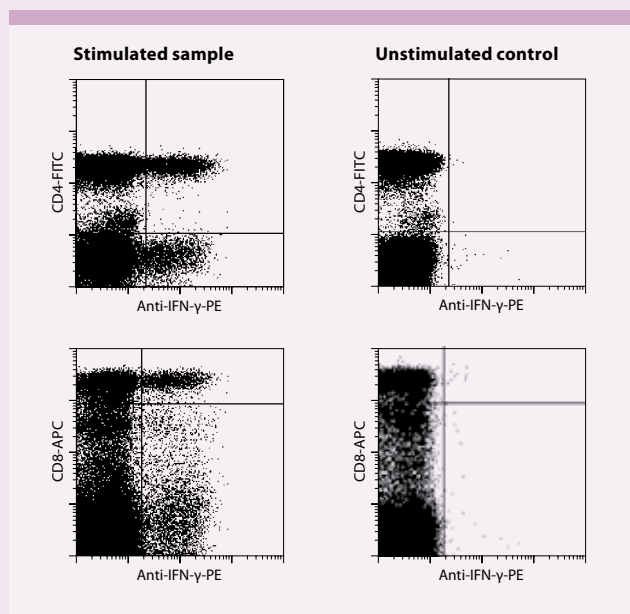


Figure 8: Human PBMCs were stimulated with CytoStim for 1 hour and stained according to their secretion of IFN- γ using the IFN- γ Secretion Assay – Detection Kit. T cells were counterstained with CD4-FITC or CD8-APC.

Product	Size	Order no.
Cytostim, human	200 μ L	130-092-172
	1 mL	130-092-173

Antigen-specific T cell stimulation

Miltenyi Biotec offers a number of tools for the efficient antigen-specific stimulation of human T cells: recombinant CMV pp65 or peptide pools for various antigens.

CMV pp65 – Recombinant Protein

CMV pp65 – Recombinant Protein is designed for restimulation of antigen-specific T cells in order to detect and analyze human pp65-specific CD4⁺ and CD8⁺ effector/memory T cells by MACS[®] Cytokine Secretion Assays, intracellular cytokine staining, or other techniques.

Further applications for the restimulation of cells using CMV pp65 – Recombinant Protein include:

- isolation of viable pp65-specific CD4⁺ and CD8⁺ T cells, using MACS Cytokine Secretion Assay – Cell Enrichment and Detection Kits,
- generation of pp65-specific CD4⁺ and CD8⁺ effector/memory T cells from naive T cell populations, e.g., for research on immunotherapy and vaccination,
- pulsing of antigen-presenting cells, e.g., for research on dendritic cell vaccination as well as for research on antigen delivery by antigen-presenting cells.

Product	Capacity	Order no.
CMV pp65 – Recombinant Protein, human	200 μ L for 10 ⁸ total cells	130-091-824
	2x1 mL for 10 ⁹ total cells	130-091-823

PepTivator™ Peptide Pools

The PepTivator™ Products — high-quality peptide pools — consist of 15-mer peptides with 11-amino acid (aa) overlap covering the complete sequence of the respective antigen, for example, the CMV proteins pp65 and IE-1. PepTivator Peptide Pools are designed for efficient *in vitro* stimulation of antigen-specific CD4⁺ and CD8⁺ T cells, as peptides of 15-aa length with 11-aa overlap represent an optimized solution for stimulating both CD4⁺ and CD8⁺ T cells in various applications.¹ State-of-the-art peptide synthesis and rigorous quality control of the product make for a reliable tool for T cell activation. PepTivator Peptide Pools can be used in experiments that require the detection, analysis, and isolation of viable antigen-specific CD4⁺ and CD8⁺ T cells. Moreover, antigen-specific CD4⁺ and CD8⁺ effector/memory T cells can be generated from naive T cell populations. The response of antigen-specific T cells can be easily monitored with various cell analysis and isolation tools, for example, MACS® Cytokine Secretion Assays or antibodies and kits for intracellular cytokine staining.

PepTivator Peptide Pools—features at a glance:

- Optimized for the stimulation of CD4⁺ and CD8⁺ T cells
- Covering the complete sequence of the respective antigen
- Easy reconstitution—no DMSO required
- Convenient combination with MACS® Products for the analysis and isolation of antigen-specific T cells

Reference

1. Kiecker *et al.* (2004) Hum. Immunol. 65: 523–536.

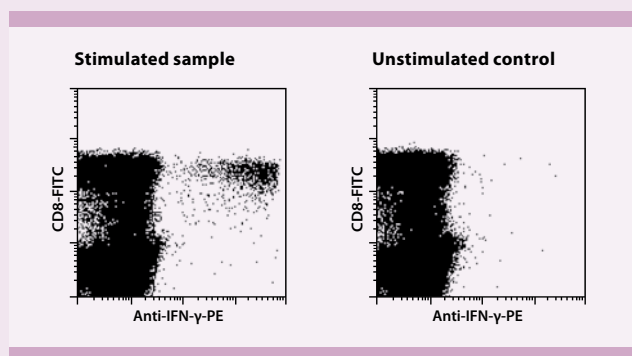


Figure 9: Human PBMCs from a CMV⁺ donor were restimulated for 6 hours with 20 μ L/mL of reconstituted PepTivator – CMV IE-1 or incubated without antigen. After 2 hours, 1 μ g/mL brefeldin A was added. Cells were fixed, permeabilized, and intracellularly stained with Anti-IFN- γ -PE. T cells were counterstained with CD8-FITC.

Product	Capacity	Order no.
PepTivator CMV pp65, human	6 nmol/peptide	130-093-438
	60 nmol/peptide	130-093-435
PepTivator CMV IE-1, human	6 nmol/peptide	130-093-493
	60 nmol/peptide	130-093-494
PepTivator Adv5 Hexon, human	6 nmol/peptide	130-093-495
	60 nmol/peptide	130-093-496
PepTivator EBV EBNA-1, human	6 nmol/peptide	130-093-613
	60 nmol/peptide	130-093-614
PepTivator EBV BZLF1, human	6 nmol/peptide	130-093-611
	60 nmol/peptide	130-093-612
PepTivator EBV LMP2A, human	6 nmol/peptide	coming soon
	60 nmol/peptide	coming soon
PepTivator Melan-A/MART-1, human	6 nmol/peptide	130-094-597
	60 nmol/peptide	130-094-477
PepTivator Survivin 1, human	6 nmol/peptide	130-094-444
	60 nmol/peptide	130-094-443
PepTivator gp100/pmel 17, human	6 nmol/peptide	130-094-449
	60 nmol/peptide	130-094-450
PepTivator Tyrosinase, human	6 nmol/peptide	coming soon
	60 nmol/peptide	coming soon

PepTivator™ Products are available in two formats, 6 nmol/peptide and 60 nmol/peptide, suitable for the stimulation of 10⁸ and 10⁹ cells, respectively.

The PepTivator Product portfolio will be continuously expanded. For the most recent additions, visit www.miltenyibiotec.com.

MACS® Cytokines and Growth Factors

Cytokines and Growth Factors for numerous applications

Miltenyi Biotec provides a broad portfolio of cytokines, growth factors, and related proteins. These high-quality products are well-suited for various applications, such as cell culture, differentiation studies, and biological assays. Selected human cytokines and growth factors are available in premium-grade as well as in research-grade quality.

Product	Content	Source	Order no.
Human IL-2, research grade	5 µg	<i>E. coli</i>	130-093-901
	50 µg	<i>E. coli</i>	130-093-903
Human IL-2 (v126), research grade	5 µg	<i>E. coli</i>	130-093-906
	50 µg	<i>E. coli</i>	130-093-907
Human IL-12, research grade	2 µg	CHO cells	130-093-951
	10 µg	CHO cells	130-093-952
Human IL-15, research grade	10 µg	<i>E. coli</i>	130-093-955
	100 µg	<i>E. coli</i>	130-093-956
	1000 µg	<i>E. coli</i>	130-093-957
Human TGF-β1, research grade	5 µg	<i>E. coli</i>	130-094-002
Human TNF-α, research grade	10 µg	Yeast	130-094-015
	50 µg	Yeast	130-094-017
	100 µg	Yeast	130-094-018
	750 µg	Yeast	130-094-019
	1000 µg	Yeast	130-094-020
Human TNF-α, premium grade	10 µg	Yeast	130-094-022
	50 µg	Yeast	130-094-023
	100 µg	Yeast	130-094-024
	1000 µg	Yeast	130-094-562
Human TNF-α, premium grade	10 µg	<i>E. coli</i>	130-094-014
Mouse IL-2	5 µg	<i>E. coli</i>	130-094-054
	20 µg	<i>E. coli</i>	130-094-055

For an overview on the complete portfolio, please visit www.miltenyibiotec.com/cytokines

Molecular analysis of immune cells

Miltenyi Biotec has developed numerous unique products and services for the molecular analysis of immune cell function, allowing:

- reliable analysis of mRNA and microRNA expression,
- protein isolation as well as analysis of protein expression and interaction.

MACSmolecular genomics services offer the expertise to provide mRNA or microRNA expression profiles or CGH patterns within just a few weeks, without the need to establish the technology in-house

RNA expression analysis

mRNA expression analysis

Miltenyi Biotec offers a variety of products for gene expression analysis—regardless of whether the analysis is performed at a single-gene level via PCR or for a multitude of genes in parallel using microarrays.

The unique in-column cDNA synthesis avoids precipitation steps and minimizes sample pipetting. Therefore, the loss of mRNA and cDNA is significantly reduced, ultimately resulting in a higher sensitivity of the analysis by PCR.

Based on the same technology, Miltenyi Biotec also offers kits for mRNA purification, cDNA labeling, as well as T7-based linear mRNA amplification.

This portfolio is complemented by the PIQOR™ Microarray Kits for topic-defined or customized gene expression analysis, e.g., the PIQOR Immunology Microarray Kit¹.

microRNA expression analysis

microRNAs are key regulators for mRNA translation and play an essential role for a large variety of developmental processes including immune cell development.

The miRXplore™ Microarray platform was developed in collaboration with leading scientists in the field of RNAi and allows the reliable expression analysis of mammalian microRNAs including viral sequences.

Protein immunoprecipitation and protein interaction analysis

Any protein can be magnetically labeled with μMACS™ MicroBeads, if an epitope tag, such as His, HA, c-myc, GST, or GFP, or a specific antibody is available. Magnetic labeling enables in-column protein assays and analytical-scale purification. Analyses of interacting proteins such as transcription factors or molecular complexes as well as display technologies are significantly accelerated.

Genomics services for immune cell research

A comprehensive set of genomics services, covering DNA, mRNA, and microRNA microarray analyses is available. Both, microarrays developed in-house as well as the Agilent Microarray Platforms are employed. Reliable support is provided by a strong bioinformatics service group. Highly sensitive gene expression analysis—down to the single cell level—of rare immune cell populations is possible through the unique SuperAmp™ RNA Amplification Service. Ready-to-publish data are delivered within only a few weeks after receiving the sample.

Products and services	Order no.
μMACS mRNA Isolation Kit – Small Scale	130-075-201
μMACS mRNA Isolation Kit – For Total RNA	130-075-102
μMACS One-step cDNA Kit	130-091-902
SuperAmp Service ²	160-000-936
PIQOR Immunology Microarray Kits, human, antisense ¹	130-091-708 (4 microarrays) 130-091-697 (8 microarrays)
PIQOR Immunology Microarray Kits, mouse, antisense ¹	130-091-701 (4 microarrays) 130-091-702 (8 microarrays)
Immunology Microarray Service Plus Amplification	160-000-680 (human) 160-000-678 (mouse)
miRXplore™ Microarray Kit	130-093-254 (4 microarrays) 130-093-272 (8 microarrays)
miRXplore Microarray Service	160-001-143
miRXplore Microarray Universal Reference Service (UR)	160-001-161

¹ PIQOR Microarray Kits are not available in the US and Canada.

² In combination with gene expression profiling services only. SuperAmp Service is not applicable for microRNA amplification.

For the complete MACSmolecular portfolio, please visit www.miltenyibiotec.com

Related Products

Product for cell separation	Separation strategy	Order no.
Human cells		
CD4 MicroBeads	Positive selection	130-045-101
CD4 ⁺ T Cell Isolation Kit II	Untouched isolation	130-091-155
CD8 MicroBeads	Positive selection	130-045-201
CD8 ⁺ T Cell Isolation Kit	Untouched isolation	130-094-156
Pan T Cell Isolation Kit II	Untouched isolation	130-091-156
CD3 ⁺ CD56 ⁺ NKT Cell Isolation Kit	Depletion and positive selection	130-093-064
Naive CD4 ⁺ T Cell Isolation Kit II	Untouched isolation	130-094-131
Naive CD8 ⁺ T Cell Isolation Kit	Depletion and positive selection	130-093-244
NK Cell Isolation Kit	Untouched isolation	130-092-657
CD56 MicroBeads	Positive selection	130-050-401
CD4 ⁺ CD25 ⁺ Regulatory T Cell Isolation Kit	Depletion and positive selection	130-091-301
CD4 ⁺ CD25 ⁺ CD127 ^{dim/-} Regulatory T Cell Isolation Kit	Depletion and positive selection	130-093-337
CD4 ⁺ CD25 ⁺ CD45RA ⁺ Regulatory T Cell Isolation Kit	Depletion and positive selection	130-093-631
CD137 MicroBead Kit	Positive selection	130-093-476
CD154 MicroBead Kit	Positive selection	130-092-658
Non-human primate cells		
CD3 MicroBead Kit	Positive selection	130-092-012
CD4 MicroBeads	Positive selection	130-091-102
CD4 ⁺ T Cell Isolation Kit	Untouched isolation	130-092-144
CD8 MicroBead Kit	Positive selection	130-091-112
CD8 ⁺ T Cell Isolation Kit	Untouched isolation	130-092-143
Pan T Cell Isolation Kit	Untouched isolation	130-091-993
Mouse cells		
CD4 (L3T4) MicroBeads	Positive selection	130-049-201
CD4 ⁺ T Cell Isolation Kit	Untouched isolation	130-090-860
CD8a (Ly-2) MicroBeads	Positive selection	130-049-401
CD8a ⁺ T Cell Isolation Kit	Untouched isolation	130-090-859
CD90.2 MicroBeads	Positive selection	130-049-101
Pan T Cell Isolation Kit	Untouched isolation	130-090-861

Cytokine Secretion Assays	Order no. Cell Enrichment and Detection Kit	Order no. Detection Kit
Human cells		
IFN- α Secretion Assay	(PE) 130-092-605	(PE) 130-094-161
Large scale IFN- γ Secretion Assay – Enrichment Kit	130-091-329	
IFN- γ Secretion Assay	(PE) 130-054-201	(FITC) 130-090-433 (PE) 130-054-202 (APC) 130-090-762
IL-2 Secretion Assay	(PE) 130-090-488	(PE) 130-090-487 (APC) 130-090-763
IL-4 Secretion Assay	(PE) 130-054-101	(PE) 130-054-102
IL-5 Secretion Assay	(PE) 130-091-622	(PE) 130-091-623 (APC) 130-091-624
IL-10 Secretion Assay	(PE) 130-090-435	(PE) 130-090-434 (APC) 130-090-761
IL-12 Secretion Assay	(PE) 130-092-122	(PE) 130-092-124
IL-13 Secretion Assay	(PE) 130-093-480	(PE) 130-093-479
IL-17 Secretion Assay	(PE) 130-094-542	(PE) 130-094-537 (APC) 130-094-536
TNF- α Secretion Assay	(PE) 130-091-269	(PE) 130-091-268 (APC) 130-091-267
Mouse cells		
Mouse IFN- γ Secretion Assay	(PE) 130-090-517	(PE) 130-090-516 (APC) 130-090-984
Mouse IL-2 Secretion Assay	(PE) 130-090-492	(PE) 130-090-491 (APC) 130-090-987
Mouse IL-4 Secretion Assay	(PE) 130-090-515	(PE) 130-090-479
Mouse IL-5 Secretion Assay	(PE) 130-091-175	(PE) 130-091-166 (APC) 130-091-174
Mouse IL-10 Secretion Assay	(PE) 130-090-490	(PE) 130-090-489
Mouse IL-17 Secretion Assay	(PE) 130-094-213	(PE) 130-094-205 (APC) 130-094-207
Product		
MACSmix Tube Rotator		130-090-753
MACSiMAG Separator		130-090-753



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