Miltenyi Biotec

CLICKABLE PRODUCT NUMBERS

# MACS® Cell Culture Reagents

## Product list

January 1, 2025



miltenyibiotec.com/cellculture

# Important notices

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**MACS® GMP Products are for *ex vivo* cell culture processing only, and are not intended for human *in vivo* applications.For regulatory status in the USA, please contact your local representative. MACS GMP Products are manufactured and tested under a quality system certified to ISO 13485 and are in compliance with relevant GMP guidelines. They are designed following the recommendations of USP <1043> on ancillary materials.**

# Table of contents

# Culture is key

**Miltenyi Biotec is a global provider of products and services that advance biomedical research and cellular therapy. Our integrated tools support research at every level, from basic to translational research and clinical settings. As a leader in regenerative medicine and immunotherapy, we recognize the importance of high-quality cytokines and cell culture reagents for the reliable expansion, stimulation, and differentiation of target cells.**

**Our cell culture and stimulation portfolio offers a specialized and versatile range of cell culture media and reagents for the work with human and mouse cells, including immune, stem, and neural cells. Small molecules and reprogramming reagents are available for stem cell research.**

# Up to MACS® GMP Grade

**One of the keys for the successful translation of scientific discovery into clinical application is the necessity for high-quality data right from the beginning. We understand how important it is for you to be able to reach this level consistently and reproducibly. To achieve this, Miltenyi Biotec has developed a spectrum of products for all aspects of translational research that allows you to go from bench to bedside without unnecessary, time-consuming, and expensive extra rounds. As an example, a project can start with our premium-grade products for research use only, and move seamlessly to MACS® GMP Grade, which would be the most adequate grade for, e.g., the development of a cellular therapy to be tested in the clinic. This approach helps to accomplish a truly smooth and seamless translation.**

**Premium-grade products share major characteristics with MACS GMP Products, such as identical protein sequence, same formulation, and hence very similar performance.**

# Turn cell therapies into clinical reality with MACS® GMP Products

**The success of your cellular products depends on the quality of the raw materials. MACS® GMP Products are designed for ex vivo processing of human cells and are manufactured in compliance with relevant GMP guidelines. The quality of raw or ancillary materials used for the manufacture of cell-based and gene therapy products needs to meet strict regulatory specifications in order to ensure quality, safety, and efficacy of the final product.**

## Available MACS® GMP Products

- Media
- Cytokines
- Antigens
- T cell activation and expansion tools

# MACS® GMP

## Production

- ISO 13485 quality management system
- Qualified equipment and personnel
- Vendor qualification of raw materials

## Filling / Lyophilization

- Automated and aseptic filling
- Clean room environment (class A isolator)

## Quality control

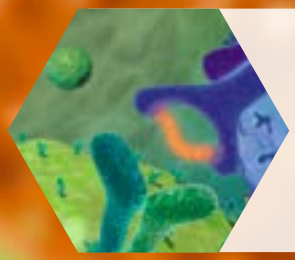
- Extensive stability studies
- Functionality testing
- Tested to regulatory standards
  USP <1043>, EP 26.4; 5.2.12

## Final products

- High lot-to-lot consistency
- Regulatory support
- Lot-specific Product Quality Certificate (PQC; former CoA)

# Cell culture is key for efficient and reliable research

Cell culture is a crucial part of many research applications. Therefore, it is important to implement standardized and proven methods for the best treatment of your target cells. Miltenyi Biotec's cell culture and stimulation portfolio offers a specialized and versatile range of cell culture media and reagents for the stimulation, expansion, and differentiation of human and mouse cells, including immune, stem, and neural cells.



## PepTivator® Peptide Pools

- **Antigen-specific stimulation of CD4+ and CD8+ T cells**
- **Easy reconstitution and handling**
- **15-mer peptides with 11-amino-acid overlaps**

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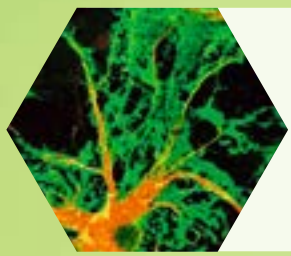
## StemMACS™ Small Molecules

- **Chemically defined**
- **Highly pure**
- **Ready-to-use in solution**

## StemMACS™ mRNA Transfection

- **High-level expression**
- **Efficient, lipid-based, transfection into various cell types**
- **Fast and easy protocols**



## Cell culture media

- Serum free
- Specialized media for primary cells
- High-quality growth factors

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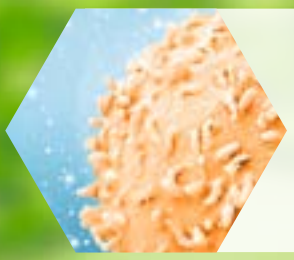
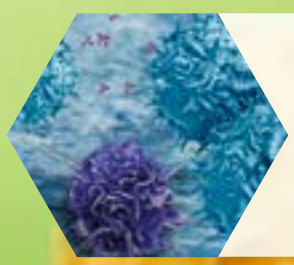


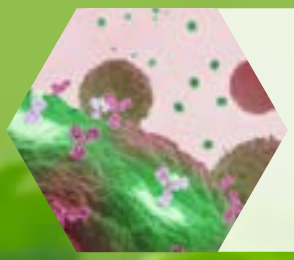
## Polyclonal stimulation reagents

- T Cell TransAct™ CD3/CD28 Polymeric Nanomatrix
- MACSiBead™-based T Cell Activation / Expansion Kits
  CytoStim™ TCR/MHC Crosslinking Reagent



## TLR ligands

- Stimulation of human and murine immune cells
- Potent ligands for high specificity
- Tested rigorously for purity and functionality



## MACS® Premium-Grade Cytokines

- Lot-specific activity
- High reproducibility
- Flexible custom production

# FAQs Highlights – MACS® Cell Culture Reagents

**What does xeno-free stand for?**

The term xeno-free or xenogeneic-free (XF) refers to the absence of any "foreign" component, relative to the native species you are working with, within the cell culture media formulation. For example, a designated XF medium for human cell lines contains human-derived components, such as human serum. It would be free of components like fetal bovine serum or growth factors from other species.

**What is the definition of "animal component–free"?**

The product is entirely free of non-human, animal-derived components. During the production process no animal components were used.

**What is the difference between the three quality grades of cytokines Miltenyi Biotec offers?**

The quality grades of MACS® Cytokines are distinguished as follows:

**Research-grade MACS® Cytokines** are cost-effective recombinant cytokines suitable for cell culture applications, differentiation studies, and functional assays.

- Biological activity determined by appropriate bioassay
- Minimal biological activity is given
- Endotoxin levels usually below 1 EU/µg cytokine (0.1 ng/µg cytokine)
- Purity generally above 95%

**Premium-grade MACS® Cytokines** are highly active and low-endotoxin recombinant cytokines, ideal for cell culture applications in pre-clinical research.

- Lyophilized without carrier proteins or preservatives
- Endotoxin levels usually below 0.1 EU/µg cytokine (0.01 ng/µg cytokine)
- Purity generally between 97% and 99%
- Special formulation with mannitol and trehalose for fast, reliable reconstitution and increased stability

Lot-specific biological activity: Biological activity is given for each lot after lyophilization and calibrated with international standards (if available), provided by the National Institute for Biological Standards and Control (NIBSC). Lot-specific certificates of analysis (CoA), stating the respective biological activity, are available for download on our website (miltenyibiotec.com/certificates).

**MACS® GMP Cytokines** facilitate *ex vivo* cell culture processing. They are manufactured in a GMP-certified facility equipped with production areas from class A to D.

- Manufactured and tested under a quality management system (ISO 13485) in compliance with relevant GMP guidelines and the requirements laid down in the Ph. Eur. Chapter 5.2.12.
- Designed following the recommendations of USP <1043> on ancillary materials.
- Lyophilized without carrier proteins or preservatives.

Stringent quality control (QC) tests are performed and thoroughly documented. Lot-specific certificates of analysis specify biological activity, sterility (European Pharmacopoeia, Ph. Eur.), purity, identity (isoelectric focusing or m ass spectrometry), endotoxin content (LAL assay according to Ph. Eur.), protein content, and host cell DNA content.

**What does "TransAct" stand for?**

TransAct is an acronym for "TRANSduction" and "ACTivation" as the main applications are the activation and transduction of T cells.

**Which other products are recommended for the use with MACS® GMP T Cell TransAct™?**

MACS® GMP T Cell TransAct™ has been developed in the context of TexMACS™ GMP Medium. Therefore, only this combination can ensure highest performance. Additionally, MACS GMP Recombinant Cytokines, such as IL-2, IL-7, and IL-15 are used within the manufacturing process of T cells. For the GMP-compliant transduction of T cells, an automated process has been established on the CliniMACS Prodigy®, e.g., to generate CAR T cells. To standardize this process an initial enrichment step with the CliniMACS® CD4 Reagent, CliniMACS CD8 Reagent, or CliniMACS CD62L Reagent is recommended.

**Can I get any additional documentation in order to facilitate communication with regulatory authorities?**

MACS GMP Products are shipped with a lot-specific Product Quality Certificate (PQC, former CoA). The PQC gives details about the specifications of the product, the release tests performed, and the results thereof. For information about any animal material eventually used during the manufacturing process, product-specific certificates of origin (CoO) are available. In order to further support our customers Miltenyi Biotec can provide Product Information Files (PIF). These documents provide supporting documentation for customers when general regulatory and design information on a product is required (e.g. clinical trial applications) and are also meant to support discussions with local regulatory bodies (e.g. in the course of product registrations or manufacturing license applications).

VISIT

Any questions left? Checkout our complete FAQs online:

▸ **miltenyibiotec.com/cellcultureFAQ**

For more detailed information please contact us.

# Find the MACS® Cell Culture Reagents you need for your research cell culture applications

## Immunology – lymphoid cells

| Application | Reagents |
|---|---|
| **T cell activation and expansion** | TexMACS™ Medium<br>IL-2, IL-7, IL-15, IL-21<br>anti-CD3, anti-CD28, T Cell TransAct™, T Cell Activation/Expansion Kit,<br>PepTivator® Peptide Pools |
| **Th1 polarization** | TexMACS™ Medium<br>IL-12, IL-18, IL-27, IFN-γ<br>anti-IL-4 |
| **Th2 polarization** | TexMACS™ Medium<br>IL-4, IL-6, IL-25, IL-33, TSLP<br>anti-IFN-γ, anti-IL-12 |
| **Th17 polarization** | TexMACS™ Medium<br>IL-1β, IL-6, IL-21, IL-23, TGF-β1<br>anti-IFN-γ, anti-IL-2, anti-IL-4 |
| **Treg polarization** | TexMACS™ Medium<br>IL-2, TGF-β1,<br>Treg Expansion Kit |
| **Lymphoid differentiation** | IL-2, IL-6, IL-7, SCF |
| **NK cell activation** | NK MACS® Medium<br>IL-2, IL-12, IL-15, IL-18, IL-21<br>NK Cell Activation/Expansion Kit |
| **B cell activation** | B Cell Expansion Kit<br>CD40-L, IL-2, IL-4, IFN-γ, TGF-β1, anti-CD40<br>TLR ligands |

## Immunology – myeloid cells

| Application | Reagents |
|---|---|
| **Macrophage (Mφ) generation** | GM-CSF, IFN-γ, IL-4, IL-13, IL-34, M-CSF, TNF-α |
| **Dendritic cell (DC) generation** | Mo-DC Differentiation Medium<br>Flt3-Ligand, GM-CSF, IFN-γ, IL-4, IL-34 |
| **Plasmacytoid DC generation** | Flt3-Ligand, IFN-β, IL-3, TPO |
| **Monocyte (Mo) generation** | Flt3-Ligand, GM-CSF, IL-34 |
| **Mo, Mφ, and DC maturation** | CD40-L, IL-1β, IL-6, IL-12, TNF-α, TLR ligands<br>PepTivator® Peptide Pools |
| **Granulocyte cultures** | G-CSF, GM-CSF, IL-3, IL-4, SCF, TGF-β1 |
| **Osteoclast differentiation** | M-CSF, RANK-Ligand |

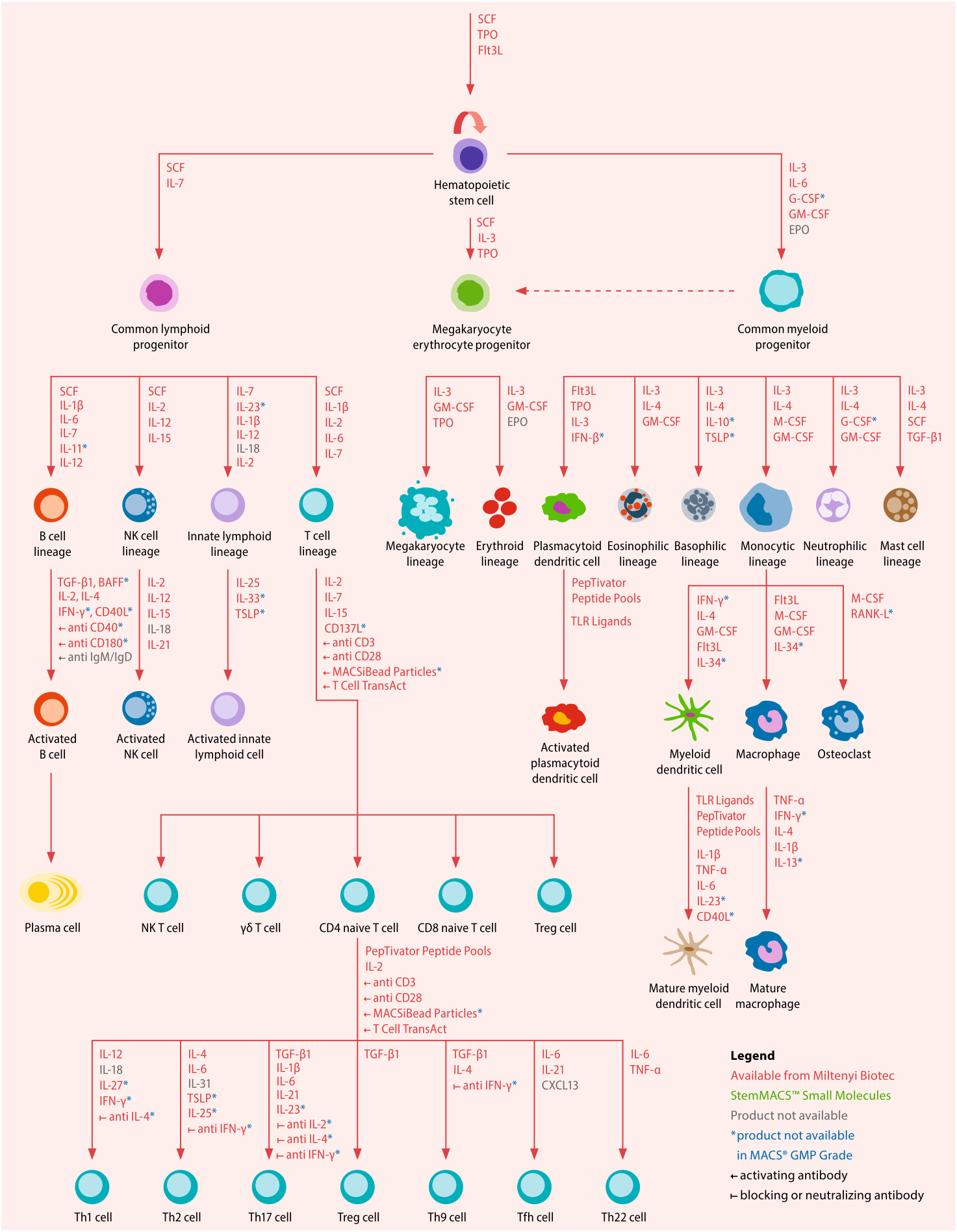
## Stem cell research

| Application | Reagents |
|---|---|
| **iPSC reprogramming** | StemMACS™ iPSC mRNA Reprogramming Kit, StemMACS™ Repro-Brew XF, StemMACS™ PSC-Brew XF, StemMACS™ PSC-Support XF, StemMACS™ Trilineage Differentiation Kit |
| **ES/iPSC maintenance** | StemMACS™ PSC-Brew XF, StemMACS™ iPS-Brew XF, StemMACS™ Passaging Solution XF<br>FGF-2, LIF, TGF-β1<br>Thiazovivin, Y27632 |
| **HSC expansion and differentiation** | StemMACS™ HSC Expansion Media, StemMACS™ HSC-CFU Assay Kit<br>Flt3-Ligand, IL-3, IL-6, SCF, TPO |
| **Cardiovascular differentiation from ES/iPSC** | StemMACS™ CardioDiff Kit XF<br>Activin A, BMP-4, DKK-1, FGF-2, TGF-β, VEGF<br>CHIR99021, IWP-2, IWP-4, IWR-1-endo, Retinoic acid |
| **Hepatic differentiation from ES/iPSC** | StemMACS™ DiffBase XF<br>Activin-A, EGF, FGF-4, FGF-10, HGF<br>CHIR99021, DAPT, Retinoic acid, SB431542 |
| **Pancreatic differentiation from ES/iPSC** | StemMACS™ DiffBase XF<br>Activin-A, BMP-4, FGF-2, FGF-7, Noggin,<br>CHIR99021, Retinoic acid, TPPB |
| **Intestinal cell differentiation from ES/iPSC** | StemMACS™ DiffBase XF<br>Activin-A, EGF, FGF-4, Noggin, R-Spondins<br>CHIR99021 |
| **MSC expansion and differentiation** | StemMACS™ MSC Expansion Medium Kit XF, StemMACS™ ChondroDiff Medium, StemMACS™ AdipoDiff Medium, StemMACS™ OsteoDiff Medium<br>BMPs, EGF, FGF-2, HGF, IGF-1, LIF, PDGF-BB, TGF-β |

## Neuroscience research

| Application | Reagents |
|---|---|
| **Peripheral neuron differentiation from ES/iPSC** | StemMACS™ DiffBase XF, MACS® NeuroBrew®-21<br>BDNF, FGF-2, NGF, Noggin,<br>CHIR99021, DAPT, Dorsomorphin, Forskolin, LDN-193189, SB431542 |
| **Spinal motor neuron differentiation from ES/iPSC** | StemMACS™ DiffBase XF, MACS® NeuroBrew®-21 w/o vit A<br>BDNF, CNTF, GDNF, SHH<br>CHIR99021, DAPT, Retinoic acid, SB431542, LDN-193189 |
| **Cortical neuron differentiation from ES/iPSC** | StemMACS™ DiffBase XF, MACS® NeuroBrew®-21<br>FGF-2<br>DAPT, LDN-193189, PD0325901, SB431542 |
| **Dopaminergic neuron generation from ES/iPSC** | StemMACS™ DiffBase XF, MACS® NeuroBrew®-21 w/o vit A<br>BDNF, FGF-2, FGF-8b, GDNF, Noggin, SHH<br>CHIR99021, DAPT, Dorsomorphin, Forskolin, LDN-193189, Purmorphamine, SB431542 |
| **Neurosphere assay** | MACS® Neuro Medium,<br>MACS® NeuroBrew®-21<br>EGF, FGF-2 |
| **Primary neural cell culture** | MACS® Neuro Medium,<br>MACS® NeuroBrew®-21,<br>AstroMACS Medium<br>BDNF, CTNF, GDNF |
| **Primary oligodendrocyte culture** | MACS® Neuro Medium,<br>MACS® NeuroBrew®-21<br>FGF-2, PDGF-AA |

## Find the MACS® Cytokines and functional-grade antibodies you need for cell differentiation and activation


SCF
TPO
Flt3L
Hematopoietic stem cell
SCF
IL-7
SCF
IL-3
TPO
IL-3
IL-6
G-CSF*
GM-CSF
EPO
Common lymphoid progenitor
Megakaryocyte erythrocyte progenitor
Common myeloid progenitor
SCF
IL-1β
IL-6
IL-7
IL-11*
IL-12
B cell lineage
SCF
IL-2
IL-12
IL-15
NK cell lineage
IL-7
IL-23*
IL-1β
IL-12
IL-18
IL-2
Innate lymphoid lineage
SCF
IL-1β
IL-2
IL-6
IL-7
T cell lineage
IL-3
GM-CSF
TPO
Megakaryocyte lineage
IL-3
GM-CSF
EPO
Erythroid lineage
Flt3L
TPO
IL-3
IFN-β*
Plasmacytoid dendritic cell
IL-3
IL-4
GM-CSF
Eosinophilic lineage
IL-3
IL-4
IL-10*
TSLP*
Basophilic lineage
IL-3
IL-4
M-CSF
GM-CSF
Monocytic lineage
IL-3
IL-4
G-CSF*
GM-CSF
Neutrophilic lineage
IL-3
IL-4
SCF
TGF-β1
Mast cell lineage
TGF-β1, BAFF*
IL-2, IL-4
IFN-γ*, CD40L*
← anti CD40*
← anti CD180*
← anti IgM/IgD
IL-2
IL-12
IL-15
IL-18
IL-21
IL-25
IL-33*
TSLP*
IL-2
IL-7
IL-15
CD137L*
← anti CD3
← anti CD28
← MACSiBead Particles*
← T Cell TransAct
PepTivator Peptide Pools
TLR Ligands
IFN-γ*
IL-4
GM-CSF
Flt3L
IL-34*
Flt3L
M-CSF
GM-CSF
IL-34*
M-CSF
RANK-L*
Activated B cell
Activated NK cell
Activated innate lymphoid cell
Activated plasmacytoid dendritic cell
Myeloid dendritic cell
Macrophage
Osteoclast
TLR Ligands
PepTivator
Peptide Pools
IL-1β
TNF-α
IL-6
IL-23*
CD40L*
TNF-α
IFN-γ*
IL-4
IL-1β
IL-13*
Plasma cell
NK T cell
γδ T cell
CD4 naive T cell
CD8 naive T cell
Treg cell
Mature myeloid dendritic cell
Mature macrophage
PepTivator Peptide Pools
IL-2
← anti CD3
← anti CD28
← MACSiBead Particles*
← T Cell TransAct
IL-12
IL-18
IL-27*
IFN-γ*
⊢ anti IL-4*
IL-4
IL-6
IL-31
TSLP*
IL-25*
⊢ anti IFN-γ*
TGF-β1
IL-1β
IL-6
IL-21
IL-23*
⊢ anti IL-2*
⊢ anti IL-4*
⊢ anti IFN-γ*
TGF-β1
TGF-β1
IL-4
⊢ anti IFN-γ*
IL-6
IL-21
CXCL13
IL-6
TNF-α
Th1 cell
Th2 cell
Th17 cell
Treg cell
Th9 cell
Tfh cell
Th22 cell
Legend
Available from Miltenyi Biotec
StemMACS™ Small Molecules
Product not available
*product not available in MACS® GMP Grade
← activating antibody
⊢ blocking or neutralizing antibody

# Find the MACS® GMP Cell Culture Reagents you need for your clinical manufacturing

## Immunology

| Application | Reagents |
|---|---|
| **TCR/ CAR T cell manufacturing*** | TexMACS™ GMP Medium<br>MACS® GMP Recombinant Human IL-2, IL-7, IL-15, IL-21<br>MACS® GMP T Cell TransAct ™ (LS), MACS® GMP CD3 pure, MACS® GMP CD28 pure<br>MACS GMP Vectofusin-1 |
| **Virus-specific T cells for immunotherapy*** | TexMACS™ GMP Medium<br>MACS® GMP PepTivator® Peptide Pools |
| **Tumor-reactive T cell for immunotherapy*** | TexMACS™ GMP Medium<br>MACS® GMP Recombinant Human IL-2, IL-7, IL-15, IL-21<br>MACS® GMP CD3 pure<br>MACS® GMP Vectofusin®-1<br>MACS® GMP PepTivator® Peptide Pools |
| **Natural killer cells for immunotherapy*** | NK MACS® GMP Medium<br>MACS® GMP Recombinant Human IL-1β, IL-2, IL-12, IL-15, IL-18, IL-21<br>MACS® GMP Vectofusin®-1 |
| **γδ T cells manufacturing** | TexMACS™ GMP Medium<br>MACS® GMP Recombinant Human IL-1beta, IL-2, IL-4, IL-7, IL-15, IL-18, IL-21<br>MACS® GMP CD3 pure<br>MACS® GMP Vectofusin®-1 |
| **Regulatory T cell manufacturing*** | TexMACS™ GMP Medium,<br>MACS® GMP Recombinant Human IL-2, TGF-β1<br>MACS® GMP Rapamycin |
| **Manufacturing of antigen-loaded Mo-DC** | MACS® GMP Recombinant Human GM-CSF, IL-1β, IL-4, IL-6, TNF-a<br>MACS® GMP PepTivator® Peptide Pools |
| **Manufacturing of antigen-loaded blood dendritic cell subsets*** | TexMACS™ GMP Medium<br>MACS® GMP Recombinant Human GM-CSF, IL-3<br>MACS® GMP CpG-P<br>MACS® GMP PepTivator® Peptide Pools |

* Process available on the CliniMACS Prodigy® with selected reagents

## Stem cell research

| Application | Reagents |
|---|---|
| **GMP compliant PSC expansion and banking*** | iPS-Brew GMP Medium<br>MACS® GMP Recombinant Human ActivinA, FGF-2, TGF-β1 |
| **GMP compliant PSC differentiation into midbrain dopaminergic progenitor cells*** | iPS-Brew GMP Medium<br>MACS® GMP Recombinant Human TGF-β1, SHH (C24II) |
| **GMP compliant PSC differentiation into NK cells** | MACS® GMP Recombinant Human FGF-2, Flt3-Ligand, IL-2, IL-3, IL-7, IL-12, IL-15, IL-18, SCF, TGF-β1 |
| **GMP compliant PSC differentiation into T cells** | MACS® GMP Recombinant Human FGF-2, Flt3-Ligand, IL-3, IL-7, IL-15, SCF, TGF-β1 |
| **GMP compliant PSC differentiation into macrophages** | MACS® GMP Recombinant Human FGF-2, Flt3-Ligand, IL-3, M-CSF, SCF, TGF-β1 |
| **Manufacturing of gene-engineered HSC*** | HSC-Brew GMP Medium<br>MACS® GMP Recombinant Human Flt3-Ligand, IL-3, IL-6, SCF, TPO<br>MACS® GMP Vectofusin®-1 |
| **MSC expansion process*** | MSC-Brew GMP Medium<br>MACS® GMP Recombinant Human FGF-2, EGF, TGF-β1 |

* Process available on the CliniMACS Prodigy® Platform with selected reagents

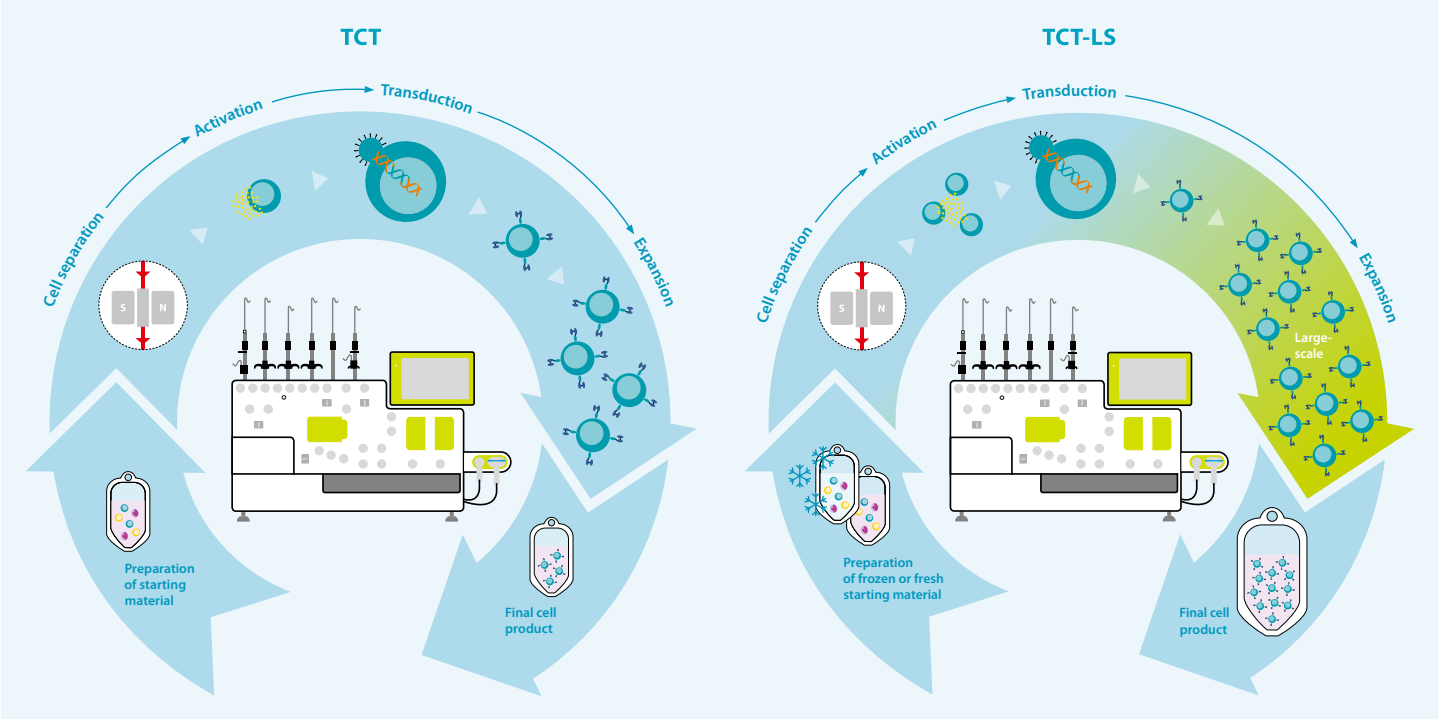
# Highlight-Workflow: The T Cell Transduction (TCT) Process on the CliniMACS Prodigy®

**GMP-compliant cell processing from development to clinical-scale cell manufacturing**

MACS® GMP reagents are part of our cell manufacturing portfolio and clinical applications. Find the complete solutions here: https://www.miltenyibiotec.com/DE-en/products/cellmanufacturing-platform.html

Two applications on the CliniMACS Prodigy accommodate different requirements of the T cell manufacturing process:

CliniMACS Prodigy TCT is designed for CAR T cell manufacturing from whole blood, PBMCs, or fresh leukapheresis (left workflow). CliniMACS Prodigy TCT-LS offers a larger cell culture capacity and accommodates the production of TCR engineered T cells (right workflow). Both come with all reagents and ancillary components needed for the entire workflow.




VISIT

See the complete TCT-workflow:

▸ **miltenyi.com/TCT-Process**

## Stem cell media

| Product | Description | Capacity/Content/Components | Order no. |
|---|---|---|---|
| **CytoMix™ – MSC, human** | Composition of cytokines for efficient expansion of human mesenchymal stromal cells | 100 µg | 130-093-552 |
| **StemMACS™ AdipoDiff Medium, human** | Medium for the differentiation of human mesenchymal stem cells into adipocytes | 100 mL | 130-091-677 |
| **StemMACS™ Cardiac Cultivation Medium XF, human** | Medium for cultivation of human cardiomyocytes | 500 mL<br>500 mL StemMACS™ CardioDiff Basal Medium XF, human<br>10 mL StemMACS™ CardioDiff Cardiac Cultivation Supplement XF (50×), human | 130-125-287 |
| **StemMACS™ CardioDiff Kit XF, human** | Medium kit for differentiation of human pluripotent stem cells to cardiomyocytes | for 48 assays<br>2×500 mL StemMACS™ CardioDiff Basal Medium XF, human<br>5 mL StemMACS™ CardioDiff Mesoderm Induction Supplement XF (20×), human<br>2×10 mL StemMACS™ CardioDiff Cardiac Cultivation Supplement XF (50×), human<br>5 mL StemMACS™ CardioDiff Cardiac Induction Supplement XF (20×), human | 130-125-289 |
| **StemMACS™ ChondroDiff Medium, human** | Medium for the differentiation of human mesenchymal stem cells into chondrocytes | 100 mL | 130-091-679 |
| **StemMACS™ Cryo-Brew** | An animal component-free media for the cryopreservation of human pluripotent and mesenchymal stem cells | 50 mL | 130-109-558 |
| **StemMACS™ DiffBase XF, human** | Base medium for differentiation of human pluripotent stem cells (hPSC) | 500 mL<br>500 mL StemMACS™ iPS-Brew Basal Medium XF, human<br>10 mL StemMACS™ DiffBase Supplement XF (50×), human | 130-126-015 |
| **StemMACS™ HSC Expansion Cocktail, human** | Cytokine cocktail for the expansion of hematopoietic stem cells | for 100 mL medium | 130-100-843 |
| **StemMACS™ HSC Expansion Medium XF, human** | Expansion media for hematopoietic stem cells (HSCs) | 100 mL<br>500 mL | 130-100-473<br>130-100-463 |
| **StemMACS™ HSC-CFU Assay Kit, human** | Medium for analyzing hematopoietic stem and progenitor cells | 450 mL<br>450 mL StemMACS™ HSC-CFU Assay Medium, human<br>1.35 mL StemMACS™ HSC-CFU Assay Cocktail, human | 130-125-042 |
| **StemMACS™ HSC-CFU complete with Epo, human** | HSC enumeration medium with Epo | 100 mL | 130-091-280 |
| **StemMACS™ HSC-CFU lite with Epo, human** | HSC enumeration medium with Epo but without G-CSF or IL-6 | 100 mL | 130-091-281 |
| **StemMACS™ iPS-Brew XF, human** | Xeno-free cell culture medium for maintenance of human ES and iPS cells under feeder-free conditions | 500 mL<br>500 mL StemMACS™ iPS-Brew Basal Medium XF, human<br>10 mL StemMACS™ iPS-Brew Supplement XF (50×), human | 130-104-368 |
| **StemMACS™ MSC Expansion Medium Kit XF, human** | Xeno-free expansion media for human mesenchymal stem cells | 500 mL<br>500 mL StemMACS MSC Expansion Medium XF, human<br>7 mL StemMACS MSC Expansion Medium Supplement XF, human | 130-104-182 |
| **StemMACS™ MSC Expansion Medium, human** | Expansion media for human mesenchymal stem cells | 500 mL | 130-091-680 |
| **StemMACS™ OsteoDiff Medium, human** | Media for the differentiation of human mesenchymal stem cells into osteoblasts | 100 mL | 130-091-678 |
| **StemMACS™ Passaging Solution XF, human** | Xeno-free passaging solution for human ES and iPS cells | 100 mL | 130-104-688 |

| Product | Description | Capacity/Content/Components | Order no. |
|---|---|---|---|
| StemMACS™ PSC-Brew XF, human *see page 18* | Culture medium for human pluripotent stem cells (hPSC) | 500 mL<br>500 mL StemMACS™ PSC-Brew Basal Medium XF, human<br>StemMACS™ PSC-Brew Supplement XF (50×), human | 130-127-865 |
| **StemMACS™ PSC-Support XF, human** | Supplement for culture of human pluripotent stem cells (hPSC) | 8 mL | 130-127-287 |
| **StemMACS™ Repro-Brew XF, human** | Medium and Supplement to support efficient reprogramming of human fibroblasts into induced pluripotent stem cells (iPSCs) | 500 mL<br>10 mL StemMACS™ Repro-Brew Supplement XF (50x), human<br>500 mL StemMACS™ Repro-Brew Basal Medium XF, human | 130-132-985 |
| **StemMACS™ Trilineage Differentiation Kit, human** | Kit for assessment of differentiation potential of human pluripotent stem cells | for 12 assays<br>36 mL StemMACS Trilineage MesoDiff Medium I, human<br>72 mL StemMACS Trilineage MesoDiff Medium II, human<br>60 mL StemMACS Trilineage EndoDiff Medium, human<br>84 mL StemMACS Trilineage EctoDiff Medium, human | 130-115-660 |

## Immune cell media

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **Mo-DC Differentiation Medium, human** | For the *in vitro* differentiation of up to $2\times10^8$ monocytes | 400 mL | 130-094-812 |
| **NK MACS® Medium, human** *see page 19* | Medium for the activation and expansion of human NK cells | 500 mL<br>500 mL NK MACS® Basal Medium, human<br>5 mL NK MACS® Supplement (100×), human | 130-114-429 |
| **TexMACS™ Medium** | Serum-free cultivation and expansion medium for T cells | 500 mL | 130-097-196 |

## Cancer cell media

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **Colon TumorMACS™ Medium, human** | Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted colorectal tumors. | 500 mL<br>500 mL TumorMACS™ Basal Medium, human<br>10 mL Colon TumorMACS™ Supplement (50×), human | 130-127-169 |
| **Ovarian TumorMACS™ Medium, human** | Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted ovarian tumors | 500 mL<br>500 mL TumorMACS™ Basal Medium, human<br>10 mL Ovarian TumorMACS™ Supplement (50×), human | 130-119-483 |
| **Pancreas TumorMACS™ Medium, human** | Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted pancreatic tumors | 500 mL<br>500 mL TumorMACS™ Basal Medium, human<br>10 mL Pancreas TumorMACS™ Supplement (50×), human | 130-119-484 |
| **Renal TumorMACS™ Medium, human** | Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted renal tumors | 500 mL<br>500 mL TumorMACS™ Basal Medium, human<br>10 mL Renal TumorMACS™ Supplement (50×), human | 130-119-482 |
| **Lung TumorMACS™ Medium, human** | Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted lung tumors. | 500 mL<br>10 mL Lung TumorMACS™ Supplement (50×), human<br>500 mL TumorMACS™ Basal Medium, human | ***new*** 130-134-218 |

## Neural cell media

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **AstroMACS Medium** | Medium for astrocyte cultivation | 500 mL<br>MACS® Neuro Medium (130-093-570)<br>MACS® NeuroBrew®-21 (50×) (130-093-566)<br>1 vial AstroMACS Supplement | 130-117-031 |
| **MACS® Neuro Medium** | Culture of neural cells of the central and peripheral nervous system | 500 mL | 130-093-570 |
| **MACS® NeuroBrew®-21 (50×)** | Serum-free supplement developed for low density plating and long-term viability and growth of neural cells of the central and peripheral nervous system | 10 mL | 130-093-566 |
| **MACS® NeuroBrew®-21 w/o Vitamin A (50×)** | Serum-free supplement developed for low density plating and long-term viability and growth of neural cells of the central and peripheral nervous system | 10 mL | 130-097-263 |

### StemMACS™ PSC-Brew XF, human

#### Overview

StemMACS PSC-Brew XF, human is a new generation culturing medium for highly efficient maintenance and expansion of human pluripotent stem cells (hPSC).

#### Background information

StemMACS PSC-Brew XF, human is a new generation cell culture medium for highly efficient maintenance and expansion of human pluripotent stem cells (hPSC). It has a xeno-free and serum-free formulation that ensures a reduced variability and standardized performances during culture. The carefully balanced composition and the presence of stable FGF-2 ensures constant exposure levels and provides flexibility with feeding schedules.

StemMACS PSC-Brew XF, human is compatible with both defined and undefined cell attachment matrices and allows the maintenance of a highly consistent pluripotent phenotype even in low density cultures. hPSCs grown in StemMACS PSC-Brew XF, human show a typical morphology, expression of pluripotency-associated markers and retain the ability to differentiate into cell types that derive from the three embryonic germ layers. Moreover, the maintenance of a stable karyotype in long-term cultivation is supported.

StemMACS PSC-Brew XF, human allows rapid culture re-initiation of hPSC cultures after cryopreservation and enables cluster passaging without the addition of any inhibitor.

StemMACS PSC-Brew XF, human is fully compatible with StemMACS PSC-Support XF, human and, when combined, can be used in challenging applications that would normally stress the cells, such as gene editing approaches or after reprogramming.

#### Applications

Highly efficient maintenance and expansion of hPSCs under xeno- and feeder-free conditions.

| Product | Content/Components | Order no. |
|---|---|---|
| **StemMACS™ PSC-Brew XF, human**<br>For research use only | 500 mL<br>500 mL StemMACS™ PSC-Brew Basal Medium XF, human<br>StemMACS™ PSC-Brew Supplement XF (50×), human | 130-127-865 |

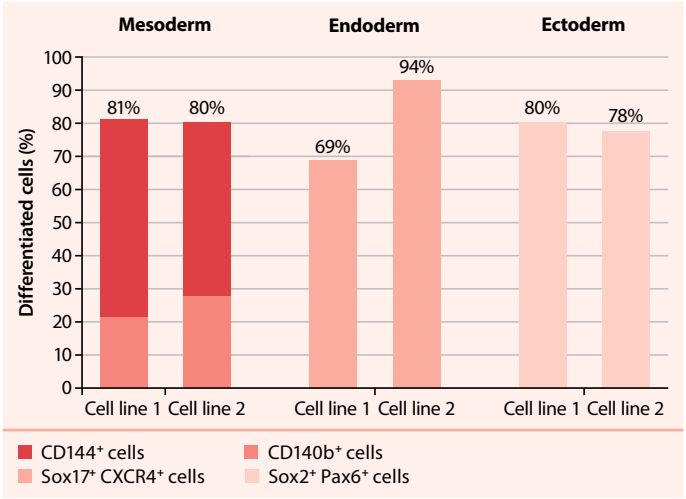



**Figure 1: Full differentiation potential.** Pluripotent stem cells cultured in StemMACS PSC-Brew XF maintain full pluripotent differentiation potential and can differentiate in all three embryonic germ layers.

## NK MACS® Medium, human

### Overview

Optimized cultivation, activation and expansion of human NK cells. The xeno-free composition with no need for feeder cells ensures reproducible results.

### Background information

NK MACS Medium was developed for the cultivation, activation, and expansion of human NK cells. It is produced without animal derived components and contains stable glutamine, as well as phenol red. The complete xeno-free media ensures reduced variability and standardized performances during culture. Robust and consistent results are backed as no feeder cells are necessary for NK cell expansion with NK MACS Medium (though they can be combined if wanted).

As starting material isolated human NK cells or PBMCs can be used. When starting the expansion from PBMCs, NK MACS Medium favors NK cell growth. Its defined composition limits the growth and expansion of unwanted cells, such as T cells, NKT cells, B cells, or DCs). Expanded NK cells are fully functional and can be used in downstream assays, e.g. killing assays.

Translation is made easy with NK MACS medium, as it is available also in MACS GMP grade with the same formulation as the research product.

| Product | Content/Components | Order no. |
|---|---|---|
| **NK MACS® Medium, human**<br>For research use only | 500 mL<br>500 mL NK MACS® Basal Medium, human<br>5 mL NK MACS® Supplement (100×), human | 130-114-429 |

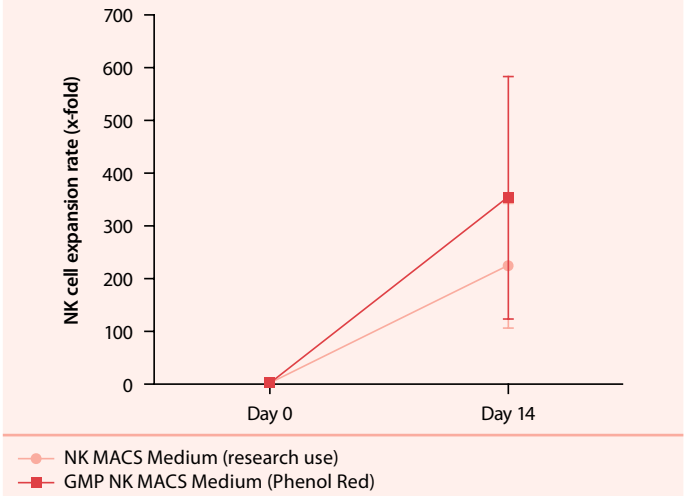



**Figure 1:** High expansion of NK cells in NK MACS Medium. NK cell fold expansion from PBMCs (n=3) using 5% AB serum and 500 IU/mL of IL-2 and 140 U/mL IL-15 during 14 days showed high expansion rates for both, NK MACS Medium (research use) and NK MACS GMP Medium (Phenol Red).

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## CytoBoxes and Kits

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **B Cell Expansion Kit, human** | Kit containing cytokines and medium for expansion of B cells isolated from human PBMC | 1 kit<br>2×Human CD40-Ligand Multimer Kit (130-098-776)<br>Human IL-4, premium grade (130-093-919)<br>StemMACS™ HSC Expansion Medium XF, human (130-100-463) | 130-106-196 |
| **B Cell Expansion Kit, human – small size** | Kit containing cytokines and medium for expansion of B cells isolated from human PBMC | 1 kit<br>2×Human CD40-Ligand Multimer Kit (130-098-775)<br>Human IL-4, premium grade (130-093-919)<br>StemMACS™ HSC Expansion Medium XF, human (130-100-473) | 130-124-195 |
| **CytoBox Mo-DC – premium grade, human** | Recombinant human granulocyte macrophage colony-stimulating factor (500 µg) and recombinant human interleukin 4 (2×100 µg) | 1 kit<br>Human GM-CSF, premium grade (130-093-867)<br>2×Human IL-4, premium grade (130-093-922) | 130-100-842 |
| **CytoBox Th1, mouse** | Starting kit for polarization of mouse $T_H1$ cells | 1 kit<br>Mouse IL-12, research grade (130-096-707)<br>Mouse IL-2 IS, premium grade (130-120-331)<br>IL-4 Antibody, anti-mouse, pure-functional grade (130-095-709) | 130-107-761 |
| **CytoBox Th17, mouse** | Starting kit for polarization of mouse $T_H17$ cells | 1 kit<br>Mouse IL-6, premium grade (130-096-682)<br>Human TGF-β1, premium grade (130-095-067)<br>Mouse IL-1β, premium grade (130-101-681)<br>Mouse IL-23, research grade (130-096-676)<br>IL-4 Antibody, anti-mouse, pure-functional grade (130-095-709)<br>IFN-γ Antibody, anti-mouse, pure-functional grade (130-095-729)<br>IL-2 Antibody, anti-mouse, pure-functional grade (130-095-736) | 130-107-758 |
| **CytoBox Th2, mouse** | Starting kit for polarization of mouse $T_H2$ cells | 1 kit<br>Mouse IL-4, premium grade (130-097-761)<br>Mouse IL-2 IS, premium grade (130-120-331)<br>IFN-γ Antibody, anti-mouse, pure-functional grade (130-095-729) | 130-107-760 |
| **Human CD40-Ligand Multimer Kit** | Recombinant Human CD40-Ligand and Cross-Linking Antibody | 1 kit (small size)<br>Human CD40-Ligand, premium grade (130-096-713)<br>0.2 mL Cross-Linking Antibody<br>1 kit (large size)<br>Human CD40-Ligand, premium grade (130-096-714)<br>1 mL Cross-Linking Antibody | 130-098-775<br><br><br><br>130-098-776 |

## Human cytokines & growth factors

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human Activin A** | research grade | FRP, Inhibin beta-1 | Recombinant human activin A | CHO cells | 10 µg | 130-115-012 |
| | | | | CHO cells | 25 µg | 130-115-013 |
| | premium grade | FRP, Inhibin beta-1 | Recombinant human activin A | CHO cells | 10 µg | 130-115-008 |
| | | | | CHO cells | 25 µg | 130-115-009 |
| | | | | CHO cells | 100 µg | 130-115-010 |
| | | | | CHO cells | 1000 µg | 130-115-011 |
| **Human ANGPTL5** | research grade | | Recombinant human angiopoietin-like 5 | HEK293 cells | 5 µg | 130-096-125 |
| | | | | HEK293 cells | 25 µg | 130-096-126 |
| **Human BAFF** | research grade | TNFSF13B, BLys | Recombinant human B cell activating factor belonging to the TNF family | *E. coli* | 5 µg | 130-093-806 |
| | | | | *E. coli* | 20 µg | 130-093-807 |
| | | | | *E. coli* | 100 µg | 130-108-987 |
| **Human BDNF** | research grade | ANON2, BULN2 | Recombinant human brain-derived neurotrophic factor | *E. coli* | 2 µg | 130-096-285 |
| | | | | *E. coli* | 10 µg | 130-093-811 |
| | | | | *E. coli* | 100 µg | 130-096-286 |
| | | | | *E. coli* | 1000 µg | 130-103-435 |
| **Human BMP-2** | research grade | | Recombinant human bone morphogenetic protein 2 | *E. coli* | 10 µg | 130-110-923 |
| | | | | *E. coli* | 25 µg | 130-110-922 |
| | premium grade | | Recombinant human bone morphogenetic protein 2 | *E. coli* | 10 µg | 130-110-924 |
| | | | | *E. coli* | 25 µg | 130-110-925 |
| | | | | *E. coli* | 100 µg | 130-110-926 |
| | | | | *E. coli* | 1000 µg | 130-110-927 |
| **Human BMP-4** | research grade | | Recombinant human bone morphogenetic protein 4 | *Pichia pastoris* | 10 µg | 130-110-921 |
| | | | | *Pichia pastoris* | 25 µg | 130-111-168 |
| | premium grade | | Recombinant human bone morphogenetic protein 4 | *Pichia pastoris* | 10 µg | 130-111-164 |
| | | | | *Pichia pastoris* | 25 µg | 130-111-167 |
| | | | | *Pichia pastoris* | 100 µg | 130-111-165 |
| | | | | *Pichia pastoris* | 1000 µg | 130-111-166 |
| **Human BMP-7** | research grade | | Recombinant human bone morphogenetic protein 7 | CHO cells | 10 µg | 130-093-818 |
| | | | | CHO cells | 100 µg | 130-103-436 |
| | | | | CHO cells | 10×100 µg | 130-108-988 |
| **Human CCL19 (MIP-3β)** | research grade | CCL19, ELC, Exodus 3 | Recombinant human chemokine (C-C motif) ligand 19 or inflammatory protein 3β | *E. coli* | 10 µg | 130-105-744 |
| | | | | *E. coli* | 25 µg | 130-105-743 |
| | | | | *E. coli* | 100 µg | 130-093-969 |
| **Human CD40-Ligand** | premium grade | TRAP, CD154, TNFSF5 | Recombinant human CD40 ligand | *E. coli* | 10 µg | 130-096-711 |
| | | | | *E. coli* | 25 µg | 130-096-712 |
| | | | | *E. coli* | 100 µg | 130-096-713 |
| | | | | *E. coli* | 500 µg | 130-096-714 |
| **Human CD137 (4-1BB)-Ligand** | research grade | 4-1BB ligand, TNFRSF9-Ligand | Recombinant human CD137 (4-1BB)-Ligand | *E. coli* | 5 µg | 130-105-768 |
| | | | | *E. coli* | 20 µg | 130-105-767 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human CNTF** | research grade | | Recombinant human ciliary neurotrophic factor | *E. coli* | 5 µg | 130-096-337 |
| | | | | *E. coli* | 20 µg | 130-096-336 |
| | | | | *E. coli* | 100 µg | 130-108-972 |
| | | | | *E. coli* | 1000 µg | 130-123-659 |
| **Human DKK-1** | research grade | | Recombinant human dickkopf-related protein 1 | HEK293 cells | 2 µg | 130-103-443 |
| | | | | HEK293 cells | 10 µg | 130-103-444 |
| | | | | HEK293 cells | 100 µg | 130-103-445 |
| **Human EGF** | research grade | HOMG4, URG | Recombinant human epidermal growth factor | *E. coli* | 100 µg | 130-093-825 |
| | premium grade | HOMG4, URG | Recombinant human epidermal growth factor | *E. coli* | 100 µg | 130-097-749 |
| | | | | *E. coli* | 500 µg | 130-097-750 |
| | | | | *E. coli* | 1000 µg | 130-097-751 |
| **Human FGF-1** | research grade | acidic FGF, aFGF, HBGF-1 | Recombinant human fibroblast growth factor 1 | *E. coli* | 10 µg | 130-093-835 |
| | | | | *E. coli* | 25 µg | 130-095-789 |
| | premium grade | acidic FGF, aFGF, HBGF-1 | Recombinant human fibroblast growth factor 1 | *E. coli* | 10 µg | 130-095-790 |
| | | | | *E. coli* | 25 µg | 130-095-763 |
| | | | | *E. coli* | 100 µg | 130-095-761 |
| | | | | *E. coli* | 1000 µg | 130-095-756 |
| **Human FGF-2** | research grade | basic FGF, HBGF-2 | Recombinant human fibroblast growth factor 2 | *E. coli* | 10 µg | 130-093-837 |
| | | | | *E. coli* | 50 µg | 130-093-838 |
| | premium grade | basic FGF, HBGF-2 | Recombinant human fibroblast growth factor 2 | *E. coli* | 10 µg | 130-093-839 |
| | | | | *E. coli* | 50 µg | 130-093-840 |
| | | | | *E. coli* | 100 µg | 130-093-564 |
| | | | | *E. coli* | 2×100 µg | 130-093-841 |
| | | | | *E. coli* | 1000 µg | 130-093-842 |
| | | | | *E. coli* | 2×1000 µg | 130-093-843 |
| **Human FGF-2 IS** *see page 33* | research grade | basic FGF | Recombinant human fibroblast growth factor 2 IS (improved sequence) | *E. coli* | 10 µg | 130-104-925 |
| | | | | *E. coli* | 50 µg | 130-104-921 |
| | premium grade | basic FGF | Recombinant human fibroblast growth factor 2 IS (improved sequence) | *E. coli* | 10 µg | 130-104-918 |
| | | | | *E. coli* | 50 µg | 130-104-924 |
| | | | | *E. coli* | 200 µg | 130-104-922 |
| | | | | *E. coli* | 1000 µg | 130-104-923 |
| **Human FGF-4** | research grade | HBGF-4 | Recombinant human fibroblast growth factor 4 | *E. coli* | 10 µg | 130-109-387 |
| | | | | *E. coli* | 25 µg | 130-109-388 |
| | premium grade | HBGF-4 | Recombinant human fibroblast growth factor 4 | *E. coli* | 10 µg | 130-109-389 |
| | | | | *E. coli* | 25 µg | 130-109-390 |
| | | | | *E. coli* | 100 µg | 130-109-394 |
| | | | | *E. coli* | 1000 µg | 130-109-391 |
| **Human FGF-7** | research grade | KGF, HBGF-7 | Recombinant human fibroblast growth factor 7 | *E. coli* | 10 µg | 130-093-849 |
| | | | | *E. coli* | 25 µg | 130-097-175 |
| | premium grade | KGF, HBGF-7 | Recombinant human fibroblast growth factor 7 | *E. coli* | 10 µg | 130-097-173 |
| | | | | *E. coli* | 25 µg | 130-097-178 |
| | | | | *E. coli* | 100 µg | 130-097-176 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human FGF-8b** | research grade | | Recombinant human fibroblast growth factor 8b | *E. coli* | 10 µg | 130-095-731 |
| | | | | *E. coli* | 25 µg | 130-095-733 |
| | premium grade | | Recombinant human fibroblast growth factor 8b | *E. coli* | 10 µg | 130-095-737 |
| | | | | *E. coli* | 25 µg | 130-095-738 |
| | | | | *E. coli* | 100 µg | 130-095-740 |
| | | | | *E. coli* | 1000 µg | 130-095-741 |
| **Human FGF-9** | research grade | | Recombinant human fibroblast growth factor 9 | *E. coli* | 5 µg | 130-103-446 |
| | | | | *E. coli* | 20 µg | 130-110-920 |
| **Human FGF-10** | research grade | KGF-2 | Recombinant human fibroblast growth f actor 10 | *E. coli* | 10 µg | 130-127-859 |
| | | | | *E. coli* | 25 µg | 130-127-858 |
| | premium grade | KGF-2 | Recombinant human fibroblast growth factor 10 | *E. coli* | 10 µg | 130-127-849 |
| | | | | *E. coli* | 25 µg | 130-127-855 |
| | | | | *E. coli* | 100 µg | 130-127-856 |
| | | | | *E. coli* | 1000 µg | 130-127-857 |
| **Human Flt3-Ligand** | research grade | | Recombinant human Flt3-ligand | *E. coli* | 10 µg | 130-093-854 |
| | | | | *E. coli* | 25 µg | 130-096-474 |
| | premium grade | | Recombinant human Flt3-ligand | *E. coli* | 10 µg | 130-096-476 |
| | | | | *E. coli* | 25 µg | 130-096-477 |
| | | | | *E. coli* | 100 µg | 130-096-479 |
| | | | | *E. coli* | 1000 µg | 130-096-480 |
| **Human G-CSF** | research grade | | Recombinant human granulocyte colony-stimulating factor | *E. coli* | 10 µg | 130-096-345 |
| | | | | *E. coli* | 25 µg | 130-096-346 |
| | premium grade | | Recombinant human granulocyte colony-stimulating factor | *E. coli* | 10 µg | 130-093-860 |
| | | | | *E. coli* | 25 µg | 130-096-347 |
| | | | | *E. coli* | 100 µg | 130-093-861 |
| | | | | *E. coli* | 1000 µg | 130-094-265 |
| **Human GDF-11** | research grade | BMP-11 | Recombinant human growth differentiation factor 11 | *E. coli* | 5 µg | 130-105-776 |
| | | | | *E. coli* | 20 µg | 130-105-775 |
| **Human GDNF** | research grade | | Recombinant human glial cell line-derived neurotrophic factor | *E. coli* | 10 µg | 130-129-547 |
| | | | | *E. coli* | 25 µg | 130-129-548 |
| | premium grade | | Recombinant human glial cell line-derived neurotrophic factor | *E. coli* | 10 µg | 130-129-544 |
| | | | | *E. coli* | 25 µg | 130-129-543 |
| | | | | *E. coli* | 100 µg | 130-129-542 |
| | | | | *E. coli* | 1000 µg | 130-129-546 |
| **Human GM-CSF** *see page 34* | research grade | CSF2 | Recombinant human granulocyte macrophage colony–stimulating factor | *E. coli* | 10 µg | 130-093-862 |
| | | | | *E. coli* | 50 µg | 130-095-372 |
| | premium grade | CSF2 | Recombinant human granulocyte macrophage colony–stimulating factor | *E. coli* | 10 µg | 130-093-864 |
| | | | | *E. coli* | 50 µg | 130-093-865 |
| | | | | *E. coli* | 100 µg | 130-093-866 |
| | | | | *E. coli* | 500 µg | 130-093-867 |
| | | | | *E. coli* | 1000 µg | 130-093-868 |
| **Human GRO-α** | research grade | CXCL1, mgSAα | Recombinant human growth-regulated oncogene α | *E. coli* | 5 µg | 130-094-620 |
| | | | | *E. coli* | 25 µg | 130-093-869 |
| | | | | *E. coli* | 100 µg | 130-108-974 |
| **Human HGF** | research grade | HPTA, SF | Recombinant human hepatocyte growth factor | Insect cells | 5 µg | 130-093-871 |
| | | | | Insect cells | 25 µg | 130-093-872 |
| | | | | Insect cells | 100 µg | 130-103-437 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human IFN-α2a** | research grade | | Recombinant human interferon α2a | *E. coli* | 20 µg | 130-093-873 |
| | | | | *E. coli* | 100 µg | 130-093-874 |
| | | | | *E. coli* | 1000 µg | 130-108-984 |
| **Human IFN-α2b** | research grade | | Recombinant human interferon α2b | *E. coli* | 20 µg | 130-093-875 |
| | | | | *E. coli* | 100 µg | 130-093-876 |
| | | | | *E. coli* | 1000 µg | 130-108-967 |
| **Human IFN-β1a** | research grade | | Recombinant human interferon β1a | CHO cells | 5 µg | 130-107-889 |
| | | | | CHO cells | 20 µg | 130-107-888 |
| **Human IFN-γ1b** | research grade | IFN-γ | Recombinant human interferon γ1b | *E. coli* | 10 µg | 130-096-872 |
| | | | | *E. coli* | 25 µg | 130-096-873 |
| | premium grade | IFN-γ | Recombinant human interferon γ1b | *E. coli* | 10 µg | 130-096-481 |
| | | | | *E. coli* | 25 µg | 130-096-482 |
| | | | | *E. coli* | 100 µg | 130-096-484 |
| | | | | *E. coli* | 1000 µg | 130-096-486 |
| **Human IGF-1** | research grade | IGF-I | Recombinant human insulin-like growth factor 1 | *E. coli* | 100 µg | 130-093-886 |
| | | | | *E. coli* | 1000 µg | 130-093-887 |
| **Human IL-1α** | research grade | | Recombinant human interleukin 1α | *E. coli* | 2 µg | 130-093-893 |
| | | | | *E. coli* | 10 µg | 130-093-894 |
| **Human IL-1β** | research grade | IL1F2 | Recombinant human interleukin 1β | *E. coli* | 10 µg | 130-093-895 |
| | | | | *E. coli* | 25 µg | 130-095-374 |
| | premium grade | IL1F2 | Recombinant human interleukin 1β | *E. coli* | 10 µg | 130-093-897 |
| | | | | *E. coli* | 25 µg | 130-093-563 |
| | | | | *E. coli* | 100 µg | 130-093-898 |
| | | | | *E. coli* | 1000 µg | 130-093-899 |
| **Human IL-2 IS** *see page 35* | research grade | | Recombinant human interleukin 2 IS (improved sequence) | *E. coli* | 10 µg | 130-097-742 |
| | | | | *E. coli* | 50 µg | 130-097-743 |
| | premium grade | | Recombinant human interleukin 2 IS (improved sequence) | *E. coli* | 10 µg | 130-097-744 |
| | | | | *E. coli* | 50 µg | 130-097-745 |
| | | | | *E. coli* | 200 µg | 130-097-746 |
| | | | | *E. coli* | 1000 µg | 130-097-748 |
| **Human IL-3** | research grade | | Recombinant human interleukin 3 | *E. coli* | 10 µg | 130-093-908 |
| | | | | *E. coli* | 25 µg | 130-093-909 |
| | premium grade | | Recombinant human interleukin 3 | *E. coli* | 10 µg | 130-095-071 |
| | | | | *E. coli* | 25 µg | 130-095-070 |
| | | | | *E. coli* | 100 µg | 130-095-069 |
| | | | | *E. coli* | 1000 µg | 130-095-068 |
| **Human IL-4** | research grade | | Recombinant human interleukin 4 | *E. coli* | 5 µg | 130-093-915 |
| | | | | *E. coli* | 10 µg | 130-095-373 |
| | | | | *E. coli* | 25 µg | 130-093-917 |
| | | | | *E. coli* | 100 µg | 130-094-117 |
| | premium grade | | Recombinant human interleukin 4 | *E. coli* | 5 µg | 130-093-919 |
| | | | | *E. coli* | 10 µg | 130-093-920 |
| | | | | *E. coli* | 25 µg | 130-093-921 |
| | | | | *E. coli* | 100 µg | 130-093-922 |
| | | | | *E. coli* | 1000 µg | 130-093-924 |
| **Human IL-5** | research grade | | Recombinant human interleukin 5 | *E. coli* | 2 µg | 130-093-926 |
| | | | | *E. coli* | 10 µg | 130-093-927 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human IL-6** | research grade | | Recombinant human interleukin 6 | *E. coli* | 10 µg | 130-095-365 |
| | | | | *E. coli* | 25 µg | 130-093-929 |
| | premium grade | | Recombinant human interleukin 6 | *E. coli* | 10 µg | 130-095-352 |
| | | | | *E. coli* | 25 µg | 130-093-931 |
| | | | | *E. coli* | 100 µg | 130-093-932 |
| | | | | *E. coli* | 500 µg | 130-093-933 |
| | | | | *E. coli* | 1000 µg | 130-093-934 |
| **Human IL-7** | research grade | | Recombinant human interleukin 7 | *E. coli* | 10 µg | 130-093-937 |
| | | | | *E. coli* | 25 µg | 130-095-367 |
| | premium grade | | Recombinant human interleukin 7 | *E. coli* | 10 µg | 130-095-361 |
| | | | | *E. coli* | 25 µg | 130-095-362 |
| | | | | *E. coli* | 100 µg | 130-095-363 |
| | | | | *E. coli* | 1000 µg | 130-095-364 |
| **Human IL-8** | research grade | | Recombinant human interleukin 8 | *E. coli* | 10 µg | 130-122-354 |
| | | | | *E. coli* | 25 µg | 130-122-353 |
| | premium grade | | Recombinant human interleukin 8 | *E. coli* | 10 µg | 130-122-357 |
| | | | | *E. coli* | 25 µg | 130-122-359 |
| | | | | *E. coli* | 100 µg | 130-122-360 |
| | | | | *E. coli* | 1000 µg | 130-122-361 |
| **Human IL-9** | research grade | | Recombinant human interleukin 9 | *E. coli* | 2 µg | 130-093-945 |
| | | | | *E. coli* | 10 µg | 130-093-946 |
| | | | | *E. coli* | 100 µg | 130-103-438 |
| **Human IL-10** | research grade | | Recombinant human interleukin 10 | *E. coli* | 2 µg | 130-093-947 |
| | | | | *E. coli* | 10 µg | 130-093-948 |
| | | | | *E. coli* | 100 µg | 130-098-448 |
| | | | | *E. coli* | 1000 µg | 130-108-985 |
| **Human IL-11** | research grade | | Recombinant human interleukin 11 | *E. coli* | 2 µg | 130-094-623 |
| | | | | *E. coli* | 10 µg | 130-093-950 |
| | | | | *E. coli* | 100 µg | 130-103-439 |
| **Human IL-12** | premium grade | | Recombinant human interleukin 12 | HEK293 cells | 5 µg | 130-096-704 |
| | | | | HEK293 cells | 25 µg | 130-096-705 |
| | | | | HEK293 cells | 100 µg | 130-096-798 |
| **Human IL-12 (CHO)** | research grade | | Recombinant human interleukin 12 | CHO cells | 10 µg | 130-129-723 |
| | | | | CHO cells | 25 µg | 130-129-722 |
| | premium grade | | Recombinant human interleukin 12 | CHO cells | 10 µg | 130-129-721 |
| | | | | CHO cells | 25 µg | 130-129-720 |
| | | | | CHO cells | 100 µg | 130-129-719 |
| | | | | CHO cells | 1000 µg | 130-129-718 |
| **Human IL-13** | research grade | | Recombinant human interleukin 13 | *E. coli* | 10 µg | 130-112-409 |
| | | | | *E. coli* | 25 µg | 130-112-410 |
| | premium grade | | Recombinant human interleukin 13 | *E. coli* | 10 µg | 130-112-411 |
| | | | | *E. coli* | 25 µg | 130-112-408 |
| | | | | *E. coli* | 100 µg | 130-112-412 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human IL-15** | research grade | | Recombinant human interleukin 15 | *E. coli* | 10 µg | 130-093-955 |
| | | | | *E. coli* | 25 µg | 130-095-760 |
| | premium grade | | Recombinant human interleukin 15 | *E. coli* | 10 µg | 130-095-762 |
| | | | | *E. coli* | 25 µg | 130-095-764 |
| | | | | *E. coli* | 100 µg | 130-095-765 |
| | | | | *E. coli* | 1000 µg | 130-095-766 |
| **Human IL-15Rα sushi** | research grade | | Recombinant human interleukin 15 receptor alpha, soluble sushi domain | *E. coli* | 10 µg | 130-104-919 |
| | | | | *E. coli* | 25 µg | 130-104-920 |
| | premium grade | | Recombinant human interleukin 15 receptor alpha, soluble sushi domain | *E. coli* | 10 µg | 130-104-912 |
| | | | | *E. coli* | 25 µg | 130-104-916 |
| | | | | *E. coli* | 100 µg | 130-104-914 |
| **Human IL-17** | research grade | IL-17A | Recombinant human interleukin 17 | *E. coli* | 5 µg | 130-093-958 |
| | | | | *E. coli* | 25 µg | 130-093-959 |
| | | | | *E. coli* | 100 µg | 130-094-625 |
| **Human IL-21** | research grade | | Recombinant human interleukin 21 | *E. coli* | 10 µg | 130-094-563 |
| | | | | *E. coli* | 25 µg | 130-095-767 |
| | premium grade | | Recombinant human interleukin 21 | *E. coli* | 10 µg | 130-095-768 |
| | | | | *E. coli* | 25 µg | 130-095-769 |
| | | | | *E. coli* | 100 µg | 130-095-784 |
| **Human IL-22** | research grade | | Recombinant human interleukin 22 | *E. coli* | 2 µg | 130-096-294 |
| | | | | *E. coli* | 10 µg | 130-096-295 |
| | | | | *E. coli* | 100 µg | 130-096-297 |
| **Human IL-23** | research grade | | Recombinant human interleukin 23 | HEK293 cells | 5 µg | 130-095-757 |
| | | | | HEK293 cells | 25 µg | 130-095-758 |
| | | | | HEK293 cells | 100 µg | 130-095-759 |
| **Human IL-24** | research grade | | Recombinant human interleukin 24 | CHO cells | 5 µg | 130-105-779 |
| | | | | CHO cells | 20 µg | 130-105-777 |
| **Human IL-25** | research grade | IL-17E | Recombinant human interleukin 25 | *E. coli* | 5 µg | 130-115-646 |
| | | | | *E. coli* | 25 µg | 130-115-644 |
| **Human IL-27** | research grade | | Recombinant human interleukin 27 | HEK293 cells | 2 µg | 130-108-960 |
| | | | | HEK293 cells | 10 µg | 130-108-961 |
| **Human IL-33** | research grade | | Recombinant human interleukin 33 | *E. coli* | 10 µg | 130-109-378 |
| | | | | *E. coli* | 25 µg | 130-109-379 |
| | premium grade | | Recombinant human interleukin 33 | *E. coli* | 10 µg | 130-109-380 |
| | | | | *E. coli* | 25 µg | 130-109-677 |
| | | | | *E. coli* | 100 µg | 130-109-381 |
| | | | | *E. coli* | 1000 µg | 130-109-382 |
| **Human IL-34** | research grade | | Recombinant human interleukin 34 | HEK293 cells | 2 µg | 130-105-781 |
| | | | | HEK293 cells | 10 µg | 130-105-780 |
| | | | | HEK293 cells | 100 µg | 130-108-977 |
| **Human IL-35** | research grade | | Recombinant human interleukin 35 | HEK293 cells | 2 µg | 130-112-947 |
| | | | | HEK293 cells | 10 µg | 130-112-950 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human IL-36RA** | research grade | | Recombinant human interleukin 36 receptor antagonist | *E. coli* | 10 µg | 130-132-866 |
| | | | | *E. coli* | 25 µg | 130-132-867 |
| | premium grade | | Recombinant human interleukin 36 receptor antagonist | *E. coli* | 10 µg | 130-132-861 |
| | | | | *E. coli* | 25 µg | 130-132-863 |
| | | | | *E. coli* | 100 µg | 130-132-864 |
| | | | | *E. coli* | 1000 µg | 130-132-865 |
| **Human IL-37b** | research grade | Il-1F7 | Recombinant human IL-37b | *E. coli* | 10 µg | 130-133-539 |
| | | | | *E. coli* | 25 µg | 130-133-520 |
| | | | | *E. coli* | 100 µg | 130-133-519 |
| | | | | *E. coli* | 1000 µg | 130-133-516 |
| **Human IL-38** | research grade | | Recombinant human interleukin 38 | *E. coli* | 10 µg | 130-132-868 |
| | | | | *E. coli* | 25 µg | 130-132-869 |
| | | | | *E. coli* | 100 µg | 130-132-870 |
| | | | | *E. coli* | 1000 µg | 130-132-871 |
| **Human LIF** | research grade | | Recombinant human leukemia inhibitory factor | *E. coli* | 10 µg | 130-132-332 |
| | | | | *E. coli* | 25 µg | 130-132-333 |
| | premium grade | | Recombinant human leukemia inhibitory factor | *E. coli* | 10 µg | 130-132-339 |
| | | | | *E. coli* | 25 µg | 130-132-340 |
| | | | | *E. coli* | 100 µg | 130-132-341 |
| | | | | *E. coli* | 1000 µg | 130-132-342 |
| **Human M-CSF** | research grade | CSF1 | Recombinant human macrophage-colony stimulating factor | *E. coli* | 10 µg | 130-093-963 |
| | | | | *E. coli* | 25 µg | 130-096-491 |
| | premium grade | CSF1 | Recombinant human macrophage-colony stimulating factor | *E. coli* | 10 µg | 130-096-485 |
| | | | | *E. coli* | 25 µg | 130-096-489 |
| | | | | *E. coli* | 100 µg | 130-096-492 |
| | | | | *E. coli* | 1000 µg | 130-096-493 |
| **Human MCP-1** | research grade | CCL2, MCAF | Recombinant human monocyte chemotactic protein 1 | *E. coli* | 5 µg | 130-093-961 |
| | | | | *E. coli* | 20 µg | 130-093-962 |
| **Human NGF-β** | research grade | | Recombinant human nerve growth factor β | *E. coli* | 20 µg | 130-127-430 |
| | | | | *E. coli* | 100 µg | 130-127-431 |
| | | | | *E. coli* | 1000 µg | 130-127-432 |
| **Human Noggin** | research grade | | Recombinant human noggin | HEK293 cells | 5 µg | 130-103-454 |
| | | | | HEK293 cells | 20 µg | 130-103-455 |
| | | | | HEK293 cells | 100 µg | 130-103-456 |
| | | | | HEK293 cells | 2×500 µg | 130-108-982 |
| **Human NT-3** | research grade | NTF-3, HDNF | Recombinant human neurotrophin 3 | *E. coli* | 2 µg | 130-096-287 |
| | | | | *E. coli* | 10 µg | 130-093-973 |
| | | | | *E. coli* | 100 µg | 130-096-288 |
| **Human Oncostatin M IS** | research grade | OSM | Recombinant human oncostatin M IS (improved sequence) | *E. coli* | 10 µg | 130-114-939 |
| | | | | *E. coli* | 25 µg | 130-114-942 |
| | premium grade | OSM | Recombinant human oncostatin M IS (improved sequence) | *E. coli* | 10 µg | 130-114-933 |
| | | | | *E. coli* | 25 µg | 130-114-934 |
| | | | | *E. coli* | 100 µg | 130-114-936 |
| | | | | *E. coli* | 1000 µg | 130-114-937 |
| **Human PDGF-AA** | research grade | | Recombinant human platelet-derived growth factor AA | *E. coli* | 2 µg | 130-093-977 |
| | | | | *E. coli* | 10 µg | 130-093-978 |
| | | | | *E. coli* | 100 µg | 130-108-983 |

| Product | Quality grade | Alternative name | Description | Source | Content | | Order no. |
|---|---|---|---|---|---|---|---|
| **Human PDGF-AB** | research grade | | Recombinant human platelet-derived growth factor AB | *E. coli* | 2 µg | | 130-094-629 |
| | | | | *E. coli* | 10 µg | | 130-093-979 |
| | | | | *E. coli* | 100 µg | | 130-103-442 |
| | | | | *E. coli* | 1000 µg | | 130-108-965 |
| **Human PDGF-BB IS** | research grade | | Recombinant human platelet derived growth factor BB IS (improved sequence) | *Pichia pastoris* | 10 µg | | 130-108-165 |
| | | | | *Pichia pastoris* | 25 µg | | 130-108-164 |
| | premium grade | | Recombinant human platelet derived growth factor BB IS (improved sequence) | *Pichia pastoris* | 10 µg | | 130-108-163 |
| | | | | *Pichia pastoris* | 25 µg | | 130-108-162 |
| | | | | *Pichia pastoris* | 100 µg | | 130-108-161 |
| | | | | *Pichia pastoris* | 1000 µg | | 130-108-160 |
| **Human Prolactin** | research grade | Mammotropin | Recombinant human prolactin | *E. coli* | 50 µg | | 130-093-985 |
| **Human R-Spondin 1** | research grade | F-spondin | Recombinant human roof plate-specific spondin 1 | HEK293 cells | 10 µg | ***new*** | 130-133-545 |
| | | | | HEK293 cells | 25 µg | ***new*** | 130-133-546 |
| | premium grade | F-spondin | Recombinant human roof plate-specific spondin 1 | HEK293 cells | 10 µg | ***new*** | 130-133-886 |
| | | | | HEK293 cells | 25 µg | ***new*** | 130-133-542 |
| | | | | HEK293 cells | 100 µg | ***new*** | 130-133-543 |
| | | | | HEK293 cells | 1000 µg | ***new*** | 130-133-544 |
| **Human R-Spondin 3** | research grade | RSPO-3 | Recombinant human roof plate-specific spondin 3 | CHO cells | 5 µg | | 130-105-801 |
| | | | | CHO cells | 20 µg | | 130-105-804 |
| | | | | CHO cells | 100 µg | | 130-108-962 |
| **Human RANK-Ligand – soluble** | research grade | TNFSF11, TRANCE, ODF | Recombinant soluble human receptor activator of NF-κB ligand | *E. coli* | 2 µg | | 130-093-987 |
| | | | | *E. coli* | 10 µg | | 130-093-988 |
| | | | | *E. coli* | 100 µg | | 130-094-631 |
| | | | | *E. coli* | 1000 µg | | 130-108-963 |
| **Human SCF** | research grade | c-kit ligand, steel factor, mgF | Recombinant human stem cell factor | *E. coli* | 10 µg | | 130-093-991 |
| | | | | *E. coli* | 25 µg | | 130-096-692 |
| | premium grade | c-kit ligand, steel factor, mgF | Recombinant human stem cell factor | *E. coli* | 10 µg | | 130-096-693 |
| | | | | *E. coli* | 25 µg | | 130-096-694 |
| | | | | *E. coli* | 100 µg | | 130-096-695 |
| | | | | *E. coli* | 1000 µg | | 130-096-696 |
| **Human SDF-1α** | research grade | CXCL12 | Recombinant human stromal cell-derived factor 1α | *E. coli* | 10 µg | | 130-093-996 |
| | | | | *E. coli* | 25 µg | | 130-096-137 |
| | | | | *E. coli* | 100 µg | | 130-093-997 |
| | | | | *E. coli* | 1000 µg | | 130-093-998 |
| **Human SHH (C24II)** | research grade | | Recombinant human sonic hedgehog (C24II) | *E. coli* | 10 µg | | 130-095-717 |
| | | | | *E. coli* | 25 µg | | 130-095-718 |
| | premium grade | | Recombinant human sonic hedgehog (C24II) | *E. coli* | 10 µg | | 130-095-721 |
| | | | | *E. coli* | 25 µg | | 130-095-723 |
| | | | | *E. coli* | 100 µg | | 130-095-727 |
| | | | | *E. coli* | 1000 µg | | 130-095-730 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Human TGF-β1** | premium grade | | Recombinant human transforming growth factor β1 | HEK293 cells | 5 µg | 130-095-067 |
| | | | | HEK293 cells | 25 µg | 130-095-066 |
| | | | | HEK293 cells | 100 µg | 130-108-969 |
| | | | | HEK293 cells | 1000 µg (liquid) | 130-108-971 |
| **Human TGF-β1 (CHO)** | premium grade | | Recombinant human transforming growth factor β1 | CHO cells | 5 µg | 130-126-723 |
| | | | | CHO cells | 25 µg | 130-126-721 |
| | | | | CHO cells | 100 µg | 130-126-724 |
| | | | | CHO cells | 1000 µg (liquid) | 130-126-722 |
| **Human TGF-β2** | research grade | | Recombinant human transforming growth factor β2 | HEK293 cells | 10 µg | 130-123-657 |
| **Human TGF-β3** | research grade | | Recombinant human transforming growth factor β3 | HEK293 cells | 5 µg (liquid) | 130-094-007 |
| | | | | HEK293 cells | 20 µg (liquid) | 130-094-008 |
| | | | | HEK293 cells | 100 µg (liquid) | 130-108-981 |
| **Human TNF-α** | premium grade | TNFSF2 | Recombinant human tumor necrosis factor α | *E. coli* | 10 µg | 130-094-014 |
| **Human TNF-α** | research grade | TNFSF2 | Recombinant human tumor necrosis factor α | Yeast | 10 µg | 130-094-015 |
| | | | | Yeast | 50 µg | 130-094-017 |
| | | | | Yeast | 100 µg | 130-094-018 |
| | | | | Yeast | 750 µg | 130-094-019 |
| | | | | Yeast | 1000 µg | 130-094-020 |
| | premium grade | TNFSF2 | Recombinant human tumor necrosis factor α | Yeast | 10 µg | 130-094-022 |
| | | | | Yeast | 50 µg | 130-094-023 |
| | | | | Yeast | 100 µg | 130-094-024 |
| | | | | Yeast | 1000 µg | 130-094-562 |
| **Human TPO** | research grade | MDGF, TSF, mgDF | Recombinant human thrombopoietin | *E. coli* | 10 µg | 130-094-011 |
| | | | | *E. coli* | 25 µg | 130-095-745 |
| | | | | *E. coli* | 100 µg | 130-094-013 |
| | premium grade | MDGF, TSF, mgDF | Recombinant human thrombopoietin | *E. coli* | 10 µg | 130-095-747 |
| | | | | *E. coli* | 25 µg | 130-095-750 |
| | | | | *E. coli* | 100 µg | 130-095-752 |
| | | | | *E. coli* | 1000 µg | 130-095-754 |
| **Human TSLP** | research grade | | Recombinant human thymic stromal lymphopoietin | *E. coli* | 2 µg | 130-106-271 |
| | | | | *E. coli* | 10 µg | 130-106-270 |
| **Human VEGF (121 aa)** | research grade | | Recombinant human vascular endothelial growth factor (121 aa) | *E. coli* | 10 µg | 130-108-956 |
| | | | | *E. coli* | 100 µg | 130-127-426 |
| **Human VEGF (165) IS** | research grade | | Recombinant human vascular endothelial growth factor (165) IS (improved sequence) | *Pichia pastoris* | 10 µg | 130-109-383 |
| | | | | *Pichia pastoris* | 25 µg | 130-109-384 |
| | premium grade | | Recombinant human vascular endothelial growth factor (165) IS (improved sequence) | *Pichia pastoris* | 10 µg | 130-109-395 |
| | | | | *Pichia pastoris* | 25 µg | 130-109-396 |
| | | | | *Pichia pastoris* | 100 µg | 130-109-385 |
| | | | | *Pichia pastoris* | 1000 µg | 130-109-386 |

## Mouse cytokines & growth factors

| Product | Quality grade | Alternative name | Description | Source | Content | | Order no. |
|---|---|---|---|---|---|---|---|
| **Mouse EGF** | research grade | HOMG4, URG | Recombinant mouse epidermal growth factor | *E. coli* | 100 µg | | 130-094-036 |
| | | | | *E. coli* | 500 µg | | 130-094-037 |
| **Mouse FGF-2** | research grade | basic FGF, HBGF-2 | Recombinant mouse fibroblast growth factor 2 | *E. coli* | 10 µg | | 130-105-787 |
| | | | | *E. coli* | 50 µg | | 130-105-786 |
| **Mouse FGF-8b** | research grade | | Recombinant mouse fibroblast growth factor 8b | *E. coli* | 10 µg | | 130-096-100 |
| | | | | *E. coli* | 25 µg | | 130-096-101 |
| | premium grade | | Recombinant mouse fibroblast growth factor 8b | *E. coli* | 10 µg | | 130-096-102 |
| | | | | *E. coli* | 25 µg | | 130-096-103 |
| | | | | *E. coli* | 100 µg | | 130-096-104 |
| | | | | *E. coli* | 1000 µg | | 130-096-105 |
| **Mouse Flt3-Ligand** | research grade | | Recombinant mouse fms-related tyrosine kinase 3 ligand | *E. coli* | 10 µg | | 130-094-038 |
| | | | | *E. coli* | 100 µg | | 130-097-372 |
| **Mouse G-CSF** | research grade | | Recombinant mouse granulocyte colony-stimulating factor | *E. coli* | 2 µg | | 130-094-039 |
| | | | | *E. coli* | 10 µg | | 130-094-040 |
| | | | | *E. coli* | 100 µg | | 130-094-041 |
| **Mouse GM-CSF** | research grade | CSF2 | Recombinant mouse granulocyte macrophage colony-stimulating factor | *E. coli* | 10 µg | | 130-094-043 |
| | | | | *E. coli* | 25 µg | | 130-095-746 |
| | premium grade | CSF2 | Recombinant mouse granulocyte macrophage colony-stimulating factor | *E. coli* | 10 µg | | 130-095-742 |
| | | | | *E. coli* | 25 µg | | 130-095-793 |
| | | | | *E. coli* | 100 µg | | 130-095-739 |
| | | | | *E. coli* | 1000 µg | | 130-095-735 |
| **Mouse IFN-α** | research grade | | Recombinant mouse interferon α | HEK293 cells | 10 µg | *new* | 130-134-222 |
| | | | | HEK293 cells | 25 µg | *new* | 130-134-235 |
| | premium grade | | Recombinant mouse interferon α | HEK293 cells | 10 µg | *new* | 130-134-226 |
| | | | | HEK293 cells | 25 µg | *new* | 130-134-224 |
| | | | | HEK293 cells | 100 µg | *new* | 130-134-225 |
| **Mouse IFN-γ** | research grade | | Recombinant mouse interferon γ | *E. coli* | 10 µg | | 130-105-790 |
| | | | | *E. coli* | 25 µg | | 130-105-785 |
| | premium grade | | Recombinant mouse interferon γ | *E. coli* | 10 µg | | 130-105-782 |
| | | | | *E. coli* | 25 µg | | 130-105-778 |
| | | | | *E. coli* | 100 µg | | 130-105-774 |
| | | | | *E. coli* | 1000 µg | | 130-105-773 |
| **Mouse IL-1β** | research grade | IL-1F2, Catabolin, MCF | Recombinant mouse interleukin 1β | *E. coli* | 10 µg | | 130-094-053 |
| | | | | *E. coli* | 25 µg | | 130-101-680 |
| | premium grade | IL-1F2, Catabolin, MCF | Recombinant mouse interleukin 1β | *E. coli* | 10 µg | | 130-101-681 |
| | | | | *E. coli* | 25 µg | | 130-101-682 |
| | | | | *E. coli* | 100 µg | | 130-101-683 |
| | | | | *E. coli* | 1000 µg | | 130-101-684 |
| **Mouse IL-2 IS** | research grade | | Recombinant mouse interleukin 2 IS (improved sequence) | *E. coli* | 10 µg | | 130-120-330 |
| | | | | *E. coli* | 25 µg | | 130-120-662 |
| | premium grade | | Recombinant mouse interleukin 2 IS (improved sequence) | *E. coli* | 10 µg | | 130-120-331 |
| | | | | *E. coli* | 25 µg | | 130-120-332 |
| | | | | *E. coli* | 100 µg | | 130-120-333 |
| | | | | *E. coli* | 1000 µg | | 130-120-334 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Mouse IL-3 IS** | research grade | | Recombinant mouse interleukin 3 IS (improved sequence) | *E. coli* | 10 µg | 130-096-687 |
| | | | | *E. coli* | 25 µg | 130-096-688 |
| | premium grade | | Recombinant mouse interleukin 3 IS (improved sequence) | *E. coli* | 10 µg | 130-099-508 |
| | | | | *E. coli* | 25 µg | 130-099-509 |
| | | | | *E. coli* | 100 µg | 130-099-510 |
| | | | | *E. coli* | 1000 µg | 130-099-511 |
| **Mouse IL-4** | research grade | | Recombinant mouse interleukin 4 | *E. coli* | 10 µg | 130-094-061 |
| | | | | *E. coli* | 25 µg | 130-097-757 |
| | premium grade | | Recombinant mouse interleukin 4 | *E. coli* | 10 µg | 130-097-761 |
| | | | | *E. coli* | 25 µg | 130-097-760 |
| | | | | *E. coli* | 100 µg | 130-097-759 |
| | | | | *E. coli* | 1000 µg | 130-097-758 |
| **Mouse IL-6** | research grade | | Recombinant mouse interleukin 6 | *E. coli* | 10 µg | 130-094-065 |
| | | | | *E. coli* | 25 µg | 130-096-683 |
| | premium grade | | Recombinant mouse interleukin 6 | *E. coli* | 10 µg | 130-096-682 |
| | | | | *E. coli* | 25 µg | 130-096-684 |
| | | | | *E. coli* | 100 µg | 130-096-685 |
| | | | | *E. coli* | 1000 µg | 130-096-686 |
| **Mouse IL-7** | research grade | | Recombinant mouse interleukin 7 | *E. coli* | 2 µg | 130-094-636 |
| | | | | *E. coli* | 10 µg | 130-094-066 |
| | | | | *E. coli* | 100 µg | 130-098-222 |
| | | | | *E. coli* | 2×500 µg | 130-108-957 |
| **Mouse IL-10** | research grade | | Recombinant mouse interleukin 10 | *E. coli* | 2 µg | 130-094-067 |
| | | | | *E. coli* | 10 µg | 130-094-068 |
| **Mouse IL-12** | research grade | | Recombinant mouse interleukin 12 | HEK293 cells | 5 µg | 130-096-707 |
| | | | | HEK293 cells | 25 µg | 130-096-708 |
| | | | | HEK293 cells | 100 µg | 130-096-795 |
| **Mouse IL-13** | research grade | | Recombinant mouse interleukin 13 | *E. coli* | 2 µg | 130-094-639 |
| | | | | *E. coli* | 10 µg | 130-094-070 |
| **Mouse IL-15** | research grade | | Recombinant mouse interleukin 15 | *E. coli* | 2 µg | 130-094-071 |
| | | | | *E. coli* | 10 µg | 130-094-072 |
| | | | | *E. coli* | 100 µg | 130-094-640 |
| **Mouse IL-21** | research grade | | Recombinant mouse interleukin 21 | *E. coli* | 2 µg | 130-108-948 |
| | | | | *E. coli* | 10 µg | 130-108-949 |
| **Mouse IL-23** | research grade | | Recombinant mouse interleukin 23 | HEK293 cells | 5 µg | 130-096-676 |
| | | | | HEK293 cells | 25 µg | 130-096-677 |
| **Mouse LIF** | research grade | | Recombinant mouse leukemia inhibitory factor | *E. coli* | 10 µg | 130-095-772 |
| | | | | *E. coli* | 25 µg | 130-095-775 |
| | premium grade | | Recombinant mouse leukemia inhibitory factor | *E. coli* | 10 µg | 130-095-777 |
| | | | | *E. coli* | 25 µg | 130-095-778 |
| | | | | *E. coli* | 100 µg | 130-095-779 |
| | | | | *E. coli* | 10×100 µg | 130-099-895 |

| Product | Quality grade | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|---|
| **Mouse M-CSF** | research grade | CSF1 | Recombinant mouse macrophage colony-stimulating factor | *E. coli* | 10 µg | 130-094-129 |
| | | | | *E. coli* | 25 µg | 130-101-706 |
| | premium grade | CSF1 | Recombinant mouse macrophage colony-stimulating factor | *E. coli* | 10 µg | 130-101-703 |
| | | | | *E. coli* | 25 µg | 130-101-700 |
| | | | | *E. coli* | 100 µg | 130-101-704 |
| | | | | *E. coli* | 1000 µg | 130-101-705 |
| **Mouse Noggin** | research grade | | Recombinant mouse noggin | *E. coli* | 5 µg | 130-103-457 |
| | | | | *E. coli* | 20 µg | 130-103-458 |
| | | | | *E. coli* | 100 µg | 130-103-459 |
| **Mouse RANK-Ligand – soluble** | research grade | TNFSF11 | Recombinant soluble mouse receptor activator of NF-κB ligand | *E. coli* | 2 µg | 130-094-645 |
| | | | | *E. coli* | 10 µg | 130-094-076 |
| | | | | *E. coli* | 100 µg | 130-094-646 |
| **Mouse SCF** | research grade | c-kit ligand, steel factor, mgF | Recombinant mouse stem cell factor | *E. coli* | 10 µg | 130-094-079 |
| | | | | *E. coli* | 25 µg | 130-101-741 |
| | premium grade | c-kit ligand, steel factor, mgF | Recombinant mouse stem cell factor | *E. coli* | 10 µg | 130-101-693 |
| | | | | *E. coli* | 25 µg | 130-101-694 |
| | | | | *E. coli* | 100 µg | 130-101-697 |
| | | | | *E. coli* | 1000 µg | 130-101-698 |
| **Mouse TNF-α** | research grade | TNFSF2 | Recombinant mouse tumor necrosis factor α | *E. coli* | 10 µg | 130-101-688 |
| | | | | *E. coli* | 25 µg | 130-101-687 |
| | premium grade | TNFSF2 | Recombinant mouse tumor necrosis factor α | *E. coli* | 10 µg | 130-101-689 |
| | | | | *E. coli* | 25 µg | 130-101-690 |
| | | | | *E. coli* | 100 µg | 130-101-691 |
| | | | | *E. coli* | 1000 µg | 130-101-692 |
| **Mouse TPO** | research grade | MDGF, TSF, mgDF | Recombinant mouse thrombopoietin | *E. coli* | 2 µg | 130-094-082 |
| | | | | *E. coli* | 10 µg | 130-094-083 |
| | | | | *E. coli* | 100 µg | 130-096-301 |
| | | | | *E. coli* | 1000 µg | 130-108-958 |
| **Mouse VEGF** | research grade | | Recombinant mouse vascular endothelial growth factor | insect cells | 5 µg | 130-094-086 |
| | | | | insect cells | 20 µg | 130-094-087 |

## Human FGF-2 IS

### Overview

FGF-2 IS stands for fibroblast growth factor 2 "Improved Sequence", also termed fibroblast growth factor basic (FGF-b) or basic FGF. Human FGF-2 IS is a variant of Human FGF-2 with a proprietary amino acid substitution. Human FGF-2 IS is covered by patent nos. US10,336,799 and EP2930181B1. Human FGF-2 IS is a recombinant protein optimized for use in cell culture, differentiation studies, and functional assays.

### Background information

Fibroblast growth factor 2 (FGF-2), also termed fibroblast growth factor basic (FGF-b) or basic FGF (bFGF), belongs to the FGF family. It functions as a wide-spectrum mitogenic, angiogenic, and neurotrophic factor and stimulates the proliferation of a wide variety of cells including mesenchymal, neuroectodermal, and endothelial cells. FGF-2 has been implicated in a multitude of physiological and pathological processes, including limb development, angiogenesis, wound healing, and tumor growth. Human FGF-2 IS is an engineered FGF-2 variant with increased thermostability and higher resistance to proteases, and retains the same biological properties as naturally occurring FGF-2.

### Applications

Human FGF-2 can be used for a variety of applications, including:

- Stimulation of proliferation and differentiation of several cell types, such as mesenchymal stromal cells, neural cells, and endothelial cells.
- Long-term maintenance and propagation of undifferentiated embryonic and induced pluripotent stem cells.
- Differentiation of neural cells starting from embryonic and induced pluripotent stem cell cultures.

### Biological activity

Proliferation of 3T3 cells (NIBSC 90/712)
**Premium grade:** ≥ $2\times10^6$ IU/mg
**Research grade:** ≥ $1\times10^6$ IU/mg

| Product | Source | Content | Order no. |
|---|---|---|---|
| **Human FGF-2 IS – research grade**<br>For research use only | *E. coli* | 10 µg | 130-104-925 |
| **Human FGF-2 IS – research grade**<br>For research use only | *E. coli* | 50 µg | 130-104-921 |
| **Human FGF-2 IS – premium grade**<br>For research use only | *E. coli* | 10 µg | 130-104-918 |
| **Human FGF-2 IS – premium grade**<br>For research use only | *E. coli* | 50 µg | 130-104-924 |
| **Human FGF-2 IS – premium grade**<br>For research use only | *E. coli* | 200 µg | 130-104-922 |
| **Human FGF-2 IS – premium grade**<br>For research use only | *E. coli* | 1000 µg | 130-104-923 |

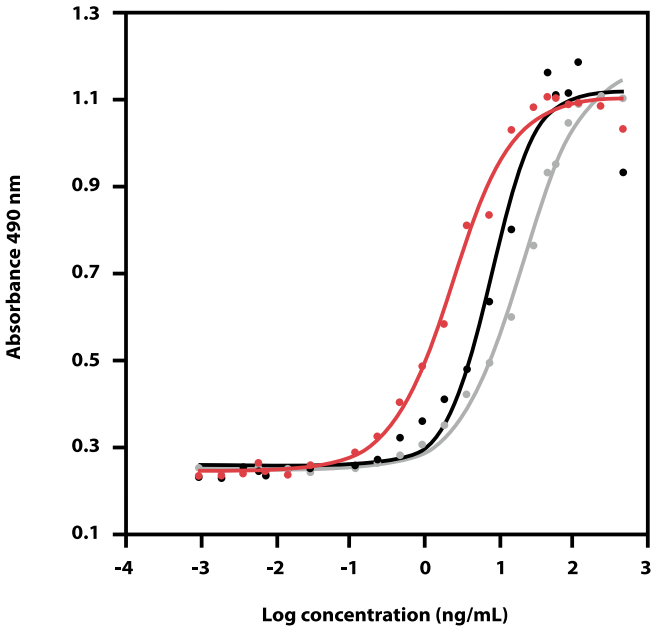


**Figure 1: Human FGF-2 IS activity assay.** The biological activity of Human FGF-2 IS, premium grade, was determined by proliferation assay using 3T3 cells. Activity of Human FGF-2 IS, premium grade, (red line) was compared to wild type Human FGF-2 (black line), and another commercially available product (gray line).

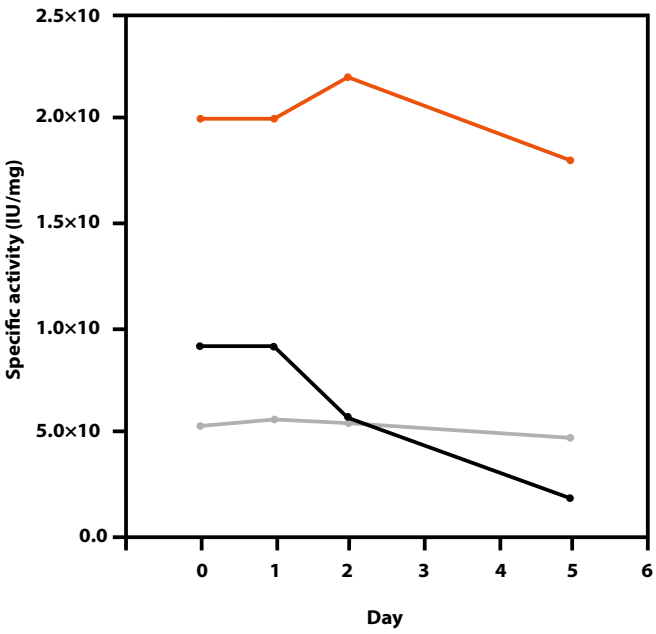


**Figure 2: Thermostability of Human FGF-2 IS.** Activity of Human FGF-2 IS, premium grade (red line) versus wild type Human FGF-2 (black line), and another commercially available product (gray line), over 5 days at 37 °C.

Selected references
1. Robinson, C. J. and Gaines-Das, R. (1994) Growth Factors 11: 9–16.
2. Mazzara, P. G. *et al.* (2020) Nat Commun 11 (1): 4178.
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6. Mannhardt, I. *et al.* (2017) J. Vis. Exp. 122: 55461.

## Human GM-CSF

### Overview

Recombinant human GM-CSF induces the differentiation of granulocytes, monocytes, and macrophages. The hematopoietic cytokine is a crucial part of the immune/inflammatory path and serves as both a survival and activation signal for mature myeloid cells. The recombinant granulocyte-macrophage colony-stimulating factor (GM-CSF) has been developed for use in cell culture, differentiation studies, and functional assays.

### Background information

GM-CSF is a hematopoietic growth factor, which is essential for proliferation and development of granulocyte and monocyte/macrophage progenitors. It also functions as a growth factor for erythroid and megakaryocytic precursor cells in conjunction with erythropoietin. GM-CSF is secreted by various cell types including T cells, macrophages, endothelial cells, and fibroblasts in response to inflammatory stimuli and cytokines. In addition, GM-CSF is a potent chemoattractant for neutrophils and eosinophils and enhances the effector functions of neutrophils and macrophages.

### Applications

Human GM-CSF can be used for a variety of applications including:

- Cultivation of hematopoietic progenitor cells from human bone marrow in semi-solid medium.
- *In vitro* generation of Mo-DCs together with Human IL-4.
- *In vitro* differentiation of $CD34^+$ cells towards eosinophils.
- Migration assays for eosinophils.

### Biological activity

Proliferation of TF-1 cells (NIBSC 88/646)
**Premium grade:** ≥ $5\times10^6$ IU/mg (typical activity: $1.2\times10^7$ IU/mg)
**Research grade:** ≥ $2\times10^6$ IU/mg

| Product | Source | Content | Order no. |
|---|---|---|---|
| **Human GM-CSF – research grade**<br>For research use only | *E. coli* | 10 µg | 130-093-862 |
| **Human GM-CSF – research grade**<br>For research use only | *E. coli* | 50 µg | 130-095-372 |
| **Human GM-CSF – premium grade**<br>For research use only | *E. coli* | 10 µg | 130-093-864 |
| **Human GM-CSF – premium grade**<br>For research use only | *E. coli* | 50 µg | 130-093-865 |
| **Human GM-CSF – premium grade**<br>For research use only | *E. coli* | 100 µg | 130-093-866 |
| **Human GM-CSF – premium grade**<br>For research use only | *E. coli* | 500 µg | 130-093-867 |
| **Human GM-CSF – premium grade**<br>For research use only | *E. coli* | 1000 µg | 130-093-868 |

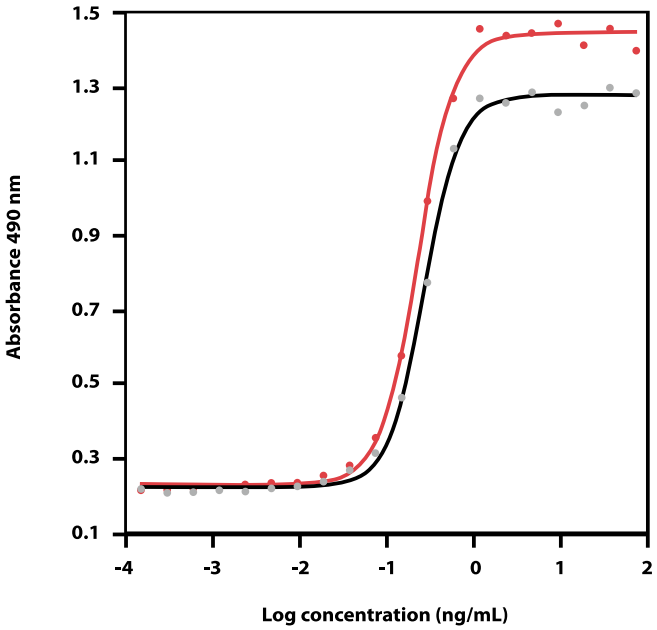


**Figure 1: Human GM-CSF activity assay.** The biological activity of Human GM-CSF, premium grade was determined by proliferation assay using TF-1 cells. Activity of Human GM-CSF, premium grade, (red line) was compared to another commercially available product (black line).

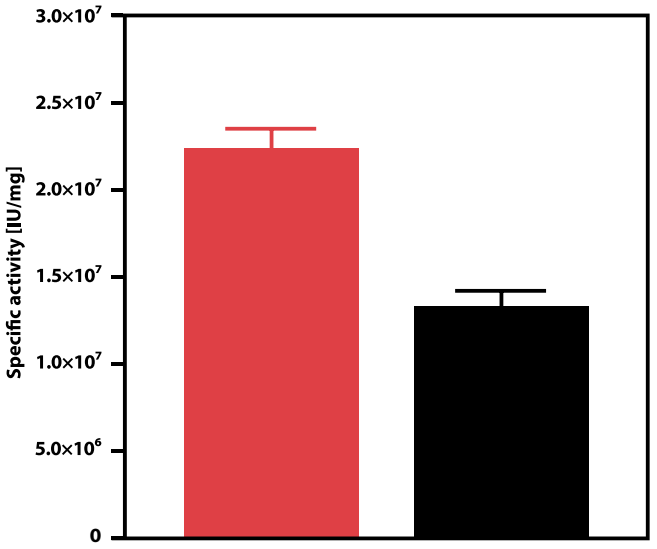


**Figure 2: Human GM-CSF biological activity.** Activity of Human GM-CSF, premium grade (red bar) was compared to another commercially available product (black bar).

Selected references
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2. Feray, A. *et al.* (2020) Nanomaterials (Basel) 10 (3): 425.
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## Human IL-2 IS

### Overview

Recombinant human IL-2 (interleukin 2) stimulates growth and differentiation of cells of the lymphoid lineage, such as T, NK, and B cells. IL-2 is a potent immunomodulatory cytokine, as it prevents autoimmunity and has key functions during infections. IL-2 IS stands for interleukin 2 "Improved Sequence", also termed aldesleukin, and is a variant of IL-2 with a serine substitution for the native cysteine at amino acid position 125. Human IL-2 IS is a recombinant protein optimized for use in cell culture, differentiation studies, and functional assays, and possesses the same biological properties as naturally occurring IL-2.

### Background information

IL-2, a potent lymphoid cell growth factor, is a typical four α-helix bundle cytokine. It is produced by activated T cells, especially the $CD4^+$ T helper cell population. It plays an important role in both the activation and maintenance of immune responses and in lymphocyte development. IL-2 promotes proliferation and differentiation of T cells, NK cells and B cells and is involved in the elimination of self-reactive T cells. IL-2 signals through a receptor complex consisting of IL-2 receptor α-chain (CD25), β- chain, and common γ-chain. The latter two are also used for IL-15 signaling.

### Applications

Human IL-2 IS can be used for a variety of applications including:

- *In vitro* activation and propagation of T cells, e.g., in combination with the T cell Activation/Expansion Kit, human.
- *In vitro* stimulation of cytolytic function and expansion of NK cells, e.g., using the NK cell Activation/Expansion Kit, human.
- Generation of lymphokine-activated killer (LAK) cells or cytokine-induced killer (CIK) cells.

### Biological activity

Proliferation of CTLL-2 cells (NIBSC 86/504)
**Premium grade:** ≥ $5\times10^6$ IU/mg (typical activity: $9\times10^6$ IU/mg)
**Research grade:** ≥ $3\times10^6$ IU/mg

| Product | Source | Content | Order no. |
|---|---|---|---|
| **Human IL-2 IS – research grade**<br>For research use only | *E. coli* | 10 µg | 130-097-742 |
| **Human IL-2 IS – research grade**<br>For research use only | *E. coli* | 50 µg | 130-097-743 |
| **Human IL-2 IS – premium grade**<br>For research use only | *E. coli* | 10 µg | 130-097-744 |
| **Human IL-2 IS – premium grade**<br>For research use only | *E. coli* | 50 µg | 130-097-745 |
| **Human IL-2 IS – premium grade**<br>For research use only | *E. coli* | 200 µg | 130-097-746 |
| **Human IL-2 IS – premium grade**<br>For research use only | *E. coli* | 1000 µg | 130-097-748 |

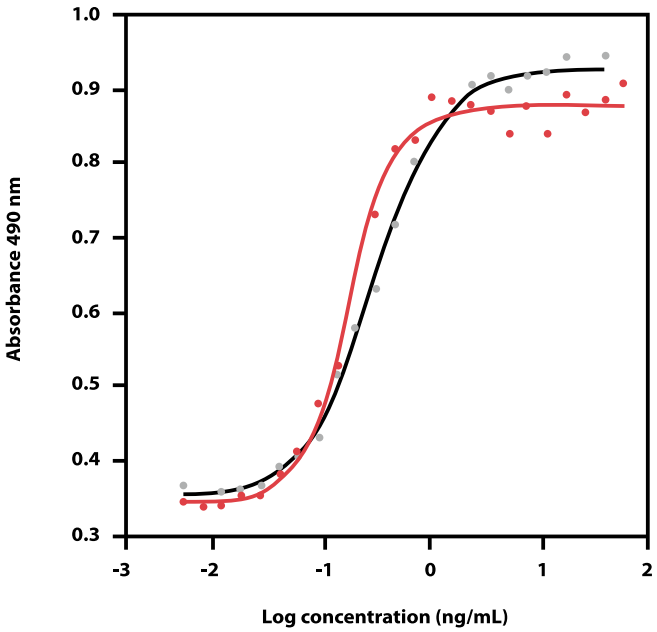


**Figure 1: Human IL-2 IS activity assay.** Activity of Human IL-2 IS, premium grade (red line) was compared to commercially available aldesleukin (black line).

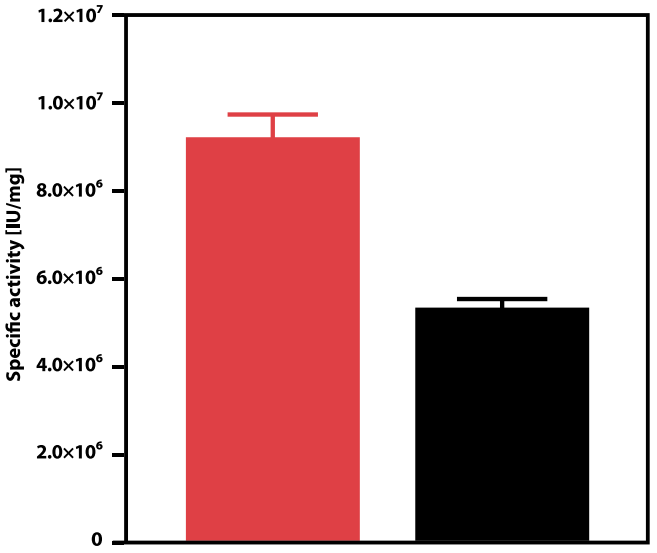


**Figure 2: Human IL-2 IS biological activity.** Activity of Human IL-2 IS, premium grade, (red bar) was compared to another commercially available product (black bar).

Selected references
1. Jamali, A. *et al.* (2020) Front Immunol 11: 2028.
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## Polyclonal stimulation

| Product | Description | Capacity/Content | Order no. |
|---|---|---|---|
| **Anti-Biotin MACSiBead™ Particles – cell culture grade** | Anti-Biotin MACSiBead Particles, ready for loading with biotinylated antibodies, for activation, expansion, and differentiation of cells | 2 mL | 130-092-357 |
| **CytoStim™, human** | Rapid and efficient restimulation of human effector/memory T cells | for $1\times10^8$ total cells 200 µL | 130-092-172 |
| | | for $5\times10^8$ total cells 1 mL | 130-092-173 |
| **CytoStim™, non-human primate** | Rapid and efficient restimulation of non-human primate effector/ memory T cells | for $1\times10^8$ total cells 200 µL | 130-094-447 |
| | | for $5\times10^8$ total cells 1 mL | 130-094-442 |
| **MSC Suppression Inspector, human** | Preloaded MACSiBead Particles for investigation of immunomodulatory properties of human mesenchymal stem cells (MSCs) | 2.5 mL | 130-096-207 |
| **NK cell Activation/Expansion Kit, human** | Kit containing biotinylated antibodies and Anti-Biotin MACSiBead Particles, cell culture grade, for the activation and expansion of human NK cells | 1 kit | 130-094-483 |
| **T cell Activation/Expansion Kit, human** | Kit containing biotinylated antibodies and Anti-Biotin MACSiBead Particles, cell culture grade, for the activation and/or expansion of human T cells | 1 kit | 130-091-441 |
| **T cell Activation/Expansion Kit, mouse** | Kit containing biotinylated antibodies and Anti-Biotin MACSiBead Particles, cell culture grade, for the activation and/or expansion of mouse T cells | 1 kit | 130-093-627 |
| **T cell Activation/Expansion Kit, non-human primate** | Kit containing biotinylated antibodies and Anti-Biotin MACSiBead Particles, cell culture grade, for the activation and/or expansion of rhesus monkey T cells | 1 kit | 130-092-919 |
| **T cell TransAct™, human** | T cell TransAct is intended for the *in vitro* stimulation and expansion of human T cells from PBMCs or enriched T cells | 2 mL | 130-128-758 |
| | | 2×2 mL | 130-111-160 |
| **Treg Expansion Kit, human** | MACSiBead Particles, cell culture grade, pre-loaded with CD3 and CD28 antibodies for the *in vitro* expansion of human regulatory T cells | 2 mL | 130-095-345 |
| | | 2×2 mL | 130-095-353 |
| **Treg Expansion Kit, mouse** | Anti-Biotin MACSiBead Particles, cell culture grade, pre-loaded with CD3 and CD28 antibodies for the *in vitro* expansion of mouse regulatory T cells | 2 mL | 130-095-925 |
| **Treg Suppression Inspector, human** | Anti-Biotin MACSiBead Particles, preloaded with biotinylated CD2, CD3, and CD28 antibodies for functional characterization of human $CD4^+CD25^+$ regulatory T cells | 2.5 mL | 130-092-909 |

## Antigens

| Product | Description | Content | Order no. |
|---|---|---|---|
| **Recombinant Human ACE2 (HEK)** | Recombinant human angiotensin-converting enzyme 2 | 25 µg | 130-127-456 |
| | | 100 µg | 130-127-516 |
| **Recombinant Human ACE2 (HEK)-Biotin** | Biotinylated recombinant human angiotensin-converting enzyme 2 | 10 µg | 130-127-442 |
| | | 50 µg | 130-127-465 |
| **Recombinant Human ACE2 (insect cells)** | Recombinant human angiotensin-converting enzyme 2 | 25 µg | 130-127-444 |
| **Recombinant Human ACE2 (insect cells)-Biotin** | Biotinylated recombinant human angiotensin-converting enzyme 2 | 10 µg | 130-127-468 |
| | | 50 µg | 130-127-464 |
| **Recombinant SARS-CoV-2 Nucleoprotein** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-127-462 |
| | | 100 µg | 130-127-517 |
| **Recombinant SARS-CoV-2 Nucleoprotein-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-127-454 |
| | | 50 µg | 130-127-467 |
| **Recombinant SARS-CoV-2 RBD (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-127-448 |
| | | 100 µg | 130-127-518 |
| **Recombinant SARS-CoV-2 RBD (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-127-458 |
| | | 50 µg | 130-127-457 |
| **Recombinant SARS-CoV-2 RBD (insect cells)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-127-463 |
| | | 100 µg | 130-127-453 |

| Product | Description | Content | Order no. |
|---|---|---|---|
| **Recombinant SARS-CoV-2 RBD (insect cells)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-127-445 |
| | | 50 µg | 130-127-469 |
| **Recombinant SARS-CoV-2 RBD B.1.1.529/BA.1 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-130-535 |
| | | 100 µg | 130-130-416 |
| **Recombinant SARS-CoV-2 RBD B.1.1.529/BA.1 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-130-418 |
| | | 50 µg | 130-130-419 |
| **Recombinant SARS-CoV-2 RBD B.1.1.7 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-128-478 |
| | | 100 µg | 130-128-477 |
| **Recombinant SARS-CoV-2 RBD B.1.1.7 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-128-481 |
| | | 50 µg | 130-128-479 |
| **Recombinant SARS-CoV-2 RBD B.1.351 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-128-935 |
| | | 100 µg | 130-128-932 |
| **Recombinant SARS-CoV-2 RBD B.1.351 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-128-931 |
| | | 50 µg | 130-128-930 |
| **Recombinant SARS-CoV-2 RBD B.1.617.2 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-129-705 |
| | | 100 µg | 130-129-556 |
| **Recombinant SARS-CoV-2 RBD B.1.617.2 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-129-704 |
| | | 50 µg | 130-129-703 |
| **Recombinant SARS-CoV-2 Spike-Prot (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-127-681 |
| | | 50 µg | 130-127-680 |
| **Recombinant SARS-CoV-2 Spike-Prot (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-127-682 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.1.529/BA.1 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-130-626 |
| | | 50 µg | 130-130-628 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.1.529/BA.1 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-130-417 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.1.7 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-129-572 |
| | | 50 µg | 130-129-561 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.1.7 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-129-570 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.351 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-129-559 |
| | | 50 µg | 130-129-560 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.351 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-129-569 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.617.2 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-129-558 |
| | | 50 µg | 130-129-557 |
| **Recombinant SARS-CoV-2 Spike-Prot B.1.617.2 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-129-565 |
| **Recombinant SARS-CoV-2 Spike-S1 (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-127-852 |
| | | 50 µg | 130-127-854 |
| **Recombinant SARS-CoV-2 Spike-S1 (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-127-853 |
| **Recombinant SARS-CoV-2 Spike-S2 (insect cells)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-127-687 |
| | | 50 µg | 130-127-686 |
| **Recombinant SARS-CoV-2 Spike-S2 (insect cells)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-127-688 |
| **Recombinant SARS-CoV-2 Spike-Trimer (HEK)** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 10 µg | 130-127-684 |
| | | 50 µg | 130-127-683 |
| **Recombinant SARS-CoV-2 Spike-Trimer (HEK)-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 25 µg | 130-127-685 |

| Product | Description | Content | Order no. |
|---|---|---|---|
| **SARS-CoV-2 Envelope C-term** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-446 |
| **SARS-CoV-2 Envelope C-term-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-451 |
| **SARS-CoV-2 Envelope H2** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-450 |
| **SARS-CoV-2 Envelope H2-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-452 |
| **SARS-CoV-2 Envelope N-term** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-455 |
| **SARS-CoV-2 Envelope N-term-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-461 |
| **SARS-CoV-2 Furin Cleavage Site Control FAM-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-692 |
| **SARS-CoV-2 Furin Cleavage Site Control-Biotin** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-691 |
| **SARS-CoV-2 Furin Cleavage Site FAM-Biotin** | Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-690 |
| **SARS-CoV-2 Furin Cleavage Site-Biotin** | SARS-CoV-2 antigen for investigation of virus-specific immune responses | 100 µg | 130-127-689 |

## PepTivator® Peptide Pools covering antigens from infectious diseases

| Product | Quality grade | Capacity/Content | Order no. |
|---|---|---|---|
| **PepTivator® A. fumigatus Catalase B** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-291 |
| **PepTivator® A. fumigatus crf1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-775 |
| **PepTivator® A. fumigatus f 22** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-776 |
| **PepTivator® A. fumigatus Gel1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-289 |
| **PepTivator® A. fumigatus pmp20** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-772 |
| **PepTivator® A. fumigatus SHMT** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-290 |
| **PepTivator® A. fumigatus SOD** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-288 |
| **PepTivator® AdV Select** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-124-394 |
| **PepTivator® AdV5 Hexon** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-093-495 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-093-496 |
| **PepTivator® AdV5 Penton** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-777 |
| **PepTivator® Aquaporin-4** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-126-131 |
| **PepTivator® B. afzelii bmpA** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-788 |
| **PepTivator® B. afzelii bmpB** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-792 |
| **PepTivator® B. afzelii ospA** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-778 |
| **PepTivator® B. afzelii ospB** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-782 |
| **PepTivator® B. afzelii ospC** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-786 |

| Product | Quality grade | Capacity/Content | Order no. |
|---|---|---|---|
| **PepTivator® BKV LT** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-131-249 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-131-252 |
| **PepTivator® BKV ST** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-503 |
| **PepTivator® BKV VP1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-131-251 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-131-250 |
| **PepTivator® BKV VP2** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-273 |
| **PepTivator® C. albicans MP65** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-776 |
| **PepTivator® CEF MHC Class I Plus** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-098-426 |
| **PepTivator® CMV IE-1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-093-493 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-093-494 |
| **PepTivator® CMV pp65** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-093-438 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-093-435 |
| **PepTivator® CMV pp65 (HT)** | premium grade | for 96 tests | 130-097-727 |
| **PepTivator® Dengue Virus Type 2 Capsid Protein C** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-123-131 |
| **PepTivator® Dengue Virus Type 2 Envelope Protein E1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-123-128 |
| **PepTivator® Dengue Virus Type 2 Envelope Protein E2** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-123-127 |
| **PepTivator® Dengue Virus Type 2 Glycoprotein M** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-123-129 |
| **PepTivator® Dengue Virus Type 2 Protein NS1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-123-145 |
| **PepTivator® Dengue Virus Type 2 Protein NS2a** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-123-130 |
| **PepTivator® Dengue Virus Type 4 Protein NS2a** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-123-126 |
| **PepTivator® EBV BMLF1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-283 |
| **PepTivator® EBV BRLF1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-284 |
| **PepTivator® EBV BZLF1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-093-611 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-093-612 |
| **PepTivator® EBV Consensus** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-764 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-103-462 |
| **PepTivator® EBV EBNA-1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-093-613 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-093-614 |

| Product | Quality grade | Capacity/Content | Order no. |
|---|---|---|---|
| **PepTivator® EBV LMP1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-095-930 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-095-931 |
| **PepTivator® EBV LMP2A** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-093-615 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-093-616 |
| **PepTivator® HCV1a Core** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-773 |
| **PepTivator® HCV1a NS3** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-780 |
| **PepTivator® HCV1a NS4** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-282 |
| **PepTivator® HCV1a NS5** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-281 |
| **PepTivator® HCV1b Core** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-782 |
| **PepTivator® HCV1b NS3** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-783 |
| **PepTivator® HCV1b NS4** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-280 |
| **PepTivator® HCV1b NS5** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-279 |
| **PepTivator® HHV1 Envelope Glycoprotein D** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-114-929 |
| **PepTivator® HPV16 E6** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-095-997 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-095-998 |
| **PepTivator® HPV16 E7** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-095-999 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-096-000 |
| **PepTivator® HPV18 E6** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-005 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-096-006 |
| **PepTivator® HPV18 E7** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-095-996 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-096-007 |
| **PepTivator® Influenza A (H1N1) HA** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-803 |
| **PepTivator® Influenza A (H1N1) MP1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-285 |
| **PepTivator® Influenza A (H1N1) MP2** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-812 |
| **PepTivator® Influenza A (H1N1) NA** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-099-806 |
| **PepTivator® Influenza A (H1N1) NP** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-097-278 |

| Product | Quality grade | Capacity/Content | Order no. |
|---|---|---|---|
| **PepTivator® JCV LT** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-131-253 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-131-541 |
| **PepTivator® JCV ST** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-766 |
| **PepTivator® JCV VP1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-131-255 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-131-254 |
| **PepTivator® JCV VP2** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-764 |
| **PepTivator® JCV VP3** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-096-762 |
| **PepTivator® M. tuberculosis ACR** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-043 |
| **PepTivator® M. tuberculosis Ag85B** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-042 |
| **PepTivator® M. tuberculosis CFP-10** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-049 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-132-046 |
| **PepTivator® M. tuberculosis ESAT-6** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-048 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-132-045 |
| **PepTivator® M. tuberculosis TB10.4** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-053 |
| **PepTivator® M. tuberculosis TB7.7** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-047 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-132-044 |
| **PepTivator® RSV Nucleoprotein** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-104-803 |
| **PepTivator® SARS-CoV-2 MHC-I Select** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-130-629 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-130-632 |
| **PepTivator® SARS-CoV-2 MHC-I Select Prot_S** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-130-634 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-130-633 |
| **PepTivator® SARS-CoV-2 Prot_M** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-126-702 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-126-703 |
| **PepTivator® SARS-CoV-2 Prot_N** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-126-698 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-126-699 |
| **PepTivator® SARS-CoV-2 Prot_N B.1.1.7 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-127-843 |

| Product | Quality grade | Capacity/Content | Order no. |
|---|---|---|---|
| **PepTivator® SARS-CoV-2 Prot_N B.1.1.7 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-127-842 |
| **PepTivator® SARS-CoV-2 Prot_S** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-126-700 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-126-701 |
| **PepTivator® SARS-CoV-2 Prot_S AY.1 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-129-568 |
| **PepTivator® SARS-CoV-2 Prot_S AY.1 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-129-564 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.529/BA.1 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-129-928 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.529/BA.1 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-129-927 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.529/BA.2 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-130-807 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.529/BA.2 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-130-806 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.529/BA.5 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-051 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.529/BA.5 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-050 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.7 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-127-844 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.1.7 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-127-841 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.351 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-127-958 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.351 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-127-952 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.427/B.1.429 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-482 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.427/B.1.429 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-487 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.525 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-483 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.525 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-484 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.617.1 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-762 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.617.1 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-764 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.617.2 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-763 |
| **PepTivator® SARS-CoV-2 Prot_S B.1.617.2 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-128-761 |
| **PepTivator® SARS-CoV-2 Prot_S BQ.1.1 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-887 |
| **PepTivator® SARS-CoV-2 Prot_S BQ.1.1 Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-132-888 |

| Product | Quality grade | Capacity/Content | | Order no. |
|---|---|---|---|---|
| **PepTivator® SARS-CoV-2 Prot_S Complete** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-129-712 |
| | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-127-951 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-127-953 |
| **PepTivator® SARS-CoV-2 Prot_S Complete BA.1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-131-611 |
| **PepTivator® SARS-CoV-2 Prot_S Complete BA.5** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-132-810 |
| **PepTivator® SARS-CoV-2 Prot_S P.1 Mutation Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-128-485 |
| **PepTivator® SARS-CoV-2 Prot_S P.1 WT Reference Pool** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-128-486 |
| **PepTivator® SARS-CoV-2 Prot_S+** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-127-311 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-127-312 |
| **PepTivator® SARS-CoV-2 Prot_S1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-127-041 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-127-048 |
| **PepTivator® SARS-CoV-2 Select** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-127-309 |
| **PepTivator® WNV Capsid protein C** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-484 |
| **PepTivator® WNV Envelope 1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-486 |
| **PepTivator® WNV Envelope 2** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-487 |
| **PepTivator® WNV NS1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-488 |
| **PepTivator® WNV Protein M** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-485 |
| **PepTivator® WNV Select** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-489 |
| **PepTivator® Zika Capsid Protein C** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-114-926 |
| **PepTivator® Zika Envelope Protein E1-2** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-114-927 |
| **PepTivator® Zika Envelope Protein E3** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-114-925 |
| **PepTivator® Zika Glycoprotein M** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-114-923 |
| **PepTivator® Zika NS1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-114-922 |

## PepTivator Peptide Pools covering tumor-associated antigens

| Product | Quality grade | Capacity/Content | | Order no. |
|---|---|---|---|---|
| **PepTivator® LINE-1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | *new* | 130-134-743 |
| **PepTivator® gp100/Pmel 17** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-094-449 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-094-450 |
| **PepTivator® MAGE-A1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-095-382 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-095-383 |
| **PepTivator® MAGE-A3** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-095-384 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-095-385 |
| **PepTivator® MAGE-A4** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-095-386 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-095-387 |
| **PepTivator® Melan-A/MART-1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-094-597 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-094-477 |
| **PepTivator® NY-ESO-1** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-095-380 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-095-381 |
| **PepTivator® PAP** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-096-767 |
| **PepTivator® PRAME** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-097-286 |
| **PepTivator® Prostein** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-099-801 |
| **PepTivator® PSA** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-099-800 |
| **PepTivator® PSCA** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-099-798 |
| **PepTivator® PSMA** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-099-795 |
| **PepTivator® RAS G12C** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-133-669 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-133-877 |
| **PepTivator® RAS G12D** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-133-874 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-133-878 |
| **PepTivator® RAS G12R** | premium grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-133-876 |
| | | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | | 130-133-871 |

| Product | Quality grade | Capacity/Content | | Order no. |
|---|---|---|---|---|
| **PepTivator® RAS G12V** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | | 130-133-879 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | | 130-133-872 |
| **PepTivator® RAS G13D** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | | 130-133-870 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | | 130-133-668 |
| **PepTivator® RAS Q61K** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | *new* | 130-136-475 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | *new* | 130-136-508 |
| **PepTivator® RAS Q61R** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | *new* | 130-136-476 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | *new* | 130-136-477 |
| **PepTivator® RAS WT G12** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | *new* | 130-134-833 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | *new* | 130-134-798 |
| **PepTivator® RAS WT G13** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | *new* | 130-135-445 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | *new* | 130-134-816 |
| **PepTivator® Uveal Melanoma GNA11_Q209L** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | *new* | 130-135-446 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | *new* | 130-134-804 |
| **PepTivator® Uveal Melanoma GNAQ_Q209L** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | *new* | 130-135-448 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | *new* | 130-134-756 |
| **PepTivator® Uveal Melanoma GNAQ_Q209P** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | *new* | 130-135-447 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | *new* | 130-134-822 |
| **PepTivator® WT1** | premium grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | | 130-095-916 |
| | | for stimulation of 1×10$^9$ cells<br>60 nmol/peptide | | 130-095-918 |

## PepTivator Peptide Pools covering other antigens

| Product | Quality grade | Capacity/Content | Order no. |
|---|---|---|---|
| **PepTivator® α-Synuclein** | research grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | 130-132-052 |
| **PepTivator® CHI3L2** | research grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | 130-097-276 |
| **PepTivator® Desmoglein** | research grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | 130-099-766 |
| **PepTivator® GAD65** | research grade | for stimulation of 1×10$^8$ cells<br>6 nmol/peptide | 130-096-769 |

| Product | Quality grade | Capacity/Content | | Order no. |
|---|---|---|---|---|
| **PepTivator® IA-2** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-097-275 |
| **PepTivator® Insulin** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-096-771 |
| **PepTivator® MBP Isoform 1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-096-763 |
| **PepTivator® MBP Isoform 5** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-097-287 |
| **PepTivator® MOG** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-096-770 |
| **PepTivator® Mucin-1** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-099-774 |
| **PepTivator® Negative Control** | | for stimulation of $1\times10^8$ cells<br>for stimulation of $1\times10^9$ cells | | 130-131-610<br>130-131-612 |
| **PepTivator® Ovalbumin** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-099-771 |
| **PepTivator® PLP** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | | 130-097-274 |
| **PepTivator® RO60** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-496 |
| **PepTivator® RU17** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-495 |
| **PepTivator® SSB** | research grade | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | ***new*** | 130-136-497 |

## PepTivator® CMV pp65

### Overview

PepTivator® CMV pp65 is a peptide pool that consists mainly of 15-mer peptides with 11–amino acid (aa) overlap, covering the complete sequence of the pp65 protein of cytomegalovirus (UniProt ID: P06725).

PepTivator peptide pools have been developed for the 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.

Quantitative, phenotypical, or functional analysis of pp65-specific T cell immunity can provide important information on the natural course of immune responses in healthy or immunocompromised individuals.

### Background information

CMV pp65 (65 kDa lower matrix phosphoprotein), also known as glycoprotein 64 or UL83, is a virion tegument protein and the main component of the enveloped subviral particle. CMV pp65 is an immunodominant target of CD4$^+$ and CD8$^+$ T cell responses to CMV. CMV pp65-specific T cells predominantly produce inflammatory cytokines, such as IFN-γ, IL-2, and TNF-α.

### Downstream applications

The *in vitro* stimulation of pp65-specific CD4$^+$ and CD8$^+$ T cells with PepTivator CMV pp65 causes the secretion of effector cytokines and the upregulation of activation markers, which then allow the detection and isolation of pp65-specific T cells [1–6]:

- Detection and analysis of CMV pp65-specific CD4$^+$ and CD8$^+$ effector/memory T cells in PBMCs by MACS® Cytokine Secretion Assays, intracellular staining, or other technologies.
- Isolation of viable CMV pp65-specific CD4$^+$ T cells with the CD154 MicroBead Kit, or of CD4$^+$ and CD8$^+$ T cells using the CD137 MicroBead Kit or MACS Cytokine Secretion Assay - Cell Enrichment and Detection Kits. Subsequently, cells can be expanded for generation of T cell lines.
- Generation of CMV pp65-specific CD4$^+$ and CD8$^+$ effector/memory T cells from naive T cell populations.
- Pulsing of antigen-presenting cells for research on dendritic cell vaccination.

| Product | Capacity/Content | Order no. |
|---|---|---|
| **PepTivator® CMV pp65 – premium grade**<br>For research use only | for stimulation of $1\times10^8$ cells<br>6 nmol/peptide | 130-093-438 |
| **PepTivator® CMV pp65 – premium grade**<br>For research use only | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 130-093-435 |
| **PepTivator® CMV pp65 (HT) – premium grade**<br>For research use only | for 96 tests | 130-097-727 |

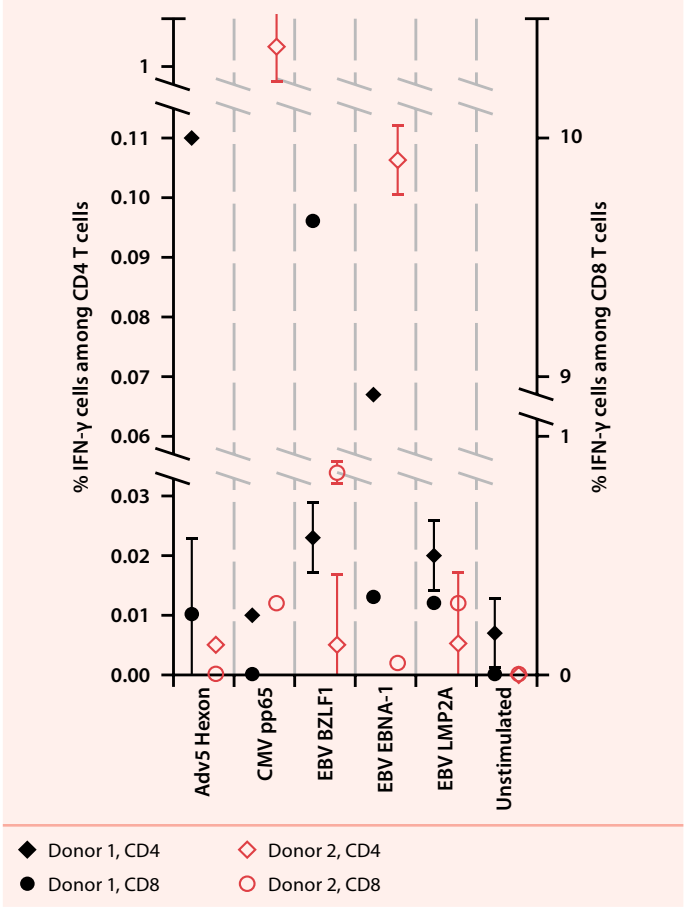


**Figure 1:** Production of IFN-γ by human CD4$^+$ or CD8$^+$ T cells after stimulation with different antigens using PepTivator Peptide Pools. Data from two different donors are shown (triplicates).

Selected references
1. Peggs, K. S. *et al.* (2011) Clin. Infect. Dis. 52 (1): 49–57.
2. Beck, B. *et al.* (2011) J. Transl. Med. 9: 151.
3. Aïssi-Rothé, L. *et al.* (2010) J Immunother 33 (4): 414–424.
4. Faist, B. *et al.* (2010) Clin. Vaccine Immunol. 17 (6): 986–992.
5. Zandvliet, M. *et al.* (2010) Cytotherapy 12: 933–944.
6. Dodero, A. *et al.* (2009) Blood 113: 4771–4779.

## TLR3 agonists

| Product | Description | Content | Order no. |
|---|---|---|---|
| **Poly (I:C)** | Polyinosinic-polycytidylic acid | 50 mg | 130-112-563 |
| | | 5×50 mg | 130-112-562 |

## TLR7/8 agonists

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **ORN R-0002** | TLR8 agonist for stimulation of human immune cells | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-427 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-438 |
| **ORN R-0006** | TLR7/8 agonist, for stimulation of human and mouse immune cells | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-440 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-439 |
| **ORN R-1263** | Control ORN for sequence and backbone control for ORN R-0002 and ORN R-0006 | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-433 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-435 |
| **ORN R-2176-dT** | TLR7/8 agonist for stimulation of human and mouse immune cells. Can be used without formulation with DOTAP-Cl | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-436 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-437 |
| **ORN R-2176-dT Control** | Control ORN for sequence and backbone control for ORN R-2176-dT. Can be used without formulation with DOTAP-Cl | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-442 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-441 |
| **ORN R-2336** | TLR7 agonist for stimulation of human and mouse immune cells | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-431 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-432 |

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **ORN R-2336 Control** | Control ORN for sequence and backbone control for ORN R-2336 | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-385 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-387 |
| **ORN RNA 40** | TLR7/8 agonist, for stimulation of human and mouse immune cells | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-428 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-429 |
| **ORN RNA 41** | Control ORN for sequence and backbone control for ORN RNA 40 | 200 µg<br>200 µg lyophilized ORN<br>1 mL RNase-free Water<br>400 µL DOTAP-Cl [1 mg/mL] | 130-104-430 |
| | | 1 mg<br>1 mg lyophilized ORN<br>1 mL RNase-free Water<br>5×400 µL DOTAP-Cl [1 mg/mL] | 130-104-448 |
| **R848 (Resiquimod)** | TLR7/8 agonist, for stimulation of human and mouse immune cells | 1 mg | 130-109-376 |
| **TLR7/8 Explorer** | Kit of three different ORNs for stimulation of TLR7, TLR8, and TLR7/8, and their respective control ORNs | 5×100 µg<br>5×100 µg lyophilized ORN<br>1 mL RNase-free Water<br>3×400 µL DOTAP-Cl [1 mg/mL] | 130-104-388 |

## TLR9 agonists

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **ODN 1826** | B-class CpG oligodeoxyribonucleotide (murine) | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-274 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-103 |
| **ODN 1826 Control (ODN 2138)** | B-class CpG control oligodeoxyribonucleotide (murine) | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-275 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-276 |
| **ODN 1826 Ready-to-use** | B-class CpG oligodeoxyribonucleotide (murine) | 5×100 µg in 50 µL | 130-109-374 |
| | | 20×100 µg in 50 µL | 130-109-373 |
| **ODN 1982** | B-class CpG control oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-104 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-277 |

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **ODN 2006** | B-class CpG oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-106 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-105 |
| **ODN 2006 Control (ODN 2137)** | B-class CpG control oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1x TE Buffer | 130-100-107 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-278 |
| **ODN 21798** | P-class CpG oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-281 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-280 |
| **ODN 21798 Control (ODN 23098)** | P-class control CpG oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-285 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-284 |
| **ODN 2216** | A-class CpG oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-243 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-244 |
| **ODN 2216 Control (ODN 2243)** | A-class CpG control oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-241 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-108 |
| **ODN 2395** | C-class CpG oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-282 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-283 |
| **ODN 2395 Control (ODN 5328)** | C-class control CpG oligodeoxyribonucleotide | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-279 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-109 |
| **TLR9 Explorer** | Kit of four different CpG ODNs for stimulation of the TLR9 receptor. The kit comprises agonists of the A-class, B-class, C-class and P-class as well as the respective control ODNs. | 8×100 µg<br>8×100 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-100-589 |

## TLR7/8/9 antagonists

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **ODN 2088** | TLR antagonist inhibiting TLR7, 8, and 9 signalling. | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-815 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-816 |
| **ODN 2088 Control (ODN 2087)** | Sequence control for ODN 2088. Inhibits TLR7 and TLR8 mediated signalling but not TLR9 mediated signalling. | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-819 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-940 |
| **ODN 2088 Control (ODN 20958)** | Sequence control for ODN 2088 and ODN 20959. Inhibits TLR7 mediated signalling but not TLR9 or TLR8 mediated signalling. | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-821 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-820 |
| **ODN 2088 Control (ODN 20959)** | Sequence control for ODN 2088. Inhibits TLR7 and TLR8 mediated signalling but not TLR9 mediated signalling. | 200 µg<br>200 µg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-818 |
| | | 1 mg<br>1 mg lyophilized ODN<br>1 mL 1×TE Buffer | 130-105-814 |

## StemMACS™ Small Molecules

| Product | Description | Content | Order no. |
|---|---|---|---|
| **StemMACS™ A83-01** | A potent inhibitor of the TGF-β, Activin and Nodal signaling pathway | 2 mg | 130-105-333 |
| | | 5×2 mg | 130-106-274 |
| **StemMACS™ CHIR99021** | The most selective inhibitor of glycogen synthase kinase 3β (GSK3β) | 2 mg | 130-103-926 |
| | | 5×2 mg | 130-104-172 |
| **StemMACS™ CHIR99021 in Solution** | The most selective inhibitor of glycogen synthase kinase 3β (GSK3β) | 2 mg | 130-106-539 |
| **StemMACS™ DAPT** | A selective, cell-permeable gamma-secretase inhibitor which blocks Notch activation | 5 mg | 130-110-489 |
| **StemMACS™ Dorsomorphin** | A potent inhibitor of BMP and AMPK signaling | 2 mg | 130-104-466 |
| **StemMACS™ Forskolin** | An activator of adenylate cyclase that increases cAMP levels | 10 mg | 130-117-341 |
| **StemMACS™ IWP-2** | An antagonist of the Wnt/β-catenin pathway | 2 mg | 130-105-335 |
| **StemMACS™ IWP-4** | An antagonist of the Wnt/β-catenin pathway | 2 mg | 130-110-488 |
| **StemMACS™ IWR-1-endo** | An antagonist of the Wnt/β-catenin pathway | 5 mg | 130-110-491 |
| **StemMACS™ LDN-193189** | A cell-permeable, small molecule inhibitor of BMP type I receptors ALK2 and ALK3 | 2 mg | 130-103-925 |
| | | 5×2 mg | 130-104-171 |
| **StemMACS™ LDN-193189 in Solution** | A cell-permeable, small molecule inhibitor of BMP type I receptors ALK2 and ALK3 | 2 mg | 130-106-540 |
| **StemMACS™ LY411575** | A selective, cell-permeable gamma-secretase inhibitor which blocks Notch activation | 5 mg | 130-103-924 |
| **StemMACS™ PD0325901** | A selective inhibitor of MAPK/ERK kinase (MEK) | 2 mg | 130-103-923 |
| | | 5×2 mg | 130-104-170 |
| **StemMACS™ PD0325901 in Solution** | A selective inhibitor of MAPK/ERK kinase (MEK) | 2 mg | 130-106-541 |
| **StemMACS™ Purmorphamine** | An agonist of Smoothened that activates the hedgehog signaling pathway | 5 mg | 130-104-465 |
| **StemMACS™ RepSox** | A potent inhibitor of the TGF-β type I receptor, activin receptor-like kinase (ALK5) | 10 mg | 130-117-340 |
| **StemMACS™ Retinoic Acid** | A small molecule agonist for the heterodimeric retinoid receptor RAR/RXR | 50 mg | 130-117-339 |
| **StemMACS™ RG108** | A non-nucleoside inhibitor of DNA methyltransferase (DNMT) | 10 mg | 130-104-464 |
| **StemMACS™ SB431542** | A potent inhibitor of the TGF-β, Activin and Nodal signaling pathway | 5 mg | 130-105-336 |
| | | 2×5 mg | 130-106-275 |
| **StemMACS™ SB431542 in Solution** | A potent inhibitor of the TGF-β, Activin and Nodal signaling pathway | 5 mg | 130-106-543 |
| **StemMACS™ Thiazovivin** | A Rho-associated kinase ROCK inhibitor that enhances survival and cloning efficiency of human embryonic stem cells | 1 mg | 130-104-461 |
| **StemMACS™ Thiazovivin in Solution** | A Rho-associated kinase ROCK inhibitor that enhances survival and cloning efficiency of human embryonic stem cells | 0.5 mg | 130-106-542 |
| **StemMACS™ TPPB** | A high affinity activator of Protein Kinase C | 1 mg | 130-117-338 |
| **StemMACS™ Y27632** | A Rho-associated kinase ROCK inhibitor that enhances survival and cloning efficiency of human embryonic stem cells | 2 mg | 130-103-922 |
| | | 5×2 mg | 130-104-169 |
| **StemMACS™ Y27632 in Solution** | A Rho-associated kinase ROCK inhibitor that enhances survival and cloning efficiency of human embryonic stem cells | 2 mg | 130-106-538 |

## StemMACS™ mRNA Transfection

| Product | Description | Content/Components | Order no. |
|---|---|---|---|
| **StemMACS™ Brn2 mRNA, human** | mRNA encoding the neural transcription factor Brn2 for transfection | 20 µg | 130-104-370 |
| **StemMACS™ c-Myc mRNA, human** | mRNA encoding the transcription factor c-Myc for transfection | 20 µg | 130-101-112 |
| **StemMACS™ Cebpb mRNA, human** | mRNA encoding the transcription factor C/EBP-beta for transfection | 20 µg | 130-104-377 |
| **StemMACS™ Cre Recombinase mRNA** | mRNA encoding Cre recombinase for transfection | 20 µg | 130-101-113 |
| **StemMACS™ eGFP mRNA** | An mRNA transfection control encoding enhanced GFP | 20 µg | 130-101-114 |
| **StemMACS™ Flp Recombinase mRNA** | mRNA encoding Flp recombinase for transfection | 20 µg | 130-106-769 |
| **StemMACS™ iPSC mRNA Reprogramming Kit, human** *see page 54* | Kit for reprogramming of human fibroblasts into induced pluripotent stem cells (iPSCs) | 1 kit<br>1× StemMACS™ iPSC mRNA Reprogramming Box, human<br>1× StemMACS Repro-Brew XF, human | 130-132-990 |
| **StemMACS™ Lin28 mRNA, human** | mRNA encoding human Lin28 for transfection | 20 µg | 130-101-117 |
| **StemMACS™ Lmx1a mRNA, human** | mRNA encoding the transcription factor Lmx1a for transfection | 20 µg | 130-104-381 |
| **StemMACS™ Mash1 (Ascl1) mRNA, human** | mRNA encoding the neural transcription factor Mash1 for transfection | 20 µg | 130-104-369 |
| **StemMACS™ mCherry mRNA** | StemMACS™ mCherry mRNA encodes the red fluorescent protein mCherry for transient transfection | 20 µg | 130-120-975 |
| **StemMACS™ mRNA Transfection Kit** *see page 54* | A transfection reagent designed for efficient mRNA delivery into a broad range of targeT cells, including primary human fibroblasts and ES and iPS cells | 1 kit (large size)<br>1 kit (medium size)<br>1 kit (small size) | 130-104-463<br>130-132-949<br>130-132-978 |
| **StemMACS™ Myt1l mRNA, human** | mRNA encoding the neural transcription factor Myt1l for transfection | 20 µg | 130-104-379 |
| **StemMACS™ Nanog mRNA, human** | mRNA encoding the transcription factor Nanog for transfection | 20 µg | 130-101-118 |
| **StemMACS™ NeuroD1 mRNA, human** | mRNA encoding the neural transcription factor NeuroD1 for transfection | 20 µg | 130-104-382 |
| **StemMACS™ NeuroG2 mRNA, human** | mRNA encoding the neural transcription factor NeuroG2 for transfection | 20 µg | 130-104-383 |
| **StemMACS™ Nuclear eGFP mRNA** | mRNA encoding eGFP linked to a nuclear localization signal for transfection | 20 µg | 130-101-119 |
| **StemMACS™ Nurr1 (NR4a2) mRNA, human** | mRNA encoding the dopaminergic transcription factor Nurr1 for transfection | 20 µg | 130-104-384 |
| **StemMACS™ Pparg mRNA, human** | mRNA encoding PPAR-gamma for transfection | 20 µg | 130-104-386 |
| **StemMACS™ Sox2 mRNA, human** | StemMACS™ Sox2 mRNA encodes the human transcription factor Sox2 for transient transfection | 20 µg | 130-101-075 |
| **StemMACS™ YPet mRNA** | StemMACS™ YPet mRNA encodes the yellow fluorescent protein YPet for transient transfection | 20 µg | 130-120-971 |

## StemMACS™ iPSC mRNA Reprogramming Kit, human

### Overview

The StemMACS iPSC mRNA Reprogramming Kit, human has been designed for the rapid and highly efficient reprogramming of human fibroblasts into induced pluripotent stem cells (iPSCs).

### Background information

With the StemMACS iPSC mRNA Reprogramming Kit, human iPSCs can be generated within 14 days under feeder-free conditions without the need for a conditioned medium or the use of B18R protein. The used mRNA-based approach in contrast to traditional viral- or DNA-based reprogramming methods eliminates the risk for genomic integration and the safety concerns connected with using viral-based vectors. There is no need for subsequent screening and laborious experiments to confirm the elimination of the exogenous factors. The StemMACS mRNA Reprogramming Cocktail, human contains transcripts of the following genes: POU5F1 (OCT3/4 ), SOX2, KLF4, MYC, NANOG, LIN28A, and SOCS1. The StemMACS iPSC mRNA Reprogramming Kit, human is an all-inclusive reagent set, containing the mRNA cocktails, transfection reagents, and reprogramming medium needed for the whole reprogramming process.

### Applications

mRNA-based reprogramming of human fibroblasts into iPSC.

| Product | Content/Components | Order no. |
|---|---|---|
| **StemMACS™ iPSC mRNA Reprogramming Kit, human**<br>For research use only | 1 kit<br>1× StemMACS™ iPSC mRNA Reprogramming Box, human<br>1× StemMACS Repro-Brew XF, human | 130-132-990 |

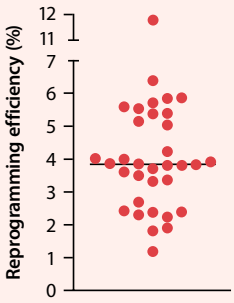


**Figure 1: The successful reprogramming of human BJ fibroblasts using the StemMACS iPSC mRNA Reprogramming Kit, human.** Overview of fixed cells on day 11 of reprogramming in a 12-well plate, displaying Oct3/4-positive colonies (A). Reprogramming efficiency of BJ fibroblasts seeded at densities ranging from 8–18x10$^3$ cells per well in a 12-well plate across multiple experiments and operators (B). Immunostaining results of an iPSC colony on day 11 of reprogramming, validating the expression of pluripotency markers Oct3/4 and Sox2 in iPSCs, while non-reprogrammed fibroblasts were stained with fibroblast or fibronectin antibodies (C).

## StemMACS™ mRNA Transfection Kit

### Overview

The StemMACS™ mRNA Transfection Kit is a lipid-based transfection system designed for efficient mRNA delivery into various cell types. The optimized formulation ensures high transfection efficiency at minimal cytotoxicity.

### Background information

The transient, non-integrative expression of key developmental regulators, recombinases or markers via mRNA transfection is a powerful tool for modulating cell fate.

The StemMACS™ mRNA Transfection Reagent has been selected for its minimal cytotoxicity and high transfection efficiency. It is therefore particularly suited for sensitive cell lines such as pluripotent stem cells and complex transfection schedules that involve repeated mRNA delivery over several days. The StemMACS™ mRNA Transfection Kit has been successfully used for transfection of primary human fibroblasts and the generation of iPS cell lines by mRNA reprogramming.

### Detailed procedure

For satisfactory transfection results, use a transfection protocol optimized for your specific cell type. StemMACS™ eGFP mRNA or StemMACS™ Nuclear eGFP mRNA allow easy evaluation of transfection efficiency and are recommended as positive controls.

### Applications

- Transient, non-integrative delivery of mRNA encoded factors into a broad range of cell types, including primary fibroblasts and human iPS cells
- mRNA reprogramming of human fibroblasts
- mRNA-induced differentiation of stem and progenitor cells
- mRNA-induced transdifferentiation of differentiated cells
- mRNA-induced recombination
- Transient labeling with fluorescent proteins

| Product | Content | Order no. |
|---|---|---|
| **StemMACS™ mRNA Transfection Kit**<br>For research use only | 1 kit (large size) | 130-104-463 |
| **StemMACS™ mRNA Transfection Kit**<br>For research use only | 1 kit (medium size) | 130-132-949 |
| **StemMACS™ mRNA Transfection Kit**<br>For research use only | 1 kit (small size) | 130-132-978 |

## MACS® GMP Cell Culture Media

| Product | Description | Content/Components | | Order no. |
|---|---|---|---|---|
| **HSC-Brew GMP Medium** | GMP Medium for expansion of isolated hematopoietic stem and progenitor cells | 500 mL<br>500 mL HSC-Brew GMP Basal Medium<br>5 mL HSC-Brew GMP Supplement | | 170-076-310 |
| **iPS-Brew GMP Basal Medium** *see page 56* | Cultivation media for iPSCs in GMP environment | 500 mL | | 170-076-317 |
| **iPS-Brew GMP Medium** *see page 56* | Cultivation media for iPSCs in GMP environment | 2000 mL bag<br>2000 mL iPS-Brew GMP Basal Medium (bag)<br>20 mL iPS-Brew GMP Supplement (bag) | ***new*** | 170-076-339 |
| **iPS-Brew GMP Supplement R** *see page 56* | Supplement for completion of iPS-Brew GMP Basal Medium | 10 mL | | 170-076-318 |
| **MACS® GMP Rapamycin** | GMP Cell Culture supplement for expansion of human Treg cells | 200 nmol | | 170-076-308 |
| **MSC-Brew GMP Medium** | GMP Medium for the generationand expansion of mesenchymal stem cells | 500 mL bag<br>500 mL MSC-Brew Basal Medium (bag)<br>10 mL MSC-Brew Supplement (bag) | ***new*** | 170-076-332 |
| | | 2000 mL bag<br>2000 mL MSC-Brew Basal Medium<br>20 mL MSC-Brew Supplement (bag) | ***new*** | 170-076-331 |
| | | 500 mL<br>500 mL MSC-Brew Basal Medium<br>MSC-Brew GMP Supplement I<br>MSC-Brew GMP Supplement II | | 170-076-326 |
| | | 2000 mL<br>2000 mL MSC-Brew Basal Medium<br>MSC-Brew GMP Supplement I<br>MSC-Brew GMP Supplement II | | 170-076-325 |
| **NK MACS® GMP Medium (Phenol Red)** *see page 57* | GMP Medium for expansion of NK cells | 2000 mL<br>2000 mL NK MACS® GMP Basal Medium<br>10 mL NK MACS® GMP Supplement | | 170-076-356 |
| **TexMACS™ GMP Medium (Phenol Red)** *see page 57* | GMP Medium for cultivation and expansion of T cells supplied in a bottle | 1000 mL | | 170-076-309 |
| **TexMACS™ GMP Medium** *see page 57* | GMP Medium for cultivation and expansion of T cells supplied in a bottle | 1000 mL | | 170-076-307 |
| | GMP Medium for cultivation and expansion of T cells supplied in a bag | 2000 mL | | 170-076-306 |

## iPS-Brew GMP Medium

### Overview

iPS-Brew GMP Medium is a xeno-and serum-free medium formulation that has been developed for the maintenance of undifferentiated pluripotent stem cells under feeder-free conditions.

The complete medium is composed of the specifically formulated "iPS-Brew GMP Basal Medium" as well as the optimized "iPS-Brew GMP Supplement R" that when used together support long-term growth and maintenance of undifferentiated cells.

### Background information

iPS-Brew GMP Medium is based on the formulation of StemMACS iPS-Brew XF (#130-104-368) thus enabling seamless translation from research to clinical applications.

- Serum-free and xeno-free formulation
- Manufactured under strictly controlled conditions
- Consistent lot-to-lot performance
- Quality control: functionality test on every batch
- 500 mL bottles – without phenol red
- Recombinant human TGF- ß1 has to be added to the medium

### Applications

iPS-Brew GMP Medium has been developed for the maintenance and expansion of human pluripotent stem cells on standard cell attachment matrices, e.g. Laminin 521.

| Product | Content/Components | | Order no. |
|---|---|---|---|
| **iPS-Brew GMP Medium** | 2000 mL bag<br>2000 mL iPS-Brew GMP Basal Medium (bag)<br>20 mL iPS-Brew GMP Supplement (bag) | ***new*** | 170-076-339 |
| **iPS-Brew GMP Basal Medium** | 500 mL | | 170-076-317 |
| **iPS-Brew GMP Supplement R** | 10 mL | | 170-076-318 |

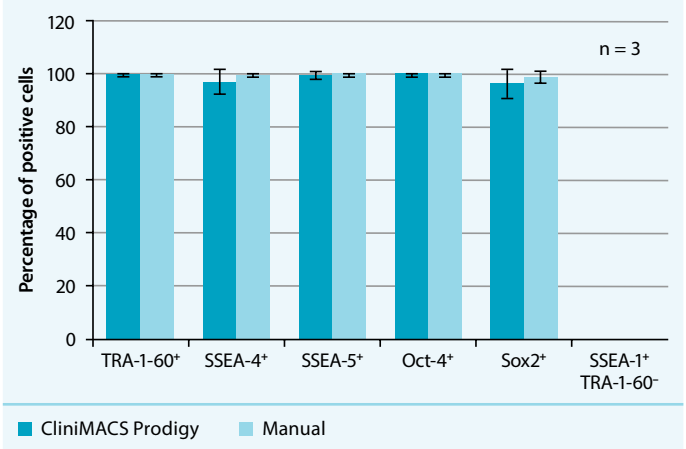


**Figure 1:** Human iPS cells cultured in iPS-Brew GMP Medium show high expression of pluripotency markers, when expanded either manually or with the CliniMACS Prodigy AdherenT cell Culture process.

Selected references

1. Kirkeby, A. *et al.* (2023) Cell Stem Cell: DOI: 10.1016/j.stem.2023.08.014.
2. Haase, A. *et al.* (2019) Stem Cell Res.: DOI: 10.1016/j.scr.2019.101394.

## NK MACS® GMP Medium (Phenol Red)

### Overview

NK MACS GMP Medium (Phenol Red) has been optimized for the cultivation, activation, and expansion of isolated human NK cells or NK cells from peripheral blood mononuclear cells (PBMCs). It is manufactured without animal-derived components. NK MACS GMP Medium (Phenol Red) is filled in flexible bags, making handling in GMP confirming processes easy.

### Background information

NK MACS GMP Medium is serum- and xeno-component free.

- Flexible bags (2000 mL)
- Manufactured under strictly controlled conditions
- Consistent lot-to-lot performance
- Quality control: functionality test on every batch

### Applications

NK MACS GMP Medium has beed developed for the cultivation and expansion of human NK cells from PBMCs or isolated human NK cells.

| Product | Content/Components | Order no. |
|---|---|---|
| **NK MACS® GMP Medium (Phenol Red)** | 2000 mL<br>2000 mL NK MACS® GMP Basal Medium<br>10 mL NK MACS® GMP Supplement | 170-076-356 |

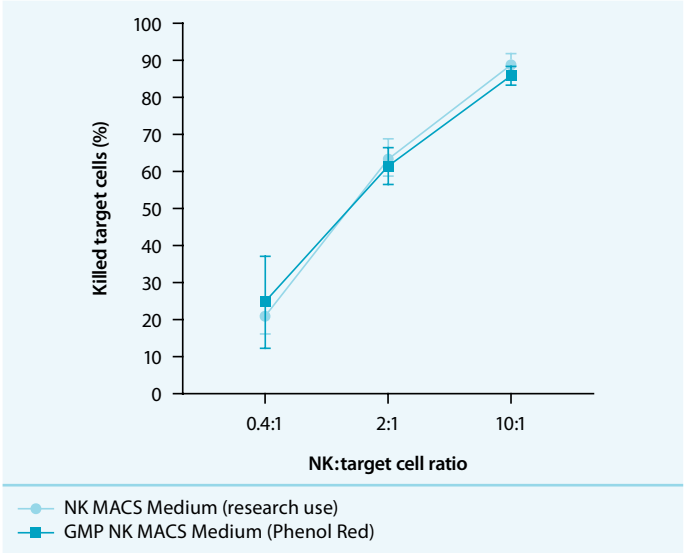


**Figure 1:** Expanded NK cells are fully functional and can be used in downstream assays, e.g. cytotoxicity assays. NK cells from PBMCs were expanded for 14 days in NK MACS Medium (research use) and NK MACS GMP Medium (Phenol Red) and were analyzed via flow cytometry for cytotoxicity againsT cell line K-562 at different effector-to-target (E:T) ratios.

Selected references
1. de Jonge, P. *et al.* (2023) Cancer Immunol. Immunother. 72 (10): 3323–3335.
2. Soldierer, M. *et al.* (2022) Front Immunol 13: doi: 10.3389/fimmu.2022.847008.
3. Fernandez, A. *et al.* (2021) Cancers (Basel) 13 (3): 577.
4. Motais, B. *et al.* (2021) Cells 10 (5): 967.
5. Oberschmidt, O. *et al.* (2019) Hum Gene Ther Methods 30 (3): 102–120.
6. Klöß, S. *et al.* (2017) Hum. Gene Ther. 28 (10): 897–913.

## TexMACS™ GMP Medium

### Overview

TexMACS GMP Medium is specialized for optimal cultivation of human T cells and Treg cells. It is manufactured without animal-derived components. TexMACS GMP Medium is either filled in bottles or flexible bags, making handling in GMP confirming processes easy.

### Background information

TexMACS GMP Medium is serum- and xeno-component free.

- Pharmaceutical grade human serum albumine
- Optimized formulation containing glucose and stable glutamine (L-alanyl-L-glutamine)
- QC functionality test on every batch
- Flexible bags (2000 mL) – without phenol red
- Bottles (1000 mL) – with and without phenol red

### Applications

TexMACS GMP Medium has been developed for the cultivation and expansion of human T cells and Treg cells, and optimized for the use in combination with the CliniMACS Cytokine Capture System (IFN-gamma).

| Product | Content | Order no. |
|---|---|---|
| **TexMACS™ GMP Medium** | 1000 mL | 170-076-307 |
| **TexMACS™ GMP Medium** | 2000 mL | 170-076-306 |
| **TexMACS™ GMP Medium (Phenol Red)** | 1000 mL | 170-076-309 |

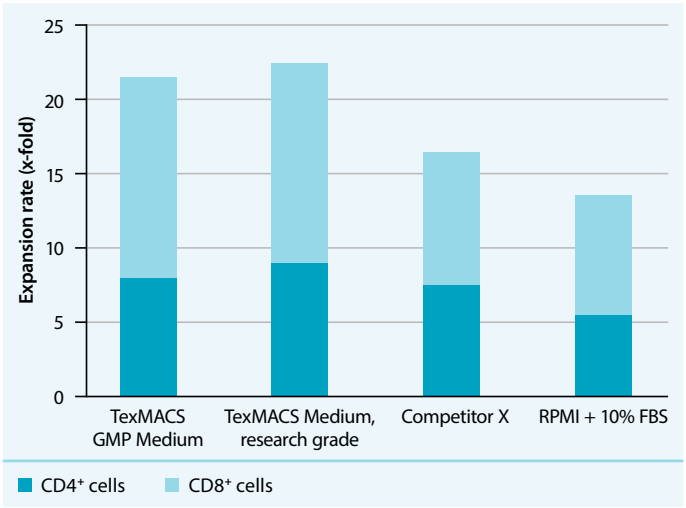


**Figure 1:** Superb polyclonal activation/expansion of human T cell. Comparison of expansion rates of human T cells with TexMACS Medium, a competitor product, and serum-containing basal medium (RPMI + 10% FBS) after 14 days of expansion using the T cell Activation/Expansion Kit, human.

Selected references
1. Bernaldo-de-Quirós, E. *et al.* (2022) Front Immunol 16 (13): 893576.
2. Glienke, W. *et al.* (2022) Front Immunol: doi: 10.3389/fimmu.2022.839783.
3. Lavazza, C. *et al.* (2022) J. Transl. Med. 20 (1): 14.
4. Cooper, R. S. *et al.* (2021) Front Immunol 11: 598402.
5. Joedicke, J. J. *et al.* (2021) Mol Ther Methods Clin Dev. 25 (24): 181–198.
6. Schwarze, L. I. *et al.* (2021) Gene Ther. 28 (9): 572–587.
7. Fernández, L. *et al.* (2019) Front Immunol 10 (10): 2361.
8. Fraser, H. *et al.* (2018) Mol Ther Methods Clin Dev. 8: 198–209.
9. Fraser, A. R. *et al.* (2017) Cytotherapy 19 (9): 1113–1124.
10. Priesner, C. *et al.* (2016) Front Immunol 7: 393.
11. Tischer, S. *et al.* (2014) J. Transl. Med. 12: 336.

## MACS® GMP Cytokines and Growth Factors

| Product | Alternative name | Description | Source | Content | Order no. |
|---|---|---|---|---|---|
| **MACS® GMP Recombinant Human Activin A** | FRP, Inhibin beta-1 | Recombinant human activin A | CHO cells | 5 µg | 170-076-179 |
| | | | CHO cells | 25 µg | 170-076-180 |
| **MACS® GMP Recombinant Human EGF** | HOMG4, URG | Recombinant human epidermal growth factor | *E. coli* | 100 µg | 170-076-406 |
| | | | *E. coli* | 500 µg | 170-076-407 |
| **MACS® GMP Recombinant Human FGF-2** | basic FGF, HBGF-2 | Recombinant human fibroblast growth factor 2 | *E. coli* | 25 µg | 170-076-107 |
| | | | *E. coli* | 500 µg | 170-076-125 |
| **MACS® GMP Recombinant Human Flt3-Ligand** | | Recombinant human Flt3-ligand | *E. coli* | 100 µg | 170-076-132 |
| **MACS® GMP Recombinant Human GM-CSF** | CSF2 | Recombinant human granulocyte colony-stimulating factor | *E. coli* | 25 µg | 170-076-112 |
| | | | *E. coli* | 250 µg | 170-076-136 |
| **MACS® GMP Recombinant Human IL-1β** | IL1F2 | Recombinant human interleukin 1β | *E. coli* | 25 µg | 170-076-102 |
| **MACS® GMP Recombinant Human IL-2** *see page 60* | | Recombinant human interleukin 2 | *E. coli* | 25 µg | 170-076-148 |
| | | | *E. coli* | 100 µg | 170-076-146 |
| | | | *E. coli* | 500 µg | 170-076-147 |
| **MACS® GMP Recombinant Human IL-3** | | Recombinant human interleukin 3 | *E. coli* | 25 µg | 170-076-110 |
| **MACS® GMP Recombinant Human IL-4** | | Recombinant human interleukin 4 | *E. coli* | 25 µg | 170-076-101 |
| | | | *E. coli* | 250 µg | 170-076-135 |
| **MACS® GMP Recombinant Human IL-6** | | Recombinant human interleukin 6 | *E. coli* | 10 µg | 170-076-160 |
| | | | *E. coli* | 50 µg | 170-076-161 |
| **MACS® GMP Recombinant Human IL-7** | | Recombinant human interleukin 7 | *E. coli* | 25 µg | 170-076-111 |
| | | | *E. coli* | 100 µg | 170-076-184 |
| **MACS® GMP Recombinant Human IL-12** | | Recombinant human interleukin 12 | CHO cells | 5 µg | 170-076-173 |
| | | | CHO cells | 25 µg | 170-076-174 |
| | | | CHO cells | 100 µg | 170-076-175 |
| **MACS® GMP Recombinant Human IL-15** | | Recombinant human interleukin 15 | *E. coli* | 25 µg | 170-076-114 |
| | | | *E. coli* | 100 µg | 170-076-186 |
| **MACS® GMP Recombinant Human IL-18** *see page 59* | IL1F4 | Recombinant human interleukin 18 | *E. coli* | 25 µg | 170-076-183 |
| **MACS® GMP Recombinant Human IL-21** | | Recombinant human interleukin 21 | *E. coli* | 100 µg | 170-076-189 |
| | | | *E. coli* | 25 µg | 170-076-115 |
| **MACS® GMP Recombinant Human M-CSF** | CSF1 | Recombinant human macrophage colony-stimulating factor | *E. coli* | 10 µg | 170-076-170 |
| | | | *E. coli* | 50 µg | 170-076-171 |
| | | | *E. coli* | 250 µg | 170-076-172 |
| **MACS® GMP Recombinant Human SCF** | c-kit ligand, steel factor, mgF | Recombinant human stem cell factor | *E. coli* | 10 µg | 170-076-149 |
| | | | *E. coli* | 100 µg | 170-076-133 |
| **MACS® GMP Recombinant Human SHH (C24II)** | | Recombinant human SHH (C24II) | | 25 µg | 170-076-181 |
| **MACS® GMP Recombinant Human TGF-β1** | | Recombinant human transforming growth factor β1 | CHO cells | 5 µg | 170-076-166 |
| | | | CHO cells | 25 µg | 170-076-167 |
| | | | CHO cells | 100 µg | 170-076-168 |
| **MACS® GMP Recombinant Human TNF-α** | TNFSF2 | Recombinant human tumor necrosis factor α | *E. coli* | 25 µg | 170-076-103 |
| | | | *E. coli* | 100 µg | 170-076-178 |
| **MACS® GMP Recombinant Human TPO** | MGDF, TSF | Recombinant human thrombopoietin | *E. coli* | 50 µg | 170-076-134 |

## MACS® GMP Recombinant Human IL-18

### Overview

MACS GMP Recombinant Human Interleukin-18 (IL-18) is a recombinant protein optimized as an ancillary material for *ex vivo* cell processing. It is not intended for human *in vivo* applications.

### Background information

IL-18 is a pro-inflammatory cytokine and is a member of the IL-1 cytokine family, which comprises cytokines like IL-1β, IL-33 and IL-36. Like other members of this family, IL-18 is expressed as an inactive 24 kDa precursor covering 193 amino acids[7,8].

Similar to other IL-1 family members, the molecular structure of IL-18 contains a β-trefoil arrangement[9]. Due to the lack of a signal peptide, the IL-18 precursor accumulates in the cytoplasm, where it can be activated by proteolytic processing by Caspase-1[7,8]. Active Caspase-1 also cleaves Gasdermin D to liberate a pore-forming domain, which allows secretion of the mature 17.2 kDa IL-18[10].

IL-18 is a pleiotropic cytokine, mainly expressed by macrophages. Its most prominent biological function is its ability to induce IFN-γ expression by $CD8^+$ T cells, Th1 cells as well as NK and $CD4^+$ NKT cells. The presence of IL-12 enhances the IFN-γ expression significantly and a combination of IL-12 and IL-18 can synergize to induce IFN-γ expression from DCs, Møs and B cells[10]. IL-18 therefore plays a crucial part in the host defense against both bacterial and viral pathogens, as IL-18 induced IFN-γ strongly enhances phagocytosis, NO and ROS production by macrophages and enhances activation of CTLs[10]. In the absence of IL-12, IL-18 plays a role in Th2 diseases, as it can induce expression of large amounts of IL-4 and IL-13 from basophils and masT cells[11].

Apart from its obvious role in host defense, IL-18 has also been implicated in playing a beneficial role in metabolic homeostasis, as it has been demonstrated that IL-18-deficient mice spontaneously developed obesity and insulin resistance[10]. Moreover, in several human autoimmune diseases such as systemic lupus erythematosus, rheumatoid arthritis, Type-1 diabetes, Crohn's disease and psoriasis, elevated levels of IFN-γ and IL-18 have been observed – implicating an involvement of IL-18 in the disease mechanism.[11]

The receptor for IL-18 is comprised of two subunits, the inducible IL-18Rα and the constitutively expressed IL-18Rβ. Both subunits contain an intracellular TIR signaling domain, similar to other IL-1 family cytokine receptors and TLRs. Stimulation of naïve T cells with IL-12 results in the upregulation of IL-18Rα, rendering these cells susceptible to IL-18 signaling[10].

### Applications

MACS GMP Recombinant Human IL-18 can be used for a variety of applications, including:

- Generation of cytokine-induced memory-like natural killer cells (CIML NK). Memory-like NK cells can be generated *ex vivo* by cultivating human NK cells with a combination of IL-12, IL-15 and IL-18. Such CIML NK cells demonstrated an increased longevity and enhanced anticancer functionality compared to normal effector NK cells[1].
- Ex vivo expansion of NK cells. In concert with IL-2, IL-15, IL-12 and IL-21, IL-18 is a key player in the priming, expansion and survival of NK cells[2,3,4].
- Optimization of *ex vivo* manufacturing protocols for adoptive cell transfer. Studies in animal models have demonstrated that cultivation of HER2-CAR T cells in the presence of IL-18 can improve anti-tumor functions and increase the amount of TCM cells in the cellular product[5].

MACS GMP Recombinant Human IL-18 is manufactured and released based on the stringent specifications displayed below. Lot-specific results of the respective QC measurements are depicted on each Product Quality Certificate (PQC).

- Identity: Confirmed by mass spectrometry and chip electrophoresis. This corresponds to the mature form of IL-18.
- Purity: ≥ 95% as determined by chip electrophoresis.
- Endotoxin content: < 50 EU/mg, as determined by kinetic Limulus Amoebocyte Lysate (LAL) assay (Pharmacopoeia Europaea (Ph. Eur.)).
- Residual hosT cell DNA content: < 5 ng/mg, as determined by quantitative PCR specific for E.coli genomic DNA.
- Residual hosT cell protein content: < 10 µg/mg, as determined by E.coli HCP ELISA.

MACS GMP Recombinant Human IL-18 is expressed as a single chain protein, covering amino acids 37-193 of the amino acid sequence of human interleukin 18 (UniProt Q14116). This sequences corresponds to the mature form of IL-18 after proteolytic cleavage.

### Biological activity

The specific activity is determined by induction of IFN-γ secretion by KG-1 cells[6]. The proliferation assay was calibrated with the reference reagent for human IL-18 (NIBSC code 03/200) provided by the WHO/National Institute for Biological Standards and Control.
**Specific activity:** ≥ $5\times10^6$ U/mg

| Product | Content | Order no. |
|---|---|---|
| **MACS® GMP Recombinant Human IL-18** | 25 µg | 170-076-183 |

Selected references
1. Tarannum, M. *et al.* (2021) Stem Cell Res Ther. 12: 592.
2. Islam, R. *et al.* (2021) Cells 10 (5): 1058.
3. Gaggero, S. *et al.* (2021) Front Immunol 11: 621225.
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6. Konishi, K. *et al.* (1997) J Immunol Methods 209 (2): 187–191.
7. Dinarello, C. A. *et al.* (1998) J Leukoc Biol 63 (6): 658–664.
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## MACS® GMP Recombinant Human IL-2

### Overview

Interleukin 2 (IL-2), a potent lymphoid cell growth factor, plays an important role in both the activation and maintenance of immune responses and in lymphocyte development. IL-2 promotes, for instance, proliferation and differentiation of T cells, NK cells, and B cells.

MACS GMP Recombinant Human IL-2 is designed for *ex vivo* cell culture processing. No animal- or human-derived materials were used for the manufacture of this product, unless otherwise stated in the respective Certificate of Origin. The product is lyophilized without carrier protein or preservatives.

### Background information

IL-2 is a typical four α-helix bundle cytokine and is produced by activated T cells, especially the $CD4^+$ T helper cell population. IL-2 signals through a receptor complex consisting of IL-2 receptor α-chain (CD25), β-chain, and common γ-chain.

### Applications

MACS GMP Recombinant Human IL-2 can be used for a variety of applications, including the *ex vivo* activation and expansion of T cells, e.g., antigen-specific cytotoxic T lymphocytes[2,3] or regulatory T cells[4] or the *ex vivo* stimulation of NK cells[5,6].

- Identity/ Molecular mass: 15400 Da, determined by mass spectrometry. This corresponds to the mature form of human IL-2 with a cysteine-to-serine substitution at amino acid sequence position 125 (133 amino acids).
- Purity: ≥ 95% as determined by chip electrophoresis.
- Endotoxin content: < 50 EU/mg, as determined by kinetic Limulus Amoebocyte Lysate (LAL) assay (Pharmacopoeia Europaea (Ph. Eur.)).
- Residual hosT cell DNA content: < 150 ng/mg, as determined by quantitative PCR specific for *E. coli* genomic DNA.
- Residual hosT cell protein content: < 0.5 µg/mg, as determined by *E. coli* HCP ELISA.

The product quality certificate of our MACS® GMP Recombinant Human IL-2 was adapted.

### Biological activity

The specific activity is determined by proliferation assay according to Gearing and Bird[1] using CTLL-2 cells. The proliferation assay was calibrated with the 2nd international standard for human IL-2 (NIBSC code 86/500) provided by the National Institute for Biological Standards and Control.

**Specific activity:** ≥ $1×10^6$ IU/mg

| Product | Content | Order no. |
|---|---|---|
| MACS® GMP Recombinant Human IL-2 | 25 µg | 170-076-148 |
| MACS® GMP Recombinant Human IL-2 | 100 µg | 170-076-146 |
| MACS® GMP Recombinant Human IL-2 | 500 µg | 170-076-147 |

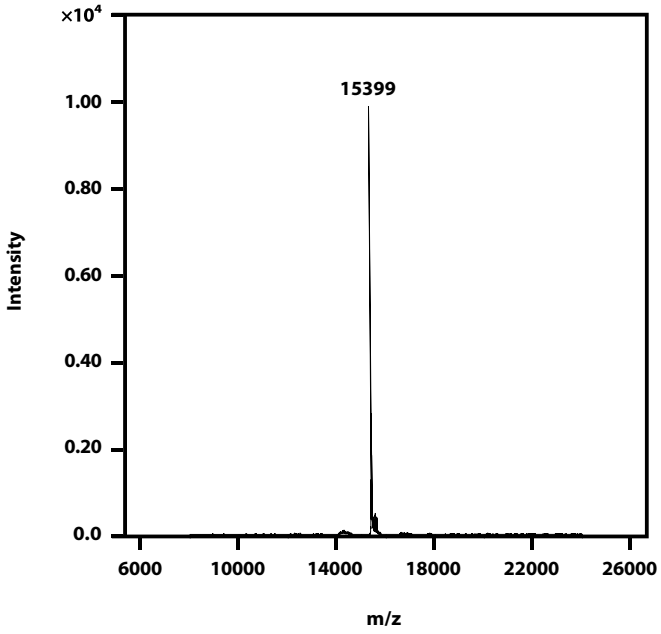


**Figure 1:** Mass spectrometry analysis (ESI-MS) of MACS GMP Recombinant Human IL-2. The peak corresponds to the calculated molecular mass of 15400 Da.

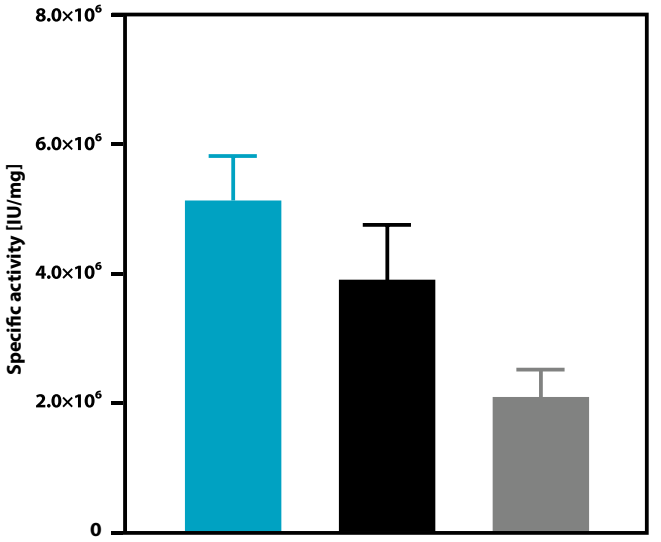


**Figure 2: MACS GMP Recombinant Human IL-2 biological activity.** Activity of Human IL-2, GMP grade, (blue bar) was compared to other commercially available products (black and grey bar).

Selected references
1. Gearing, A. J. H. and Bird, C. B. (1987) Oxford: IRL Press: 295.
2. Zhang, H. *et al.* (2007) J Immunol 179: 4910–4918.
3. Hinrichs, C. S. *et al.* (2008) Blood 111: 5326–5333.
4. Peters, J. H. *et al.* (2008) PLoS One 3 (5): e2233.
5. Berg, M. *et al.* (2009) Cytotherapy 11: 341–355.
6. McKenna, D. H. Jr. *et al.* (2007) Transfusion 47 (3): 520–528.

## MACS® GMP Activation and Expansion Tools

| Product | Description | Content | Order no. |
|---|---|---|---|
| **MACS® GMP CD3 pure** | GMP-grade antibody for *ex vivo* T cell activation and expansion | 0.2 mg in 1 mL | 170-076-124 |
| | | 1 mg in 1 mL | 170-076-116 |
| **MACS® GMP CD28 pure** | GMP-grade antibody for *ex vivo* T cell activation and expansion | 0.5 mg in 1 mL | 170-076-117 |
| **MACS® GMP T cell TransAct™ CR/GMP** *see page 61* | MACS GMP T cell TransAct is intended for the *in vitro* stimulation and expansion of human T cells from PBMCs or enriched T cells | 4 mL | 200-076-202 |
| **MACS® GMP T cell TransAct™ Large Scale CR/GMP** *see page 61* | MACS GMP T cell TransAct is intended for the *in vitro* stimulation and expansion of human T cells from PBMCs or enriched T cells | 4 mL | 200-076-204 |
| **MACS® GMP Vectofusin®-1** | Synthetic peptide for enhanced viral transduction efficiency | 1 mg | 170-076-165 |

### MACS® GMP T cell TransAct™

#### Overview

MACS®GMP T cell TransAct™ CR/GMP for T cell activation via CD3 CD28 in clinical research. Suited for cell manufacturing according to GMP guidelines, the MACS® GMP Grade reagent is intended for *in vitro* stimulation and expansion of human T cells. It is optimized for automated cell culture such as CAR T cell manufacturing on the CliniMACS Prodigy®.

#### Background information

Polyclonal T cell expansion can be used in applications of cellular therapy when increased numbers of effector cells are required or when T cells are activated to improve gene modification.

MACS® GMP T cell TransAct™ CR/GMP consists of a colloidal polymeric nanomatrix covalently attached to humanized recombinant agonists against human CD3 and CD28.

Due to the nanomatrix MACS GMP T cell TransAct™ CR/GMP can be sterile filtered and excess reagent can be removed by centrifugation and following conventional supernatant replacement or simply by medium wash. This reagent is suitable for the use in automated culture systems, such as the CliniMACS Prodigy® Instrument.

**MACS® GMP T cell TransAct™ CR/GMP -** The reagent is optimized to activate and expand $1\times10^8$ enriched T cells.
**MACS® GMP T cell TransAct™ CR/GMP – Large Scale:** The reagent is optimized to activate and expand up to $4\times10^8$ enriched T cells.

#### Applications

MACS® GMP T cell TransAct™ CR/GMP is intended for the *in vitro* stimulation and expansion of human T cells from hematological cell populations (e.g. PBMC or enriched T cells).

| Product | Content | Order no. |
|---|---|---|
| **MACS® GMP T cell TransAct™ CR/GMP** | 4 mL | 200-076-202 |
| **MACS® GMP T cell TransAct™ Large Scale CR/GMP** | 4 mL | 200-076-204 |

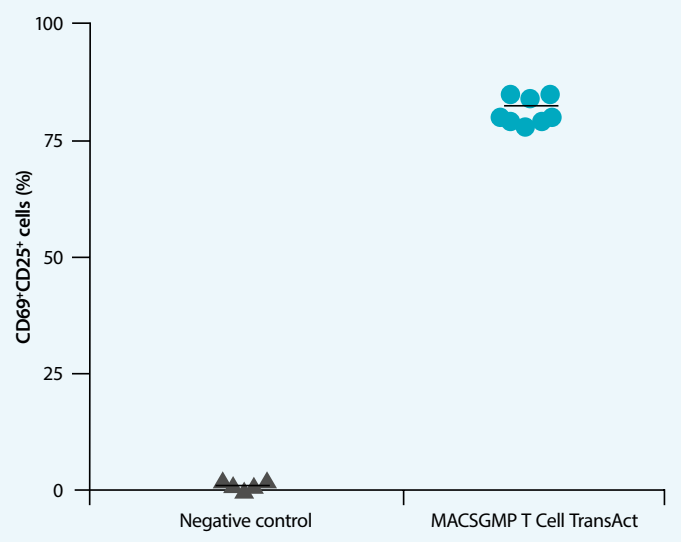


**Figure 1:** Higher marker activation efficiency of T cell TransAct compared to the negative control. Comparison of activation efficiency on day two between T cell TransAct and negative control using the activation markers CD69 and CD25.

Selected references
1. Maschan, M. *et al.* (2021) Nat Commun 12 (1): 7200.
2. Castella, M. *et al.* (2020) Front Immunol 11: 482.

## MACS® GMP Antigens and Peptide Pools

| Product | Capacity/Content | Order no. |
|---|---|---|
| MACS® GMP PepTivator® AdV select | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-169 |
| MACS® GMP PepTivator® AdV5 Hexon | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-106 |
| MACS® GMP PepTivator® BKV LT | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-139 |
| MACS® GMP PepTivator® BKV VP1 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-138 |
| MACS® GMP PepTivator® EBV EBNA-1 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-129 |
| MACS® GMP PepTivator® EBV Select | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-143 |
| MACS® GMP PepTivator® HCMV pp65 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-109 |
| MACS® GMP PepTivator® HPV16-E6 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-158 |
| MACS® GMP PepTivator® HPV16-E7 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-159 |
| MACS® GMP PepTivator® JCV LT | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-190 |
| MACS® GMP PepTivator® JCV VP1 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-191 |
| MACS® GMP PepTivator® MAGE-A3 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-153 |
| MACS® GMP PepTivator® Melanoma Select | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-164 |
| MACS® GMP PepTivator® Mucin-1 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-151 |
| MACS® GMP PepTivator® NY-ESO-1 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-137 |
| MACS® GMP PepTivator® PRAME | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-157 |
| MACS® GMP PepTivator® SARS-CoV-2 Select | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-017 |
| MACS® GMP PepTivator® Survivin 1 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-152 |
| MACS® GMP PepTivator® WT1 | for stimulation of $1\times10^9$ cells<br>60 nmol/peptide | 170-076-123 |

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