Miltenyi Biotec

CytoGenics
life science innovation

CLICKABLE PRODUCT NUMBERS

MACS® Cell Culture Reagents

Product list

January 1, 2024

► miltenyibiotec.com/cellculture

Important notices

Unless otherwise specifically indicated, all offered products and services are for research use only and not for therapeutic or diagnostic use.

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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.

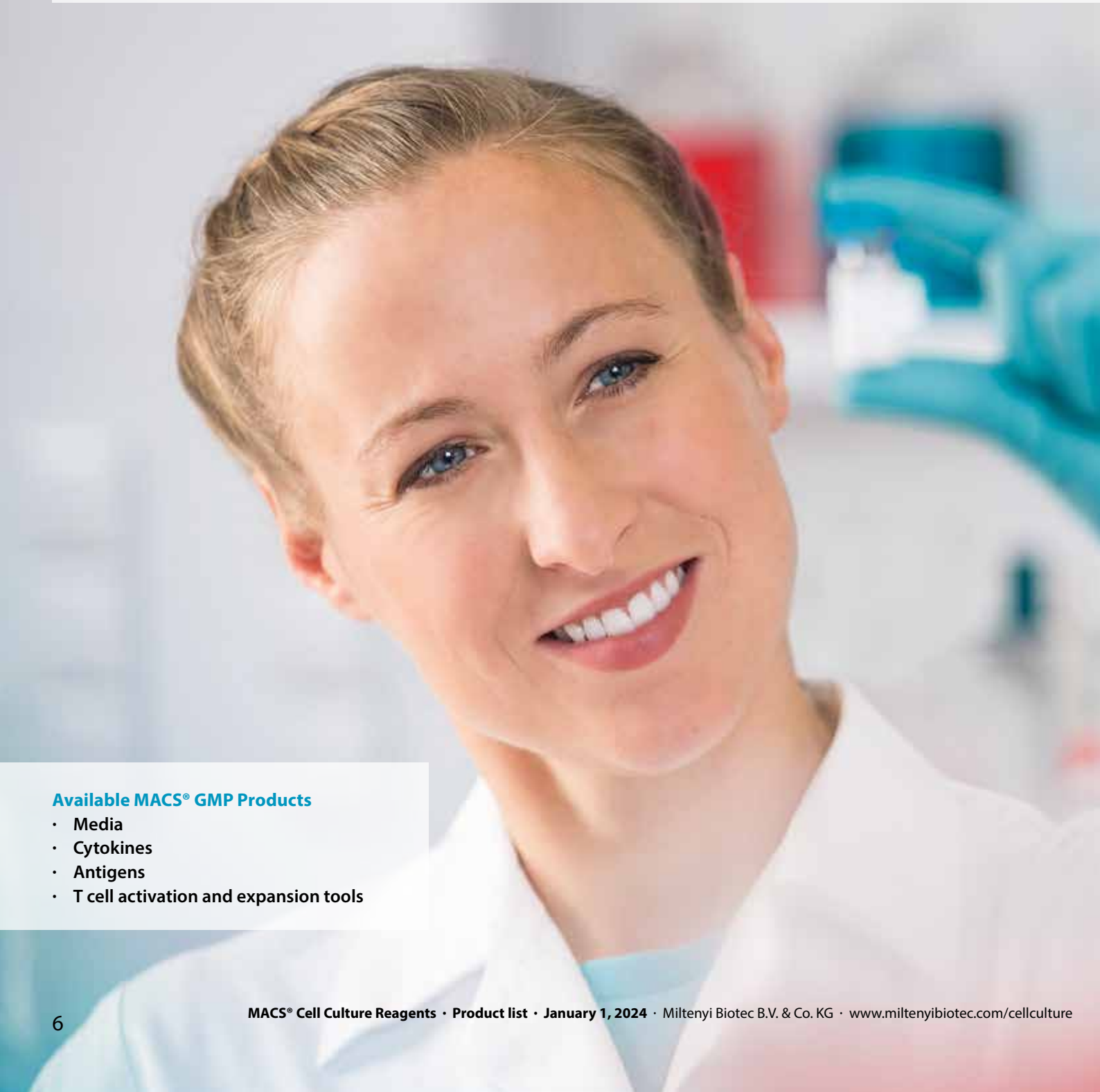
Up to MACS® GMP Grade

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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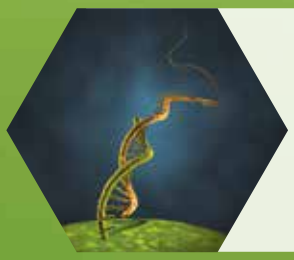
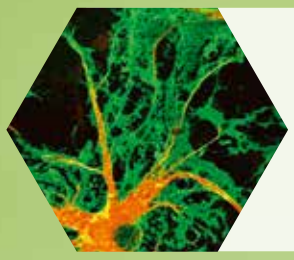
StemMACS™ Small Molecules

- 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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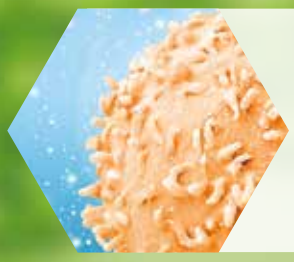
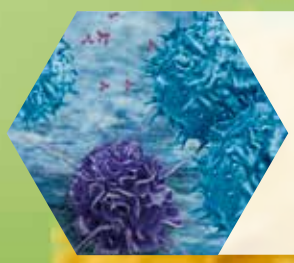


Polyclonal stimulation reagents

- 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 IL-2, IL-7, IL-15, IL-21 anti-CD3, anti-CD28, T Cell TransAct™, T Cell Activation/ Expansion Kit, PepTivator® Peptide Pools
Th1 polarization	TexMACS™ Medium IL-12, IL-18, IL-27, IFN-γ anti-IL-4
Th2 polarization	TexMACS™ Medium IL-4, IL-6, IL-25, IL-33, TSLP anti-IFN-γ, anti-IL-12
Th17 polarization	TexMACS™ Medium IL-1β, IL-6, IL-21, IL-23, TGF-β1 anti-IFN-γ, anti-IL-2, anti-IL-4
Treg polarization	TexMACS™ Medium IL-2, TGF-β1, Treg Expansion Kit
Lymphoid differentiation	IL-2, IL-6, IL-7, SCF
NK cell activation	NK MACS® Medium IL-2, IL-12, IL-15, IL-18, IL-21 NK Cell Activation/Expansion Kit
B cell activation	B Cell Expansion Kit CD40-L, IL-2, IL-4, IFN-γ, TGF-β1, anti-CD40 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 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 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 FGF-2, LIF, TGF-β1 Thiazovivin, Y27632
HSC expansion and differentiation	StemMACS™ HSC Expansion Media, StemMACS™ HSC-CFU Assay Kit Flt3-Ligand, IL-3, IL-6, SCF, TPO
Cardiovascular differentiation from ES/iPSC	StemMACS™ CardioDiff Kit XF Activin A, BMP-4, DKK-1, FGF-2, TGF-β, VEGF CHIR99021, IWP-2, IWP-4, IWR-1-endo, Retinoic acid
Hepatic differentiation from ES/iPSC	StemMACS™ DiffBase XF Activin-A, EGF, FGF-4, FGF-10, HGF CHIR99021, DAPT, Retinoic acid, SB431542
Pancreatic differentiation from ES/iPSC	StemMACS™ DiffBase XF Activin-A, BMP-4, FGF-2, FGF-7, Noggin, CHIR99021, Retinoic acid, TPPB
Intestinal cell differentiation from ES/iPSC	StemMACS™ DiffBase XF Activin-A, EGF, FGF-4, Noggin, R-Spondins CHIR99021
MSC expansion and differentiation	StemMACS™ MSC Expansion Medium Kit XF, StemMACS™ ChondroDiff Medium, StemMACS™ AdipoDiff Medium, StemMACS™ OsteoDiff Medium 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 BDNF, FGF-2, NGF, Noggin, CHIR99021, DAPT, Dorsomorphin, Forskolin, LDN-193189, SB431542
Spinal motor neuron differentiation from ES/iPSC	StemMACS™ DiffBase XF, MACS® NeuroBrew®-21 w/o vit A BDNF, CNTF, GDNF, SHH CHIR99021, DAPT, Retinoic acid, SB431542, LDN-193189
Cortical neuron differentiation from ES/iPSC	StemMACS™ DiffBase XF, MACS® NeuroBrew®-21 FGF-2 DAPT, LDN-193189, PD0325901, SB431542
Dopaminergic neuron generation from ES/iPSC	StemMACS™ DiffBase XF, MACS® NeuroBrew®-21 w/o vit A BDNF, FGF-2, FGF-8b, GDNF, Noggin, SHH CHIR99021, DAPT, Dorsomorphin, Forskolin, LDN-193189, Purmorphamine, SB431542
Neurosphere assay	MACS® Neuro Medium, MACS® NeuroBrew®-21 EGF, FGF-2
Primary neural cell culture	MACS® Neuro Medium, MACS® NeuroBrew®-21, AstroMACS Medium BDNF, CTNF, GDNF
Primary oligodendrocyte culture	MACS® Neuro Medium, MACS® NeuroBrew®-21 FGF-2, PDGF-AA

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

Immunology

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

* Process available on the CliniMACS Prodigy® with selected reagents

Stem cell research

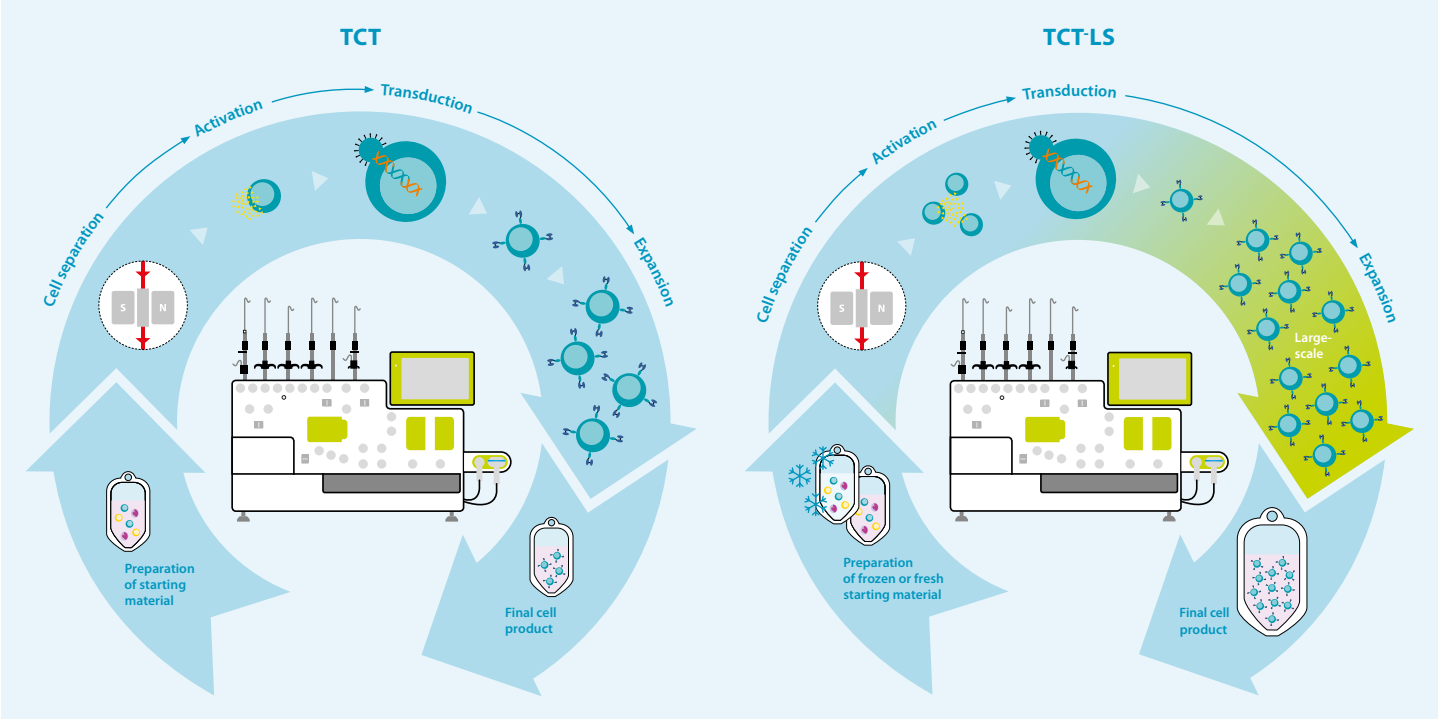
Application	Reagents
GMP compliant PSC expansion and banking*	iPS-Brew GMP Medium MACS® GMP Recombinant Human ActivinA, FGF-2, TGF-β1
GMP compliant PSC differentiation into midbrain dopaminergic progenitor cells*	iPS-Brew GMP Medium MACS® GMP Recombinant Human TGF-β1, SHH (C24II)
GMP compliant PSC differentiation 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 MACS® GMP Recombinant Human Flt3-Ligand, IL-3, IL-6, SCF, TPO MACS® GMP Vectofusin®-1
MSC expansion process*	MSC-Brew GMP Medium 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

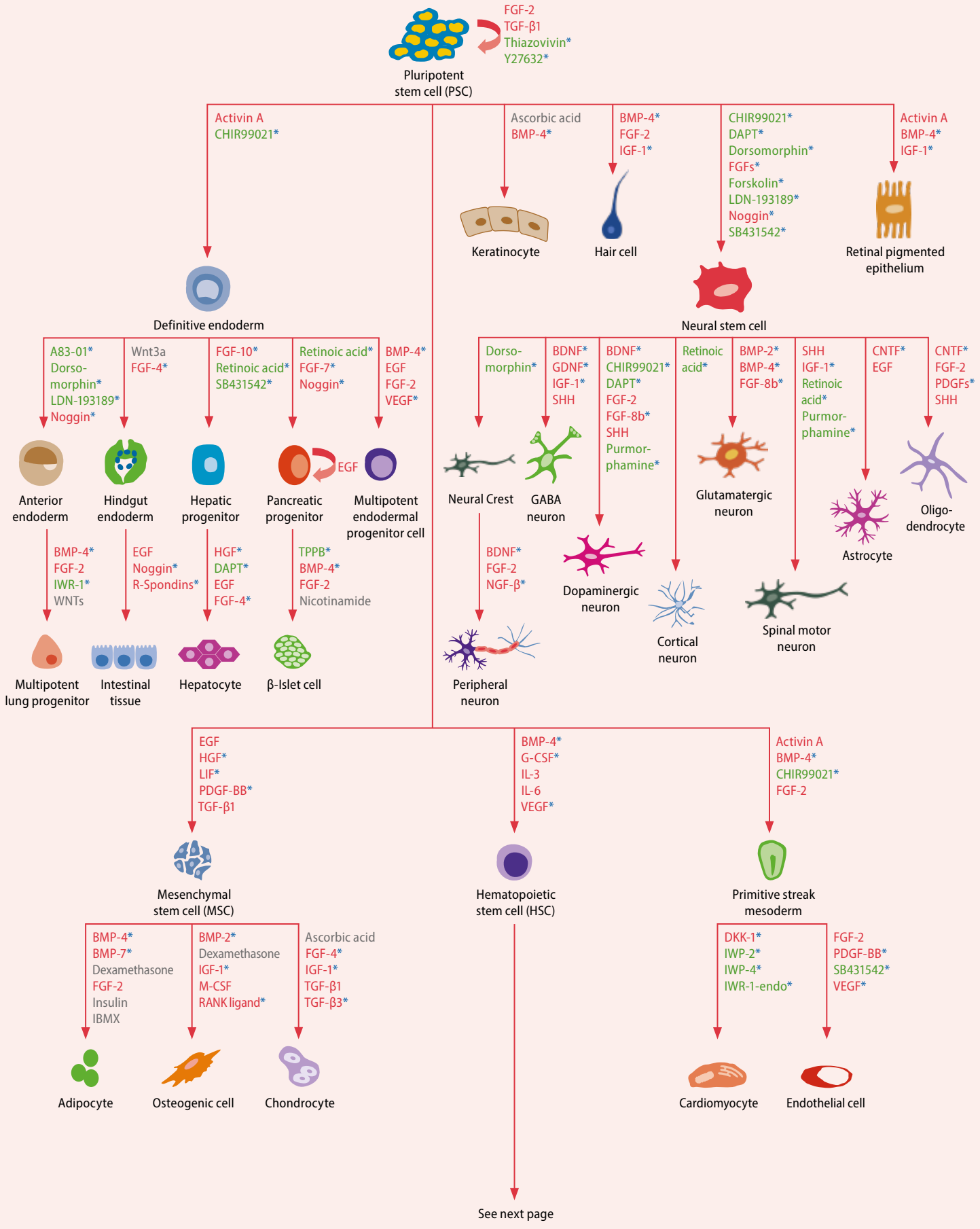
Two applications on the CliniMACS Prodigy accommodate different requirements of the T cell manufacturing process:
CliniMACS Prodigy TCT is designed for CAR T cell manufacturing from whole blood, PBMCs, or fresh leukapheresis (left workflow).
CliniMACS Prodigy TCT-LS offers a larger cell culture capacity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

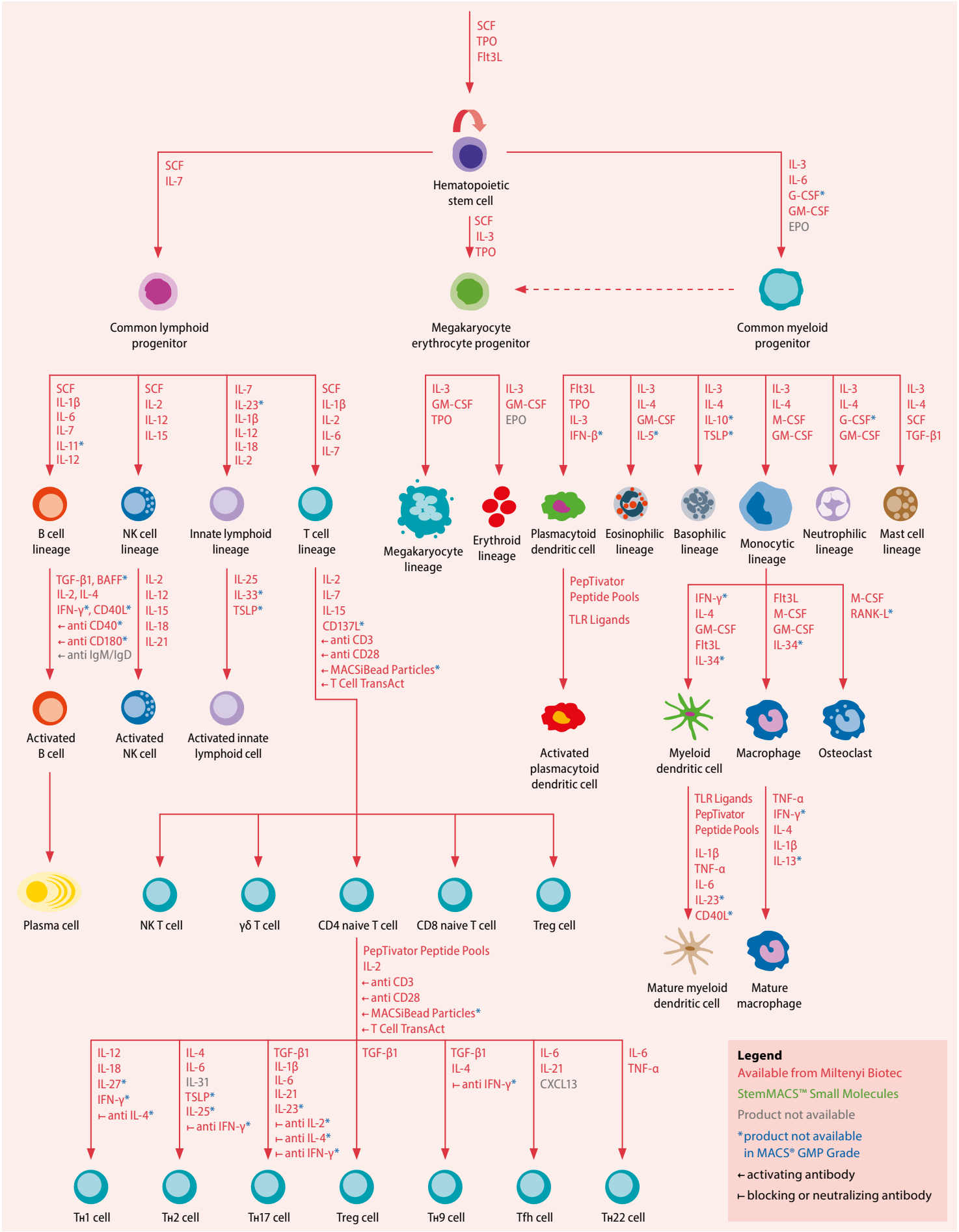


VISIT

See the complete TCT-workflow:
▸ **miltenyi.com/TCT-Process**

Find the MACS® Cell Culture Reagents you need for cell differentiation and activation




SCF
TPO
Flt3L
Hematopoietic stem cell
SCF
IL-7
IL-3
IL-6
G-CSF*
GM-CSF
EPO
SCF
IL-3
TPO
Common lymphoid progenitor
Megakaryocyte erythrocyte progenitor
Common myeloid progenitor
SCF
IL-1β
IL-6
IL-7
IL-11*
IL-12
SCF
IL-2
IL-12
IL-15
IL-7
IL-23*
IL-1β
IL-12
IL-18
IL-2
SCF
IL-1β
IL-2
IL-6
IL-7
IL-3
GM-CSF
TPO
IL-3
GM-CSF
EPO
Flt3L
TPO
IL-3
IFN-β*
IL-3
IL-4
GM-CSF
IL-5*
IL-3
IL-4
IL-10*
TSLP*
IL-3
IL-4
M-CSF
GM-CSF
IL-3
IL-4
G-CSF*
GM-CSF
IL-3
IL-4
SCF
TGF-β1
B cell lineage
NK cell lineage
Innate lymphoid lineage
T cell lineage
Megakaryocyte lineage
Erythroid lineage
Plasmacytoid dendritic cell
Eosinophilic lineage
Basophilic lineage
Monocytic lineage
Neutrophilic lineage
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

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 500 mL StemMACS™ CardioDiff Basal Medium XF, human 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 2×500 mL StemMACS™ CardioDiff Basal Medium XF, human 5 mL StemMACS™ CardioDiff Mesoderm Induction Supplement XF (20×), human 2×10 mL StemMACS™ CardioDiff Cardiac Cultivation Supplement XF (50×), human 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 500 mL StemMACS™ iPS-Brew Basal Medium XF, human 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 500 mL	130-100-473 130-100-463
StemMACS™ HSC-CFU Assay Kit, human	Medium for analyzing hematopoietic stem and progenitor cells	450 mL 450 mL StemMACS™ HSC-CFU Assay Medium, human 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 500 mL StemMACS™ iPS-Brew Basal Medium XF, human 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 500 mL StemMACS MSC Expansion Medium XF, human 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

Product	Description	Capacity/Content/ Components	Order no.
StemMACS™ Passaging Solution XF, human	Xeno-free passaging solution for human ES and iPS cells	100 mL	130-104-688
StemMACS™ PSC-Brew XF, human *see page 19*	Culture medium for human pluripotent stem cells (hPSC)	500 mL 500 mL StemMACS™ PSC-Brew Basal Medium XF, human 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 10 mL StemMACS™ Repro-Brew Supplement XF (50x), human 500 mL StemMACS™ Repro-Brew Basal Medium XF, human	***new*** 130-132-985
StemMACS™ Trilineage Differentiation Kit, human	Kit for assessment of differentiation potential of human pluripotent stem cells	for 12 assays 36 mL StemMACS Trilineage MesoDiff Medium I, human 72 mL StemMACS Trilineage MesoDiff Medium II, human 60 mL StemMACS Trilineage EndoDiff Medium, human 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 2×10^8 monocytes	400 mL	130-094-812
NK MACS® Medium, human *see page 20*	Medium for the activation and expansion of human NK cells	500 mL 500 mL NK MACS® Basal Medium, human 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 500 mL TumorMACS™ Basal Medium, human 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 500 mL TumorMACS™ Basal Medium, human 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 500 mL TumorMACS™ Basal Medium, human 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 500 mL TumorMACS™ Basal Medium, human 10 mL Renal TumorMACS™ Supplement (50×), human	130-119-482

Neural cell media

Product	Description	Content/Components	Order no.
AstroMACS Medium	Medium for astrocyte cultivation	500 mL MACS® Neuro Medium (130-093-570) MACS® NeuroBrew®-21 (50×) (130-093-566) 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 For research use only	500 mL 500 mL StemMACS™ PSC-Brew Basal Medium XF, human StemMACS™ PSC-Brew Supplement XF (50×), human	130-127-865

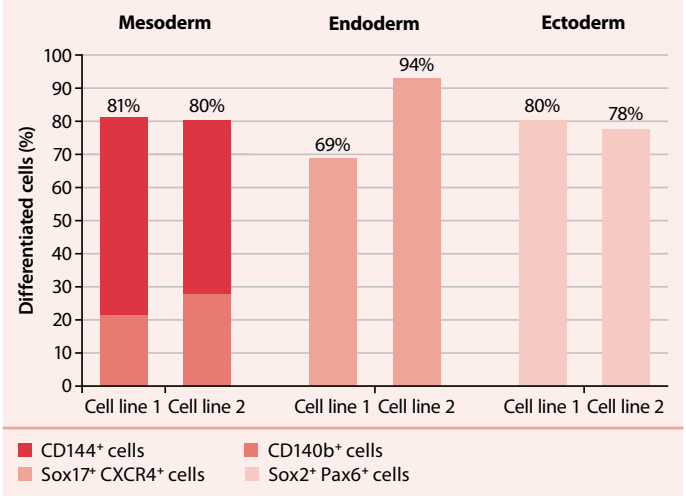


Figure 1:Full differentiation potential. Pluripotent stem cells cultured in StemMACS PSC-Brew XF maintain full pluripotent differentiation potential and can differentiate in all three embryonic germ layers.

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 For research use only	500 mL 500 mL NK MACS® Basal Medium, human 5 mL NK MACS® Supplement (100×), human	130-114-429

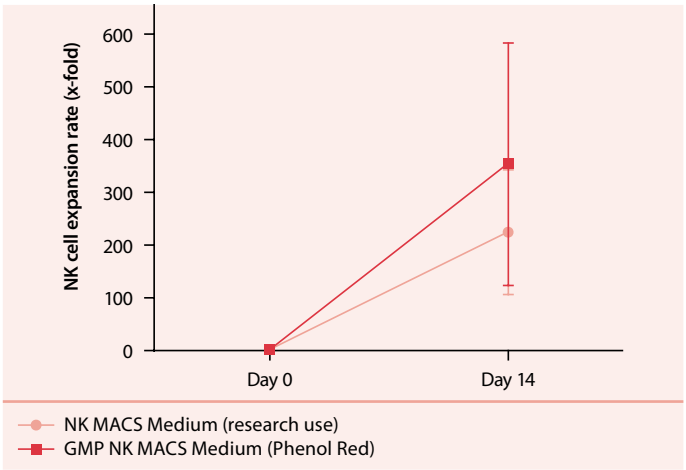


Figure 1: High expansion of NK cells in NK MACS Medium. NK cell fold expansion from PBMCs (n=3) using 5% AB serum and 500 IU/mL of IL-2 and 140 U/mL IL-15 during 14 days showed high expansion rates for both, NK MACS Medium (research use) and NK MACS GMP Medium (Phenol Red).

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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 2×Human CD40-Ligand Multimer Kit (130-098-776) Human IL-4, premium grade (130-093-919) 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 2×Human CD40-Ligand Multimer Kit (130-098-775) Human IL-4, premium grade (130-093-919) 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 Human GM-CSF, premium grade (130-093-867) 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 Mouse IL-12, research grade (130-096-707) Mouse IL-2 IS, premium grade (130-120-331) 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 Mouse IL-6, premium grade (130-096-682) Human TGF-β1, premium grade (130-095-067) Mouse IL-1β, premium grade (130-101-681) Mouse IL-23, research grade (130-096-676) IL-4 Antibody, anti-mouse, pure-functional grade (130-095-709) IFN-γ Antibody, anti-mouse, pure-functional grade (130-095-729) 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 Mouse IL-4, premium grade (130-097-761) Mouse IL-2 IS, premium grade (130-120-331) 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) Human CD40-Ligand, premium grade (130-096-713) 0.2 mL Cross-Linking Antibody 1 kit (large size) Human CD40-Ligand, premium grade (130-096-714) 1 mL Cross-Linking Antibody	130-098-775 130-098-776

Human cytokines & growth factors

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Custom Cytokine			Customized fillings, bulk quantities and cytokines not available off-the-shelf can be requested under this number			130-094-808
Human Activin A	research grade		Recombinant human activin A	CHO cells	10 µg	130-115-012
				CHO cells	25 µg	130-115-013
	premium grade		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		Recombinant human epidermal growth factor	*E. coli*	100 µg	130-093-825
	premium grade		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 34*	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 factor 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 35*	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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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
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 36*	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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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
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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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
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

Product	Quality grade	Alternative name	Description	Source	Content		Order no.
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
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	***new***	130-133-539
				E. coli	25 µg	***new***	130-133-520
				E. coli	100 µg	***new***	130-133-519
				E. coli	1000 µg	***new***	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		Recombinant human macrophage-colony stimulating factor	*E. coli*	10 µg		130-093-963
				E. coli	25 µg		130-096-491
	premium grade		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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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
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	Mammo-tropin	Recombinant human prolactin	*E. coli*	50 µg	130-093-985
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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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
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	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	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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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.
Custom Cytokine			Customized fillings, bulk quantities and cytokines not available off-the-shelf can be requested under this number			130-094-808
Mouse EGF	research grade		Recombinant mouse epidermal growth factor	*E. coli*	100 µg	130-094-036
				E. coli	500 µg	130-094-037
Mouse FGF-2	research grade		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		Recombinant mouse granulocyte macrophage colony-stimulating factor	*E. coli*	10 µg	130-094-043
				E. coli	25 µg	130-095-746
	premium grade		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	200 µL	130-093-131
				HEK293 cells	1 mL	130-093-130
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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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
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

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
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
Mouse M-CSF	research grade		Recombinant mouse macrophage colony-stimulating factor	*E. coli*	10 µg	130-094-129
				E. coli	25 µg	130-101-706
	premium grade		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	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: ≥ 2×10^6 IU/mg
Research grade: ≥ 1×10^6 IU/mg

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

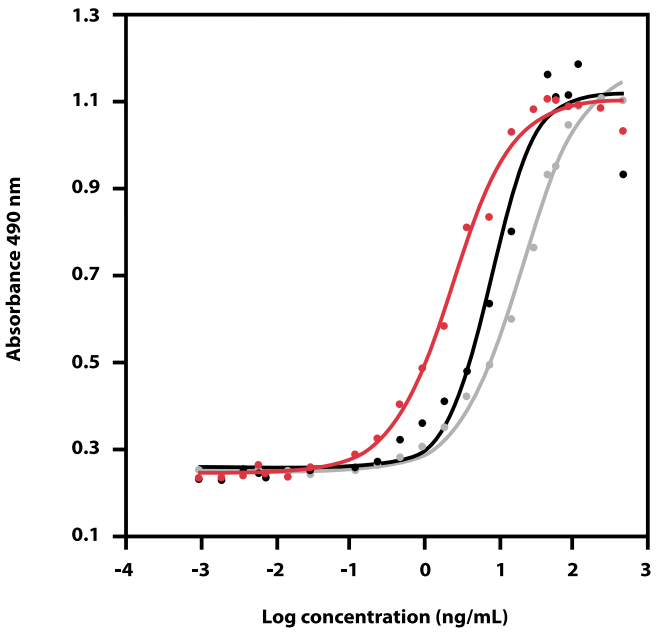

Figure 1:Human FGF-2 IS activity assay. The biological activity of Human FGF-2 IS, premium grade, was determined by proliferation assay using 3T3 cells. Activity of Human FGF-2 IS, premium grade, (red line) was compared to wild type Human FGF-2 (black line), and another commercially available product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

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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: ≥ 5×10^6 IU/mg (typical activity: 1.2×10^7 IU/mg)
Research grade: ≥ 2×10^6 IU/mg

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

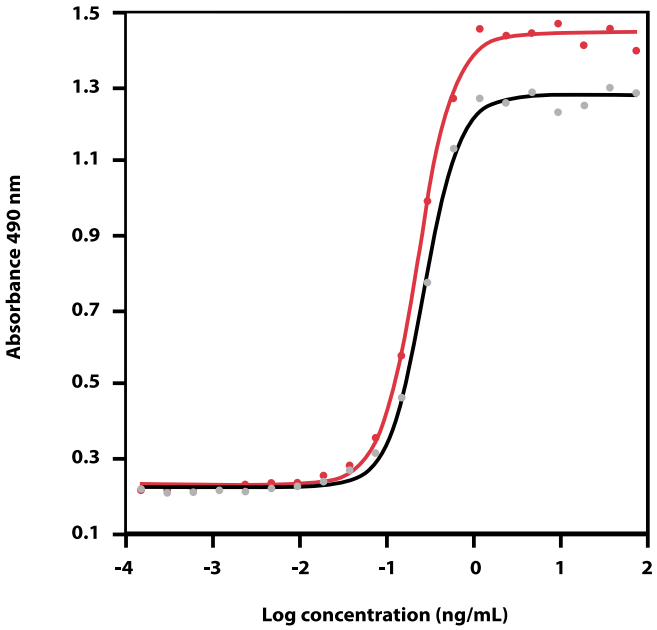

Figure 1:Human GM-CSF activity assay. The biological activity of Human GM-CSF, premium grade was determined by proliferation assay using TF-1 cells. Activity of Human GM-CSF, premium grade, (red line) was compared to another commercially available product (black line).

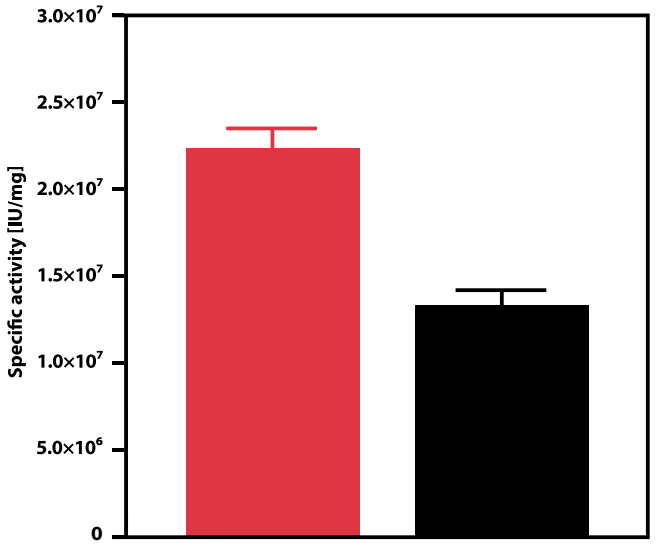

Figure 2:Human GM-CSF biological activity. Activity of Human GM-CSF, premium grade (red bar) was compared to another commercially available product (black bar).

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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: ≥ 5×10^6 IU/mg (typical activity: 9×10^6 IU/mg)
Research grade: ≥ 3×10^6 IU/mg

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

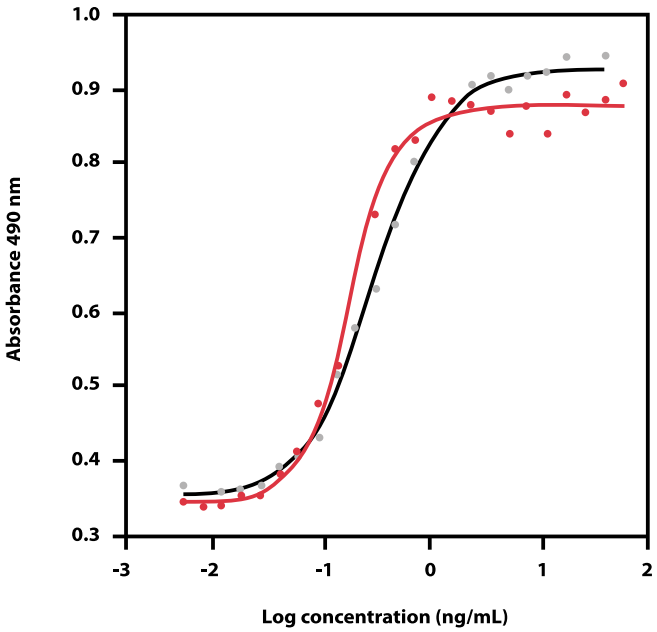

Figure 1:Human IL-2 IS activity assay. Activity of Human IL-2 IS, premium grade (red line) was compared to commercially available aldesleukin (black line).

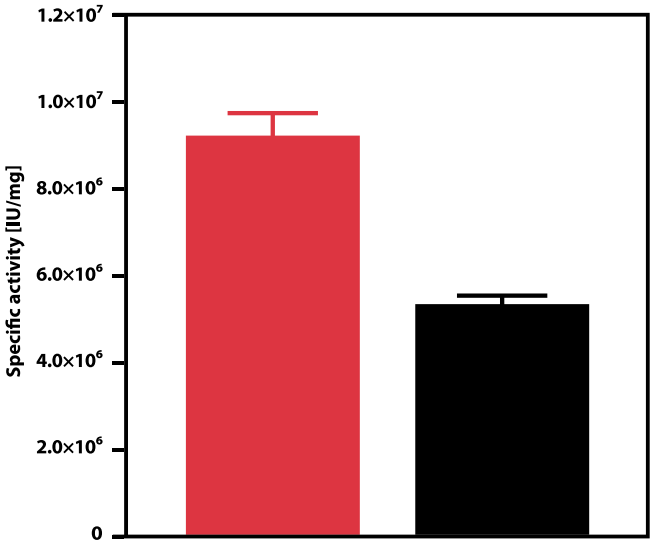

Figure 2:Human IL-2 IS biological activity. Activity of Human IL-2 IS, premium grade, (red bar) was compared to another commercially available product (black bar).

Selected references
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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 1×10^8 total cells 200 µL	130-092-172
		for 5×10^8 total cells 1 mL	130-092-173
CytoStim™, non-human primate	Rapid and efficient restimulation of non-human primate effector/memory T cells	for 1×10^8 total cells 200 µL	130-094-447
		for 5×10^8 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
		100 µg	130-127-466
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
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

Product	Description	Content	Order no.
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
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® α-Synuclein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	*new*	130-132-052
PepTivator® A. fumigatus Catalase B	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-097-291
PepTivator® A. fumigatus crf1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-096-775
PepTivator® A. fumigatus f 22	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-099-776
PepTivator® A. fumigatus Gel1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-097-289
PepTivator® A. fumigatus pmp20	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-096-772
PepTivator® A. fumigatus SHMT	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-097-290
PepTivator® A. fumigatus SOD	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-097-288
PepTivator® AdV Select	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-124-394
PepTivator® AdV5 Hexon	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide for stimulation of 1×10^9 cells 60 nmol/peptide		130-093-495 130-093-496
PepTivator® AdV5 Penton	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-096-777
PepTivator® Aquaporin-4	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-126-131
PepTivator® B. afzelii bmpA	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-099-788
PepTivator® B. afzelii bmpB	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-099-792
PepTivator® B. afzelii ospA	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-099-778
PepTivator® B. afzelii ospB	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-099-782
PepTivator® B. afzelii ospC	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-099-786
PepTivator® BKV LT	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide for stimulation of 1×10^9 cells 60 nmol/peptide		130-131-249 130-131-252
PepTivator® BKV ST	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-096-503
PepTivator® BKV VP1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide for stimulation of 1×10^9 cells 60 nmol/peptide		130-131-251 130-131-250
PepTivator® BKV VP2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-097-273
PepTivator® C. albicans MP65	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-096-776

Product	Quality grade	Capacity/Content	Order no.
PepTivator® CEF MHC Class I Plus	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-098-426
PepTivator® CMV IE-1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-093-493
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-093-494
PepTivator® CMV pp65 *see page 48*	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-093-438
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-093-435
PepTivator® CMV pp65 (HT) *see page 48*	premium grade	for 96 tests	130-097-727
PepTivator® Dengue Virus Type 2 Capsid Protein C	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-123-131
PepTivator® Dengue Virus Type 2 Envelope Protein E1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-123-128
PepTivator® Dengue Virus Type 2 Envelope Protein E2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-123-127
PepTivator® Dengue Virus Type 2 Glycoprotein M	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-123-129
PepTivator® Dengue Virus Type 2 Protein NS1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-123-145
PepTivator® Dengue Virus Type 2 Protein NS2a	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-123-130
PepTivator® Dengue Virus Type 4 Protein NS2a	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-123-126
PepTivator® EBV BMLF1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-283
PepTivator® EBV BRLF1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-284
PepTivator® EBV BZLF1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-093-611
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-093-612
PepTivator® EBV Consensus	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-764
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-103-462
PepTivator® EBV EBNA-1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-093-613
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-093-614
PepTivator® EBV LMP1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-930
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-095-931
PepTivator® EBV LMP2A	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-093-615
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-093-616
PepTivator® HCV1a Core	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-773

PepTivator® Peptide Pools covering antigens from infectious diseases

Product	Quality grade	Capacity/Content	Order no.
PepTivator® HCV1a NS3	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-780
PepTivator® HCV1a NS4	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-282
PepTivator® HCV1a NS5	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-281
PepTivator® HCV1b Core	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-782
PepTivator® HCV1b NS3	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-783
PepTivator® HCV1b NS4	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-280
PepTivator® HCV1b NS5	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-279
PepTivator® HHV1 Envelope Glycoprotein D	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-114-929
PepTivator® HPV16 E6	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-997
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-095-998
PepTivator® HPV16 E7	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-999
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-096-000
PepTivator® HPV18 E6	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-005
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-096-006
PepTivator® HPV18 E7	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-996
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-096-007
PepTivator® Influenza A (H1N1) HA	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-803
PepTivator® Influenza A (H1N1) MP1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-285
PepTivator® Influenza A (H1N1) MP2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-812
PepTivator® Influenza A (H1N1) NA	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-806
PepTivator® Influenza A (H1N1) NP	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-278
PepTivator® JCV LT	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-131-253
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-131-541
PepTivator® JCV ST	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-766
PepTivator® JCV VP1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-131-255
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-131-254

Product	Quality grade	Capacity/Content		Order no.
PepTivator® JCV VP2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-096-764
PepTivator® JCV VP3	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-096-762
PepTivator® M. tuberculosis ACR	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	*new*	130-132-043
PepTivator® M. tuberculosis Ag85B	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	*new*	130-132-042
PepTivator® M. tuberculosis CFP-10	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	*new*	130-132-049
		for stimulation of 1×10^9 cells 60 nmol/peptide	*new*	130-132-046
PepTivator® M. tuberculosis ESAT-6	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	*new*	130-132-048
		for stimulation of 1×10^9 cells 60 nmol/peptide	*new*	130-132-045
PepTivator® M. tuberculosis TB10.4	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	*new*	130-132-053
PepTivator® M. tuberculosis TB7.7	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	*new*	130-132-047
		for stimulation of 1×10^9 cells 60 nmol/peptide	*new*	130-132-044
PepTivator® Negative Control		for stimulation of 1×10^8 cells		130-131-610
		for stimulation of 1×10^9 cells		130-131-612
PepTivator® RAS G12C	premium grade	for stimulation of 1×10^8 cells	*new*	130-133-669
		for stimulation of 1×10^9 cells	*new*	130-133-877
PepTivator® RAS G12D	premium grade	for stimulation of 1×10^8 cells	*new*	130-133-874
		for stimulation of 1×10^9 cells	*new*	130-133-878
PepTivator® RAS G12R	premium grade	for stimulation of 1×10^8 cells	*new*	130-133-876
		for stimulation of 1×10^9 cells	*new*	130-133-871
PepTivator® RAS G12V	premium grade	for stimulation of 1×10^8 cells	*new*	130-133-879
		for stimulation of 1×10^9 cells	*new*	130-133-872
PepTivator® RAS G13D	premium grade	for stimulation of 1×10^8 cells	*new*	130-133-870
		for stimulation of 1×10^9 cells	*new*	130-133-668
PepTivator® RSV Nucleoprotein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-104-803
PepTivator® SARS-CoV-2 MHC-I Select	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-130-629
		for stimulation of 1×10^9 cells 60 nmol/peptide		130-130-632
PepTivator® SARS-CoV-2 MHC-I Select Prot_S	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-130-634
		for stimulation of 1×10^9 cells 60 nmol/peptide		130-130-633
PepTivator® SARS-CoV-2 Prot_M	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide		130-126-702
		for stimulation of 1×10^9 cells 60 nmol/peptide		130-126-703

Product	Quality grade	Capacity/Content	Order no.
PepTivator® SARS-CoV-2 Prot_N	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-126-698
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-126-699
PepTivator® SARS-CoV-2 Prot_N B.1.1.7 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-843
PepTivator® SARS-CoV-2 Prot_N B.1.1.7 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-842
PepTivator® SARS-CoV-2 Prot_S	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-126-700
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-126-701
PepTivator® SARS-CoV-2 Prot_S AY.1 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-129-568
PepTivator® SARS-CoV-2 Prot_S AY.1 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 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 1×10^8 cells 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 1×10^8 cells 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 1×10^8 cells 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 1×10^8 cells 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 1×10^8 cells 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 1×10^8 cells 6 nmol/peptide	130-132-050
PepTivator® SARS-CoV-2 Prot_S B.1.1.7 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-844
PepTivator® SARS-CoV-2 Prot_S B.1.1.7 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-841
PepTivator® SARS-CoV-2 Prot_S B.1.351 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-958
PepTivator® SARS-CoV-2 Prot_S B.1.351 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 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 1×10^8 cells 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 1×10^8 cells 6 nmol/peptide	130-128-487
PepTivator® SARS-CoV-2 Prot_S B.1.525 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-483
PepTivator® SARS-CoV-2 Prot_S B.1.525 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-484
PepTivator® SARS-CoV-2 Prot_S B.1.617.1 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-762
PepTivator® SARS-CoV-2 Prot_S B.1.617.1 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-764
PepTivator® SARS-CoV-2 Prot_S B.1.617.2 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-763
PepTivator® SARS-CoV-2 Prot_S B.1.617.2 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-761

Product	Quality grade	Capacity/Content	Order no.
PepTivator® SARS-CoV-2 Prot_S BQ.1.1 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-887
PepTivator® SARS-CoV-2 Prot_S BQ.1.1 Reference Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-888
PepTivator® SARS-CoV-2 Prot_S Complete	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-129-712
	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-951
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-127-953
PepTivator® SARS-CoV-2 Prot_S Complete BA.1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-131-611
PepTivator® SARS-CoV-2 Prot_S Complete BA.5	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-810
PepTivator® SARS-CoV-2 Prot_S P.1 Mutation Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-485
PepTivator® SARS-CoV-2 Prot_S P.1 WT Reference Pool	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-128-486
PepTivator® SARS-CoV-2 Prot_S+	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-311
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-127-312
PepTivator® SARS-CoV-2 Prot_S1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-041
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-127-048
PepTivator® SARS-CoV-2 Select	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-127-309
PepTivator® Zika Capsid Protein C	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-114-926
PepTivator® Zika Envelope Protein E1-2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-114-927
PepTivator® Zika Envelope Protein E3	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-114-925
PepTivator® Zika Glycoprotein M	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-114-923
PepTivator® Zika NS1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-114-922

PepTivator Peptide Pools covering tumor-associated antigens

Product	Quality grade	Capacity/Content	Order no.
PepTivator® gp100/Pmel 17	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-094-449
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-094-450
PepTivator® MAGE-A1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-382
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-095-383
PepTivator® MAGE-A3	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-384
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-095-385
PepTivator® MAGE-A4	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-386
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-095-387
PepTivator® Melan-A/MART-1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-094-597
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-094-477
PepTivator® NY-ESO-1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-380
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-095-381
PepTivator® PAP	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-767
PepTivator® PRAME	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-286
PepTivator® Prostein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-801
PepTivator® PSA	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-800
PepTivator® PSCA	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-798
PepTivator® PSMA	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-795
PepTivator® ROR1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-767
PepTivator® STEAP1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-100-784
PepTivator® Survivin 1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-094-444
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-094-443
PepTivator® TERT	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-277
PepTivator® Tyrosinase	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-094-445
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-094-446

Product	Quality grade	Capacity/Content	Order no.
PepTivator® WT1	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-095-916
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-095-918

PepTivator Peptide Pools covering other antigens

Product	Quality grade	Capacity/Content	Order no.
PepTivator® CHI3L2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-276
PepTivator® Desmoglein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-766
PepTivator® GAD65	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-769
PepTivator® IA-2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-275
PepTivator® Insulin	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-771
PepTivator® MBP Isoform 1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-763
PepTivator® MBP Isoform 5	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-287
PepTivator® MOG	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-770
PepTivator® Mucin-1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-774
PepTivator® Ovalbumin	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-099-771
PepTivator® PLP	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-097-274

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.

PepTivator CMV pp65-HT is a peptide pool lyophilized in the wells of a 96-well plate, allowing stimulation and analysis of cells directly on the plate.

The convenient 96-well format, composed of 12 individually removable strips of 8 wells each allows for easy and flexible experimental set-up, different antigens can be combined by assembling different strips. A control can also be added easily by using strips from the Control plate (12x8).

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 For research use only	for stimulation of 1×10^8 cells 6 nmol/peptide	130-093-438
PepTivator® CMV pp65 – premium grade For research use only	for stimulation of 1×10^9 cells 60 nmol/ peptide	130-093-435
PepTivator® CMV pp65 (HT) – premium grade For research use only	for 96 tests	130-097-727

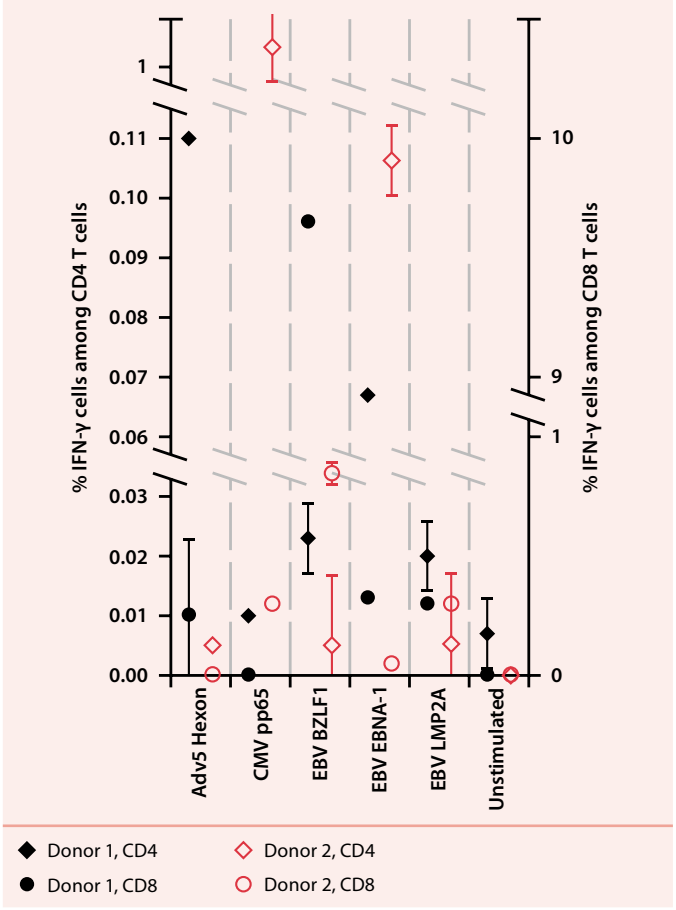

Figure 1: Production of IFN-γ by human CD4$^+$ or CD8$^+$ T cells after stimulation with different antigens using PepTivator Peptide Pools. Data from two different donors are shown (triplicates).

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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-427
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-440
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-433
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-436
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-442
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-431
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-385
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-428
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-430
		1 mg 1 mg lyophilized ORN 1 mL RNase-free Water 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 5×100 µg lyophilized ORN 1 mL RNase-free Water 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 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-274
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-103
ODN 1826 Control (ODN 2138)	B-class CpG control oligodeoxyribonucleotide (murine)	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-275
		1 mg 1 mg lyophilized ODN 1 mL 1x 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 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-104
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-277

Product	Description	Content/Components	Order no.
ODN 2006	B-class CpG oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-106
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-105
ODN 2006 Control (ODN 2137)	B-class CpG control oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-107
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-278
ODN 21798	P-class CpG oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-281
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-280
ODN 21798 Control (ODN 23098)	P-class control CpG oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-285
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-284
ODN 2216	A-class CpG oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-243
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-244
ODN 2216 Control (ODN 2243)	A-class CpG control oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-241
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-108
ODN 2395	C-class CpG oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-282
		1 mg 1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-283
ODN 2395 Control (ODN 5328)	C-class control CpG oligodeoxyribonucleotide	200 µg 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-279
		1 mg 1 mg lyophilized ODN 1 mL 1x 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 8×100 µg lyophilized ODN 1 mL 1x 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 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-105-815
		1 mg 1 mg lyophilized ODN 1 mL 1x 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 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-105-819
		1 mg 1 mg lyophilized ODN 1 mL 1x 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 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-105-821
		1 mg 1 mg lyophilized ODN 1 mL 1x 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 200 µg lyophilized ODN 1 mL 1x TE Buffer	130-105-818
		1 mg 1 mg lyophilized ODN 1 mL 1x 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™ Cas9 Nickase mRNA	mRNA encoding a D10A mutated version of Cas9 nuclease from Streptococcus pyogenes for transfection	20 µg		130-107-679
StemMACS™ Cas9 Nuclease mRNA	mRNA encoding Cas9 nuclease from Streptococcus pyogenes for transfection	20 µg		130-107-751
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 55*	Kit for reprogramming of human fibroblasts into induced pluripotent stem cells (iPSCs)	1 kit 1x StemMACS™ iPSC mRNA Reprogramming Box, human 1x StemMACS Repro-Brew XF, human	***new***	130-132-990
StemMACS™ Klf4 mRNA, human	mRNA encoding the transcription factor Klf4 for transfection	20 µg		130-101-115
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 55*	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) 1 kit (medium size) 1 kit (small size)	 ***new*** ***new***	130-104-463 130-132-949 130-132-978
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 For research use only	1 kit 1x StemMACS™ iPSC mRNA Reprogramming Box, human 1x StemMACS Repro-Brew XF, human	*new*	130-132-990

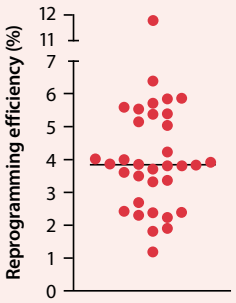

Figure 1:The successful reprogramming of human BJ fibroblasts using the StemMACS iPSC mRNA Reprogramming Kit, human. Reprogramming efficiency of BJ fibroblasts seeded at densities ranging from 8–18x10^3 cells per well in a 12-well plate across multiple experiments and operator.

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 For research use only	1 kit (large size)		130-104-463
StemMACS™ mRNA Transfection Kit For research use only	1 kit (medium size)	*new*	130-132-949
StemMACS™ mRNA Transfection Kit For research use only	1 kit (small size)	*new*	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 500 mL HSC-Brew GMP Basal Medium 5 mL HSC-Brew GMP Supplement	170-076-310
iPS-Brew GMP Basal Medium *see page 57*	GMP Medium for the maintenance and expansion of human pluripotent stem cells	500 mL	170-076-317
iPS-Brew GMP Supplement R *see page 57*	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 500 mL MSC-Brew Basal Medium MSC-Brew GMP Supplement I MSC-Brew GMP Supplement II	170-076-326
		2000 mL 2000 mL MSC-Brew Basal Medium MSC-Brew GMP Supplement I 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 2000 mL NK MACS® GMP Basal Medium 5 mL NK MACS® GMP Supplement	170-076-356
TexMACS™ GMP Medium (Phenol Red) *see page 58*	GMP Medium for cultivation and expansion of T cells supplied in a bottle	1000 mL	170-076-309
TexMACS™ GMP Medium *see page 58*	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.

Recombinant human TGF-β1 has to be added to the complete medium for the maintenance and expansion of human pluripotent stem 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	Order no.
iPS-Brew GMP Basal Medium Availability: worldwide	500 mL	170-076-317
iPS-Brew GMP Supplement R Availability: worldwide	10 mL	170-076-318

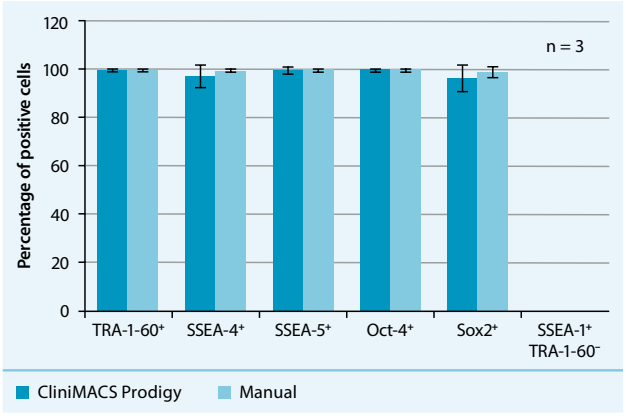

Figure 1: Human iPS cells cultured in iPS-Brew GMP Medium show high expression of pluripotency markers, when expanded either manually or with the CliniMACS Prodigy Adherent Cell Culture process.

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) Availability: worldwide	2000 mL 2000 mL NK MACS® GMP Basal Medium 5 mL NK MACS® GMP Supplement	170-076-356

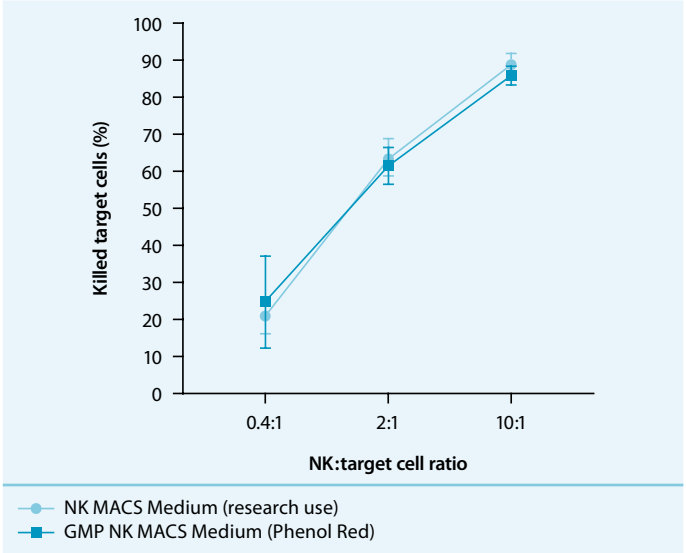

Figure 1: Expanded NK cells are fully functional and can be used in downstream assays, e.g. cytotoxicity assays. NK cells from PBMCs were expanded for 14 days in NK MACS Medium (research use) and NK MACS GMP Medium (Phenol Red) and were analyzed via flow cytometry for cytotoxicity against cell line K-562 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 Availability: worldwide	1000 mL	170-076-307
TexMACS™ GMP Medium Availability: worldwide	2000 mL	170-076-306
TexMACS™ GMP Medium (Phenol Red) Availability: worldwide[1]	1000 mL	170-076-309

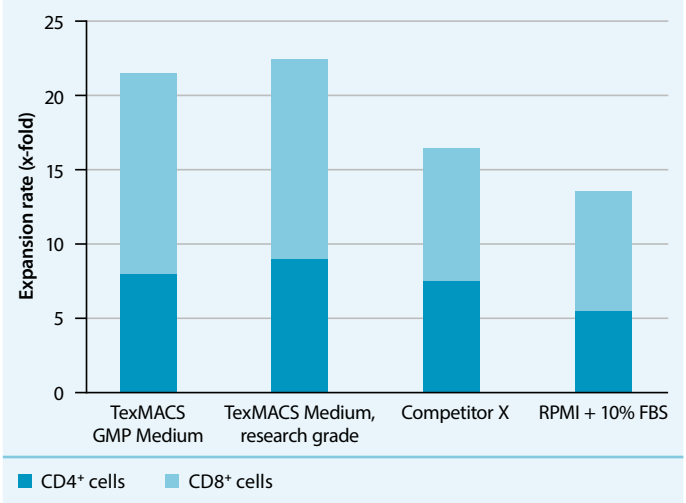

Figure 1: Superb polycloncal activation/expansion of human T cell. Comparison of expansion rates of human T cells with TexMACS Medium, a competitor product, and serum-containing basal medium (RPMI + 10% FBS) after 14 days of expansion using the T Cell Activation/Expansion Kit, human.

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	Description	Source	Content		Order no.
MACS® GMP Recombinant Human Activin A	Recombinant human activin A	CHO cells	5 µg		170-076-179
		CHO cells	25 µg		170-076-180
MACS® GMP Recombinant Human EGF	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	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	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	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 61*	Recombinant human interleukin 18	*E. coli*	25 µg	***new***	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	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	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)		100 µg		170-076-182
			25 µg	***new***	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	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	Recombinant human thrombopoietin	*E. coli*	50 µg		170-076-134

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. Learn more supheresup/DE-en/lp/discover-our-new-product-quality-certificates.html

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 Availability: worldwide	25 µg	170-076-148
MACS® GMP Recombinant Human IL-2 Availability: worldwide	100 µg	170-076-146

Product	Content	Order no.
MACS® GMP Recombinant Human IL-2 Availability: worldwide	500 µg	170-076-147

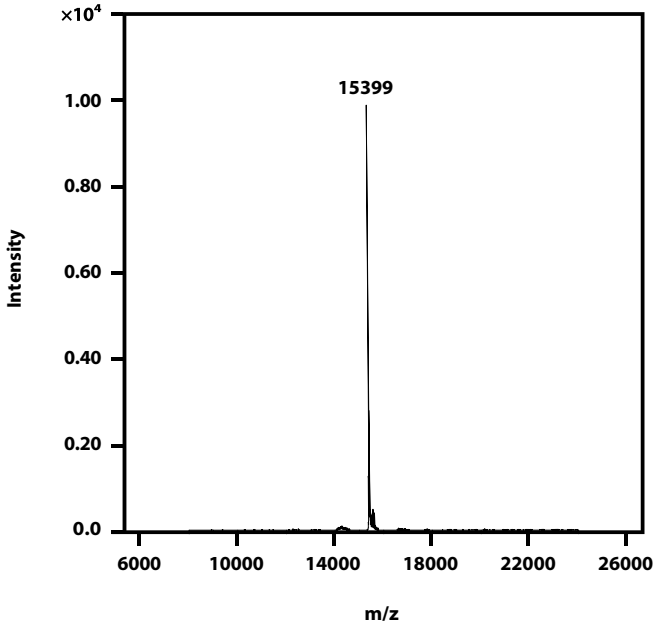

Figure 1: Mass spectrometry analysis (ESI-MS) of MACS GMP Recombinant Human IL-2. The peak corresponds to the calculated molecular mass of 15400 Da.

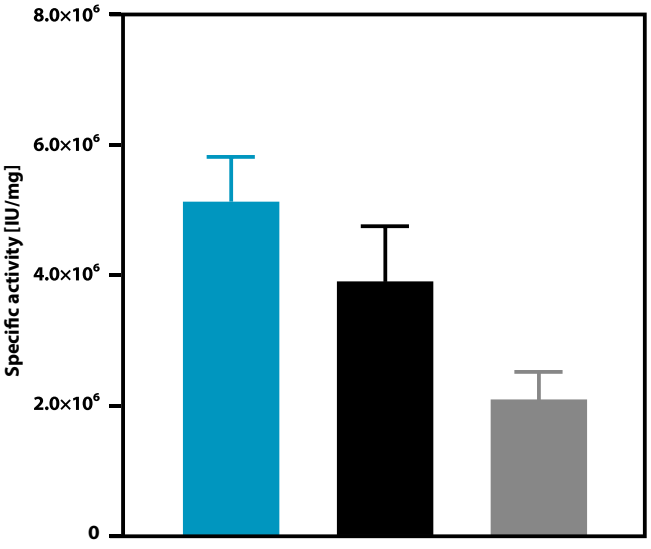

Figure 2:MACS GMP Recombinant Human IL-2 biological activity. Activity of Human IL-2, GMP grade, (blue bar) was compared to other commercially available products (black and grey bar).

Selected references
1. Gearing, A. J. H. and Bird, C. B. (1987) Oxford: IRL Press: 295.
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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

- 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). Learn more here/DE-en/lp/discover-our-new-product-quality-certificates.html

- 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: ≥ 5×10^6 U/mg

Product	Content		Order no.
MACS® GMP Recombinant Human IL-18 Availability: worldwide	25 µg	*new*	170-076-183

Selected references
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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 CpG-P	MACS GMP CpG-P is intended for *in vitro* stimulation of human B cells or plasmacytoid dendritic cells (pDCs)	75 nmol	170-079-000
MACS® GMP T Cell TransAct™ CR/GMP *see page 62*	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 62*	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™

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

Overview
MACS®GMP T Cell TransAct™ 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™ 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 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: The reagent is optimized to activate and expand 1×10^8 enriched T cells.

MACS GMP T Cell TransAct - Large Scale: The reagent is optimized to activate and expand up to 4×10^8 enriched T cells.

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

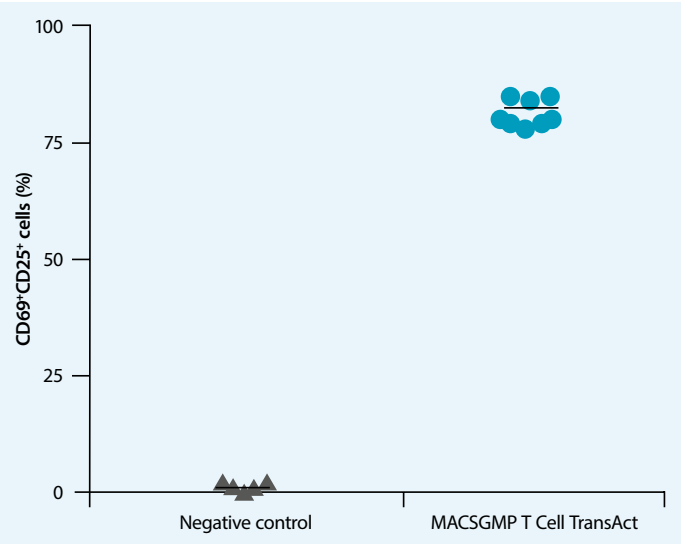

Figure 1: Higher marker activation efficiency of T Cell TransAct compared to the negative control. Comparison of activation efficiency on day two between T Cell TransAct and negative control using the activation markers CD69 and CD25.

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MACS® GMP Antigens and Peptide Pools

Product	Capacity/Content	Order no.
MACS® GMP PepTivator® AdV select	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-169
MACS® GMP PepTivator® AdV5 Hexon	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-106
MACS® GMP PepTivator® BKV LT	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-139
MACS® GMP PepTivator® BKV VP1	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-138
MACS® GMP PepTivator® EBV EBNA-1	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-129
MACS® GMP PepTivator® EBV Select	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-143
MACS® GMP PepTivator® HCMV pp65	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-109
MACS® GMP PepTivator® HPV16-E6	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-158
MACS® GMP PepTivator® HPV16-E7	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-159
MACS® GMP PepTivator® JCV LT	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-190
MACS® GMP PepTivator® JCV VP1	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-191
MACS® GMP PepTivator® MAGE-A3	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-153
MACS® GMP PepTivator® Melanoma Select	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-164
MACS® GMP PepTivator® Mucin-1	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-151
MACS® GMP PepTivator® NY-ESO-1	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-137
MACS® GMP PepTivator® PRAME	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-157
MACS® GMP PepTivator® SARS-CoV-2 Select	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-017
MACS® GMP PepTivator® Survivin 1	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-152
MACS® GMP PepTivator® WT1	for stimulation of 1×10^9 cells 60 nmol/peptide	170-076-123

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