



Miltenyi Biotec

**CLICKABLE
PRODUCT
NUMBERS**

MACS[®] Cell Culture Reagents

Product list

January 1, 2026

MACS[®] Media

MACS[®] Cytokines

Polyclonal stimulation

Antigens and peptide pools

TLR ligands

StemMACS[™] Small Molecules

Viral transduction and matrices



► miltenyibiotec.com/cellculture

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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.

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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.

MACS® GMP Cell culture 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

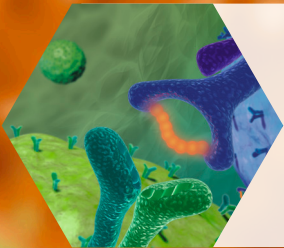


Final products

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

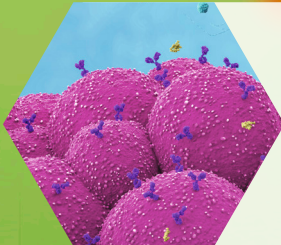
Cell culture is key for efficient and reliable research

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.



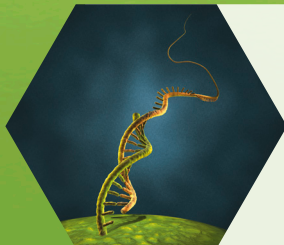
PepTivator® Peptide Pools

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



StemMACS™ Small Molecules

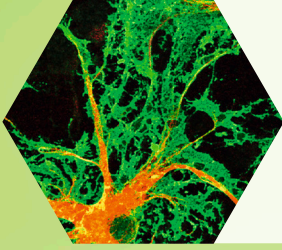
- Chemically defined
- Highly pure
- Ready-to-use in solution



StemMACS™ mRNA Transfection

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

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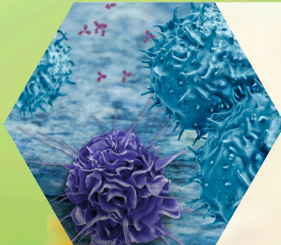
Cell culture media

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



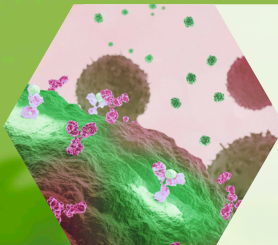
Polyclonal stimulation reagents

- 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

Complete
on for
search

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 mass 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-1 β , IL-6, IL-21, IL-23, TGF- β 1 anti-IFN- γ , anti-IL-2, anti-IL-4
Treg polarization	TexMACS™ Medium IL-2, TGF- β 1, 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- β 1, anti-CD40 TLR ligands

Immunology – myeloid cells

Application	Reagents
Macrophage (M ϕ) 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, M ϕ , and DC maturation	CD40-L, IL-1 β , IL-6, IL-12, TNF- α , TLR ligands PepTivator® Peptide Pools
Granulocyte cultures	G-CSF, GM-CSF, IL-3, IL-4, SCF, TGF- β 1
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- β 1 Thiazovivin, Y27632

Application	Reagents
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/ CART 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-α 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

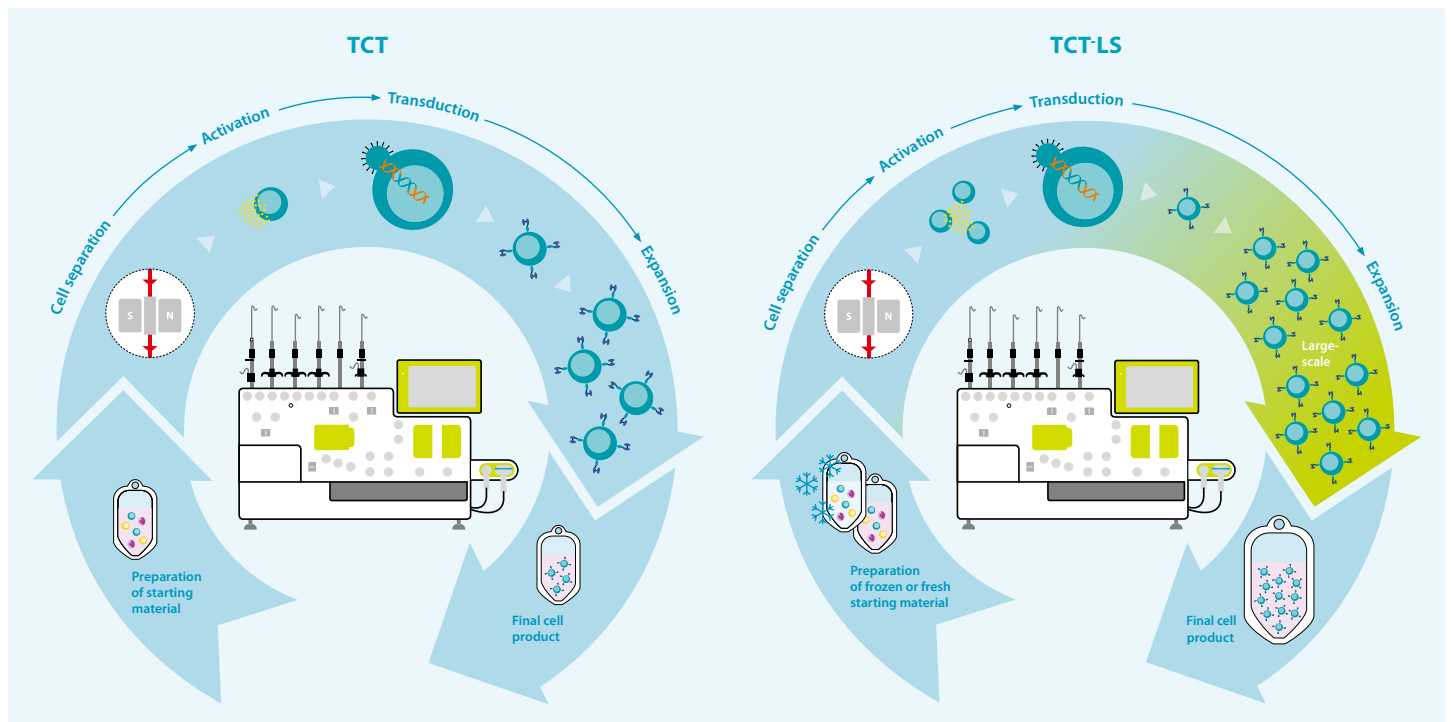
* Process available on the CliniMACS Prodigy® Platform with selected reagents

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.

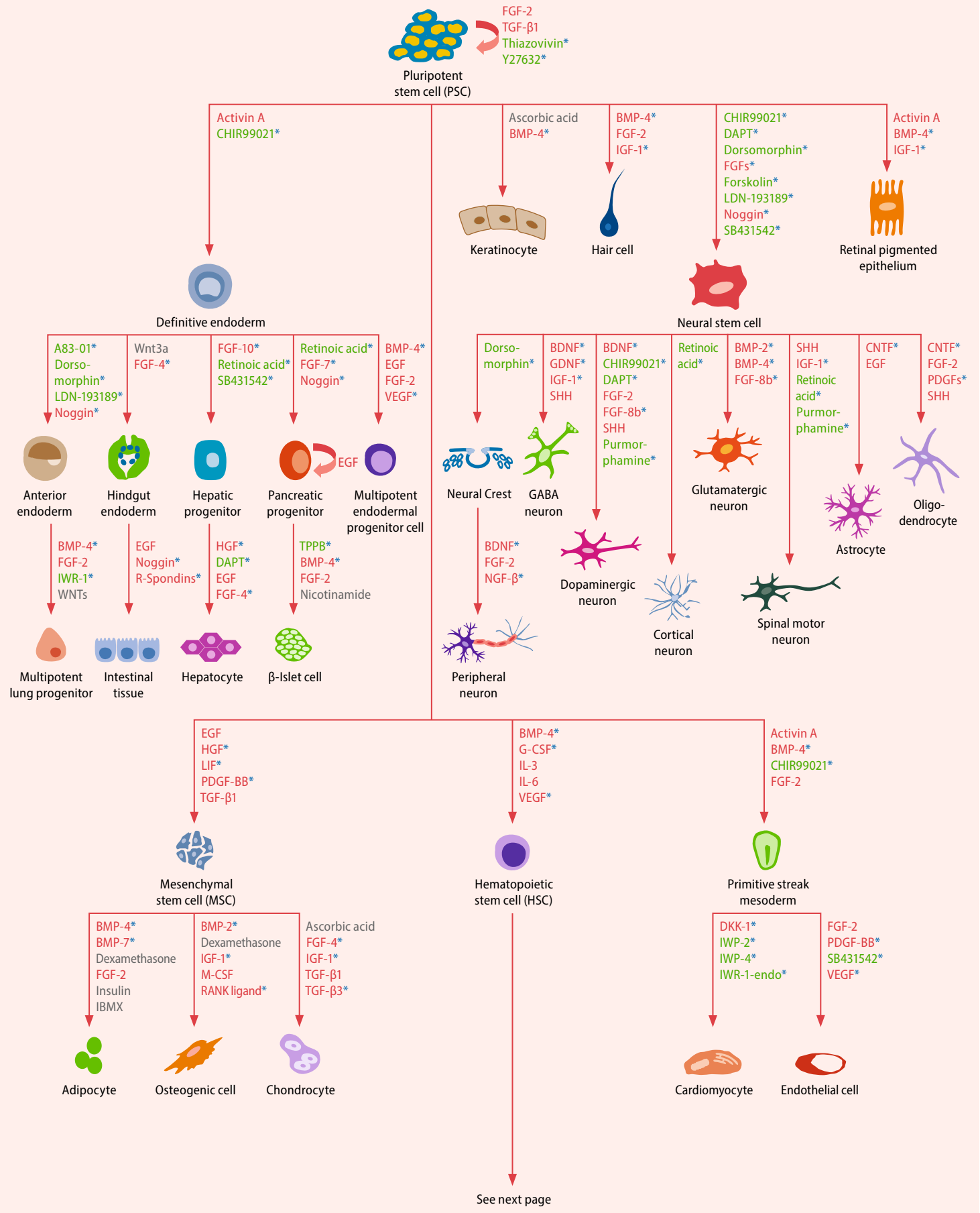


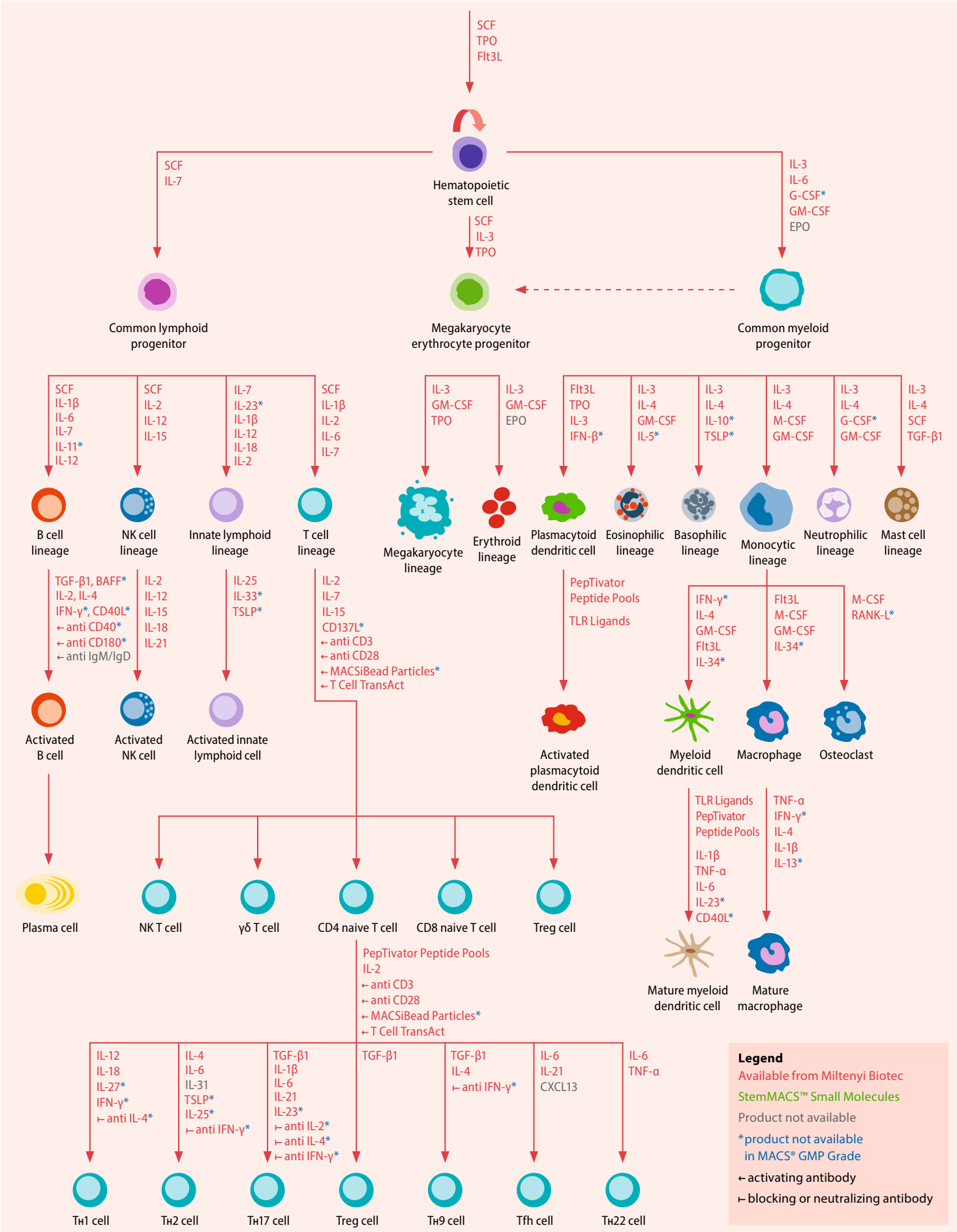
VISIT 

See the complete TCT-workflow:

► [miltenyi.com/TCT-Process](https://www.miltenyibiotec.com/TCT-Process)

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





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 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 StemMACS™ iPS-Brew Basal Medium XF, human 10 mL StemMACS™ DiffBase Supplement XF (50×), human	130-126-015
StemMACS™ Endothel Cultivation Medium XF, human	Cultivation medium for expansion of iPSC derived endothelial cells	125 mL StemMACS Endothel Cultivation Basal Medium XF, human 5 mL StemMACS™ Endothel Cultivation Supplement XF (25×), human	new 130-139-193
StemMACS™ EndothelDiff Kit XF, human	Ready to use kit for differentiation of iPSCs to endothelial cells	for 55 assays 500 mL StemMACS™ PSC-Brew Basal Medium XF, human 125 mL StemMACS Endothel Cultivation Basal Medium XF, human 5 mL StemMACS™ Endothel Cultivation Supplement XF (25×), human 4 mL StemMACS™ EndothelDiff Supplement I XF (50×), human 7 mL StemMACS™ EndothelDiff Supplement II XF (50×), human	new 130-139-194
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 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 iPSC cells under feeder-free conditions	500 mL StemMACS™ iPS-Brew Basal Medium XF, human 10 mL StemMACS™ iPS-Brew Supplement XF (50×), human	130-104-368

Product	Description	Capacity/Content/Components	Order no.
StemMACS™ MSC Expansion Medium Kit XF, human	Xeno-free expansion media for human mesenchymal stem cells	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
StemMACS™ Passaging Solution XF, human	Xeno-free passaging solution for human ES and iPSC cells	100 mL	130-104-688
StemMACS™ PSC-Brew XF, human <i>see page 21</i>	Culture medium for human pluripotent stem cells (hPSC)	500 mL StemMACS™ PSC-Brew Basal Medium XF, human StemMACS™ PSC-Brew Supplement XF (50x), 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)	10 mL StemMACS™ Repro-Brew Supplement XF (50x), human 500 mL StemMACS™ Repro-Brew Basal Medium XF, human	130-132-985
StemMACS™ Trilineage Differentiation Kit, human	Kit for assessment of differentiation potential of human pluripotent stem cells	for 12 assays 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 <i>in vitro</i> differentiation of up to 2×10^8 monocytes	400 mL	130-094-812
NK MACS® Medium, human <i>see page 22</i>	Medium for the activation and expansion of human NK cells	500 mL NK MACS® Basal Medium, human 5 mL NK MACS® Supplement (100x), 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.
Breast TumorMACS™ Medium, human	Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted breast tumors.	10 mL Breast TumorMACS™ Supplement (50×), human 500 mL TumorMACS™ Basal Medium, human	new 130-134-234
Colon TumorMACS™ Medium, human	Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted colorectal tumors.	500 mL TumorMACS™ Basal Medium, human 10 mL Colon TumorMACS™ Supplement (50×), human	130-127-169
Lung TumorMACS™ Medium, human	Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted lung tumors.	10 mL Lung TumorMACS™ Supplement (50×), human 500 mL TumorMACS™ Basal Medium, human	130-134-218
Ovarian TumorMACS™ Medium, human	Cell culture medium for the cultivation and expansion of tumor cells from primary and xenotransplanted ovarian tumors	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 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 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 StemMACS™ PSC-Brew Basal Medium XF, human StemMACS™ PSC-Brew Supplement XF (50x), human	130-127-865

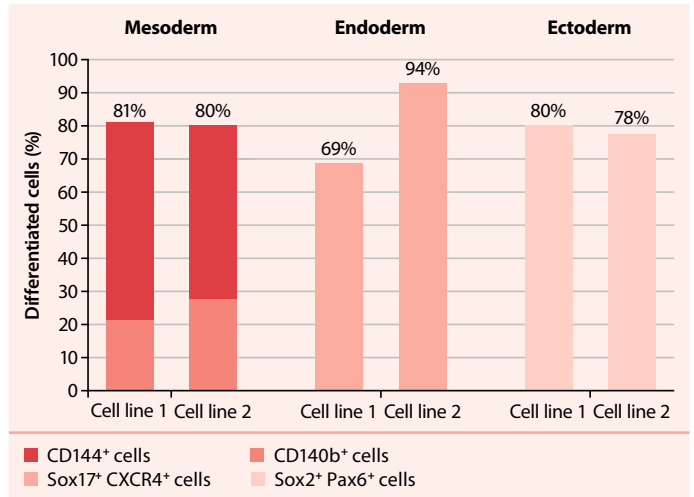


Figure 1: Full differentiation potential. Pluripotent stem cells cultured in StemMACS PSC-Brew XF maintain full pluripotent differentiation potential and can differentiate in all three embryonic germ layers.

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 NK MACS® Basal Medium, human 5 mL NK MACS® Supplement (100x), human	130-114-429

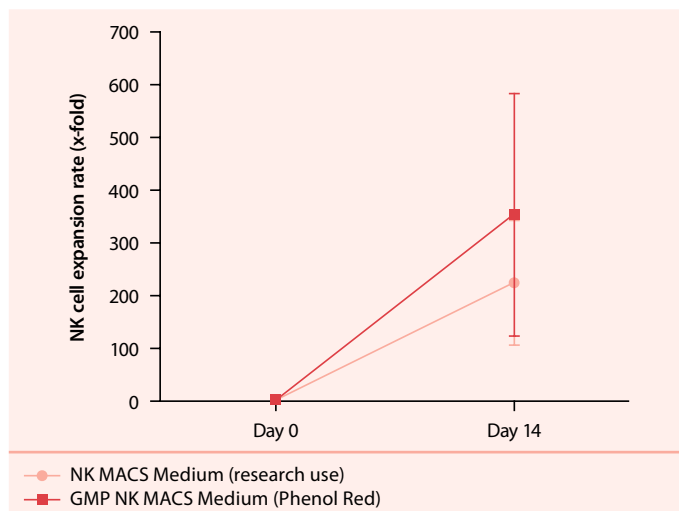


Figure 1: High expansion of NK cells in NK MACS Medium. NK cell fold expansion from PBMCs (n=3) using 5% AB serum and 500 IU/mL of IL-2 and 140 U/mL IL-15 during 14 days showed high expansion rates for both, NK MACS Medium (research use) and NK MACS GMP Medium (Phenol Red).

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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 2xHuman 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 2xHuman 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 (2x100 µg)	1 kit Human GM-CSF, premium grade (130-093-867) 2xHuman IL-4, premium grade (130-093-922)	130-100-842
CytoBox Th1, mouse	Starting kit for polarization of mouse T _H 1 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 _H 17 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 _H 2 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	130-098-775
		1 kit (large size) Human CD40-Ligand, premium grade (130-096-714) 1 mL Cross-Linking Antibody	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	FRP, Inhibin beta-1	Recombinant human activin A	CHO cells	10 µg	130-115-012
				CHO cells	25 µg	130-115-013
	premium grade	FRP, Inhibin beta-1	Recombinant human activin A	CHO cells	10 µg	130-115-008
				CHO cells	25 µg	130-115-009
				CHO cells	100 µg	130-115-010
				CHO cells	1000 µg	130-115-011
Human ANGPTL5	research grade		Recombinant human angiopoietin-like 5	HEK293 cells	5 µg	130-096-125
				HEK293 cells	25 µg	130-096-126
Human BAFF	research grade	TNFSF13B, BLys	Recombinant human B cell activating factor belonging to the TNF family	<i>E. coli</i>	20 µg	130-093-807
				<i>E. coli</i>	100 µg	130-108-987
Human BDNF	research grade	ANON2, BULN2	Recombinant human brain-derived neurotrophic factor	HEK293 cells	10 µg	new 130-138-876
				HEK293 cells	100 µg	new 130-138-877
				HEK293 cells	1000 µg	new 130-138-875
Human BMP-2	research grade		Recombinant human bone morphogenetic protein 2	<i>E. coli</i>	10 µg	130-110-923
				<i>E. coli</i>	25 µg	130-110-922
	premium grade		Recombinant human bone morphogenetic protein 2	<i>E. coli</i>	10 µg	130-110-924
				<i>E. coli</i>	25 µg	130-110-925
				<i>E. coli</i>	100 µg	130-110-926
Human BMP-4	research grade		Recombinant human bone morphogenetic protein 4	<i>Pichia pastoris</i>	10 µg	130-110-921
				<i>Pichia pastoris</i>	25 µg	130-111-168
	premium grade		Recombinant human bone morphogenetic protein 4	<i>Pichia pastoris</i>	10 µg	130-111-164
				<i>Pichia pastoris</i>	25 µg	130-111-167
				<i>Pichia pastoris</i>	100 µg	130-111-165
				<i>Pichia pastoris</i>	1000 µg	130-111-166
Human BMP-7	research grade		Recombinant human bone morphogenetic protein 7	HEK293 cells	10 µg	new 130-138-917
				HEK293 cells	100 µg	new 130-138-916
Human CCL19 (MIP-3β)	research grade	CCL19, ELC, Exodus 3	Recombinant human chemokine (C-C motif) ligand 19 or inflammatory protein 3β	<i>E. coli</i>	10 µg	130-105-744
				<i>E. coli</i>	25 µg	130-105-743
				<i>E. coli</i>	100 µg	130-093-969
Human CD40-Ligand	premium grade	TRAP, CD154, TNFSF5	Recombinant human CD40 ligand	<i>E. coli</i>	10 µg	130-096-711
				<i>E. coli</i>	25 µg	130-096-712
				<i>E. coli</i>	100 µg	130-096-713
				<i>E. coli</i>	500 µg	130-096-714
Human CD137 (4-1BB)-Ligand	research grade	4-1BB ligand, TNFRSF9-Ligand	Recombinant human CD137 (4-1BB)-Ligand	<i>E. coli</i>	5 µg	130-105-768
				<i>E. coli</i>	20 µg	130-105-767
Human CNTF	research grade		Recombinant human ciliary neurotrophic factor	HEK293 cells	10 µg	new 130-138-918
				HEK293 cells	100 µg	new 130-138-928
Human DKK-1	research grade		Recombinant human dickkopf-related protein 1	HEK293 cells	10 µg	new 130-138-919

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human EGF	research grade	HOMG4, URG	Recombinant human epidermal growth factor	<i>E. coli</i>	100 µg	130-093-825
	premium grade	HOMG4, URG	Recombinant human epidermal growth factor	<i>E. coli</i>	100 µg	130-097-749
				<i>E. coli</i>	500 µg	130-097-750
				<i>E. coli</i>	1000 µg	130-097-751
Human FGF-1	research grade	acidic FGF, aFGF, HBGF-1	Recombinant human fibroblast growth factor 1	<i>E. coli</i>	10 µg	130-093-835
				<i>E. coli</i>	25 µg	130-095-789
	premium grade	acidic FGF, aFGF, HBGF-1	Recombinant human fibroblast growth factor 1	<i>E. coli</i>	10 µg	130-095-790
				<i>E. coli</i>	25 µg	130-095-763
				<i>E. coli</i>	100 µg	130-095-761
<i>E. coli</i>	1000 µg	130-095-756				
Human FGF-2	research grade	basic FGF, HBGF-2	Recombinant human fibroblast growth factor 2	<i>E. coli</i>	10 µg	130-093-837
				<i>E. coli</i>	50 µg	130-093-838
	premium grade	basic FGF, HBGF-2	Recombinant human fibroblast growth factor 2	<i>E. coli</i>	10 µg	130-093-839
				<i>E. coli</i>	50 µg	130-093-840
				<i>E. coli</i>	100 µg	130-093-564
				<i>E. coli</i>	2×100 µg	130-093-841
				<i>E. coli</i>	1000 µg	130-093-842
<i>E. coli</i>	2×1000 µg	130-093-843				
Human FGF-2 IS <i>see page 36</i>	research grade	basic FGF	Recombinant human fibroblast growth factor 2 IS (improved sequence)	<i>E. coli</i>	10 µg	130-104-925
				<i>E. coli</i>	50 µg	130-104-921
	premium grade	basic FGF	Recombinant human fibroblast growth factor 2 IS (improved sequence)	<i>E. coli</i>	10 µg	130-104-918
				<i>E. coli</i>	50 µg	130-104-924
				<i>E. coli</i>	200 µg	130-104-922
<i>E. coli</i>	1000 µg	130-104-923				
Human FGF-4	research grade	HBGF-4	Recombinant human fibroblast growth factor 4	<i>E. coli</i>	10 µg	130-109-387
				<i>E. coli</i>	25 µg	130-109-388
	premium grade	HBGF-4	Recombinant human fibroblast growth factor 4	<i>E. coli</i>	10 µg	130-109-389
				<i>E. coli</i>	25 µg	130-109-390
				<i>E. coli</i>	100 µg	130-109-394
<i>E. coli</i>	1000 µg	130-109-391				
Human FGF-7	research grade	KGF, HBGF-7	Recombinant human fibroblast growth factor 7	<i>E. coli</i>	10 µg	130-093-849
				<i>E. coli</i>	25 µg	130-097-175
	premium grade	KGF, HBGF-7	Recombinant human fibroblast growth factor 7	<i>E. coli</i>	10 µg	130-097-173
				<i>E. coli</i>	25 µg	130-097-178
<i>E. coli</i>	100 µg	130-097-176				
Human FGF-8b	research grade		Recombinant human fibroblast growth factor 8b	<i>E. coli</i>	10 µg	130-095-731
				<i>E. coli</i>	25 µg	130-095-733
	premium grade		Recombinant human fibroblast growth factor 8b	<i>E. coli</i>	10 µg	130-095-737
				<i>E. coli</i>	25 µg	130-095-738
				<i>E. coli</i>	100 µg	130-095-740
<i>E. coli</i>	1000 µg	130-095-741				
Human FGF-9	research grade		Recombinant human fibroblast growth factor 9	HEK293 cells	10 µg	new 130-138-931

Human cytokines & growth factors

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human FGF-10	research grade	KGF-2	Recombinant human fibroblast growth factor 10	<i>E. coli</i>	10 µg	130-127-859
				<i>E. coli</i>	25 µg	130-127-858
	premium grade	KGF-2	Recombinant human fibroblast growth factor 10	<i>E. coli</i>	10 µg	130-127-849
				<i>E. coli</i>	25 µg	130-127-855
				<i>E. coli</i>	100 µg	130-127-856
				<i>E. coli</i>	1000 µg	130-127-857
Human Flt3-Ligand	research grade		Recombinant human Flt3-ligand	<i>E. coli</i>	10 µg	130-093-854
				<i>E. coli</i>	25 µg	130-096-474
	premium grade		Recombinant human Flt3-ligand	<i>E. coli</i>	10 µg	130-096-476
				<i>E. coli</i>	25 µg	130-096-477
				<i>E. coli</i>	100 µg	130-096-479
				<i>E. coli</i>	1000 µg	130-096-480
Human G-CSF	research grade		Recombinant human granulocyte colony-stimulating factor	<i>E. coli</i>	10 µg	130-096-345
				<i>E. coli</i>	25 µg	130-096-346
	premium grade		Recombinant human granulocyte colony-stimulating factor	<i>E. coli</i>	10 µg	130-093-860
				<i>E. coli</i>	25 µg	130-096-347
				<i>E. coli</i>	100 µg	130-093-861
				<i>E. coli</i>	1000 µg	130-094-265
Human GDF-11	research grade	BMP-11	Recombinant human growth differentiation factor 11	<i>E. coli</i>	5 µg	130-105-776
				<i>E. coli</i>	20 µg	130-105-775
Human GDNF	research grade		Recombinant human glial cell line-derived neurotrophic factor	<i>E. coli</i>	10 µg	130-129-547
				<i>E. coli</i>	25 µg	130-129-548
	premium grade		Recombinant human glial cell line-derived neurotrophic factor	<i>E. coli</i>	10 µg	130-129-544
				<i>E. coli</i>	25 µg	130-129-543
				<i>E. coli</i>	100 µg	130-129-542
				<i>E. coli</i>	1000 µg	130-129-546
Human GM-CSF <i>see page 37</i>	research grade	CSF2	Recombinant human granulocyte macrophage colony-stimulating factor	<i>E. coli</i>	10 µg	130-093-862
				<i>E. coli</i>	50 µg	130-095-372
	premium grade	CSF2	Recombinant human granulocyte macrophage colony-stimulating factor	<i>E. coli</i>	10 µg	130-093-864
				<i>E. coli</i>	50 µg	130-093-865
				<i>E. coli</i>	100 µg	130-093-866
				<i>E. coli</i>	500 µg	130-093-867
<i>E. coli</i>	1000 µg	130-093-868				
Human GRO-α	research grade	CXCL1, MGSAα	Recombinant human growth-regulated oncogene α	<i>E. coli</i>	5 µg	130-094-620
				<i>E. coli</i>	25 µg	130-093-869
				<i>E. coli</i>	100 µg	130-108-974
Human HGF	research grade	HPTA, SF	Recombinant human hepatocyte growth factor	Insect cells	5 µg	130-093-871
				Insect cells	25 µg	130-093-872
				Insect cells	100 µg	130-103-437
Human IFN-α2a	research grade		Recombinant human interferon α2a	<i>E. coli</i>	20 µg	130-093-873
				<i>E. coli</i>	100 µg	130-093-874
				<i>E. coli</i>	1000 µg	130-108-984
Human IFN-α2b	research grade		Recombinant human interferon α2b	<i>E. coli</i>	20 µg	130-093-875
				<i>E. coli</i>	100 µg	130-093-876
				<i>E. coli</i>	1000 µg	130-108-967

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human IFN- β 1a	research grade		Recombinant human interferon β 1a	CHO cells	5 μ g	130-107-889
				CHO cells	20 μ g	130-107-888
Human IFN- γ 1b	research grade	IFN- γ	Recombinant human interferon γ 1b	<i>E. coli</i>	10 μ g	130-096-872
				<i>E. coli</i>	25 μ g	130-096-873
	premium grade	IFN- γ	Recombinant human interferon γ 1b	<i>E. coli</i>	10 μ g	130-096-481
				<i>E. coli</i>	25 μ g	130-096-482
				<i>E. coli</i>	100 μ g	130-096-484
				<i>E. coli</i>	1000 μ g	130-096-486
Human IGF-1	research grade	IGF-I	Recombinant human insulin-like growth factor 1	HEK293 cells	1000 μ g	new 130-138-936
				HEK293 cells	100 μ g	new 130-138-933
Human IL-1 α	research grade		Recombinant human interleukin 1 α	HEK293 cells	10 μ g	new 130-138-945
Human IL-1 β	research grade	IL1F2	Recombinant human interleukin 1 β	<i>E. coli</i>	10 μ g	130-093-895
				<i>E. coli</i>	25 μ g	130-095-374
	premium grade	IL1F2	Recombinant human interleukin 1 β	<i>E. coli</i>	10 μ g	130-093-897
				<i>E. coli</i>	25 μ g	130-093-563
				<i>E. coli</i>	100 μ g	130-093-898
				<i>E. coli</i>	1000 μ g	130-093-899
Human IL-2 IS <i>see page 38</i>	research grade		Recombinant human interleukin 2 IS (improved sequence)	<i>E. coli</i>	10 μ g	130-097-742
				<i>E. coli</i>	50 μ g	130-097-743
	premium grade		Recombinant human interleukin 2 IS (improved sequence)	<i>E. coli</i>	10 μ g	130-097-744
				<i>E. coli</i>	50 μ g	130-097-745
				<i>E. coli</i>	200 μ g	130-097-746
				<i>E. coli</i>	1000 μ g	130-097-748
Human IL-3	research grade		Recombinant human interleukin 3	<i>E. coli</i>	10 μ g	130-093-908
				<i>E. coli</i>	25 μ g	130-093-909
	premium grade		Recombinant human interleukin 3	<i>E. coli</i>	10 μ g	130-095-071
				<i>E. coli</i>	25 μ g	130-095-070
				<i>E. coli</i>	100 μ g	130-095-069
				<i>E. coli</i>	1000 μ g	130-095-068
Human IL-4	research grade		Recombinant human interleukin 4	<i>E. coli</i>	5 μ g	130-093-915
				<i>E. coli</i>	10 μ g	130-095-373
				<i>E. coli</i>	25 μ g	130-093-917
				<i>E. coli</i>	100 μ g	130-094-117
	premium grade		Recombinant human interleukin 4	<i>E. coli</i>	5 μ g	130-093-919
				<i>E. coli</i>	10 μ g	130-093-920
				<i>E. coli</i>	25 μ g	130-093-921
				<i>E. coli</i>	100 μ g	130-093-922
				<i>E. coli</i>	1000 μ g	130-093-924
Human IL-5	research grade		Recombinant human interleukin 5	HEK293 cells	10 μ g	new 130-138-949
Human IL-6	research grade		Recombinant human interleukin 6	<i>E. coli</i>	10 μ g	130-095-365
				<i>E. coli</i>	25 μ g	130-093-929
	premium grade		Recombinant human interleukin 6	<i>E. coli</i>	10 μ g	130-095-352
				<i>E. coli</i>	25 μ g	130-093-931
				<i>E. coli</i>	100 μ g	130-093-932
				<i>E. coli</i>	500 μ g	130-093-933
			<i>E. coli</i>	1000 μ g	130-093-934	

Human cytokines & growth factors

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human IL-7	research grade		Recombinant human interleukin 7	<i>E. coli</i>	10 µg	130-093-937
				<i>E. coli</i>	25 µg	130-095-367
	premium grade		<i>E. coli</i>	10 µg	130-095-361	
			<i>E. coli</i>	25 µg	130-095-362	
			<i>E. coli</i>	100 µg	130-095-363	
Human IL-7-Fc	research grade		Fc-fused recombinant human interleukin 7	HEK293 cells	10 µg	new 130-137-021
				HEK293 cells	25 µg	new 130-137-023
	premium grade		HEK293 cells	10 µg	new 130-137-047	
			HEK293 cells	25 µg	new 130-137-048	
			HEK293 cells	100 µg	new 130-137-020	
Human IL-8	research grade		Recombinant human interleukin 8	<i>E. coli</i>	10 µg	130-122-354
				<i>E. coli</i>	25 µg	130-122-353
	premium grade		<i>E. coli</i>	10 µg	130-122-357	
			<i>E. coli</i>	25 µg	130-122-359	
			<i>E. coli</i>	100 µg	130-122-360	
Human IL-9			Recombinant human interleukin 9	<i>E. coli</i>	10 µg	130-122-361
				<i>E. coli</i>	25 µg	130-122-361
				<i>E. coli</i>	100 µg	130-122-361
				<i>E. coli</i>	1000 µg	130-122-361
				<i>E. coli</i>	1000 µg	130-122-361
Human IL-9	research grade		Recombinant human interleukin 9	HEK293 cells	10 µg	new 130-138-926
Human IL-10	research grade		Recombinant human interleukin 10	HEK293 cells	10 µg	new 130-138-922
				HEK293 cells	100 µg	new 130-138-921
Human IL-11	research grade	IL-17	Recombinant human interleukin 11	HEK293 cells	10 µg	new 130-138-923
				HEK293 cells	100 µg	new 130-138-940
Human IL-12	premium grade		Recombinant human interleukin 12	HEK293 cells	5 µg	130-096-704
				HEK293 cells	25 µg	130-096-705
				HEK293 cells	100 µg	130-096-798
Human IL-12 (CHO)	research grade		Recombinant human interleukin 12	CHO cells	10 µg	130-129-723
				CHO cells	25 µg	130-129-722
	premium grade		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	<i>E. coli</i>	10 µg	130-112-409
				<i>E. coli</i>	25 µg	130-112-410
	premium grade		<i>E. coli</i>	10 µg	130-112-411	
			<i>E. coli</i>	25 µg	130-112-408	
			<i>E. coli</i>	100 µg	130-112-412	
Human IL-15	research grade		Recombinant human interleukin 15	<i>E. coli</i>	10 µg	130-093-955
				<i>E. coli</i>	25 µg	130-095-760
	premium grade		<i>E. coli</i>	10 µg	130-095-762	
			<i>E. coli</i>	25 µg	130-095-764	
			<i>E. coli</i>	100 µg	130-095-765	
<i>E. coli</i>	1000 µg	130-095-766				

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human IL-15Ra sushi	research grade		Recombinant human interleukin 15 receptor alpha, soluble sushi domain	<i>E. coli</i>	10 µg	130-104-919
				<i>E. coli</i>	25 µg	130-104-920
	premium grade		<i>E. coli</i>	10 µg	130-104-912	
			<i>E. coli</i>	25 µg	130-104-916	
			<i>E. coli</i>	100 µg	130-104-914	
Human IL-17	research grade	IL-17A	Recombinant human interleukin 17	HEK293 cells	10 µg	new 130-138-942
Human IL-21	research grade		Recombinant human interleukin 21	<i>E. coli</i>	10 µg	130-094-563
				<i>E. coli</i>	25 µg	130-095-767
	premium grade		<i>E. coli</i>	10 µg	130-095-768	
			<i>E. coli</i>	25 µg	130-095-769	
			<i>E. coli</i>	100 µg	130-095-784	
Human IL-22	research grade		Recombinant human interleukin 22	<i>E. coli</i>	2 µg	130-096-294
				<i>E. coli</i>	10 µg	130-096-295
				<i>E. coli</i>	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	<i>E. coli</i>	25 µg	130-115-644
Human IL-27	research grade		Recombinant human interleukin 27	HEK293 cells	10 µg	new 130-138-924
Human IL-33	research grade		Recombinant human interleukin 33	<i>E. coli</i>	10 µg	130-109-378
				<i>E. coli</i>	25 µg	130-109-379
	premium grade		<i>E. coli</i>	10 µg	130-109-380	
			<i>E. coli</i>	25 µg	130-109-677	
			<i>E. coli</i>	100 µg	130-109-381	
Human IL-34	research grade		Recombinant human interleukin 34	HEK293 cells	10 µg	new 130-138-947
				HEK293 cells	100 µg	new 130-138-925
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	<i>E. coli</i>	10 µg	130-132-866
				<i>E. coli</i>	25 µg	130-132-867
	premium grade		<i>E. coli</i>	10 µg	130-132-861	
			<i>E. coli</i>	25 µg	130-132-863	
			<i>E. coli</i>	100 µg	130-132-864	
Human IL-37b	research grade	IL-1F7	Recombinant human IL-37b	<i>E. coli</i>	10 µg	130-133-539
				<i>E. coli</i>	25 µg	130-133-520
				<i>E. coli</i>	100 µg	130-133-519
				<i>E. coli</i>	1000 µg	130-133-516
Human IL-38	research grade		Recombinant human interleukin 38	<i>E. coli</i>	10 µg	130-132-868
				<i>E. coli</i>	25 µg	130-132-869
				<i>E. coli</i>	100 µg	130-132-870
				<i>E. coli</i>	1000 µg	130-132-871

Human cytokines & growth factors

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human LIF	research grade		Recombinant human leukemia inhibitory factor	<i>E. coli</i>	10 µg	130-132-332
				<i>E. coli</i>	25 µg	130-132-333
	premium grade		Recombinant human leukemia inhibitory factor	<i>E. coli</i>	10 µg	130-132-339
				<i>E. coli</i>	25 µg	130-132-340
				<i>E. coli</i>	100 µg	130-132-341
<i>E. coli</i>	1000 µg	130-132-342				
Human M-CSF	research grade	CSF1	Recombinant human macrophage-colony stimulating factor	<i>E. coli</i>	10 µg	130-093-963
				<i>E. coli</i>	25 µg	130-096-491
	premium grade	CSF1	Recombinant human macrophage-colony stimulating factor	<i>E. coli</i>	10 µg	130-096-485
				<i>E. coli</i>	25 µg	130-096-489
				<i>E. coli</i>	100 µg	130-096-492
<i>E. coli</i>	1000 µg	130-096-493				
Human MCP-1	research grade	CCL2, MCAF	Recombinant human monocyte chemotactic protein 1	HEK293 cells	10 µg	new 130-138-929
Human NGF-β	research grade		Recombinant human nerve growth factor β	HEK293 cells	10 µg	new 130-138-951
				HEK293 cells	100 µg	new 130-138-934
Human Noggin	research grade		Recombinant human noggin	HEK293 cells	10 µg	new 130-138-912
				HEK293 cells	100 µg	new 130-138-914
				HEK293 cells	1000 µg	new 130-138-904
Human NT-3	research grade	NTF-3, HDNF	Recombinant human neurotrophin 3	<i>E. coli</i>	10 µg	130-093-973
				<i>E. coli</i>	100 µg	130-096-288
Human Oncostatin M IS	research grade	OSM	Recombinant human oncostatin M IS (improved sequence)	<i>E. coli</i>	10 µg	130-114-939
				<i>E. coli</i>	25 µg	130-114-942
	premium grade	OSM	Recombinant human oncostatin M IS (improved sequence)	<i>E. coli</i>	10 µg	130-114-933
				<i>E. coli</i>	25 µg	130-114-934
				<i>E. coli</i>	100 µg	130-114-936
<i>E. coli</i>	1000 µg	130-114-937				
Human PDGF-AA	research grade		Recombinant human platelet-derived growth factor AA	HEK293 cells	10 µg	new 130-138-938
				HEK293 cells	100 µg	new 130-138-953
Human PDGF-AB	research grade		Recombinant human platelet-derived growth factor AB	<i>E. coli</i>	2 µg	130-094-629
				<i>E. coli</i>	10 µg	130-093-979
				<i>E. coli</i>	1000 µg	130-108-965
Human PDGF-BB IS	research grade		Recombinant human platelet derived growth factor BB IS (improved sequence)	<i>Pichia pastoris</i>	10 µg	130-108-165
				<i>Pichia pastoris</i>	25 µg	130-108-164
	premium grade		Recombinant human platelet derived growth factor BB IS (improved sequence)	<i>Pichia pastoris</i>	10 µg	130-108-163
				<i>Pichia pastoris</i>	25 µg	130-108-162
				<i>Pichia pastoris</i>	100 µg	130-108-161
				<i>Pichia pastoris</i>	1000 µg	130-108-160
Human Prolactin	research grade	Mammothropin	Recombinant human prolactin	<i>E. coli</i>	50 µg	130-093-985

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human R-Spondin 1	research grade	F-spondin	Recombinant human roof plate-specific spondin 1	HEK293 cells	10 µg	130-133-545
				HEK293 cells	25 µg	130-133-546
	premium grade	F-spondin	Recombinant human roof plate-specific spondin 1	HEK293 cells	10 µg	130-133-886
				HEK293 cells	25 µg	130-133-542
				HEK293 cells	100 µg	130-133-543
HEK293 cells	1000 µg	130-133-544				
Human R-Spondin 3	research grade	RSPO-3	Recombinant human roof plate-specific spondin 3	CHO cells	5 µg	130-105-801
				CHO cells	20 µg	130-105-804
				CHO cells	100 µg	130-108-962
Human RANK-Ligand – soluble	research grade	TNFSF11, TRANCE, ODF	Recombinant soluble human receptor activator of NF-κB ligand	<i>E. coli</i>	10 µg	130-093-988
				<i>E. coli</i>	100 µg	130-094-631
				<i>E. coli</i>	1000 µg	130-108-963
Human SCF	research grade	c-kit ligand, steel factor, MGF	Recombinant human stem cell factor	<i>E. coli</i>	10 µg	130-093-991
				<i>E. coli</i>	25 µg	130-096-692
	premium grade	c-kit ligand, steel factor, MGF	Recombinant human stem cell factor	<i>E. coli</i>	10 µg	130-096-693
				<i>E. coli</i>	25 µg	130-096-694
				<i>E. coli</i>	100 µg	130-096-695
<i>E. coli</i>	1000 µg	130-096-696				
Human SDF-1α	research grade	CXCL12	Recombinant human stromal cell-derived factor 1α	<i>E. coli</i>	10 µg	130-093-996
				<i>E. coli</i>	25 µg	130-096-137
				<i>E. coli</i>	100 µg	130-093-997
				<i>E. coli</i>	1000 µg	130-093-998
Human SHH (C24II)	research grade		Recombinant human sonic hedgehog (C24II)	<i>E. coli</i>	10 µg	130-095-717
				<i>E. coli</i>	25 µg	130-095-718
	premium grade		Recombinant human sonic hedgehog (C24II)	<i>E. coli</i>	10 µg	130-095-721
				<i>E. coli</i>	25 µg	130-095-723
				<i>E. coli</i>	100 µg	130-095-727
<i>E. coli</i>	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	<i>E. coli</i>	10 µg	130-094-014

Human cytokines & growth factors

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Human TNF- α	research grade	TNFSF2	Recombinant human tumor necrosis factor α	Yeast	10 μ g	130-094-015
				Yeast	50 μ g	130-094-017
				Yeast	100 μ g	130-094-018
				Yeast	750 μ g	130-094-019
	premium grade	TNFSF2	Recombinant human tumor necrosis factor α	Yeast	1000 μ g	130-094-020
				Yeast	10 μ g	130-094-022
				Yeast	50 μ g	130-094-023
				Yeast	100 μ g	130-094-024
Human TPO	research grade	MDGF, TSF, MGDF	Recombinant human thrombopoietin	<i>E. coli</i>	10 μ g	130-094-011
				<i>E. coli</i>	25 μ g	130-095-745
				<i>E. coli</i>	100 μ g	130-094-013
	premium grade	MDGF, TSF, MGDF	Recombinant human thrombopoietin	<i>E. coli</i>	10 μ g	130-095-747
				<i>E. coli</i>	25 μ g	130-095-750
				<i>E. coli</i>	100 μ g	130-095-752
				<i>E. coli</i>	1000 μ g	130-095-754
Human TSLP	research grade		Recombinant human thymic stromal lymphopoietin	<i>E. coli</i>	10 μ g	130-106-270
Human VEGF (121 aa)	research grade		Recombinant human vascular endothelial growth factor (121 aa)	<i>E. coli</i>	10 μ g	130-108-956
				<i>E. coli</i>	100 μ g	130-127-426
Human VEGF (165) IS	research grade		Recombinant human vascular endothelial growth factor (165) IS (improved sequence)	<i>Pichia pastoris</i>	10 μ g	130-109-383
				<i>Pichia pastoris</i>	25 μ g	130-109-384
				<i>Pichia pastoris</i>	100 μ g	130-109-385
	premium grade		Recombinant human vascular endothelial growth factor (165) IS (improved sequence)	<i>Pichia pastoris</i>	10 μ g	130-109-395
				<i>Pichia pastoris</i>	25 μ g	130-109-396
				<i>Pichia pastoris</i>	100 μ g	130-109-385
				<i>Pichia pastoris</i>	1000 μ g	130-109-386
Human Wnt3a	research grade		Recombinant human Wnt3a	HEK293 cells	10 μ g	new 130-138-963
				HEK293 cells	100 μ g	new 130-138-964

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	HOMG4, URG	Recombinant mouse epidermal growth factor	<i>E. coli</i>	100 μ g	130-094-036
Mouse FGF-2	research grade	basic FGF, HBGF-2	Recombinant mouse fibroblast growth factor 2	<i>E. coli</i>	10 μ g	130-105-787
				<i>E. coli</i>	50 μ g	130-105-786
Mouse FGF-8b	research grade		Recombinant mouse fibroblast growth factor 8b	<i>E. coli</i>	10 μ g	130-096-100
				<i>E. coli</i>	25 μ g	130-096-101
				<i>E. coli</i>	100 μ g	130-096-102
	premium grade		Recombinant mouse fibroblast growth factor 8b	<i>E. coli</i>	10 μ g	130-096-102
				<i>E. coli</i>	25 μ g	130-096-103
				<i>E. coli</i>	100 μ g	130-096-104
				<i>E. coli</i>	1000 μ g	130-096-105

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Mouse Flt3-Ligand	research grade		Recombinant mouse fms-related tyrosine kinase 3 ligand	<i>E. coli</i>	10 µg	130-094-038
				<i>E. coli</i>	100 µg	130-097-372
Mouse GM-CSF	research grade	CSF2	Recombinant mouse granulocyte macrophage colony-stimulating factor	<i>E. coli</i>	10 µg	130-094-043
				<i>E. coli</i>	25 µg	130-095-746
	premium grade	CSF2	Recombinant mouse granulocyte macrophage colony-stimulating factor	<i>E. coli</i>	10 µg	130-095-742
				<i>E. coli</i>	25 µg	130-095-793
				<i>E. coli</i>	100 µg	130-095-739
<i>E. coli</i>	1000 µg	130-095-735				
Mouse IFN-α	research grade		Recombinant mouse interferon α	HEK293 cells	10 µg	130-134-222
				HEK293 cells	25 µg	130-134-235
	premium grade		Recombinant mouse interferon α	HEK293 cells	10 µg	130-134-226
				HEK293 cells	25 µg	130-134-224
				HEK293 cells	100 µg	130-134-225
Mouse IFN-γ	research grade		Recombinant mouse interferon γ	<i>E. coli</i>	10 µg	130-105-790
				<i>E. coli</i>	25 µg	130-105-785
	premium grade		Recombinant mouse interferon γ	<i>E. coli</i>	10 µg	130-105-782
				<i>E. coli</i>	25 µg	130-105-778
				<i>E. coli</i>	100 µg	130-105-774
<i>E. coli</i>	1000 µg	130-105-773				
Mouse IL-1β	research grade	IL-1F2, Catabolin, MCF	Recombinant mouse interleukin 1β	<i>E. coli</i>	10 µg	130-094-053
				<i>E. coli</i>	25 µg	130-101-680
	premium grade	IL-1F2, Catabolin, MCF	Recombinant mouse interleukin 1β	<i>E. coli</i>	10 µg	130-101-681
				<i>E. coli</i>	25 µg	130-101-682
				<i>E. coli</i>	100 µg	130-101-683
<i>E. coli</i>	1000 µg	130-101-684				
Mouse IL-2 IS	research grade		Recombinant mouse interleukin 2 IS (improved sequence)	<i>E. coli</i>	10 µg	130-120-330
				<i>E. coli</i>	25 µg	130-120-662
	premium grade		Recombinant mouse interleukin 2 IS (improved sequence)	<i>E. coli</i>	10 µg	130-120-331
				<i>E. coli</i>	25 µg	130-120-332
				<i>E. coli</i>	100 µg	130-120-333
<i>E. coli</i>	1000 µg	130-120-334				
Mouse IL-3 IS	research grade		Recombinant mouse interleukin 3 IS (improved sequence)	<i>E. coli</i>	10 µg	130-096-687
				<i>E. coli</i>	25 µg	130-096-688
	premium grade		Recombinant mouse interleukin 3 IS (improved sequence)	<i>E. coli</i>	10 µg	130-099-508
				<i>E. coli</i>	25 µg	130-099-509
				<i>E. coli</i>	100 µg	130-099-510
<i>E. coli</i>	1000 µg	130-099-511				
Mouse IL-4	research grade		Recombinant mouse interleukin 4	<i>E. coli</i>	10 µg	130-094-061
				<i>E. coli</i>	25 µg	130-097-757
	premium grade		Recombinant mouse interleukin 4	<i>E. coli</i>	10 µg	130-097-761
				<i>E. coli</i>	25 µg	130-097-760
				<i>E. coli</i>	100 µg	130-097-759
<i>E. coli</i>	1000 µg	130-097-758				

Mouse cytokines & growth factors

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Mouse IL-6	research grade		Recombinant mouse interleukin 6	<i>E. coli</i>	10 µg	130-094-065
				<i>E. coli</i>	25 µg	130-096-683
	premium grade			<i>E. coli</i>	10 µg	130-096-682
				<i>E. coli</i>	25 µg	130-096-684
				<i>E. coli</i>	100 µg	130-096-685
				<i>E. coli</i>	1000 µg	130-096-686
Mouse IL-7	research grade		Recombinant mouse interleukin 7	<i>E. coli</i>	2 µg	130-094-636
				<i>E. coli</i>	10 µg	130-094-066
				<i>E. coli</i>	100 µg	130-098-222
				<i>E. coli</i>	2x500 µg	130-108-957
Mouse IL-7-Fc	research grade		Fc-fused recombinant mouse interleukin 7	HEK293 cells	10 µg	new 130-137-043
				HEK293 cells	25 µg	new 130-137-018
	premium grade			HEK293 cells	10 µg	new 130-137-015
				HEK293 cells	25 µg	new 130-137-017
				HEK293 cells	100 µg	new 130-136-931
Mouse IL-10	research grade		Recombinant mouse interleukin 10	<i>E. coli</i>	2 µg	130-094-067
				<i>E. coli</i>	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	<i>E. coli</i>	10 µg	130-094-070
Mouse IL-15	research grade		Recombinant mouse interleukin 15	<i>E. coli</i>	10 µg	130-094-072
				<i>E. coli</i>	100 µg	130-094-640
Mouse IL-21	research grade		Recombinant mouse interleukin 21	<i>E. coli</i>	10 µg	130-108-949
Mouse IL-23	research grade		Recombinant mouse interleukin 23	HEK293 cells	5 µg	130-096-676
				HEK293 cells	25 µg	130-096-677
Mouse LIF	research grade		Recombinant mouse leukemia inhibitory factor	<i>E. coli</i>	10 µg	130-095-772
				<i>E. coli</i>	25 µg	130-095-775
	premium grade			<i>E. coli</i>	10 µg	130-095-777
				<i>E. coli</i>	25 µg	130-095-778
				<i>E. coli</i>	100 µg	130-095-779
				<i>E. coli</i>	10x100 µg	130-099-895
Mouse M-CSF	research grade	CSF1	Recombinant mouse macrophage colony-stimulating factor	<i>E. coli</i>	10 µg	130-094-129
				<i>E. coli</i>	25 µg	130-101-706
	premium grade			<i>E. coli</i>	10 µg	130-101-703
				<i>E. coli</i>	25 µg	130-101-700
				<i>E. coli</i>	100 µg	130-101-704
				<i>E. coli</i>	1000 µg	130-101-705
Mouse Noggin	research grade		Recombinant mouse noggin	<i>E. coli</i>	5 µg	130-103-457
				<i>E. coli</i>	20 µg	130-103-458
				<i>E. coli</i>	100 µg	130-103-459
Mouse RANK-Ligand – soluble	research grade	TNFSF11	Recombinant soluble mouse receptor activator of NF-κB ligand	<i>E. coli</i>	10 µg	130-094-076
				<i>E. coli</i>	100 µg	130-094-646

Product	Quality grade	Alternative name	Description	Source	Content	Order no.
Mouse SCF	research grade	c-kit ligand, steel factor, MGF	Recombinant mouse stem cell factor	<i>E. coli</i>	10 µg	130-094-079
				<i>E. coli</i>	25 µg	130-101-741
	premium grade	c-kit ligand, steel factor, MGF	Recombinant mouse stem cell factor	<i>E. coli</i>	10 µg	130-101-693
				<i>E. coli</i>	25 µg	130-101-694
				<i>E. coli</i>	100 µg	130-101-697
<i>E. coli</i>	1000 µg	130-101-698				
Mouse TNF-α	research grade	TNFSF2	Recombinant mouse tumor necrosis factor α	<i>E. coli</i>	10 µg	130-101-688
				<i>E. coli</i>	25 µg	130-101-687
	premium grade	TNFSF2	Recombinant mouse tumor necrosis factor α	<i>E. coli</i>	10 µg	130-101-689
				<i>E. coli</i>	25 µg	130-101-690
				<i>E. coli</i>	100 µg	130-101-691
<i>E. coli</i>	1000 µg	130-101-692				
Mouse TPO	research grade	MDGF, TSF, MGDF	Recombinant mouse thrombopoietin	<i>E. coli</i>	10 µg	130-094-083
				<i>E. coli</i>	100 µg	130-096-301
				<i>E. coli</i>	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: $\geq 2 \times 10^6$ IU/mg

Research grade: $\geq 1 \times 10^6$ IU/mg

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

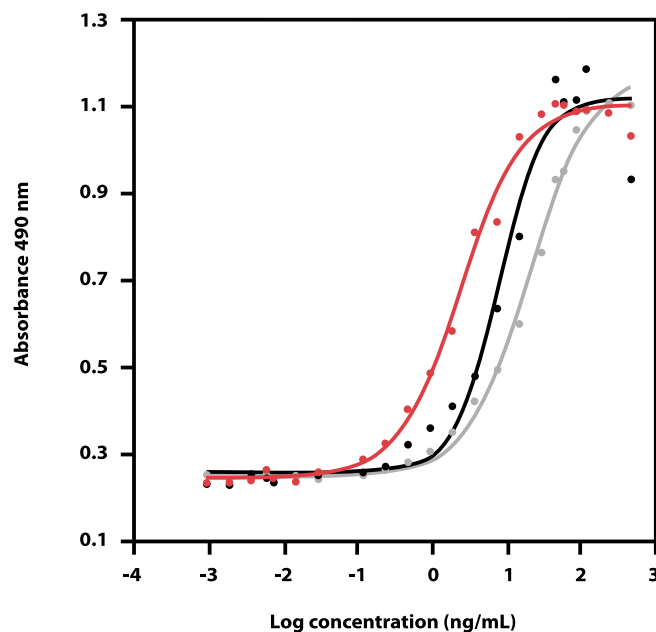


Figure 1: Human FGF-2 IS activity assay. The biological activity of Human FGF-2 IS, premium grade, was determined by proliferation assay using 3T3 cells. Activity of Human FGF-2 IS, premium grade, (red line) was compared to wild type Human FGF-2 (black line), and another commercially available product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

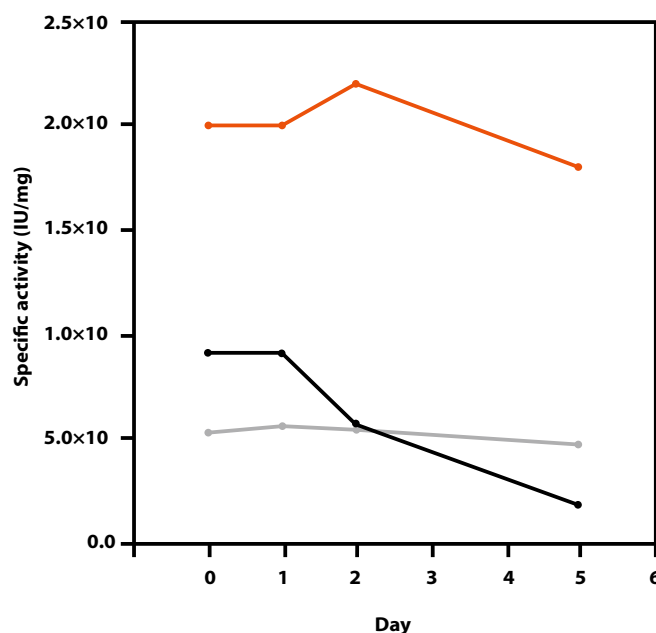


Figure 2: Thermostability of Human FGF-2 IS. Activity of Human FGF-2 IS, premium grade (red line) versus wild type Human FGF-2 (black line), and another commercially available product (gray line), over 5 days at 37 °C.

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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: $\geq 5 \times 10^6$ IU/mg (typical activity: 1.2×10^7 IU/mg)

Research grade: $\geq 2 \times 10^6$ IU/mg

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

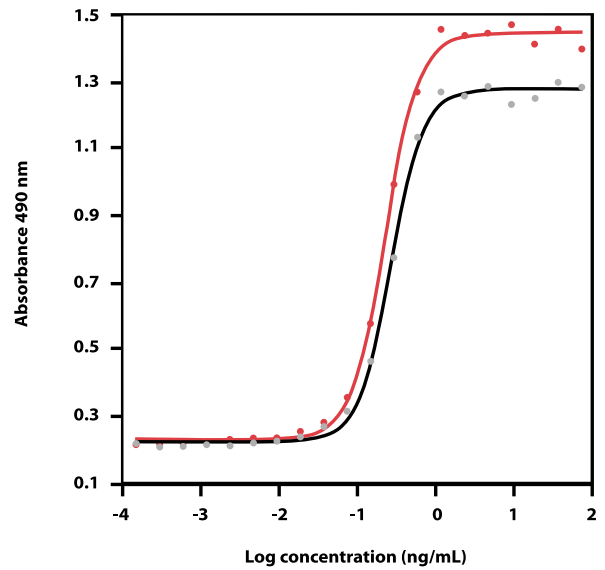


Figure 1: Human GM-CSF activity assay. The biological activity of Human GM-CSF, premium grade was determined by proliferation assay using TF-1 cells. Activity of Human GM-CSF, premium grade, (red line) was compared to another commercially available product (black line).

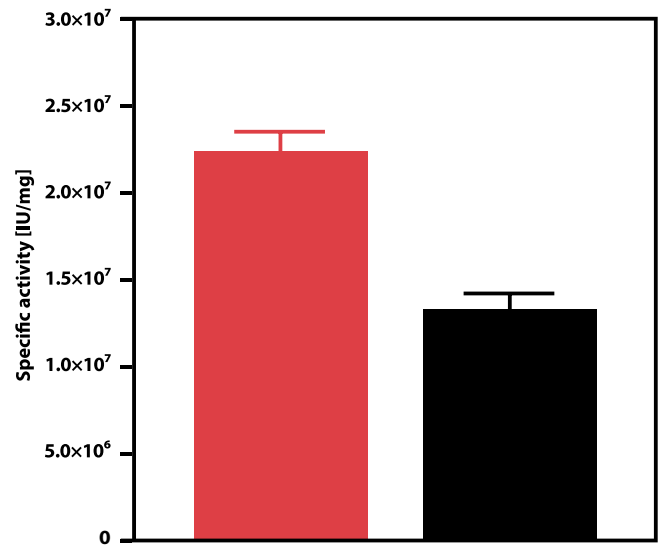


Figure 2: Human GM-CSF biological activity. Activity of Human GM-CSF, premium grade (red bar) was compared to another commercially available product (black bar).

Selected references

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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 86/500)

Premium grade: $\geq 5 \times 10^6$ IU/mg (typical activity: 9×10^6 IU/mg)

Research grade: $\geq 3 \times 10^6$ IU/mg

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

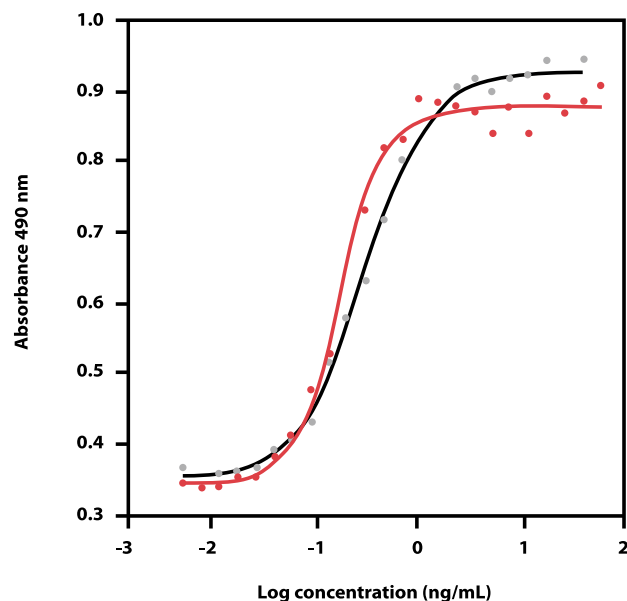


Figure 1: Human IL-2 IS activity assay. Activity of Human IL-2 IS, premium grade (red line) was compared to commercially available aldesleukin (black line).

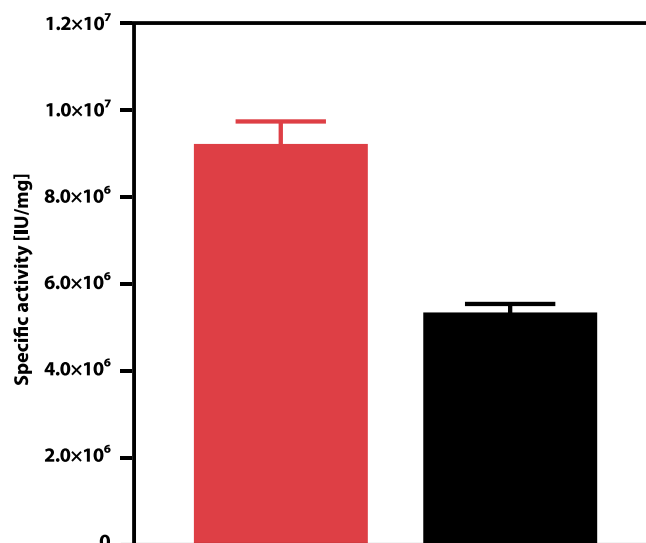


Figure 3: Human IL-2 IS biological activity. Activity of Human IL-2 IS, premium grade, (red bar) was compared to another commercially available product (black bar).

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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 <i>in vitro</i> 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 <i>in vitro</i> 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 <i>in vitro</i> expansion of mouse regulatory T cells	2 mL	130-095-925
Treg Suppression Inspector, human	Anti-Biotin MACSiBead Particles, preloaded with biotinylated CD2, CD3, and CD28 antibodies for functional characterization of human CD4 ⁺ CD25 ⁺ regulatory T cells	2.5 mL	130-092-909

Antigens

Product	Description	Content	Order no.
Recombinant Human ACE2 (HEK)	Recombinant human angiotensin-converting enzyme 2	25 µg	130-127-456
		100 µg	130-127-516
Recombinant Human ACE2 (HEK)-Biotin	Biotinylated recombinant human angiotensin-converting enzyme 2	10 µg	130-127-442
		50 µg	130-127-465
Recombinant Human ACE2 (insect cells)	Recombinant human angiotensin-converting enzyme 2	25 µg	130-127-444
Recombinant Human ACE2 (insect cells)-Biotin	Biotinylated recombinant human angiotensin-converting enzyme 2	10 µg	130-127-468
		50 µg	130-127-464
Recombinant SARS-CoV-2 Nucleoprotein	SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-127-462
		100 µg	130-127-517
Recombinant SARS-CoV-2 Nucleoprotein-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-127-454
		50 µg	130-127-467
Recombinant SARS-CoV-2 RBD (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-127-448
		100 µg	130-127-518
Recombinant SARS-CoV-2 RBD (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-127-458
		50 µg	130-127-457
Recombinant SARS-CoV-2 RBD (insect cells)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-127-463
		100 µg	130-127-453
Recombinant SARS-CoV-2 RBD (insect cells)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-127-445
		50 µg	130-127-469
Recombinant SARS-CoV-2 RBD B.1.1.529/BA.1 (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-130-535
		100 µg	130-130-416
Recombinant SARS-CoV-2 RBD B.1.1.529/BA.1 (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-130-418
		50 µg	130-130-419
Recombinant SARS-CoV-2 RBD B.1.1.7 (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-128-478
		100 µg	130-128-477
Recombinant SARS-CoV-2 RBD B.1.1.7 (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-128-481
		50 µg	130-128-479
Recombinant SARS-CoV-2 RBD B.1.351 (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-128-935
		100 µg	130-128-932
Recombinant SARS-CoV-2 RBD B.1.351 (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-128-931
		50 µg	130-128-930
Recombinant SARS-CoV-2 RBD B.1.617.2 (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-129-705
		100 µg	130-129-556
Recombinant SARS-CoV-2 RBD B.1.617.2 (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-129-704
		50 µg	130-129-703
Recombinant SARS-CoV-2 Spike-Prot (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-127-681
		50 µg	130-127-680
Recombinant SARS-CoV-2 Spike-Prot (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-127-682
Recombinant SARS-CoV-2 Spike-Prot B.1.1.529/BA.1 (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-130-626
		50 µg	130-130-628
Recombinant SARS-CoV-2 Spike-Prot B.1.1.529/BA.1 (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-130-417
Recombinant SARS-CoV-2 Spike-Prot B.1.1.7 (HEK)	SARS-CoV-2 antigen for investigation of virus-specific immune responses	10 µg	130-129-572
		50 µg	130-129-561
Recombinant SARS-CoV-2 Spike-Prot B.1.1.7 (HEK)-Biotin	Biotinylated SARS-CoV-2 antigen for investigation of virus-specific immune responses	25 µg	130-129-570

Product	Description	Content	Order no.
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® 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	130-093-495
		for stimulation of 1×10^9 cells 60 nmol/peptide	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	130-131-249
		for stimulation of 1×10^9 cells 60 nmol/peptide	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	130-131-251
		for stimulation of 1×10^9 cells 60 nmol/peptide	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
PepTivator® CEF MHC Class I Plus	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-098-426

Product	Quality grade	Capacity/Content	Order no.
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	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)	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® HCV1a NS3	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-096-780

PepTivator® Peptide Pools covering antigens from infectious diseases

Product	Quality grade	Capacity/Content	Order no.
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® HHV-1 Envelope Glycoprotein D	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-114-929
PepTivator® HHV-1 VP22	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-137-774
PepTivator® HHV-2 Envelope Glycoprotein D	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-494
PepTivator® HHV-2 VP22	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-137-775
PepTivator® HHV-6 IE2 Select	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-139-340
PepTivator® HHV-6 U57 Select	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-139-339
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® Peptide Pools covering antigens from infectious diseases

Product	Quality grade	Capacity/Content	Order no.
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
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	130-132-043
PepTivator® M. tuberculosis Ag85B	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-042
PepTivator® M. tuberculosis CFP-10	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-049
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-132-046
PepTivator® M. tuberculosis ESAT-6	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-048
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-132-045
PepTivator® M. tuberculosis TB10.4	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-053
PepTivator® M. tuberculosis TB7.7	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-047
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-132-044
PepTivator® Parvovirus B19 NS1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-139-336
PepTivator® Parvovirus B19 Select	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-139-337
PepTivator® Parvovirus B19 VP1u	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-139-332
PepTivator® Parvovirus B19 VP2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-139-333
PepTivator® RSV Fusion Protein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-501
PepTivator® RSV Fusion Select	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-505
PepTivator® RSV Glycoprotein G	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-502
PepTivator® RSV Matrix Protein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-503
PepTivator® RSV Nucleoprotein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-104-803
PepTivator® RSV Select	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-506

PepTivator® Peptide Pools covering antigens from infectious diseases

Product	Quality grade	Capacity/Content	Order no.
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
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

Product	Quality grade	Capacity/Content	Order no.
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
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® WNV Capsid protein C	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-484
PepTivator® WNV Envelope 1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-486
PepTivator® WNV Envelope 2	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-487
PepTivator® WNV NS1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-488
PepTivator® WNV Protein M	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-485
PepTivator® WNV Select	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-489

PepTivator® Peptide Pools covering antigens from infectious diseases

Product	Quality grade	Capacity/Content	Order no.
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® DNMT3A R882H	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-479
		for stimulation of 1×10^9 cells 60 nmol/peptide	new 130-136-480
PepTivator® ErbB2 (HER2) EC	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-499
PepTivator® ErbB2 (HER2) IC	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-498
PepTivator® Fibromodulin	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-500
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® IDH2 R140Q	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-478
		for stimulation of 1×10^9 cells 60 nmol/peptide	new 130-136-483
PepTivator® LINE-1	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-134-743
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® Myc	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-491

Product	Quality grade	Capacity/Content	Order no.
PepTivator® NPM1-mut	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-481
		for stimulation of 1×10^9 cells 60 nmol/peptide	new 130-136-482
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® RAS G12C	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-133-669
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-133-877
PepTivator® RAS G12D	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-133-874
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-133-878
PepTivator® RAS G12R	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-133-876
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-133-871
PepTivator® RAS G12V	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-133-879
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-133-872
PepTivator® RAS G13D	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-133-870
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-133-668
PepTivator® RAS Q61K	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-475
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-136-508
PepTivator® RAS Q61R	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-136-476
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-136-477
PepTivator® RAS WT G12	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-134-833
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-134-798

PepTivator® Peptide Pools covering tumor-associated antigens

Product	Quality grade	Capacity/Content	Order no.
PepTivator® RAS WT G13	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-135-445
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-134-816
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
PepTivator® Uveal Melanoma GNA11_Q209L	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-135-446
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-134-804
PepTivator® Uveal Melanoma GNAQ_Q209L	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-135-448
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-134-756
PepTivator® Uveal Melanoma GNAQ_Q209P	premium grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-135-447
		for stimulation of 1×10^9 cells 60 nmol/peptide	130-134-822
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® α -Synuclein	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	130-132-052
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® Negative Control		for stimulation of 1×10^8 cells for stimulation of 1×10^9 cells	130-131-610 130-131-612
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® RO60	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-496
PepTivator® RU17	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-495
PepTivator® SSB	research grade	for stimulation of 1×10^8 cells 6 nmol/peptide	new 130-136-497

PepTivator® CMV pp65

Overview

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

PepTivator peptide pools have been developed for the efficient *in vitro* stimulation of antigen-specific CD4⁺ and CD8⁺ T cells, as peptides of 15-aa length with 11-aa overlap represent an optimized solution for stimulating both CD4⁺ and CD8⁺ T cells in various applications.

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

Background information

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

Downstream applications

The *in vitro* stimulation of pp65-specific CD4⁺ and CD8⁺ T cells with PepTivator CMV pp65 causes the secretion of effector cytokines and the upregulation of activation markers, which then allow the detection and isolation of pp65-specific T cells¹⁻⁶:

- 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

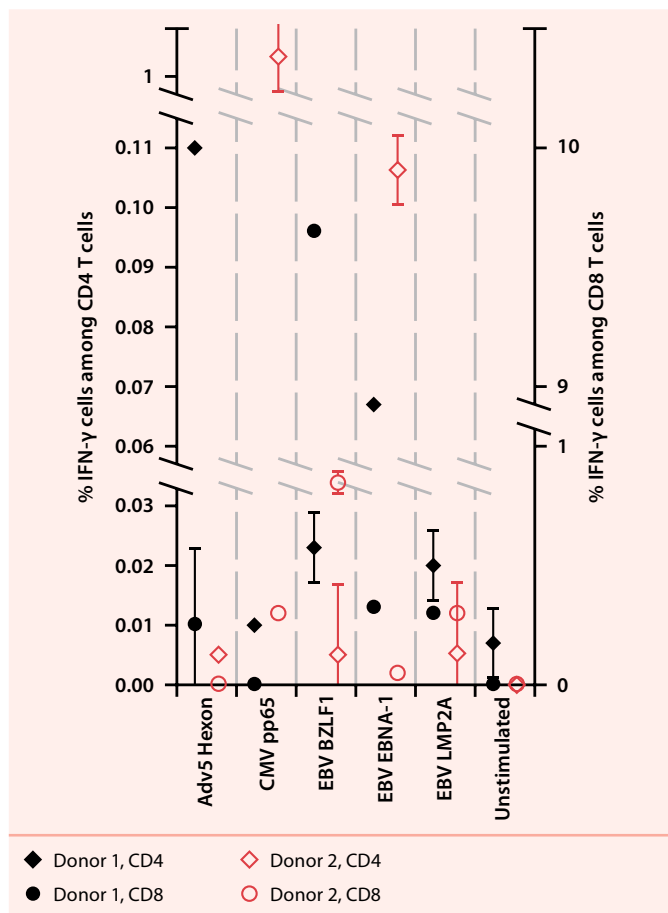


Figure 1: Production of IFN-γ by human CD4⁺ or CD8⁺ T cells after stimulation with different antigens using PepTivator Peptide Pools. Data from two different donors are shown (triplicates).

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. Aissi-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. Doderer, 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 lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-427
		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 lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-440
		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 lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-433
		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 lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-436
		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 lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-442
		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 lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-431
		1 mg lyophilized ORN 1 mL RNase-free Water 5×400 µL DOTAP-Cl [1 mg/mL]	130-104-432
ORN R-2336 Control	Control ORN for sequence and backbone control for ORN R-2336	200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-385
		1 mg lyophilized ORN 1 mL RNase-free Water 5×400 µL DOTAP-Cl [1 mg/mL]	130-104-387

TLR7/8 agonists

Product	Description	Content/Components	Order no.
ORN RNA 40	TLR7/8 agonist, for stimulation of human and mouse immune cells	200 µg lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-428
		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 lyophilized ORN 1 mL RNase-free Water 400 µL DOTAP-Cl [1 mg/mL]	130-104-430
		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 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 lyophilized ODN 1 mL 1x TE Buffer	130-100-274
		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 lyophilized ODN 1 mL 1x TE Buffer	130-100-275
		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 lyophilized ODN 1 mL 1x TE Buffer	130-100-104
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-277
ODN 2006	B-class CpG oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-106
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-105
ODN 2006 Control (ODN 2137)	B-class CpG control oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-107
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-278
ODN 21798	P-class CpG oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-281
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-280
ODN 21798 Control (ODN 23098)	P-class control CpG oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-285
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-284

Product	Description	Content/Components	Order no.
ODN 2216	A-class CpG oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-243
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-244
ODN 2216 Control (ODN 2243)	A-class CpG control oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-241
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-108
ODN 2395	C-class CpG oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-282
		1 mg lyophilized ODN 1 mL 1x TE Buffer	130-100-283
ODN 2395 Control (ODN 5328)	C-class control CpG oligodeoxyribonucleotide	200 µg lyophilized ODN 1 mL 1x TE Buffer	130-100-279
		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 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 lyophilized ODN	130-105-815
		1 mL 1x TE Buffer	
		1 mg lyophilized ODN	130-105-816
		1 mL 1x TE Buffer	
ODN 2088 Control (ODN 2087)	Sequence control for ODN 2088. Inhibits TLR7 and TLR8 mediated signalling but not TLR9 mediated signalling.	200 µg lyophilized ODN	130-105-819
		1 mL 1x TE Buffer	
		1 mg lyophilized ODN	130-105-940
		1 mL 1x TE Buffer	
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 lyophilized ODN	130-105-821
		1 mL 1x TE Buffer	
		1 mg lyophilized ODN	130-105-820
		1 mL 1x TE Buffer	
ODN 2088 Control (ODN 20959)	Sequence control for ODN 2088. Inhibits TLR7 and TLR8 mediated signalling but not TLR9 mediated signalling.	200 µg lyophilized ODN	130-105-818
		1 mL 1x TE Buffer	
		1 mg lyophilized ODN	130-105-814
		1 mL 1x TE Buffer	

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 \times 2 mg	130-106-274
StemMACS™ CHIR99021	The most selective inhibitor of glycogen synthase kinase 3 β (GSK3 β)	2 mg	130-103-926
		5 \times 2 mg	130-104-172
StemMACS™ CHIR99021 in Solution	The most selective inhibitor of glycogen synthase kinase 3 β (GSK3 β)	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 \times 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 \times 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 Smoothed 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 \times 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 \times 2 mg	130-104-169
StemMACS™ Y27632 in Solution	A Rho-associated kinase ROCK inhibitor that enhances survival and cloning efficiency of human embryonic stem cells	2 mg	130-106-538

StemMACS™ mRNA transfection

Product	Description	Content/Components	Order no.
StemMACS™ Brn2 mRNA, human	mRNA encoding the neural transcription factor Brn2 for transfection	20 µg	130-104-370
StemMACS™ c-Myc mRNA, human	mRNA encoding the transcription factor c-Myc for transfection	20 µg	130-101-112
StemMACS™ Cebpb mRNA, human	mRNA encoding the transcription factor C/EBP-beta for transfection	20 µg	130-104-377
StemMACS™ Cre Recombinase mRNA	mRNA encoding Cre recombinase for transfection	20 µg	130-101-113
StemMACS™ eGFP mRNA	An mRNA transfection control encoding enhanced GFP	20 µg	130-101-114
StemMACS™ Flp Recombinase mRNA	mRNA encoding Flp recombinase for transfection	20 µg	130-106-769
StemMACS™ iPSC mRNA Reprogramming Kit, human <i>see page 59</i>	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	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 <i>see page 59</i>	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)	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™ 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

Viral transduction and matrices

Product	Description	Content	Order no.
Human Fibronectin (Fragment) – premium grade	Recombinant engineered human fibronectin fragment for use in cell culture	100 µg	130-109-392
		1000 µg	130-109-393
MACSmatrix Laminin 511 <i>see page 61</i>	MACSmatrix Laminin 511 is a highly pure, human recombinant protein (E8 fragment) produced in CHO cells.	350 µg	130-136-454

MACSmatrix Laminin 511

Overview

MACSmatrix Laminin 511 is a highly pure, human recombinant protein (E8 fragment) produced in CHO cells.

Background information

Laminins are proteins that are important for correct cell functionality. They are essential for the culture of stem cells and tissue-specific cells by controlling cell behaviour and cell fate. The type of laminin presents changes during the differentiation process of cells. In cell culture, stem cells grow as monolayers on laminin enabling contact to both the laminin matrix and the cell culture medium forming a homogenous population of cells. The laminin 511 isoform is instrumental to the growth and maintenance of human pluripotent stem cells (hPSCs) through its binding to cell receptors $\alpha6\beta1$ integrin. The E8 fragment of laminin 511 has the highest binding activity with integrin $\alpha6\beta1$. MACSmatrix Laminin 511 enables extended culture of human pluripotent stem cells keeping the expression of pluripotency markers, preserving genomic integrity and keeping the differentiation capability of cells. MACSmatrix Laminin 511 is Animal Component Free (ACF).

- Biological activity
- Concentration
- Microbial contamination
- Endotoxins
- Mycoplasma
- Purity

Applications

- Culture of hPSCs
- Culture of iPS-derived cardiomyocytes
- Reprogramming of fibroblasts into iPSCs

Product	Source	Content	Order no.
MACSmatrix Laminin 511	CHO cells	350 μ g	130-136-454
For research use only			

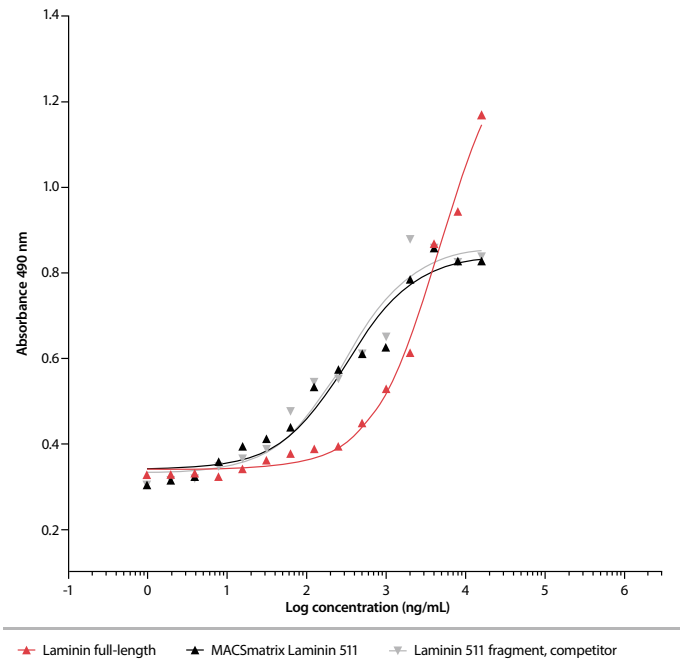


Figure 1: MACSmatrix Laminin 511 biological activity. The biological activity of MACSmatrix Laminin 511 was determined by an adhesion assay using induced pluripotent stem cells (iPSCs; clone K10). Activity of MACSmatrix Laminin 511 (black) was compared to other commercially available products (grey) and Laminin in full length (red).

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 HSC-Brew GMP Basal Medium 5 mL HSC-Brew GMP Supplement	170-076-310
iPS-Brew GMP Basal Medium <i>see page 63</i>	Cultivation media for iPSCs in GMP environment	500 mL	170-076-317
iPS-Brew GMP Medium <i>see page 63</i>	Cultivation media for iPSCs in GMP environment	2000 mL/bag 2000 mL iPS-Brew GMP Basal Medium (bag) 20 mL iPS-Brew GMP Supplement (bag)	170-076-339
iPS-Brew GMP Supplement R <i>see page 63</i>	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 generation and expansion of mesenchymal stem cells	500 mL/bag 500 mL MSC-Brew Basal Medium (bag) 10 mL MSC-Brew Supplement (bag)	170-076-332
		2000 mL/bag 2000 mL MSC-Brew Basal Medium 20 mL MSC-Brew Supplement (bag)	170-076-331
		500 mL MSC-Brew Basal Medium MSC-Brew GMP Supplement I MSC-Brew GMP Supplement II	170-076-326
		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) <i>see page 64</i>	GMP Medium for expansion of NK cells	2000 mL NK MACS® GMP Basal Medium 10 mL NK MACS® GMP Supplement	170-076-356
TexMACS™ GMP Medium (Phenol Red) <i>see page 655</i>	GMP Medium for cultivation and expansion of T cells supplied in a bottle	1000 mL	170-076-309
TexMACS™ GMP Medium <i>see page 655</i>	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 GMP-compliant, xeno-free and serum-free formulation designed to support the long-term growth and maintenance of undifferentiated human pluripotent stem cells (hPSCs) under feeder-free conditions. Based on the proven research-grade StemMACS iPS-Brew XF (130-104-368), this medium enables a seamless transition from research to clinical manufacturing while ensuring optimal cell growth.

Available in bag and bottle formats to support both automated and manual workflows.

Background information

Features

- Weldable tubing from supplement bag to basal medium bag ensures simplified handling
- Media designed and optimized for efficient expansion of hPSCs
- Lot-to-lot consistency ensured by xeno-free media composition and standardized manufacturing procedures

Bag Format

The iPS-Brew GMP Medium offered in bag format enables a fully closed system for clinical cell manufacturing. This design enhances safety and regulatory compliance, minimizes contamination risks and simplifies handling by allowing direct connection between supplement bag and basal medium bag through weldable tubing. Moreover, the supplement in bag is specially formulated with TGF-β1 to ensure optimal cell culture performance.

Optimized for use with the CliniMACS Prodigy ACC process, the GMP-compliant, xeno-free medium ensures reliable and scalable stem cell expansion with bioreactors at clinical settings.

Available Formats

The medium is available in two formats: in bag for automated closed workflows (e.g. CliniMACS Prodigy or bioreactors) and in bottle for manual workflows.

1. iPS-Brew GMP Medium, 2000mL (bag) (170-076-339)
 - 2000 mL iPS-Brew GMP Basal Medium in bag
 - 20 mL supplement in bag containing TGF-β1

Simplified handling, is ensured by tube-tube connection via weldable tubing from supplement bag to basal medium bag.

Enables seamless connection to bioreactors for manufacturing of hPSCs

2. iPS-Brew GMP Medium, 500 mL (bottle)
 - iPS-Brew GMP Basal Medium, 500 mL in bottle (170-076-317)
 - iPS-Brew GMP Supplement R, 10 mL in vial (170-076-318)
 - Requires addition of recombinant human TGF-β1 (170-076-166)

Applications

- Designed for maintenance and expansion of hPSCs and embryonic stem cells (ESCs)
- Optimized both for manual and automated workflows including CliniMACS Prodigy ACC process and bioreactor-based manufacturing

Product	Content/Components	Order no.
iPS-Brew GMP Medium Availability: worldwide ¹⁾	2000 mL/bag 2000 mL iPS-Brew GMP Basal Medium (bag) 20 mL iPS-Brew GMP Supplement (bag)	170-076-339
iPS-Brew GMP Basal Medium Availability: worldwide ¹⁾	500 mL	170-076-317
iPS-Brew GMP Supplement R Availability: worldwide ¹⁾	10 mL	170-076-318

¹⁾ For availability in your country please contact your local representative.

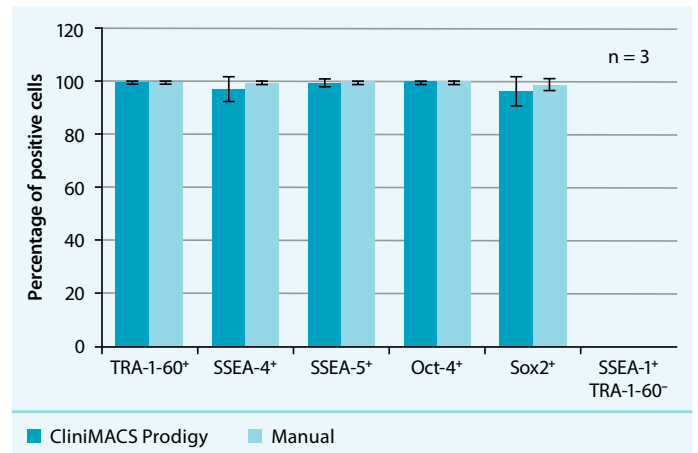


Figure 1: Human iPS cells cultured in iPS-Brew GMP Medium show high expression of pluripotency markers, when expanded either manually or with the CliniMACS Prodigy Adherent Cell Culture process.

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 been developed for the cultivation and expansion of human NK cells from PBMCs or isolated human NK cells.

Product	Content/Components	Order no.
NK MACS® GMP Medium (Phenol Red)	2000 mL NK MACS® GMP Basal Medium	170-076-356
Availability: worldwide ¹⁾	10 mL NK MACS® GMP Supplement	

¹⁾ For availability in your country please contact your local representative.

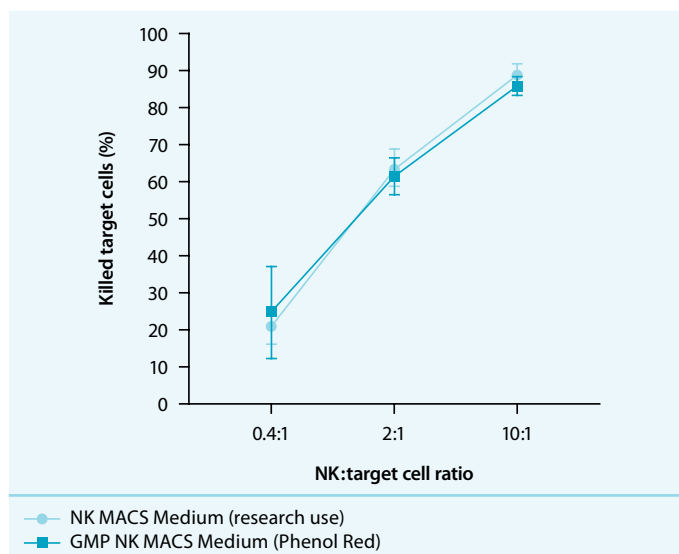


Figure 1: Expanded NK cells are fully functional and can be used in downstream assays, e.g. cytotoxicity assays. NK cells from PBMCs were expanded for 14 days in NK MACS Medium (research use) and NK MACS GMP Medium (Phenol Red) and were analyzed via flow cytometry for cytotoxicity against cell line K-562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

¹⁾ For availability in your country please contact your local representative.

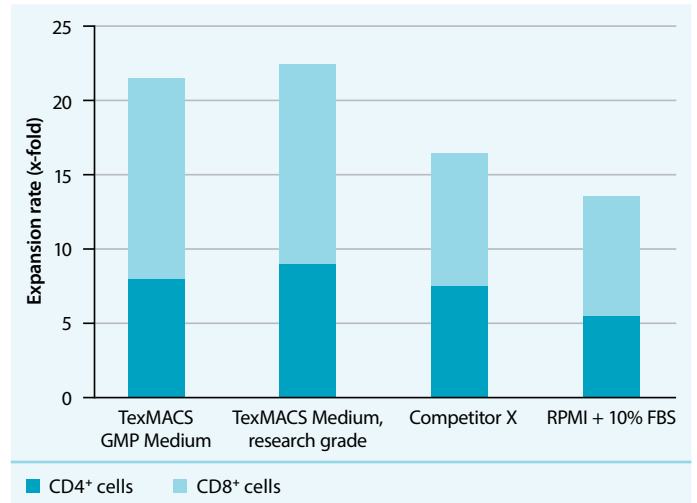


Figure 1: Superb polyclonal activation/expansion of human T cell. Comparison of expansion rates of human T cells with TexMACS Medium, a competitor product, and serum-containing basal medium (RPMI + 10% FBS) after 14 days of expansion using the T Cell Activation/Expansion Kit, human.

Selected references

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MACS® GMP Cytokines and Growth Factors

Product	Alternative name	Description	Source	Content	Order no.
MACS® GMP Recombinant Human EGF	HOMG4, URG	Recombinant human epidermal growth factor	<i>E. coli</i>	100 µg	170-076-406
MACS® GMP Recombinant Human FGF-2	basic FGF, HBGF-2	Recombinant human fibroblast growth factor 2	<i>E. coli</i>	25 µg	170-076-107
			<i>E. coli</i>	500 µg	170-076-125
MACS® GMP Recombinant Human Flt3-Ligand		Recombinant human Flt3-ligand	<i>E. coli</i>	100 µg	170-076-132
MACS® GMP Recombinant Human GM-CSF	CSF2	Recombinant human granulocyte colony-stimulating factor	<i>E. coli</i>	25 µg	170-076-112
			<i>E. coli</i>	250 µg	170-076-136
MACS® GMP Recombinant Human IL-1β	IL1F2	Recombinant human interleukin 1β	<i>E. coli</i>	25 µg	170-076-102
MACS® GMP Recombinant Human IL-2 <i>see page 68</i>		Recombinant human interleukin 2	<i>E. coli</i>	25 µg	170-076-148
			<i>E. coli</i>	100 µg	170-076-146
			<i>E. coli</i>	500 µg	170-076-147
MACS® GMP Recombinant Human IL-3		Recombinant human interleukin 3	<i>E. coli</i>	25 µg	170-076-110
MACS® GMP Recombinant Human IL-4		Recombinant human interleukin 4	<i>E. coli</i>	25 µg	170-076-101
			<i>E. coli</i>	250 µg	170-076-135
MACS® GMP Recombinant Human IL-6		Recombinant human interleukin 6	<i>E. coli</i>	10 µg	170-076-160
			<i>E. coli</i>	50 µg	170-076-161
MACS® GMP Recombinant Human IL-7		Recombinant human interleukin 7	<i>E. coli</i>	25 µg	170-076-111
			<i>E. coli</i>	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	<i>E. coli</i>	25 µg	170-076-114
			<i>E. coli</i>	100 µg	170-076-186
MACS® GMP Recombinant Human IL-18 <i>see page 67</i>	IL1F4	Recombinant human interleukin 18	<i>E. coli</i>	25 µg	170-076-183
MACS® GMP Recombinant Human IL-21		Recombinant human interleukin 21	<i>E. coli</i>	100 µg	170-076-189
			<i>E. coli</i>	25 µg	170-076-115
MACS® GMP Recombinant Human M-CSF	CSF1	Recombinant human macrophage colony-stimulating factor	<i>E. coli</i>	10 µg	170-076-170
			<i>E. coli</i>	50 µg	170-076-171
			<i>E. coli</i>	250 µg	170-076-172
MACS® GMP Recombinant Human SCF	c-kit ligand, steel factor, MGF	Recombinant human stem cell factor	<i>E. coli</i>	10 µg	170-076-149
			<i>E. coli</i>	100 µg	170-076-133
MACS® GMP Recombinant Human SHH (C24II)		Recombinant human SHH (C24II)	<i>E. coli</i>	25 µg	170-076-181
MACS® GMP Recombinant Human TGF-β1		Recombinant human transforming growth factor β1	CHO cells	5 µg	170-076-166
			CHO cells	25 µg	170-076-167
			CHO cells	100 µg	170-076-168
MACS® GMP Recombinant Human TNF-α	TNFSF2	Recombinant human tumor necrosis factor α	<i>E. coli</i>	25 µg	170-076-103
			<i>E. coli</i>	100 µg	170-076-178
MACS® GMP Recombinant Human TPO	MGDF, TSF	Recombinant human thrombopoietin	<i>E. coli</i>	50 µg	170-076-134
MACS® GMP Recombinant Human FGF-8b	FGF-8b	Recombinant Human fibroblast growth factor 8b	<i>E. coli</i>	25 µg	170-100-165
			<i>E. coli</i>	100 µg	170-100-167

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-1 β , 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 arrangement⁹. 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-18¹⁰.

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, M ϕ s and B cells¹⁰. 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 CTLs¹⁰. 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 cells¹¹.

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 resistance¹⁰. 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-18R α and the constitutively expressed IL-18R β . 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-18R α , rendering these cells susceptible to IL-18 signaling¹⁰.

Applications

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

- Generation of cytokine-induced memory-like natural killer cells (CIML NK). Memory-like NK cells can be generated *ex vivo* by cultivating human NK cells with a combination of IL-12, IL-15 and IL-18. Such CIML NK cells demonstrated an increased longevity and enhanced anticancer functionality compared to normal effector NK cells¹.
- *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 product⁵.

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: $\geq 95\%$ 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 μ g/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 sequence 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 cells⁶. 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: $\geq 5 \times 10^6$ U/mg

Product	Content	Order no.
MACS® GMP Recombinant Human IL-18	25 μ g	170-076-183

Selected references

1. Tarannum, M. *et al.* (2021) Stem Cell Res Ther. 12: 592.
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MACS® GMP Recombinant Human IL-2

Overview

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

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

Background information

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

Applications

MACS GMP Recombinant Human IL-2 can be used for a variety of applications, including the *ex vivo* activation and expansion of T cells, e.g., antigen-specific cytotoxic T lymphocytes^{2,3} or regulatory T cells⁴ 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: $\geq 95\%$ 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 μ g/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 Bird¹ 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: $\geq 1 \times 10^6$ IU/mg

Product	Content	Order no.
MACS® GMP Recombinant Human IL-2	25 μ g	170-076-148
Availability: worldwide ¹⁾		

¹⁾ For availability in your country please contact your local representative.

Product	Content	Order no.
MACS® GMP Recombinant Human IL-2	100 μ g	170-076-146
Availability: worldwide ¹⁾		
MACS® GMP Recombinant Human IL-2	500 μ g	170-076-147
Availability: worldwide ¹⁾		

¹⁾ For availability in your country please contact your local representative.

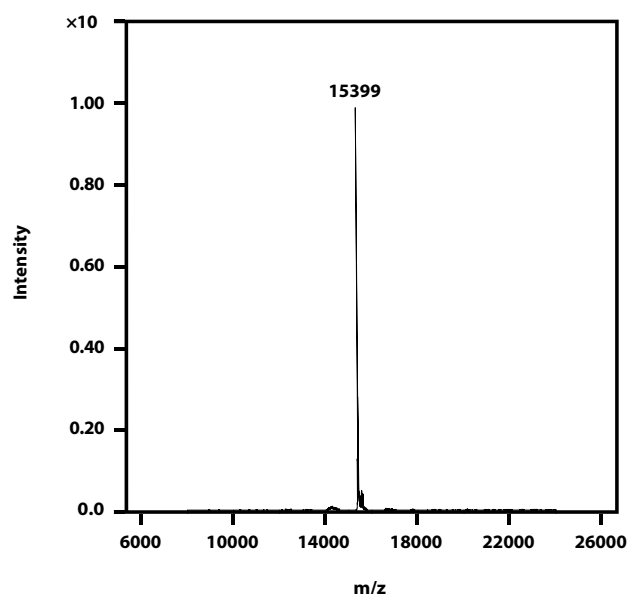


Figure 1: Mass spectrometry analysis (ESI-MS) of MACS GMP Recombinant Human IL-2. The peak corresponds to the calculated molecular mass of 15400 Da.

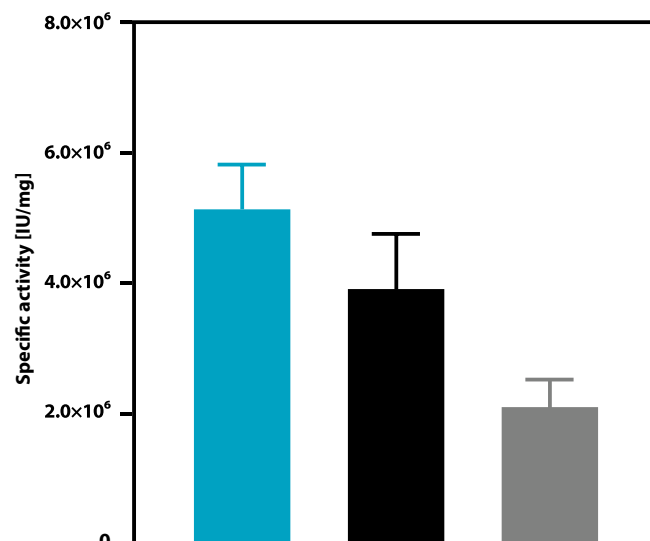


Figure 2: MACS GMP Recombinant Human IL-2 biological activity. Activity of Human IL-2, GMP grade, (blue bar) was compared to other commercially available products (black and grey bar).

Selected references

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

MACS® GMP Activation and Expansion Tools

Product	Description	Content	Order no.
MACS® GMP CD3 pure	GMP-grade antibody for <i>ex vivo</i> 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 <i>ex vivo</i> T cell activation and expansion	0.5 mg in 1 mL	170-076-117
MACS® GMP T Cell TransAct™ CR/ GMP <i>see page 70</i>	MACS GMP T Cell TransAct is intended for the <i>in vitro</i> 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 <i>see page 70</i>	MACS GMP T Cell TransAct is intended for the <i>in vitro</i> stimulation and expansion of human T cells from PBMCs or enriched T cells	4 mL	200-076-204
MACS® GMP Vectofusin®-1	Synthetic peptide for enhanced viral transduction efficiency	1 mg	170-076-165

MACS® GMP T Cell TransAct™

Overview

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

Background information

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

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

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

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

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

Applications

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

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

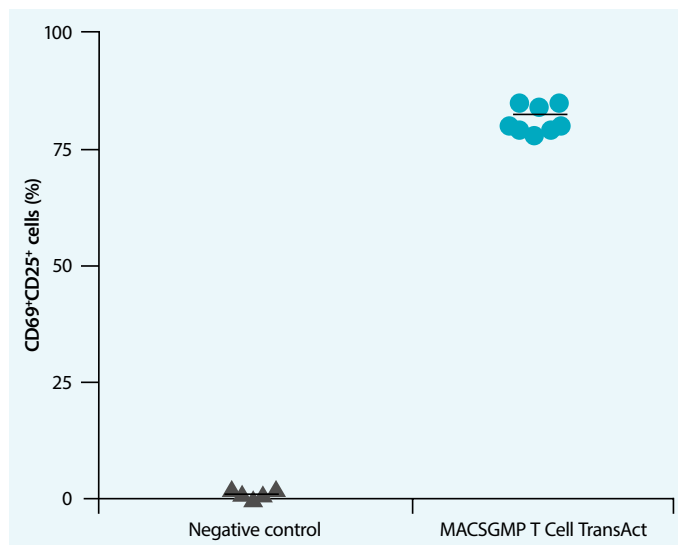


Figure 1: Higher marker activation efficiency of T Cell TransAct compared to the negative control. Comparison of activation efficiency on day two between T Cell TransAct and negative control using the activation markers CD69 and CD25.

Selected references

1. Maschan, M. *et al.* (2021) Nat Commun 12 (1): 7200.
2. Castella, M. *et al.* (2020) Front Immunol 11: 482.
3. Lock, D. *et al.* (2017) Hum. Gene Ther. 28 (10): 914–925.

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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