MERCK MILLIPORE

Human
Stem Cell Systems

Merck Millipore is a division of MERCK

Advancing Human Stem Cell Research with Validated Solutions

As the focus of stem cell research undergoes a transition from animal to human models, researchers are in critical need of validated products to support the isolation, maintenance, differentiation, and characterization of human stem cells. While many reagents designed for rodent systems can be applied to human stem cell studies, they are not truly optimized for robust human stem cell culture or analysis.

This is why human stem cell researchers have always trusted Merck Millipore, the first provider of commercially available human embryonic stem cells and human neural stem cell lines, to accelerate their research. All of our human stem cell systems are extensively tested in defined media culture, and differentiated progeny are comprehensively characterized with highly validated antibodies and detection reagents.

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Merck Millipore's Validated Solutions for Human Stem Cell Research

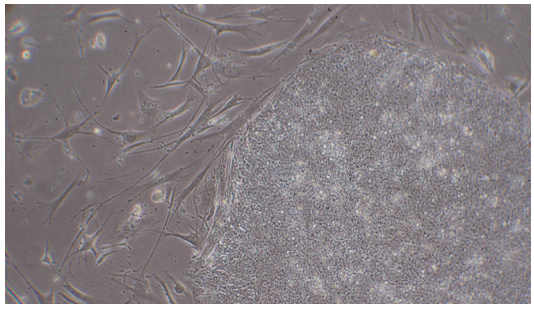
Merck Millipore's human stem cell solutions include products for each step of the human stem cell workflow, including cells and cell isolation products, expansion media, differentiation reagents and assays to comprehensively characterize your cells. Catalog numbers are included in parentheses - please see our website for detailed information.

Species	Cells	Media / Supplements	Differentiation Reagents	Characterization Kits
Human Pluripotent Stem Cell Research	• MEL-1 Human Embryonic Stem Cells (SCC020) • MEL-2 Human Embryonic Stem Cells (SCC021) • FibroGRO™ Xeno-Free Human Foreskin Fibroblasts (SCC058) • FibroGRO Inactivated Xeno-Free Human Foreskin Fibroblasts (SCC057) • EmbryoMax® Primary Mouse Embryo Fibroblasts (PMEF-CFL,-HL,-NL,-N,-H,-CF)	• HEScGRO® hES Media – animal-component-free culture of hES cells (SCM020) • HEScGRO Basal Medium (SCM021) • Human ES Embryoid Body Formation Medium (SCM026) • ROCK inhibitor (SCM075) • Basic FGF (GF003-AF) • Complete Range of ECMs & Growth Factors	• HEScGRO Basal Medium (SCM021)	• Alkaline Phosphatase Detection Kit (SCR004) • ES Cell Characterization Kit (SCR001) • ES Cell Marker Sample Kit (SCR002) • Human iPS Selection Kit (SCR502) • PCR Germ Layer Characterization kit
Human Neural Stem Cell Research	• ReNcell® VM Immortalized Human Neural Stem Cells (SCC010) • ReNcell CX Immortalized Human Neural Stem Cells (SCC009) • ENStem™-A Neural Progenitor Expansion Kit (SCR055) • MilliTrace™ GFP Reporter Human Neural Stem Cell Kits (SCR092, SCR095, SCR096) • ACTCellerate™ hEP Cell Lines (SCR220 – SCR225)	• ReNcell Freezing Medium (SCM007) • ReNcell Maintenance Medium (SCM005) • ENStem-A Neural Freezing Medium (SCM011) • ENStem-A Expansion Medium (SCM004) • ACTCellerate hEP Media (SCM201 – SCM204) • Complete Range of ECMs & Growth Factors	• ENStem-A Differentiation Medium (SCM017) • ReNcell Maintenance Medium (SCM005) + withdrawal of growth factors • Human Oligodendrocyte Differentiation Kit (SCR600)	• Human NSC Characterization Kit (SCR060) • Human Neurogenesis CELISA Assay (Colorimetric) (SCR109) • FlowCellect™ • Human Oligodendrocyte Characterization Kit (SCR601)
Human Mesenchymal Stem Cell Research	• Human MSC Kit (derived from bone marrow) (Cells and Media; SCR108) • Human Neonatal Liver Cell Suspensions (SCC001) • Human Pancreatic Mesenchymal Stem Cell Lines (SCR013, SCR014) • Human MSCs (derived from hES cells) (SCC036)	• FibroGRO Low Serum MSC Expansion Medium (SCMF002) • MSC Expansion Medium (SCM015) • Pancreatic Cell Culture Medium and supplements (SCR015, SCR016, SCR017) • MSC Freezing Medium (SCM016) • Growth Factors for MSC Cell Culture	• MSC Adipogenesis Kit (SCR020) • MSC Osteogenesis Kit (SCR028)	• Human MSC Characterization Kit (SCR018) • Pancreatic Islet Cell Characterization Kit (SCR045)
Cardiac Stem Cells		• Complete Range of ECMs & Growth Factors		• Cardiac Stem Cell Isolation Kit (SCR061) (validated for mouse) • Cardiomyocyte Characterization Kit (SCR059)

01 Xeno-Free Solutions for Human Pluripotent (ES & iPS) Stem Cell Culture

Merck Millipore is committed to advancing research in the exciting area of human pluripotent stem cells. Our integrated solutions include human embryonic stem cells, tools for generating human iPS cells, animal-free media and xeno-free feeders, and novel characterization kits for reliable human pluripotent stem cell culture.

Cells	Maintenance & Expansion	Differentiation	Characterization
• Mel-1 Human ES Cells • Mel-2 Human ES Cells • Xeno-Free Human Foreskin Fibroblasts (proliferating) • STEMCCA™ Reprogramming Kits to Generate Human iPS Cells	• HEScGRO Xeno-Free Medium for hES/iPS cells • Xeno-Free Human Foreskin Fibroblasts (proliferating and Mit-C inactivated) • Human iPS Selection Kit • PMEFs	• HEScGRO Basal medium	• Alkaline Phosphatase Detection Kit • ES Cell Characterization Kit • Epigenetic Profiling Tools • FlowCellect hESC Characterization Kits • Human iPS Selection Kit • ESC Germ Layer PCR Kit • Novel Antibodies



MEL-1 p22 cells cultured in KOSR media for 11 passages.

Human Embryonic Stem Cells: Mel-1 and Mel-2

MEL-1 and MEL-2 human embryonic stem cell lines have been approved for stem cell derivation by the Australian National Health and Medical Research Council (License #309709). The cells have been comprehensively characterized for pluripotency markers, morphology, differentiation capacity, and karyotyped. MEL-1 has a stable XY karyotype, and MEL-2 has a stable XX karyotype.

- Provided at low passage
- Well-defined colonies display high nuclear to cytoplasmic ratios and prominent nucleoli
- Maintain pluripotency after extended passaging

Description	Qty	Catalog No.
MEL-1 Human Embryonic Stem Cell Line	1 x 10^6 cells	SCC020
MEL-2 Human Embryonic Stem Cell Line	1 x 10^6 cells	SCC021

ROCK Inhibitor (Y-27632)

ROCK Inhibitor (Y-27632) has been shown to block apoptosis of dissociated cultured human embryonic stem cells (hESCs) and increase survival and cloning efficiency of hESCs without affecting their pluripotency.

Description	Qty	Catalog No.
ROCK Inhibitor (Y-27632)	5 mg	SCM075

HEScGRO Medium for hESC/hIPS Cell Culture

HEScGRO hES cell medium is the first animal component-free medium that is specially formulated to meet the unique requirements of human embryonic stem cell culture. HEScGRO has been extensively tested and proven to maintain the pluripotency of several hES cell lines, including MEL-1, MEL-2, H1, H7, and H9. This medium is fully defined, serum-free, animal component-free, and does not require additional supplementation to maintain cells in their pluripotent state. Mitotically inactive human feeder cell layers, such as the FibroGRO Xeno-Free HFFs, are commonly used to support hES cell growth, and maintain the xeno-free integrity of the cell culture system.

- Xeno-Free Formulation
- Extensively tested to maintain pluripotency of several hES cell lines and hiPS cells
- Basal Formulation available (without FGF)

Description	Qty	Catalog No.
HEScGRO Medium for Human ES/iPS Cell Culture	5 x 100 mL	SCM020
HEScGRO Basal Medium for Human ES/iPS Cell Culture (requires addition of growth factors to maintain pluripotency)	100 mL	SCM021

Xeno-Free Human Foreskin Fibroblasts

FibroGRO Xeno-Free Human Foreskin Fibroblasts are derived from normal human foreskin (male neonate) and have been isolated and manufactured under xeno-free conditions. They are available as proliferating cultures (ideal for creating iPS cells) or inactivated with mitomycin-C, a perfect choice as a feeder layer to support xeno-free hESC culture using HEScGRO Medium.

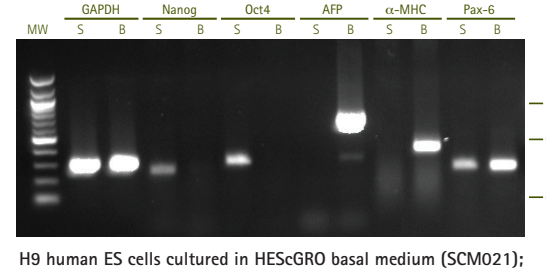
Description	Qty	Catalog No.
FibroGRO Xeno-Free Human Foreskin Fibroblasts (mitomycin-C treated)	4 vials of 3 x 10^6 cells	SCC057
FibroGRO Xeno-Free Human Foreskin Fibroblasts (proliferating)	1 x 10^6 cells	SCC058

Human ESC Germ Layer PCR Kit

This kit enables researchers to quantitatively monitor the health of undifferentiated human ES/iPS cell populations and to analyze the capacity of these cells to differentiate into cell derivatives of the three germ layers. The kit provides optimized and validated primer sets for pluripotency markers as well as endoderm, ectoderm and mesoderm markers. Also included are control cDNAs from undifferentiated human ES cells and from human ES cells that have been differentiated as embryoid bodies (EB) to help confirm the specificity of RT-PCR results.

- Optimized PCR conditions and protocols provided
- Primers are specific to human ES/iPS cells
- Complete kit: primer sets, control cDNAs, loading dye

Description	Qty	Catalog No.
Human ESC Germ Layer PCR Kit	1 kit	SCR063

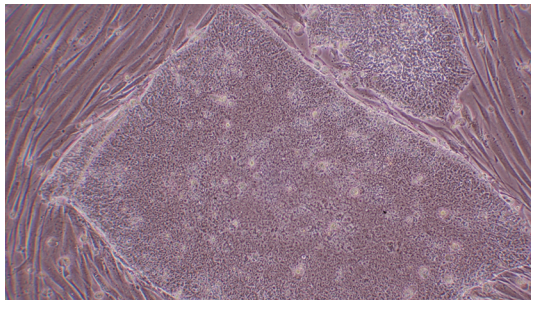


H9 human ES cells cultured in HEScGRO basal medium (SCM021); ES (S) and 30-day differentiated EB (B) cells. RT-PCR analyses display relative expression levels of gene transcripts that are commonly associated with pluripotent (Nanog and Oct-4) and differentiated states (AFP, α-MHC and Pax-6) of human ES cells. cDNAs were generated from undifferentiated H9 human ES cells cultured in Millipore's HEScGRO medium or in KOSR medium.

ES/iPS Cell Characterization Kit

This kit is a specific and sensitive tool for the phenotypic assessment of the differentiation status of human ES and iPS cells. The kit includes reagents for measuring alkaline phosphatase activity and, four ES cell-specific antibodies (SSEA-1, SSEA-4, TRA-1-60, and TRA-1-81). A combinatorial analysis of marker expression using this kit provides a more accurate assessment of stem cell phenotype, compared to assessment based solely on single stem cell markers.

Description	Qty	Catalog No.
ES Cell Characterization Kit	1 kit/ 100 reactions	SCR001



Morphology of H1 cells at passage 5 stained with the SCR004 kit.

Alkaline Phosphatase Detection Kit

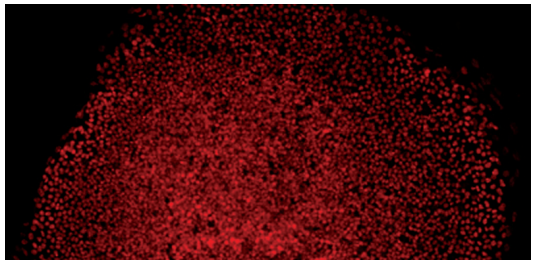
Alkaline phosphatase (AP) activity is a marker of the undifferentiated state of hES cells. Use this kit to specifically and sensitively detect endogeneous AP expression in undifferentiated ES cells, which show intense staining following the recommended staining procedure. Sufficient reagents are provided for 100 tests.

Description	Qty	Catalog No.
Alkaline Phosphatase Detection Kit	1 kit (100 tests)	SCR004

PRODUCT HIGHLIGHT

STEMCCA Lentivirus Reprogramming Kits

Efficient iPS cell generation with a single vector



Xeno-Free Human foreskin fibroblasts (HFFs) (Cat. No. SCC058) infected with the Human STEMCCA Lentivirus (Cat. No. SCR544) express high levels of Oct-4 after 5 passages.

Unlike traditional iPS cell generation, which typically requires simultaneous co-infection by four separate expression vectors (OCT-4, Klf4, Sox2 and c-myc), the STEMCCA kits use a single polycistronic lentiviral vector to improve efficiency and reduce the number of viral integrations. STEMCCA kits include lentivirus that express the human OKSM factors from a single polycistronic transcript. The new humanized version of STEMCCA lentivirus enables highly efficient reprogramming of normal, or diseased postnatal human skin fibroblasts. A Cre-excisable version is also available for excision of the exogenous reprogramming transgenes.

Efficient: uses a single vector with four transcription factors rather than co-transducing four separate expression vectors

- **Minimizes viral integrations**: single vector reduces the risks of insertional mutagenesis and viral reactivation
- **Excisabl**e: Cre/LoxP-regulated version enables removal of reprogramming transgenes

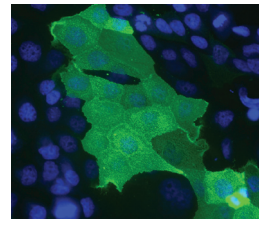
Description	Qty	Catalog No.
Human STEMCCA Constitutive Polycistronic (OKSM) Lentivirus Reprogramming Kit	30 µL lentivirus + Polybrene® transfection reagent	SCR544
Human STEMCCA Cre-Excisable Constitutive Polycistronic (OKSM) Lentivirus Reprogramming Kit	30 µL lentivirus + Polybrene transfection reagent	SCR545

Antibodies for Human Pluripotent Stem Cell Characterization

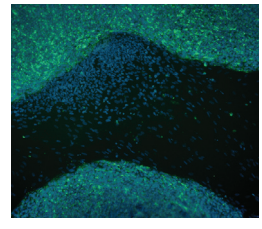
Merck Millipore offers antibodies to the following pluripotent stem cell targets while continuing to extend our line of antibodies for all stem cell research. For the most up-to-date information, please visit **www.millipore.com/antibodies**.

Description	Catalog No.
BCRP, clone BXP-21	MAB4146
BCRP, clone 5D3	MAB4155
CD30	CBL529
CD9	CBL162
Dppa1	MAB4355
Dppa5	MAB4320
E-Cadherin	MAB3199Z
GCTM-5	MAB4365
Genesis	AB5687
Heat Shock Protein 27	MAB88051
HESCA-1	MAB4407
HESCA-2	MAB4406
hPlurES-1	MAB4395
Id2	MAB4358
Id3	MAB4353
Id4	MAB4393
Nanog, N-terminus	AB5731
Nanog	AB9220
Nucleostemin	AB5689
Oct-4, clone 10H11.2	MAB4401
Oct-4, clone 7F9.2	MAB4419

Description	Catalog No.
Pan Id	MAB4394
Podocalyxin	MAB430
Pramel-4	AB4304
Pramel-5	AB4305
Rex-1	MAB4316
ShSCP-5	MAB4408
SOX17	09-038
SOX-2	MAB4343
SSEA-1	MAB4301
SSEA-3	MAB4303
SSEA-4	MAB4304
Stella	MAB4388
TG30	MAB4427
TG343	MAB4346
Thy-1 (CD90)	CBL415
TRA-1-60	MAB4360
TRA-1-81	MAB4381
TRA-1-85	MAB4385
TRA-2-49	MAB4349
UTF1	MAB4337



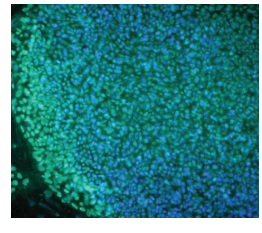
CFPAC1 cells labeled with GCTM-5 antibody (green); cells are also labeled with DAPI (blue) to visualize all nuclei.



H9 (WA09) human ES cells labeled with the HESCA-2 antibody and DAPI. Only pluripotent human ES cells are labeled by HESCA-2; note that the antibody does not recognize the cells differentiating from the human ES cell colony.

Other products for Human Pluripotent Stem Cell Research

Description	Qty	Catalog No.
FlowCellect Human Embryonic Stem Cell TRA-1-60 Surface Marker Characterization Kit	1 kit	FCHEC25106
FlowCellect Human Embryonic Stem Cell HESCA-1 Surface Marker Characterization Kit	1 kit	FCHEC25104
FlowCellect Human Embryonic Stem Cell Characterization Kit	1 kit	FCHEC25102
Quantitative Alkaline Phosphatase ES Characterization Kit	100 assays	SCR066
ES Cell Marker Sample Kit	1 kit	SCR002
Fibroblast Growth Factor basic, animal-free, recombinant human	50 µg	GF003-AF
Human Collagen Type I	100 µg	CC050
Human Collagen Type IV	100 µg	CC076
Human Vitronectin, purified protein	100 µg	CC080
Human Vitronectin, recombinant	500 µg	08-126
Human Laminin (pepsinized), purified protein	100 µg	AG56P
Human Fibronectin, cellular	1 mg	08-102
Human Plasma Fibronectin, purified protein	1 mg	FC010
Human Plasma Fibronectin, purified protein	5 mg	FC010-5MG
Human Plasma Fibronectin, purified protein	10 mg	FC010-10MG
Human Plasma Fibronectin, purified protein	100 mg	FC010-100MG
ECL Cell Attachment Matrix (EHS Mouse Tumor)	5 mg	08-110

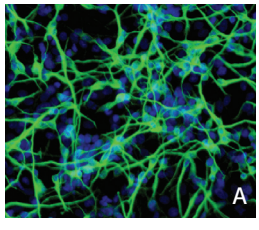


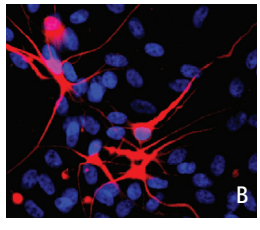
Labeling of H9 human embryonic stem cells with the human Oct-4 (MAB4401) shows its specificity for undifferentiated ES cells through indirect immunofluorescence of the culture on a mouse embryonic fibroblast feeder (MEF) layer. The human Oct-4 antibody (green) labels ES cells in the rounded cluster, but not the MEF cells, which appear in the DAPI (blue) labeling of the same culture.

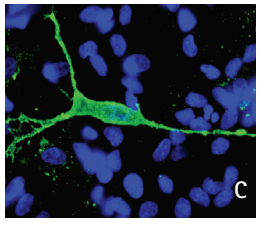
02 Human Neural Stem Cell Research

Merck Millipore is the leading provider of tools for human neural stem cell research. The first supplier of human neural stem cells in 2007, we have since complemented our leading hNSC portfolio with hES-derived neural progenitors, human oligodendrocyte progenitors, defined media and differentiation kits, and novel characterization tools to provide a complete, optimized solution for the neural stem cell researcher.

Cells	Maintenance & Expansion	Differentiation	Characterization
• ReNcell CX Human Neural Stem Cells • ReNcell VM Human Neural Stem Cells • ENStem-A Human Neural Stem Cells • MilliTrace GFP Reporter Neural Stem Cell Lines • Human Oligodendrocyte Progenitors	• ReNCell Expansion Medium • ENStem-A Expansion Medium • Oligodendrocyte Progenitor Expansion Medium	• ReNCell Expansion Medium (+ withdrawal of growth factors) • ENStem-A Neuronal Differentiation Medium • Oligodendrocyte Differentiation Kit • bFGF • Laminin	• Human Neural Stem Cell Characterization Kit • FlowCellect Human Neural Stem Cell Kits for flow cytometric analysis • Neural Stem Cell Antibodies • Neurogenesis CELISA • Human Oligodendrocyte Characterization Kit







Multipotentiality of ReNcell cells. Both ReNcell CX and ReNcell VM cell lines spontaneously differentiate into all three neuronal phenoytpes: neurons (βIII-tubulin, green, 20X, A); astrocytes (GFAP, red, 40X, B) and oligodendrocytes (Gal C, green, 60X, C); all counterstained with Hoechst nuclear stain (blue).

ReNcell Human Neural Stem Cells

ReNcell immortalized human neural stem cells can readily differentiate into neurons and glial cells. Two lines are available:

- ReNcell VM (derived from the ventral mesencephalon region of human fetal brain tissue)
- ReNcell CX (derived from the cortical region of human fetal brain tissue)

Immortalized by retroviral transduction with the myc oncogene, these robust cell lines grow rapidly as a monolayer on laminin with a doubling time of 20-30 hours. They retain a normal diploid karyotype even after prolonged passage. ReNcell cell lines may be used for a variety of research applications such as studies of neurotoxicity, neurogenesis, electrophysiology, neurotransmitter, and receptor functions.

The ReNcell Kits contain human neural progenitor cells (either VM or CX), ReNcell maintenance media and ReNCell freezing media, creating a complete system for the culture of human neural stem cells. The ReNcell NSC maintenance medium is a defined, serum-free, growth factor-free medium that has been optimized for the growth and *in vitro* differentiation of ReNcell immortalized human neural progenitor cells. When used in conjunction with fibroblast growth factor (FGF) and epidermal growth factor (EGF), the maintenance medium allows the proliferation of ReNcell immortalized neural stem cells. Withdrawal of the growth factors from the maintenance medium will result in spontaneous differentiation into a predominantly neuronal population.

Description	Qty	Catalog No.
ReNcell VM Human Neural Progenitor Kit	1 vial of cells*	SCC010
ReNcell CX Human Neural Progenitor Kit	1 vial of cells*	SCC009
ReNcell Human NSC Maintenance Media	500 mL	SCM005
ReNcell Human NSC Freezing Media	50 mL	SCM007

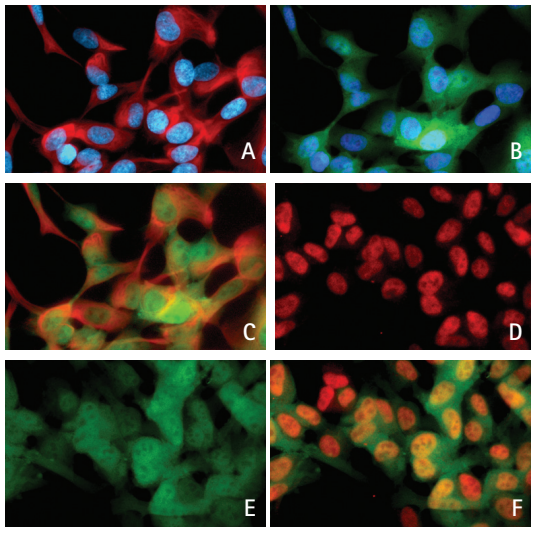
* Includes: 500 mL of expansion media (SCM005) & 50 mL of freezing medium (SCM007)

GFP Reporter Neural Stem Cell Lines

Visualize neural stem cells and their differentiated progeny with MilliTrace GFP reporter cell lines. The MilliTrace CX and MilliTrace VM constitutive GFP reporter human neural stem cell kits provide ready-to use ReNcell CX and ReNcell VM human neural stem cells that constitutively express the humanized mulleri green fluorescent protein (hmGFP), along with expansion medium to help maintain expression of the transgene.

The MilliTrace Nestin GFP Reporter Cell kit is an ideal tool to study differentiation of NSCs. The kit provides GFP-expressing human neural stem cells (hmGFP) under the regulation of the Nestin promoter. Expression of Nestin is commonly associated with undifferentiated neural stem and early progenitor cells. Upon differentiation, Nestin is down-regulated and GFP expression is decreased.

Description	Qty	Catalog No.
MilliTrace CX Constitutive GFP Reporter Human Neural Stem Cell Kit	10^6 viable cells & 500 mL of expansion media	SCR095
MilliTrace VM Constitutive GFP Reporter Human Neural Stem Cell Kit	10^6 viable cells & 500 mL of expansion media	SCR092
MilliTrace CX Nestin GFP Reporter Human Neural Stem Cell Kit	10^5 viable cells & 500 mL of MilliTrace expansion media kit (SCM043)	SCR096
MilliTrace ReNcell Neural Stem Cell Expansion Media Kit	1 kit (500 mL)	SCM043

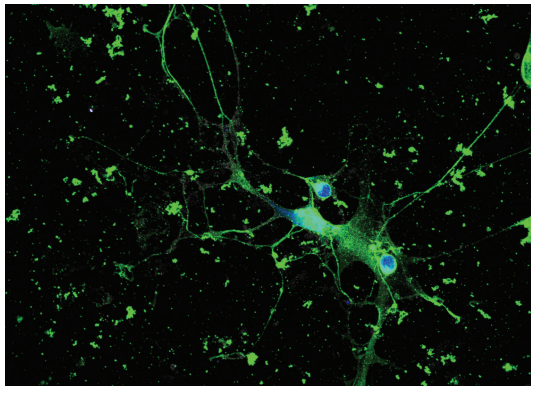


MilliTrace VM constitutive GFP reporter human neural stem cells (Catalog No. SCC092) express GFP (B, C, E, F) along with NSC markers, Nestin (A, C, red) and SOX2 (D, F, red). Nuclei of the cells were visualized with DAPI (A, B, blue). The Sox-2 transcription factor is co-localized with the GFP staining in the nucleus (D, F). Majority of cells are GFP-positive (B, C, E, F).

ENStem™-A Human Neural Progenitor Expansion Kit

ENStem-A human neural progenitor cells are derived from WA09 (H9) human embryonic stem cells (hESCs). These hESC-derived neural progenitors proliferate as an adherent monolayer and can readily differentiate into different neuronal subtypes. ENStem-A human neural progenitor cells may be used for a variety of research applications such as studies of neurotoxicity, neurogenesis, electrophysiology, neurotransmitters, and receptor functions. ENStem-A neural expansion medium is a defined, serum-free formulation that has been optimized for the culture and expansion of ENStem-A human neural progenitors. When used in conjunction with FGF-2 (provided in the kit), cells can be maintained in an undifferentiated, multipotent state for at least 10 passages. They can be differentiated into neuronal populations with the ENSTEM-A Neuronal Differentiation Medium.

Description	Qty	Catalog No.
ENStem-A Human Neural Progenitor Expansion Kit	1 vial of cells & 500 mL of media	SCR055
ENStem-A Expansion Medium	500 mL	SCM004
ENStem-A Neuronal Differentiation Medium	100 mL	SCM017



Human oligodendrocyte progenitors differentiated into oligodendrocytes stain positive for MBP (Myelin Basic Protein, Cat. No. AB980)

NEW! Human Oligodendrocyte Differentiation Kit

Merck Millipore's novel kit provides an easy, convenient, and reliable alternative for generating human oligodendrocytes. The kit contains well- characterized oligodendrocyte progenitor cells (OPCs) and cell culture medium to differentiate these cells into enriched populations (30-50%) of mature oligodendrocytes in only two to three weeks. OPCs are guaranteed >70% GalC positive and Sox10 positive; differentiated oligodendrocytes are positive for MBP.

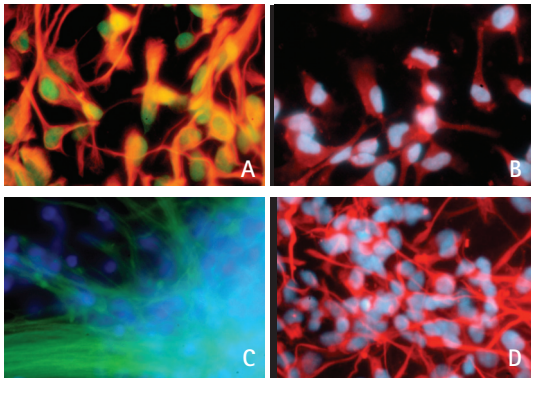
Benefits:

- Highly convenient, reliable source of human oligodendrocytes
- Easily generate enriched (>30%) populations of human oligodendrocytes in your lab
- Kit includes 500,000 oligodendrocyte progenitors and media for expansion and spontaneous differentiation
- Well characterized: OPCs are guaranteed >70% GalC positive and Sox10 positive; mature oligodendrocytes are positive for MBP

Description	Qty	Catalog No.
Human Oligodendrocyte Differentiation Kit*	1 kit	SCR600
Human Oligodendrocyte Characterization Kit (sold separately) (Contains markers of both early and late stage oligodendrocytes, including NG2, PLP, GalC, MOG, Map2, and GFAP)	1 kit	SCR601

* Kit Includes:

- 500,000 viable Oligodendrocyte Progenitors (OPCs)
- 100 mL expansion medium (sufficient for 3 passages)
- 100 mL differentiation medium (sufficient for 4 weeks of culture)



Immunofluorescent Images of Antibody Components in Human Neural Stem Cell Characterization Kit (SCR060). ReNcell CX immortalized human cortical neural progenitor cells (Cat. No. SCC007) stained for NSC markers, Nestin (A, red), Sox-2 (A, green) and Musashi (B, red). The Sox-2 transcription factor is localized in the cell nucleus. Human neural progenitor cells were differentiated into neurons (βIII-tubulin; C, green) and glial cells (GFAP; D, red). Nuclei of the cells were visualized with DAPI (blue).

Human Neural Stem Cell Characterization Kit

This kit contains a panel of antibodies to comprehensively characterize human neural stem/progenitor cells, along with antibodies recognizing more differentiated lineage markers. Kit components include antibodies against Nestin, SOX2, Musashi, βIII-tubulin (neurons), GFAP (astrocytes), and O1 (oligodendrocytes). Mouse and rabbit Ig controls for the assessment of background staining are also included. All of the antibodies provided in the kit have been tested and optimized for use in immunocytochemistry on human neural stem cells.

Description	Qty	Catalog No.
Human Neural Stem Cell Characterization Kit	1 kit	SCR060

Antibodies for Human Neural Stem Cell Characterization

Merck Millipore offers antibodies to the following neural stem cell targets while continuing to extend our line of antibodies for all stem cell research. For the most up-to-date information, please visit **www.millipore.com/antibodies**.

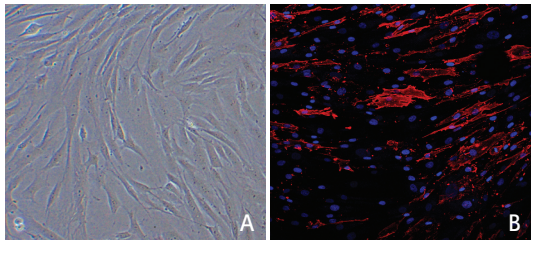
Description	Catalog No.
O1	MAB344
βIII-Tubulin	MAB380
BCRP, clone 5D3	MAB4155
CD133 (Prominin-1)	MAB4310
CD184 (C-X-C Chemokine Receptor 4)	AB1847
CD34 Class I	MAB4211
CD44s (pgp-1, Homing Receptor, HCAM)	MAB2137
CD45 (LCA)	CBL124
CD81 (TAPA-1)	CBL579
CD90 (Thy-1)	CBL415
Dishevelled-1	AB5970
Dishevelled-2	AB5972
Dishevelled-3	AB5974
EMX1	AB15067
EVX1	AB10203
EVX2	AB10201
GFAP	AB5804
Golgi Zone	MAB1271
Id2	MAB4358
Id3	MAB4353
Id4	MAB4393
LEF-1	MAB3751
LEF-1/TCG	MAB3752
MELK	MAB4331
mGCM1	AB3749
Mitochondria H	AB3598
MSX2	AB10211
Musashi	04-1041
Nestin	MAB5326
NLK	AB10206
Nuclear Ribonucleoprotein	MAB1287
Nuclei	MAB4383
Nucleostemin	AB5689

Description	Catalog No.
Polysialic Acid-NCAM	MAB5324
REN-1	MAB4339
SDNSF	MAB4324
SOX17	09-038
Sox-2, polyclonal	AB5603
Sox-2, monoclonal	MAB4343
Stage-Specific Embryonic Antigen-1	MAB4301
VIN-2PB-22	MAB4309
VIN-IS-56	MAB4308
ZIPRO1	AB3733

03 Human Mesenchymal Stem Cells

Merck Millipore is the leading provider of tools for human neural stem cell research. The first supplier of human neural stem cells in 2007, we have since complemented our leading hNSC portfolio with hES-derived neural progenitors, human oligodendrocyte progenitors, defined media and differentiation kits, and novel characterization tools to provide a complete, optimized solution for the neural stem cell researcher.

Cells	Maintenance & Expansion	Differentiation	Characterization
• Human Mesenchymal Stem Cells (derived from bone marrow) COMING SOON **Human Mesenchymal Stem Cells (derived from hES cells)**	• MSC Expansion Medium	• MSC Osteogenesis Differentiation Kit • MSC Adipogenesis Kit	• Human Mesenchymal Stem Cell Characterization Kit • FlowCellect Human Mesenchymal Stem Cell Kits for flow cytometric analysis



(A) Phase contrast images of Human Mesenchymal Stem Cells one day after thawing. (B) Immunocytochemical staining of Merck Millipore's cultured human bone marrow-derived mesenchymal stem cells. hMSCs express STRO-1 (Red), Catalog No. MAB4315: 1/500 dilution). Nuclei of the cells were visualized with DAPI (blue).

Human Mesenchymal Stem Cells

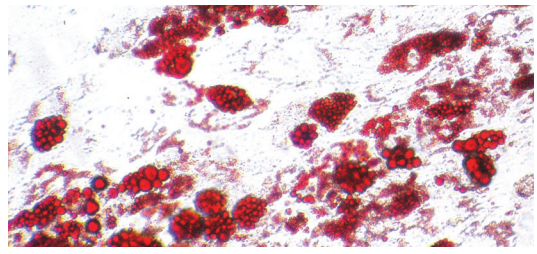
Merck Millipore's human mesenchymal stem cells are derived from human bone marrow. The cells stain positive for the MSC markers CD90, CD105, CD106, and STRO-1 and have been shown to differentiate efficiently into osteocytes and adipocytes. Included in the kit are one vial of frozen cells along with 500 mL of mesenchymal expansion medium. Adipocyte and osteocyte populations can be generated using Merck Millipore's mesenchymal stem cell adipocyte differentiation kit (Catalog No. SCR020) and mesenchymal stem cell osteogenesis differentiation kit (Catalog No. SCR028).

Description	Qty	Catalog No.
Human Mesenchymal Stem Cells (derived from bone marrow) Kit	1 x 10^6 viable cells + 500 mL medium	SCR108
Mesenchymal Stem Cell Expansion Medium	500 mL	SCM015
FibroGRO Expansion Medium (low-serum, recommended for hMSCs)	500 mL	SCMF002
Human Mesenchymal Stem Cells (derived from hES cells) Kit **COMING SOON**	1 x 10^6 viable cells	SCC036

Mesenchymal Stem Cell Adipogenesis Kit

This kit contains reagents that readily differentiate mesenchymal stem cells to an adipogenic lineage as assessed with Oil Red O staining of lipid vacuoles in mature adipocytes. These differentiation factors include dexamethasone, IBMX, insulin and indomethacin. Along with Oil Red O staining solution, a hematoxylin solution is provided to counterstain the cell nucleus. This kit has been shown to efficiently differentiate both rodent and human mesenchymal stem cells into adipocytes.

Description	Qty	Catalog No.
Mesenchymal Stem Cell Adipogenesis Kit	1 kit	SCR020

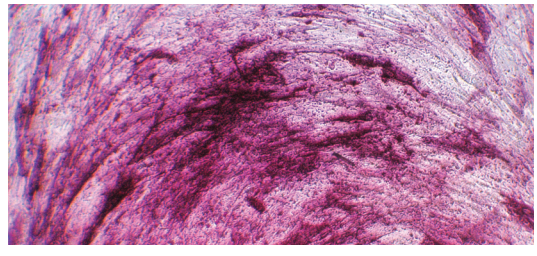


Using the mesenchymal stem cell adipogenesis kit, human mesenchymal stem cells differentiated after 21 days to mature adipocytes as indicated by the accumulation of lipid vacuoles that stain with Oil Red O (20x magnification). Cell nuclei (purple) were stained with hematoxylin solution. Control human MSCs did not contain any lipid droplets (data not shown).

Mesenchymal Stem Cell Osteogenesis Kit

This kit contains all the reagents and optimized protocols necessary to differentiate mesenchymal stem cells to an osteogenic lineage as assessed by Alizarin Red staining. Reagents in the kit include two ECM coating molecules (collagen type I and vitronectin) that have been shown to promote osteogenic differentiation of mesenchymal stem cells, along with inducing reagents (dexamethasone, ascorbic acid 2-phosphate, and glycerol-2-phosphate). Also included is Alizarin Red solution, a staining solution that is used to detect the presence of calcium in bone. This kit has been shown to efficiently differentiate both rodent and human mesenchymal stem cells into osteocytes.

Description	Qty	Catalog No.
Mesenchymal Stem Cell Osteogenesis Kit	1 kit	SCR028

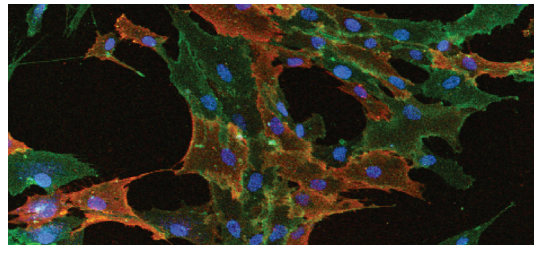


Using the mesenchymal stem cell osteogenesis kit, human mesenchymal stem cells readily differentiated to an osteocyte lineage as indicated by Alizarin Red S (ARS) staining. Alizarin Red S staining demonstrates mineral deposition throughout the culture.

Human MSC Characterization Kit

This kit contains a panel of positive and negative selection markers for the complete characterization of the mesenchymal stem cell population in human samples. Positive markers include antibodies to cell surface molecules present on mesenchymal stem cells: CD44, CD90, STRO-1, and CD146. In addition, two specific hematopoietic cell surface markers are provided as negative markers: CD14 (present on leukocytes) and CD19 (present on B-lymphocytes).

Description	Qty	Catalog No.
Human Mesenchymal Stem Cell Characterization Kit	1 kit	SCR067



Immunocytochemical staining of cultured human bone marrow-derived mesenchymal stem cells stained with STRO-1 and CD90 antibodies provided in the kit. Nuclei of the cells were visualized with DAPI (blue).

Antibodies for Human Mesenchymal Stem Cell Characterization

Merck Millipore offers antibodies to the following mesenchymal stem cell targets while continuing to extend our line of antibodies for all stem cell research. For the most up-to-date information, please visit **www.millipore.com/antibodies**.

Description	Catalog No.
Bone Morphogenetic Protein 6	MAB1048
Brachyury	04-135
CD31 (PECAM-1)	CBL1337
CD34 Class I	MAB4211
CD34 Class II	CBL496
CD34 Class III	CBL555
CD44 (HCAM), Pan	MAB4065
CD45 (L	CBL124F
CD54 (ICAM-1), clone 84H10	MAB1379
CD54 (ICAM-1), clone W-CAM-1	MAB2130
CD71 (Transferrin Receptor)	CBL47
CD90 (Thy-1)	CBL415
CD106 (VCAM-1)	CBL206
CD116 (GM-CSF-a Receptor)	MAB1037
CD133 (Prominin-1)	MAB4310
CD146 (MCAM)	05-755
c-Kit	MAB1162
c-Kit, PE conjugate	MAB1162H
Collagen I	AB765P
EVX2	AB10201
Fibronectin, cellular	MAB1940
Fibronectin, cell binding domain	MAB1926
Flk-1, polyclonal	07-716
Flk-1, monoclonal	MAB1147
LEO1	AB10190
MEOX1	AB10202
MSX2	AB10211
Nucleostemin	AB5689
OSTERIX	AB3743
PTF1A	AB3725
Stage-Specific Embryonic Antigen-1	MAB4301
STRO-1	MAB4315

Other Products for Human Mesenchymal Stem Cell Culture

Growth Factors

To expand MSCs *in vitro*, a combination of mitogenic factors including platelet-derived growth factor (PDGF), epidermal growth factor (EGF), basic fibroblast growth factor (bFGF), transforming growth factor-β (TGFβ) and insulin-like growth factor (IGF) have been indicated in the successful cell culture of MSCs. Merck Millipore offers many recombinant proteins and growth factors suitable for the in vitro culture of MSCs. For a complete listing please see **www.millipore.com/growthfactors**.

Platforms, Technologies, and Services

As a tools provider and partner in research, Merck Millipore is committed to the advancement of life science research and therapeutic development. This guide includes a number of new products for target identification, pathway detection and profiling. These products provide proven solutions for a range of applications and are backed by extensive technical support.

STEM CELLS & PRIMARY CELLS www.millipore.com/stemcells

Merck Millipore offers an extensive range of embryonic, neural, and mesenchymal stem cells for both human and rodent studies. Endothelial and epithelial progenitor cells from multiple species are also available.

CELL CULTURE MEDIA & REAGENTS www.millipore.com/sterilefiltration

Merck Millipore provides media designed for virtually all types of stem cells. Many of these optimized media are available as serum-free, feeder-free formulations, validated specifically for stem cells. Feeder cells, supplements, passaging and cryopreservation reagents are also available.

ANTIBODIES & IMMUNOASSAYS www.millipore.com/antibodies

Our extensive portfolio of antibodies for stem cell research includes widely published stem cell targets as well as recently discovered markers. Characterization kits are also available with panels of antibodies to comprehensively analyze multiple differentiation pathways.

FLOW CYTOMETRY ASSAYS AND SYSTEMS www.millipore.com/flowcytometry

Guava® flow cytometers provide direct, precise measurement via microcapillary technology that translates into smaller samples, less reagents, and minimal waste. Merck Millipore also offers FlowCellect™ reagents, kits and Milli-Mark™ conjugated antibodies that are optimized for guava systems and compatible with traditional core lab environments.

GROWTH FACTORS www.millipore.com/growthfactors

Merck Millipore offers a complete range of recombinant growth factors for stem cell research and is the official supplier of ESGRO® mLIF supplement for the maintenance of undifferentiated mouse ES cells.

EXTRACELLULAR MATRICES (ECMs) www.millipore.com/ecm

ECM proteins are complex structural entities that regulate a diverse range of cellular functions and are critical for culturing a variety of stem cell types. Merck Millipore offers a broad array of high quality purified and recombinant ECM proteins to optimize the expansion and differentiation of stem cells.

CALBIOCHEM® COMPOUNDS www.millipore.com/calbiochem1

Small-molecule compounds, including inhibitors, activators, and other pathway modulators, are critical tools for researchers studying cell signaling and other intracellular mechanisms that control cell fate, function and phenotype. Calbiochem provides high quality inhibitors, biochemicals, antibodies, proteins, and kits that have been cited in thousands of peer-reviewed publications.

CELL CULTUREWARE & STERILE FILTRATION DEVICES www.millipore.com/sterilefiltration

Designed for fast flow and maximum flexibility, our sterile filtration devices and Millicell® membrane-based cell culture inserts help optimize your cell culture conditions.

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Stem Cell Research & Specialty Culture Microsite

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