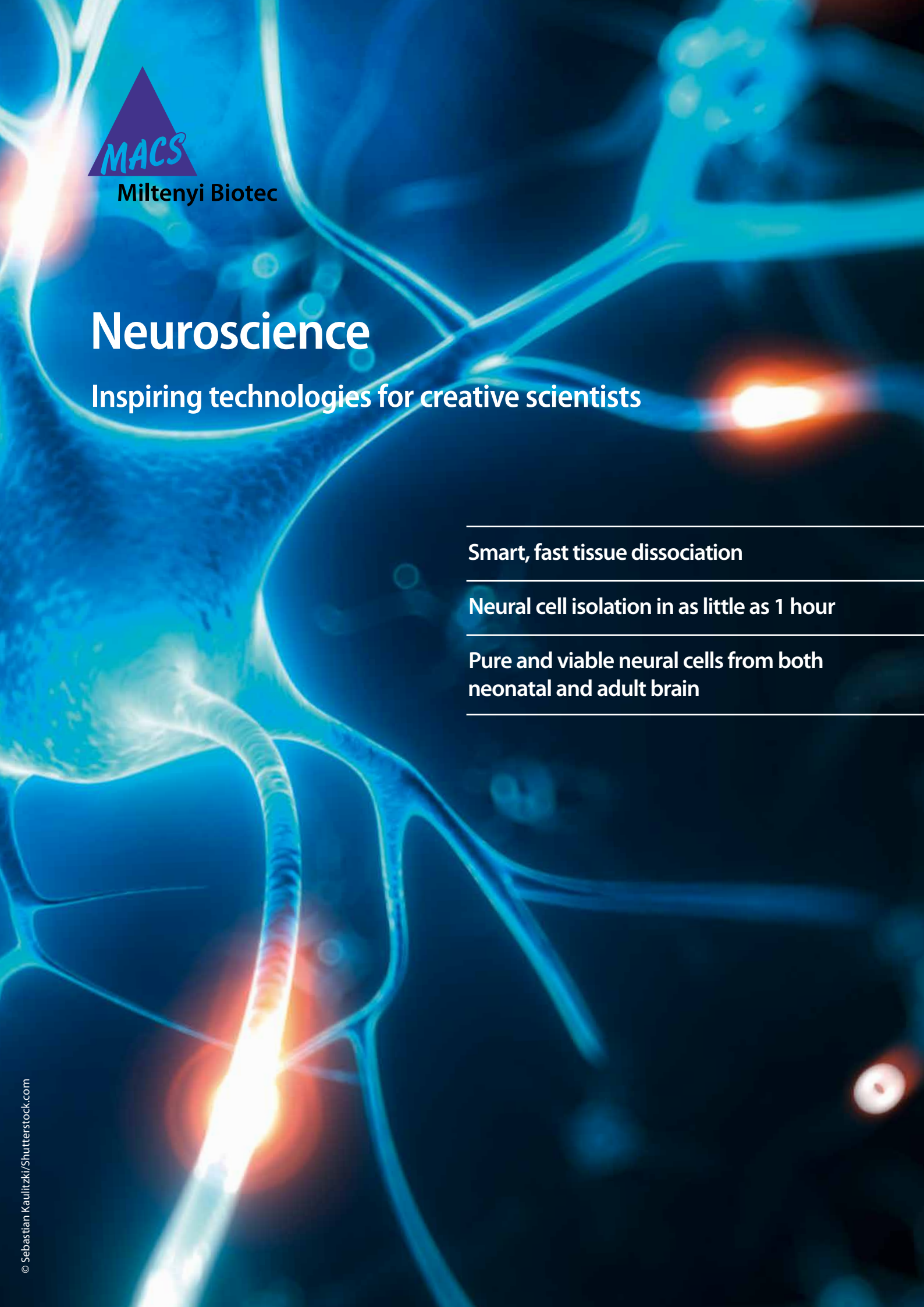


MACS
Miltenyi Biotec

Neuroscience

Inspiring technologies for creative scientists

Smart, fast tissue dissociation

Neural cell isolation in as little as 1 hour

Pure and viable neural cells from both neonatal and adult brain

Introduction

Inspiring technologies for creative neuroscientists

For more than 25 years, Miltenyi Biotec has worked alongside researchers around the world to develop innovative tools to support leading-edge science.

From brain tissue dissociation and myelin removal to neural cell isolation, culture, and analysis, we have an attractive solution for each step of your workflow.

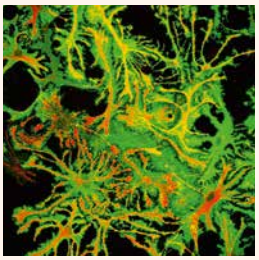
Taking together your talents and our tools, we've got the right ingredients to make groundbreaking research in neuroscience.

"Magnetic sorting is relatively fast – from dissociation to selection of cell populations, magnetic sorting took an average of 1–2 hours with little training or specialized equipment. A simple cost evaluation of supplies and reagents for the magnetic sorting indicated a relatively low cost per sample isolation. We propose that magnetic sorting will prove to be a highly useful technique for the examination of CNS cell specific gene and protein expression."

Holt, L.M. & Olsen, M.L. (2016) Novel Applications of Magnetic Cell Sorting to Analyze Cell-Type Specific Gene and Protein Expression in the Central Nervous System. PloS One, 11(2):e0150290.

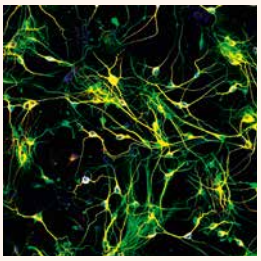
Get the neural cells you want by using our product portfolio for neuroscience

Astrocytes



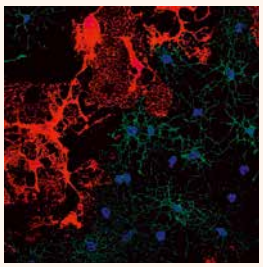
GFAP/ GLAST(ACSA-1)

Neuronal cells



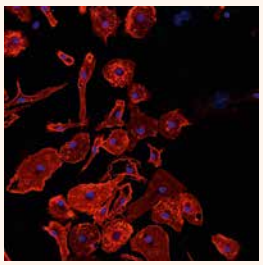
ßIII-Tubulin/MAP2/TOTO-3

Oligodendrocyte



Anti-MBP/ Anti-NG2/ DAPI

Microglia



CD11b/ DAPI

Table of contents

Start smart

The secret to success lies in your starting material

Gentle, quick and efficient neural tissue dissociation

Are you working with brain tissue? Do you spend hours on tissue dissociation in order to obtain single cell suspensions?

Then try our quick and easy MACS® Tissue Dissociation Kits in combination with the gentleMACS™ Portfolio, to experience:

- efficient walkaway tissue dissociation
- reliable, user-independent results
- high yield of viable, single cell suspension
- preserved cell integrity and surface epitopes through gentle processing protocols
- optimal sample preparation for downstream applications, including the isolation of a variety of neural cell types

Choose the specific tissue dissociation kit that was optimized for your starting material

Tissue dissociation kits	Starting material
Isolation of all neural cells	
Adult Brain Dissociation Kit, mouse and rat	Animal age > P7
Neural Tissue Dissociation Kit (P)	Animal age ≤ P7
Neural Tissue Dissociation Kit (T)	Animal age ≤ P7
Isolation of neurons only	
Neural Tissue Dissociation Kit – Postnatal Neurons	Animal age ≤ P7
Special applications	
Brain Tumor Dissociation Kit (P)	Brain tumor tissue
Brain Tumor Dissociation Kit (T)	Brain tumor tissue
Neurosphere Dissociation Kit (P)	Cultured neurospheres
Neurosphere Dissociation Kit (T)	Cultured neurospheres
Embryoid Body Dissociation Kit, human and mouse	*In vitro* generated embryoid bodies
Myelin Removal Beads II, human, mouse, rat	Single-cell suspensions

Preserve cell integrity and surface epitopes with MACS® Tissue Dissociation Kits

It is important to choose the correct enzymes for tissue dissociation in order to avoid epitope degradation and ensure good cell separation that leads to accurate cell analysis of cell surface markers. MACS Tissue Dissociation Kits are optimized to dissociate brain tissue effectively, while protecting surface epitopes. They contain either papain (P) or trypsin (T) depending on the respective epitope sensitivity. In order to find the optimal condition for your antigen of interest, refer to the table on page 7.

Figure 1: The gentleMACS Octo Dissociator with Heaters – versatile and reliable benchtop tissue dissociation.

Automated dissociation of neonatal neural tissues

The Neural Tissue Dissociation Kit enables automated generation of single-cell suspensions from neural tissue ≤ postnatal day 7 (≤ P7), using a combined enzymatic and mechanical dissociation procedure. Taking advantage of the great efficiency of enzymatic dissociation, these kits provide a high yield of viable cells with preserved cell integrity and surface epitopes. It is suitable for whole brain or tissue sections.

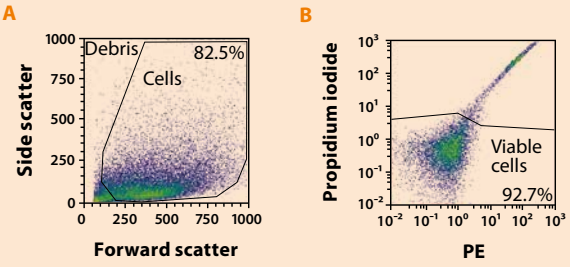


Figure 2: Standardized tissue dissociation with Neural Tissue Dissociation Kits and gentleMACS Dissociators. Mouse whole brain tissue (P4) was dissociated using the Neural Tissue Dissociation Kit (P) and the gentleMACS Dissociator Octo with Heaters. The cells were stained with Propidium iodide and analyzed with the MACSQuant Analyzer. Flow cytometry analysis showed that the dissociated cell suspension contained minimal debris (A) and a very high percentage of viable cells (B).

Dissociation of adult neural tissue

A successful experiment heavily relies on the quality of sample preparation. This is especially essential when working with fragile tissues, such as the adult brain.

When working with neural tissue derived from > P7 animals, large amounts of cell debris and erythrocytes often hurdle downstream applications. The Adult Brain Dissociation Kit, mouse and rat comes with debris and red blood cell (RBC) removal solutions that overcome this problem. The result: Pure and viable neural cells. These can immediately be used in downstream applications such as the isolation of neural cells, cell analysis by flow cytometry, single cell sequencing, or cell transplantation.

Start taking advantage of the following benefits as a result of enhanced debris and RBC removal when using the Adult Brain Dissociation Kit, mouse in combination with the gentleMACS™ Portfolio:

- Enhanced antibody binding during magnetic cell separation
- Increased antibody access leading to more effective immunostaining, Western blotting and flow cytometry
- Better quality cell culture

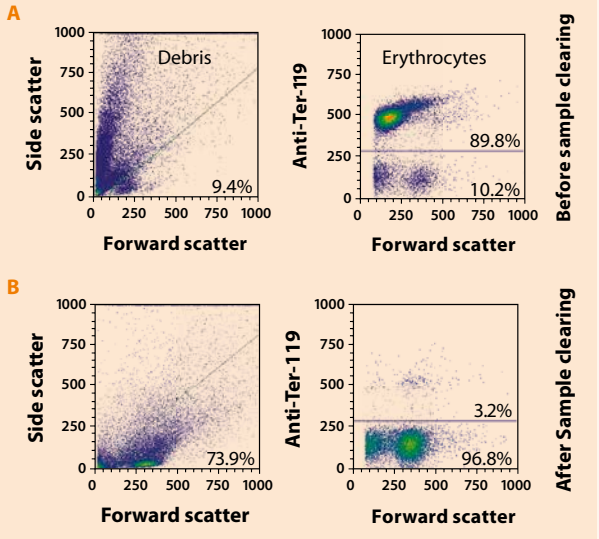


Figure 3: The Adult Brain Dissociation Kit, mouse and rat, yields highly viable and pure neural cells. The cell suspension from adult brain contains a significant amount of cell debris and erythrocytes (A), which hampers subsequent cell isolation, cultivation, and analysis. The Adult Brain Dissociation Kit, mouse and rat optimizes the tissue dissociation process, and after sample clearing yields living cells with much less cell debris and erythrocytes (B).

Automated myelin debris removal

Are you working with up to 24 samples in parallel? Are you frustrated by lots of myelin debris that hampers your downstream applications? Myelin Removal Beads II (MRB II) have been developed for the specific removal of myelin debris from single-cell suspensions (tested for mouse, rat, human, and sheep samples), and are compatible with the MultiMACS Cell24 Separator Plus (fig. 5), which enables the parallel processing of up to 24 samples simultaneously.

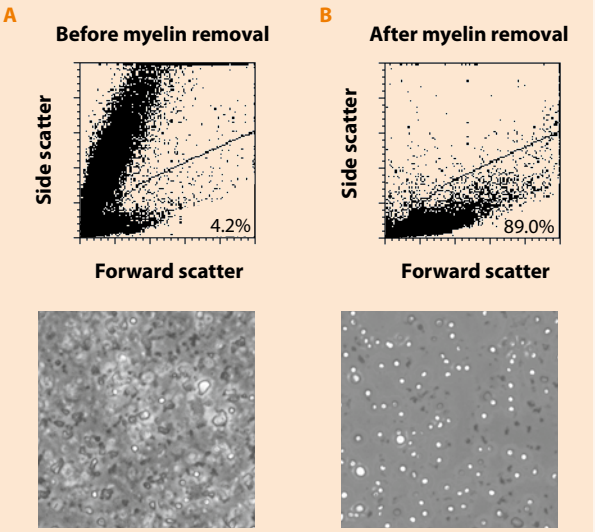


Figure 4: Myelin Removal Beads II effectively remove myelin debris from single-cell suspensions. Postnatal (P22) mouse brains were dissociated using the Neural Tissue Dissociation Kit (P) and the resulting single-cell suspensions analyzed by flow cytometry and microscopy either before (A) or after (B) treatment with Myelin Removal Beads II.

Select the best

Get on the fast track to pure, viable and functional neural cells

Viable neural cells with MACS® Technology

MACS® MicroBead Technology is a proven technology for basic research and clinical applications with more than 20,000 citations around the world. Cell separation with the MACS MicroBead Technology enables:

- **Efficient isolation** of neural cells in as little as 1 hour
- **High recovery** of viable cells with excellent purity
- **Customized cell separation** using your own antibodies of any species, by indirect labeling with anti-IgG/IgM, or anti-Biotin/FITC/PE/APC MACS MicroBeads

Manual separation: MACS MicroBeads, together with MACS Columns and Separators, give you the most flexible and efficient technology for neural cell isolation.

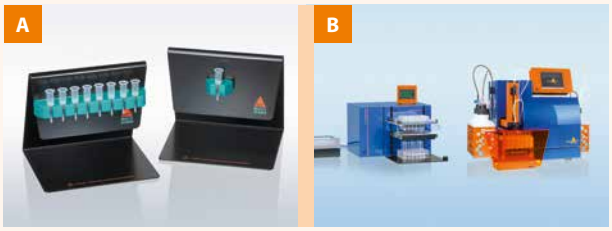


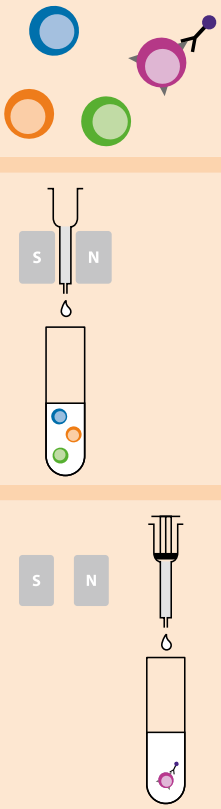
Figure 5: Fast manual separation with the (A) OctoMACS Separator and MS columns on the MACS MultiStand or automated cell separation with the (B) MultiMACS Cell24 Separator Plus and the autoMACS Pro Separator.

Automated separation for multiple cell samples
MACS MicroBeads are compatible with the autoMACS® Pro Separator and the MultiMACS™ Cell24 Separator Plus, enabling automated cell separation or parallel processing of multiple samples for convenience.

Neural cell isolation strategies using MACS® MicroBeads

Positive selection
With positive selection, the desired target cells are magnetically labeled and isolated as the magnetically retained fraction. Examples of neural cell isolation kits where this method is applied include the Anti-ACSA-2 MicroBead Kit, CD140a (PDGFRα) MicroBead Kit, mouse and CD11b (Microglia) MicroBeads, human and mouse.

The 3 easy steps of MACS® MicroBead Technology – Positive selection

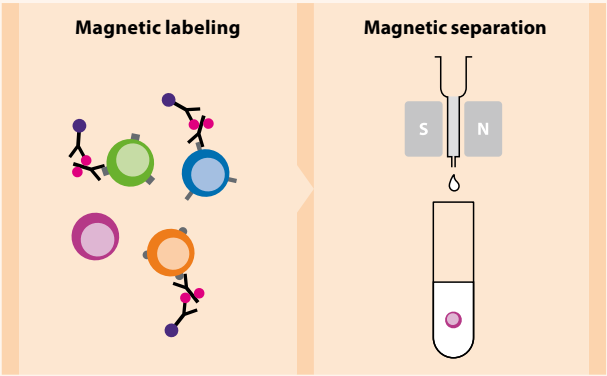


1. Magnetic labeling
Cells of interest are magnetically labeled with MACS MicroBeads.

2. Magnetic separation
Cells are separated in a MACS Column placed in a MACS Separator.
The flow-through fraction can be collected as the negative fraction depleted of the labeled cells.

3. Elution of the labeled cells
The column is removed from the separator. The retained cells are eluted as the enriched, positively selected cell fraction.

Untouched isolation
Untouched isolation, e.g., Neuron Isolation Kit, mouse, is a cell separation strategy during which undesired cells are magnetically labelled and depleted. The non-labeled, untouched cell fraction can freely flow through the column and contains the target cells. See diagram below.



Fast and easy isolation of neonatal neural cells

Do you spend 2 weeks to obtain primary neural cells from neonatal rodent brain using the "shake off" method? With our MACS® Microbead Technology in combination with Neural Tissue Dissociation Kits, you can obtain pure, viable and functional neural cells in an hour!

Isolation of cells from neonatal brain (≤ P7) using Neural Tissue Dissociation Kits (NTDKs)

Cell type	Antigen / product (species)	Dissociation kit
Astrocytes	ACSA-2, mouse	NTDK (P) or (T)
	GLAST, human, mouse, rat	NTDK (T)
Neurons	Neuron Isolation Kit, mouse	NTDK – Postnatal Neurons
	CD171 (L1-CAM), human, mouse	NTDK – Postnatal Neurons
	Retinal Ganglion Cell Isolation Kit, rat	NTDK – Postnatal Neurons
Neuronal precursor cells	PSA-NCAM, human, mouse, rat	NTDK (T)
Oligodendrocyte precursor cells	NG2 (AN2), human, mouse	NTDK (P) or (T)*
	PDGFRα (CD140a), mouse	NTDK (P) or (T)
	A2B5, human, mouse, rat	NTDK (P) or (T)
Pre-mature Oligodendrocytes	O4, human, mouse, rat	NTDK (P) or (T)
Microglia	CD11b, human, mouse	NTDK (P) or (T)
	CD11b/c, rat	NTDK (P) or (T)
Endothelial cells	CD31, mouse, rat	NTDK (P)
Neural precursor cells	Prominin-1, mouse	NTDK (P) or (T)
	CD133, human	NTDK (P) or (T)

* Re-expression of antigen necessary

Miltenyi Biotec offers a variety of MicroBeads for the isolation of different cell types from neural tissue. The Anti-ACSA-2 MicroBead Kit, mouse, for example, uses a novel astrocyte-specific monoclonal antibody developed by Miltenyi Biotec to isolate pure astrocytes (fig. 6). Due to the Papain-resistance of the ACSA-2 epitope the Anti-ACSA-2 MicroBead Kit, mouse can be used to isolate astrocytes from cell suspensions generated from papain-treated brain tissue. Another example includes the isolation of oligodendrocyte precursor cells using the CD140a (PDGFRα) MicroBead Kit, mouse (fig. 7).

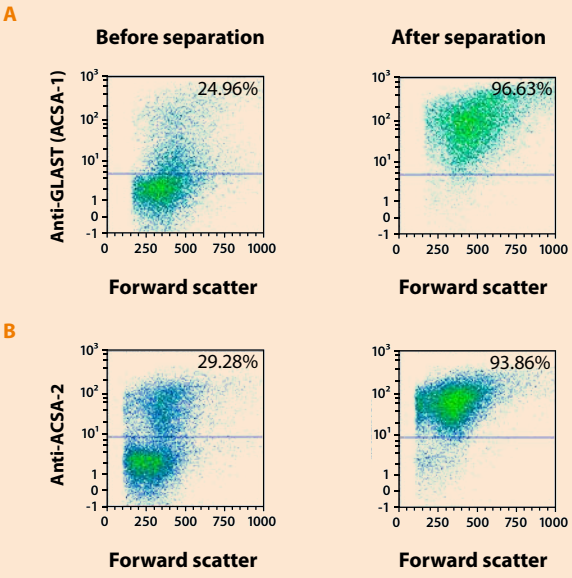


Figure 6: Isolation of neonatal astrocytes with the Anti-GLAST (ACSA-1) MicroBead Kit, human, mouse, rat or the Anti-ACSA-2 MicroBead Kit, mouse. (A, B) Single-cell suspensions from P3 mouse brain tissues were prepared using the Neural Tissue Dissociation Kit (T) (A) or Neural Tissue Dissociation Kit (P) (B). Neonatal astrocytes were isolated from the single-cell suspensions using the Anti-GLAST (ACSA-1) MicroBead Kit, human, mouse, rat (A), or the Anti-ACSA-2 MicroBead Kit, mouse (B). Cells were fluorescently stained with Anti-GLAST antibodies (A), or Anti-ACSA-2 antibodies (B) and analyzed with the MACSQuant Analyzer.

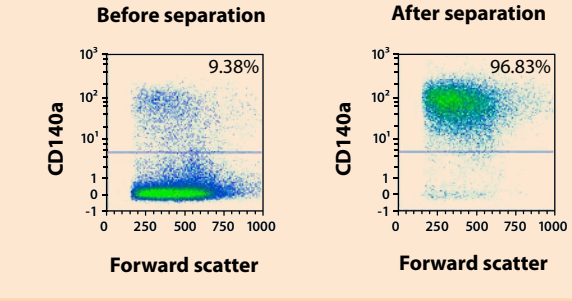


Figure 7: Isolation of oligodendrocyte precursor cells (OPCs) from neonatal mouse brain using the CD140a (PDGFRα) MicroBead Kit, mouse. A single-cell suspension from P2 mouse brain was prepared using the Neural Tissue Dissociation Kit (P) and OPCs were isolated from the single-cell suspension using the CD140a (PDGFRα) MicroBead Kit, mouse. Cells were fluorescently stained with the CD140a antibody, and analyzed with the MACSQuant Analyzer.

Select the best

The isolation of functional adult neural cells has never been easier before

Isolate your adult neural cells in just half a day

Pure, viable, and functional adult neural cells provide an important tool for fully understanding neural biology and disease mechanisms, as well as performing drug screening assays. However, adult neural cells are especially sensitive and fragile, with a tight adhesion of cell bodies and thousands of synapses and fragmentations of axons and dendrites. Due to the low viability of neural cells isolated from adult brain, current primary neural cell isolation and culture are generally limited to embryonic tissue, or early postnatal stages before the formation of synapses.

Our MACS® MicroBead Technology, in combination with the Adult Brain Dissociation Kit provides a gentle technique with minimal manipulation time. It allows you to obtain pure, viable and functional adult neurons, astrocytes, microglia, oligodendrocytes, and endothelial cells in just half a day!

Isolation of cells from adult brain (>P7)

Cell type	Available products
Astrocytes	Anti-ACSA-2 MicroBead Kit, mouse
Neurons	Neuron Isolation Kit, mouse
Pre-mature Oligodendrocytes	Anti-O4 MicroBeads, human, mouse, rat
Microglia	CD11b (Microglia) MicroBeads, human and mouse CD11b/c (Microglia) MicroBeads, rat
Endothelial cells	CD31, mouse

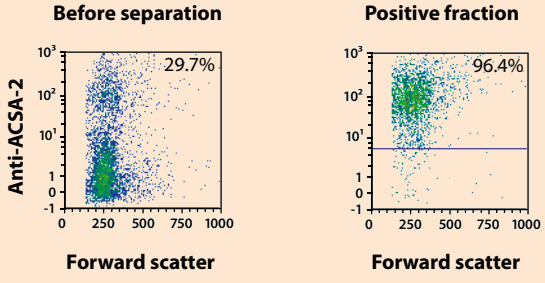


Figure 8: Isolation of adult astrocytes with the Anti-ASCA-2 MicroBead Kit, mouse. A single-cell suspension from 3 months old mouse brain was prepared using the Adult Brain Dissociation Kit, mouse and rat. Adult astrocytes were isolated from the single-cell suspension with the Anti-ACSA-2 MicroBead Kit, mouse. Cells were fluorescently stained with the Anti-ACSA-2 antibody and analyzed by flow cytometry using the MACSQuant Analyzer.

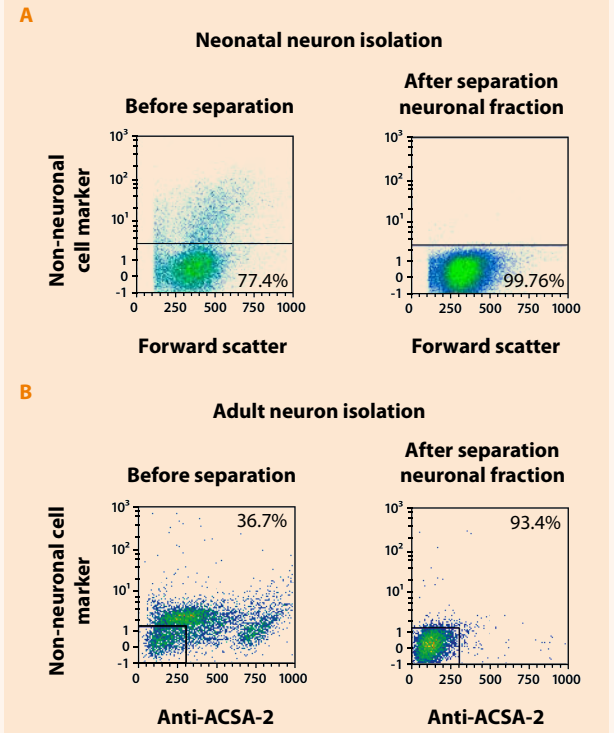


Figure 9: Isolation of neurons from both neonatal and adult mouse brain with the Neuron Isolation Kit, mouse. (A) A single-cell suspension from P1 mouse brain was prepared using the Neural Tissue Dissociation Kit (P). Neonatal neurons were isolated from the single-cell suspension using the Neuron Isolation Kit, mouse. Cells were fluorescently stained with antibodies specific for non-neuronal cell antigens, and analyzed by flow cytometry using the MACSQuant Analyzer. (B) A single-cell suspension from 3 months old mouse brain was prepared using the Adult Brain Dissociation Kit, mouse and rat. Subsequently, adult neurons were isolated from the single-cell suspension with the Neuron Isolation Kit, mouse. Cells were fluorescently stained with antibodies specific for non-neuronal cell marker and the ASCA-2 antigen and analyzed by flow cytometry using the MACSQuant Analyzer.

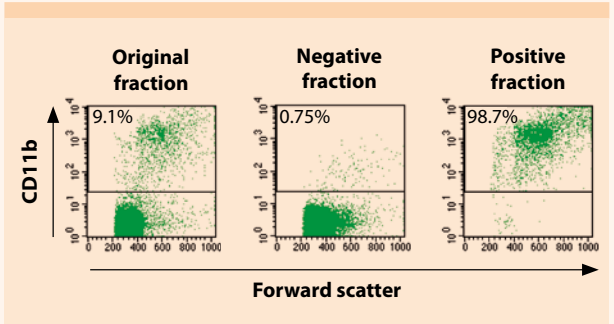


Figure 10: MACS Technology enables isolation of microglia from adult human tissue samples. Enrichment of human microglia from a glioblastoma sample achieved a purity of 99%.

Cell Analysis

Analyze millions of cells in seconds

Flow cytometry proven for neural cells

The attractive alternative to immunohistochemistry and cytochemistry
A flow cytometer will measure millions of cells in seconds and enables the analysis of cell populations using multiple markers for a more accurate assessment of the whole cell population.

Complement to Western blotting
A flow cytometer can analyze proteins with quantitative analysis on a cell-by-cell basis, analyzing up to eight proteins at once rather than one at a time.

Characterization of cells and markers
Flow cytometry enables the exact quantification of cell populations and analysis of overlapping markers. Dot plots depict cells and smaller particles as dots (events) and illustrate marker expression by a shift on the respective axis.

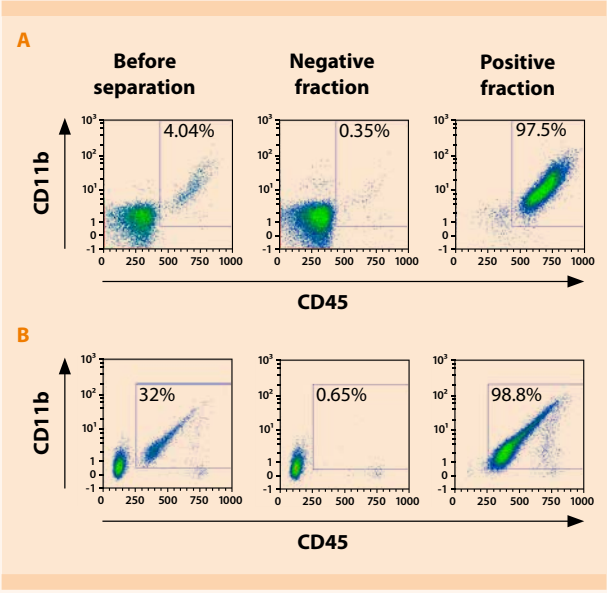


Figure 11: Isolation and characterization of microglia from neonatal and adult mouse brain. Single-cell suspensions were prepared from either P1 mouse brain using the Neural Tissue Dissociation Kit (P) (A) or from 2 months old mouse brain using the Adult Brain Dissociation Kit, mouse and rat (B). Microglia were isolated from the single-cell suspension using CD11b (Microglia) MicroBeads, human and mouse through two MS columns. Cells were fluorescently stained with CD11b and CD45 antibodies, and analyzed by flow cytometry using the MACSQuant Analyzer.

MACSQuant® Analyzers
The MACSQuant® Flow Analyzers are best-in-class benchtop flow cytometers for performing highly sensitive multicolor flow analyses.

- 3 powerful lasers and 10 optical parameters
- Convenient hands-free processing of up to 96 samples
- Automated sample labeling
- Precise and accurate absolute cell counting
- Live, worldwide remote support, 24 hours a day, Monday to Friday

Figure 12: MACSQuant Analyzers enhance your flow cytometry experience by providing high-sensitivity and accurate analyses.

MACS® Antibodies
Large, expanding portfolio of flow-validated antibodies produce brighter staining and even better data, particularly for flow cytometry. Choose from a large panel of antibodies against mouse, rat, and human antigens.

Try our novel astrocyte-specific antibody Anti-ACSA-2 (astrocyte cell surface antigen-2) for your astrocyte study. This monoclonal antibody was developed by Miltenyi Biotec and is highly specific for the astrocyte cell lineage by both immunohistochemistry and flow cytometry.

REAfinity™ Antibodies
These are recombinant antibodies that provide superior lot-to-lot consistency and purity, as compared to mouse or rat monoclonal antibodies. They have been recombinantly engineered to produce highly specific antibodies that require no FcR blocking step. Additionally, they all have the same IgG1 isotype.

Culture is key

Optimized culture conditions for happy neural cells

Best conditions for your neural cells

Get the best results out of your experiments by promoting the growth and differentiation of your cells *in vitro* with our MACS® Cell Culture product line for neuroscience. This product portfolio includes an especially formulated cell culture medium, as well as many cytokines and growth factors.

MACS® NeuroBrew®-21 Supplement and MACS Neuro Medium

- Serum-free supplement and culture medium for astrocytes, neurons, and oligodendrocytes
- Optimized components for the propagation and long-term survival of mouse, rat, or human neural cells

MACS Cytokines and Growth Factors

- Comprehensive range of cytokines for neural cell differentiation and maintenance, including human BDNF, CTNF, EGF, FGF-2, and GDNF
- Superior quality up to GMP-grade
- Standardized lot-specific activity provided
- Convenient bulk fillings or cocktails available

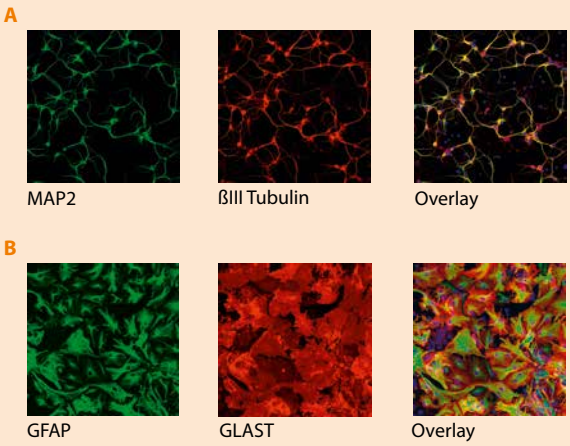


Figure 13: Culture of primary adult mouse neurons and astrocytes. (A) Primary adult mouse neurons were cultured in MACS Neuro Medium, MACS NeuroBrew-21, 1% P/S, 0.5 mM L-glutamine and BDNF (incubation for 3–6 hours with 50 µg/ml BDNF at day 3) on PLL-coated glass coverslips. After 7 days cells were fixed and stained with the neuron-specific antibodies Anti-MAP2 (green) and ßIII Tubulin (red). (B) Primary adult mouse astrocytes were cultured in MACS Neuro Medium, MACS NeuroBrew-21, 1% P/S and 0.5 mM L-glutamine on PLL- and Laminin coated 24-well glass bottom plates. After 7 days cells were fixed and stained with the astrocyte-specific antibodies Anti-GLAST (red) and Anti-GFAP (green).

Culture of iPSC-derived neural cells

StemMACS™ iPS-Brew XF is a xeno-free cell culture medium for the maintenance and expansion of human pluripotent stem cells under feeder-free conditions. It supports rapid adaption of feeder-based cell cultures to a feeder-free environment and is compatible with commonly used cell attachment matrices. Experience robust expansion of human embryonic stem (ES) cells or induced pluripotent stem (iPS) cells over multiple passages while maintaining a pluripotent phenotype as well as pluripotent differentiation potential.

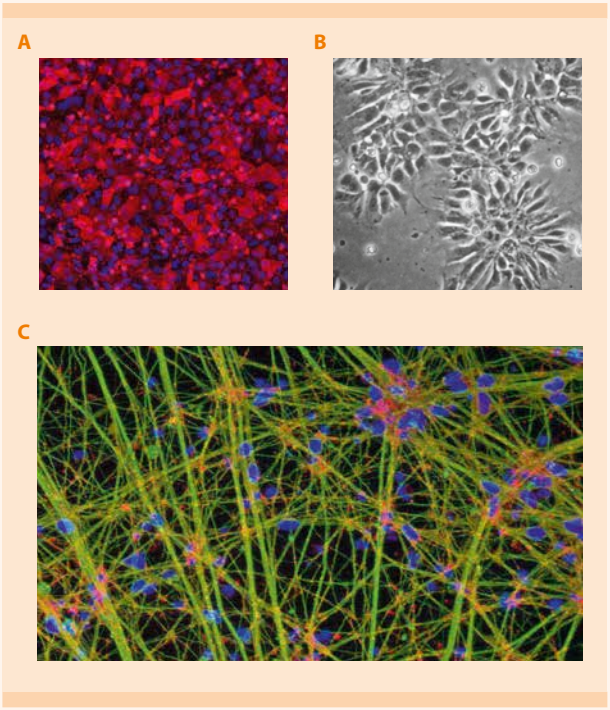


Figure 14: Efficient derivation of human neurons from induced pluripotent stem cells (iPSCs). (A) iPSCs which grow as confluent monolayer in StemMACS iPS-Brew XF stain positive for TRA-1-60. (B) A homogenous neuroepithelial layer is formed after neural induction with MACS Neuro Medium, MACS NeuroBrew-21, StemMACS A83-01, StemMACS LDN-193189, N2-Supplement, and DMEM-F12. (C) Immunofluorescence staining for synaptophysin (red) visualizes synapses on ßIII tubulin (green) positive iPSC derived neurons differentiated for 8 weeks in MACS Neuro Medium, MACS NeuroBrew-21, N2-Supplement, and DMEM-F12 (data courtesy of Dr. Julia Ladewig, Neural Development Group, Institute of Reconstructive Neurobiology, University of Bonn, Germany).

Order information

Place your order by fax, phone, or online!

Sample preparation:

Product	Order no.
gentleMACS Dissociator	130-093-235
gentleMACS Octo Dissociator	130-095-937
gentleMACS Octo Dissociator with Heaters	130-096-427
gentleMACS C Tubes	130-093-237
Neural Tissue Dissociation Kit (P)	130-092-628
Neural Tissue Dissociation Kit (T)	130-003-231
Adult Brain Dissociation Kit (P)	130-107-677
Neural Tissue Dissociation Kit – Postnatal Neurons (P)	130-094-802
Myelin Removal Beads II, human, mouse, rat	130-096-733
Brain Tumor Dissociation Kit (P)	130-095-942
Brain Tumor Dissociation Kit (T)	130-095-939
Neurosphere Dissociation Kit (P)	130-095-943
Neurosphere Dissociation Kit (T)	130-095-944
Embryoid Body Dissociation Kit (human, mouse)	130-096-348

Microglia separation and analysis:

Product	Order no.
CD11b (Microglia) MicroBeads, human and mouse	130-093-634
CD11b/c (Microglia) MicroBeads, rat	130-105-634
CD11b, human and mouse (clone: REA592)	Multiple fluorochromes
CD11b, human (clone: REA713)	Multiple fluorochromes
CD11b, human and mouse (clone: M1/70.15.11.5)	Multiple fluorochromes
CD11b/c, rat (clone: REA325)	Multiple fluorochromes
CD68, human (clone: Y1/82A)	Multiple fluorochromes
CD68, mouse (clone: FA-11)	Multiple fluorochromes
CD68, rat (clone: REA237)	Multiple fluorochromes
Anti-F4/80, mouse (clone: REA126)	Multiple fluorochromes
Anti-MHC Class II, mouse (clone: M5/114.15.2)	Multiple fluorochromes
CD16/CD32 pure, mouse (clone: 93)	130-092-574
CD16/CD32, mouse (clone: 93)	Multiple fluorochromes
CD16/CD32, mouse (clone: REA377)	Multiple fluorochromes
CD86, rat (clone: 24F)	Multiple fluorochromes
CD86, human (clone: FM95)	Multiple fluorochromes
CD86, mouse (clone: PO3.3)	Multiple fluorochromes
MACSPlex Cytokine 12 Kit, human	130-099-169
MACSPlex Cytokine 10 Kit, mouse	130-101-740

Astrocyte separation and analysis:

Product	Order no.
Anti-ACSA-2 MicroBead Kit, mouse	130-097-678
Anti-GLAST(ACSA-1) MicroBead Kit, human, mouse, rat	130-095-826
Anti-ACSA-2 pure, mouse (clone: IH3-18A3)	130-099-138
Anti-GLAST (ACSA-1) pure, human, mouse, rat (clone: ACSA-1)	130-095-822
Anti-GFAP pure, human, mouse, rat (clone: REA335)	130-105-140
Anti-ACSA-2, mouse (clone: IH3-18A3)	Multiple fluorochromes
Anti-GLAST (ACSA-1), human, mouse, rat (clone: ACSA-1)	Multiple fluorochromes
Anti-GFAP, human, mouse, rat (clone: REA335)	Multiple fluorochromes

Neuronal cell separation and analysis:

Product	Order no.
Neuron Isolation Kit (mouse)	130-098-752
CD171(L1CAM) MicroBead Kit (mouse)	130-101-549
Retinal Ganglion Cell Isolation kit (rat)	130-096-209
Anti-PSA-NCAM MicroBeads (human, mouse, rat)	130-092-966
Anti-L1CAM (CD171), mouse (clone: 555)	Multiple fluorochromes
Anti-L1CAM (CD171), human (clone: REA163)	Multiple fluorochromes
Anti-CD271 (NGFR) , mouse and human (clone: REA648)	Multiple fluorochromes
Anti-Trka (NTRK1), human (clone: REA430)	Multiple fluorochromes
Anti-PSA-NCAM, human, mouse, rat (clone: 2-2B)	Multiple fluorochromes
Anti-Pax6, human (clone: REA507)	Multiple fluorochromes

Endothelial cell separation and analysis:

Product	Order no.
CD31-MicroBeads (mouse)	130-097-418
CD45-MicroBeads (mouse)	130-052-301
CD105 (ENG) pure, mouse (clone: MJ7/18)	130-092-926
CD31, mouse (clone: 390)	Multiple fluorochromes
CD31, rat (clone: REA396)	Multiple fluorochromes
CD31, human (clone: REA730)	Multiple fluorochromes
CD31, human (clone: AC128)	Multiple fluorochromes
CD105 (ENG), mouse (clone: MJ7/18)	Multiple fluorochromes
CD105 (ENG), human (clone: 43A4E1)	Multiple fluorochromes

Oligodendrocyte separation and analysis:

Product	Order no.
CD140a (PDGFRα) MicroBead Kit, mouse	130-101-502
Anti-AN2 MicroBeads, human, mouse	130-097-170
Anti-A2B5 MicroBeads, human, mouse, rat	130-093-388
Anti-O4 MicroBeads, human, mouse, rat	130-094-543
Myelin Isolation Beads, human, mouse, rat	130-104-257; 130-104-253
Anti-AN2 pure, human and mouse (clone: 1E6.4)	130-097-455
Anti-A2B5 pure, human, mouse, rat (clone: 105HB29)	130-093-394
Anti-CD140a (PDGFRa), mouse (clone: APA5)	Multiple fluorochromes
Anti-CD140a (PDGFRa), mouse (clone: REA637)	Multiple fluorochromes
Anti- AN2(NG2), human, mouse (clone: 1E6.4)	Multiple fluorochromes
Anti-A2B5, human, mouse, rat (clone: 105HB29)	Multiple fluorochromes
Anti-O4, human, mouse, rat (clone: REA576)	Multiple fluorochromes
Anti-O4, human, mouse, rat (clone: O4)	Multiple fluorochromes

Neural stem cell or precursors separation and analysis:

Product	Order no.
Anti-Prominin-1 MicroBeads, mouse	130-092-333
Indirect CD133 MicroBead Kit (human)	130-091-895
CD133 MicroBead Kit – Tumor Tissue, human	130-100-857
CD133 MicroBead Kit – Hematopoietic Tissue, human	130-100-830
Anti-Prominin-1 pure, mouse (clone: MB9-3G8)	130-092-442
CD133/1 (AC133) pure, human (clone: AC133)	130-108-062
CD133/1 (W6B3C1) pure, human (clone: W6B3C1)	130-092-395
CD133/2 (293C3) pure, human (clone: 293C3)	130-090-851
CD133/2 (AC141) pure, human (clone: AC141)	130-090-423
Anti-Prominin-1, mouse (clone: MB9-3G8)	Multiple fluorochromes
CD133/1 (AC133), human (clone: AC133)	Multiple fluorochromes
CD133/2 (293C3), human (clone: 293C3)	Multiple fluorochromes
Anti-Nestin, mouse and rat (clone: REA575)	Multiple fluorochromes

Cell culture:

Product	Order no.
MACS NeuroBrew-21	130-093-566
MACS NeuroBrew-21 w/o Vitamin A	130-097-263
MACS Neuro Medium	130-093-570
Human BDNF, research grade	130-096-285; 130-093-811
Human NT-3, research grade	Multiple sizes
Human NT-4, research grade	Multiple sizes
Human CNTF, research grade	Multiple sizes
Human GDNF, research grade	Multiple sizes
Human PDGF-AA, research grade	Multiple sizes
Human FGF-2 IS, premium grade	Multiple sizes
Human FGF-2 IS, research grade	Multiple sizes
Human FGF-2, premium grade	Multiple sizes
Human FGF-2, research grade	Multiple sizes
Mouse FGF-2, research grade	Multiple sizes
Human Fibronectin	130-109-392; 130-109-393
Human TNF-α, premium grade	Multiple sizes
Human TNF-α, research grade	Multiple sizes
Mouse TNF-α, premium grade	Multiple sizes
Mouse TNF-α, research grade	Multiple sizes
Human IFN-γ1b, premium grade	Multiple sizes
Human IFN-γ1b, research grade	Multiple sizes
Mouse IFN-γ, research grade	Multiple sizes
Rat IFN-γ, research grade	Multiple sizes
Human GM-CSF, premium grade	Multiple sizes
Human GM-CSF, research grade	Multiple sizes
Mouse GM-CSF, premium grade	Multiple sizes
Mouse GM-CSF, research grade	Multiple sizes
Human IL-4, premium grade	Multiple sizes
Human IL-4, research grade	Multiple sizes
Mouse IL-4, premium grade	Multiple sizes
Mouse IL-4, research grade	Multiple sizes
Rat IL-4, research grade	Multiple sizes
Human IL-13, research grade	Multiple sizes
Mouse IL-13, research grade	Multiple sizes
Imaging Plate CG 1.5 (24 well)	130-098-263
Imaging Plate CG 1.5 (96 well)	130-098-265
Imaging Chamber (1, 2, 4, 8 well)	Multiple sizes

Selected publications on Miltenyi Biotec's neuroscience products

Sample preparation:

Zhang, B. et al. (2013) Functional DNA methylation differences between tissues, cell types, and across individuals discovered using the M&M algorithm. Genome Research, 23(9): 1522-1540.

Hullinger, R. et al. (2016) Increased expression of AT-1/SLC33A1 causes an autistic-like phenotype in mice by affecting dendritic branching and spine formation. Journal of Experimental Medicine, 213: 1267-1284.

Cohen, S. et al. (2016) Adverse Early Life Environment Increases Hippocampal Microglia Abundance in Conjunction with Decreased Neural Stem Cells in Juvenile Mice. International Journal of Developmental Neuroscience, 55: 56-65.

Dinkins, M.B. et al. (2016) Neutral Sphingomyelinase-2 Deficiency Ameliorates Alzheimer's Disease Pathology and Improves Cognition in the 5XFAD Mouse. Journal of Neuroscience, 36(33): 8653-8667.

Cell separation:

Feldmann, M. et al. (2014) Isolating astrocytes and neurons sequentially from postnatal murine brains with a magnetic cell separation technique. Journal of Biological Methods, 1(2):e11.

Hamner, M.A. et al. (2015) Ischemic Preconditioning in White Matter: Magnitude and Mechanism. Journal of Neuroscience, 35(47): 15599-15611.

Mesci, P. et al. (2015) System xC- is a mediator of microglial function and its deletion slows symptoms in amyotrophic lateral sclerosis mice. Brain, 138: 53-68.

Sharma, K. et al. (2015) Cell type- and brain region-resolved mouse brain proteome. Nature Neuroscience, 18(12): 1819-1831.

Holt, L.M. & Olsen, M.L. (2016) Novel Applications of Magnetic Cell Sorting to Analyze Cell-Type Specific Gene and Protein Expression in the Central Nervous System. PloS One, 11(2): e0150290.

a Dzaye, O.D. et al. (2016) Glioma Stem Cells but Not Bulk Glioma Cells Upregulate IL-6 Secretion in Microglia/Brain Macrophages via Toll-like Receptor 4 Signaling. Journal of Neuropathology and Experimental Neurology, 75(5): 429-440.

Grosche, A. et al. (2016) The Proteome of Native Adult Muller Glial Cells From Murine Retina. Molecular & Cellular Proteomics, 15(2): 462-480.

Vincenti, J.E. et al. (2016) Defining the Microglia Response during the Time Course of Chronic Neurodegeneration. Journal of Virology, 90(6): 3003-3017.

Cell analysis:

Ma, D. et al. (2013) The neurotoxic effect of astrocytes activated with toll-like receptor ligands. Journal of Neuroimmunology, 254(1-2): 10-18.

Schreiner, A.E. et al. (2014) Laminar and subcellular heterogeneity of GLAST and GLT-1 immunoreactivity in the developing postnatal mouse hippocampus. Journal of Comparative Neurology, 522(1): 204-224.

Seele, J. et al. (2016) Astrocytes Enhance Streptococcus suis-Glial Cell Interaction in Primary Astrocyte-Microglial Cell Co-Cultures. Pathogens, 5(2).

Fourgeaud, L. et al. (2016) TAM receptors regulate multiple features of microglial physiology. Nature, 532(7598): 240-244.

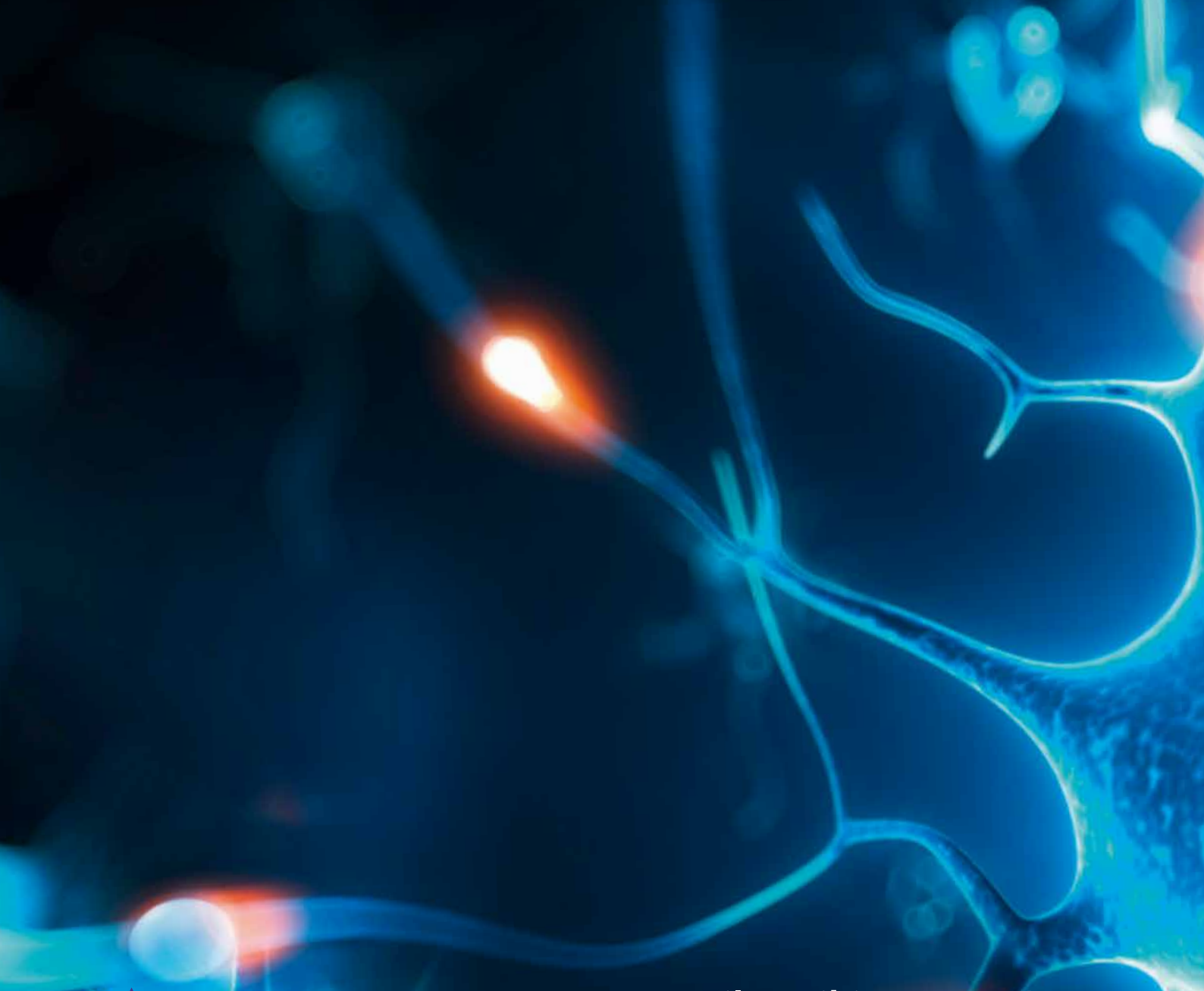
Cell culture:

Wakatsuki, S. et al. (2015) Oxidative stress-dependent phosphorylation activates ZNRF1 to induce neuronal/axonal degeneration. Journal of Cell Biology, 211(4): 881-896.

Islam, M.A. et al. (2015) N-Acetyl-D-Glucosamine Kinase Promotes the Axonal Growth of Developing Neurons. Molecules and cells, 38, 876-885.

Telezhkin, V. et al. (2016) Forced cell cycle exit and modulation of GABAA, CREB, and GSK3beta signaling promote functional maturation of induced pluripotent stem cell-derived neurons. American Journal of Physiology and Cell Physiology, 310(7): C520-541.

Demais, V. et al. (2016) Reversal of Pathologic Lipid Accumulation in NPC1-Deficient Neurons by Drug-Promoted Release of LAMP1-Coated Lamellar Inclusions. Journal of Neuroscience, 36(30): 8012-8025.



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