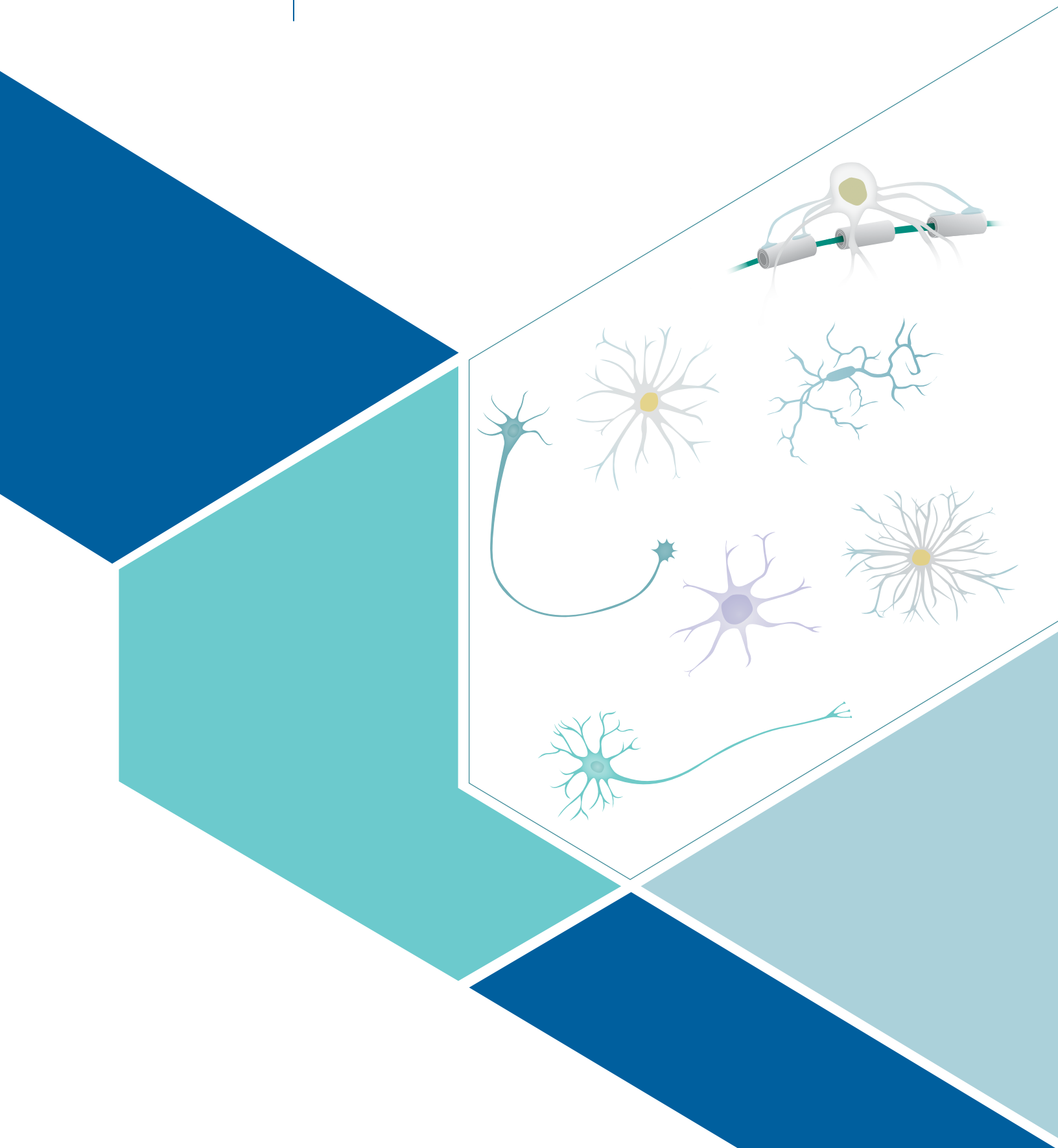
bio-techne®

Neural Cell Markers



Neural Cell Markers

Neurons and glia in neural tissue or cultures are commonly visualized and identified by immunodetection of cell-specific antigenic markers, including transcription factors, enzymes, cytoskeletal proteins, cell surface proteins, and secreted factors. The Bio-Techne brands R&D Systems and Novus Biologicals together offer an unparalleled selection of antibodies directed against these intracellular and cell surface proteins that can be used for the identification and characterization of different neural cell types. R&D Systems also offers a variety of different immunnoassays, including the gold standard Quantikine® ELISA Kits, for detecting secreted molecules. The Bio-Techne brand Tocris offers a novel and exclusive collection of tools, including bioactive small molecules, caged compounds, and fluorescent probes, for the functional identification of neural cells.

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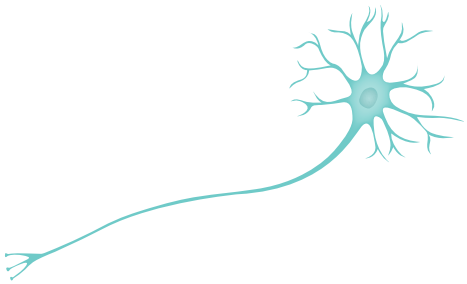
Neuronal Markers

General Markers



Nuclear

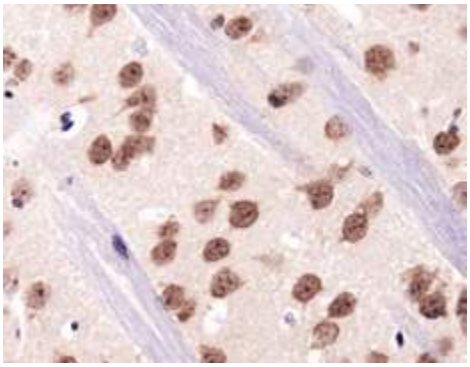
NeuroD1
RBFOX3/NeuN

Cytoplasmic

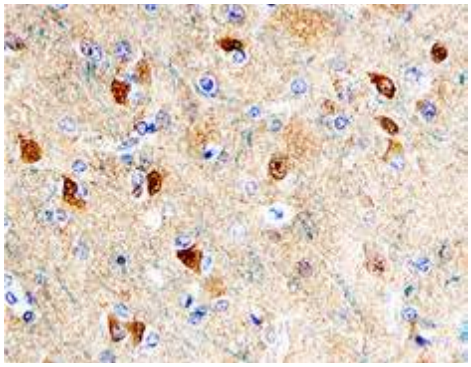
Calbindin D
Doublecortin
Enolase 2/Neuron-Specific Enolase
MAP2
NF-H
NF-L
NF-M
PSD-93
PSD-95
Tau
β-III Tubulin
UCH-L1/PGP9.5

Select R&D Systems® and Novus Biologicals® Antibodies

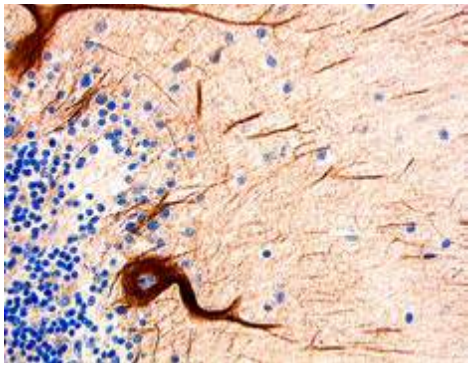
	Marker	Catalog #	Species	Clonality	Applications
◆	Calbindin D	AF3320	H	Poly	WB, IHC
◆	Calbindin D-28K	NBP2-50048	H M R +	Mono	WB, ICC
◆	Doublecortin	NBP1-92684	H M R +	Mono	WB, ICC
◆	Enolase 2/Neuron-Specific Enolase	MAB5169	H	Mono	ICC, IHC, IP
◆		AF5169	H M	Poly	WB, IHC, SW
◆	MAP2	NBP1-92711	H M R +	Mono	WB, ICC
◆		MAB8304	H	Mono	ICC, IHC
◆	NeuroD1	AF2746	H M	Poly	WB, ICC
◆	NF-H	NB300-135	H M R +	Poly	WB, ICC, IHC, ELISA
◆		AF3108	H	Poly	WB, IHC
◆	NF-L	NB300-131	H M R +	Poly	WB, ICC, IHC
◆		MAB2216	H	Mono	WB, IHC
◆	NF-M	NB300-133	H M R +	Poly	WB, ICC, IHC
◆		AF3029	H	Poly	WB, IHC
◆	PSD-93	NB300-546	H M R	Poly	WB, ICC, IHC
◆	PSD-95	NB300-556	H M R +	Mono	WB, ICC, IHC, B/N, ChIP, FC, IP
◆	RBFOX3/NeuN	NBP1-77686	H M R +	Poly	WB, ICC, IHC
◆	Tau	MAB3494	Ms	Mono	WB, IHC
◆		AF3494	Ms	Poly	WB, IHC
◆	β-III Tubulin	NB100-1612	H M R	Poly	WB, ICC, IHC
◆	β-III Tubulin (Clone TuJ-1), Neuron-Specific	MAB1195	All Species	Mono	WB, ICC, SW
◆	UCH-L1/PGP9.5	MAB6007	H	Mono	WB, IHC, IP, SW



NeuN in Mouse Brain. NeuN, also called RBFOX3, was detected in immersion-fixed paraffin-embedded sections of mouse brain using a Rabbit Anti-Human/Mouse/Rat RBFOX3/NeuN Antigen Affinity-Purified Polyclonal Antibody (Novus Biologicals, Catalog # NBP1-77686). The cerebellar tissue was stained using HRP and DAB (brown), and counterstained with hematoxylin (blue).



Enolase 2 in Human Brain. Enolase 2, also called Neuron-Specific Enolase, was detected in immersion-fixed paraffin-embedded sections of human brain using a Human/Mouse Enolase 2/Neuron-Specific Enolase Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF5169). Prior to incubation with the primary antibody, the tissue was subjected to heat-induced epitope retrieval using Antigen Retrieval Reagent-Basic (Catalog # CTS013). The tissue was stained using the Anti-Sheep HRP-DAB Cell & Tissue Staining Kit (Catalog # CTS019; brown) and counterstained with hematoxylin (blue). Specific staining was localized to cytoplasm. All cited reagents are from R&D Systems.



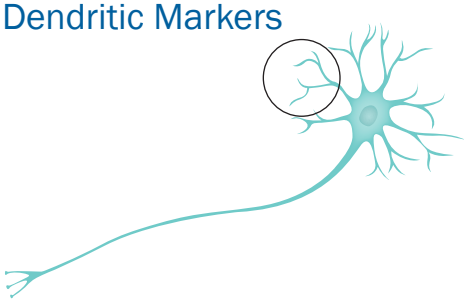
NF-H in Human Brain. Neurofilament (NF)-H was detected in immersion-fixed paraffin-embedded sections of human brain using a Goat Anti-Human NF-H Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF3108). The tissue was stained with the Anti-Goat HRP-DAB Cell & Tissue Staining Kit (Catalog # CTS008; brown) and counterstained with hematoxylin (blue). All cited reagents are from R&D Systems

Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

Dendritic Markers



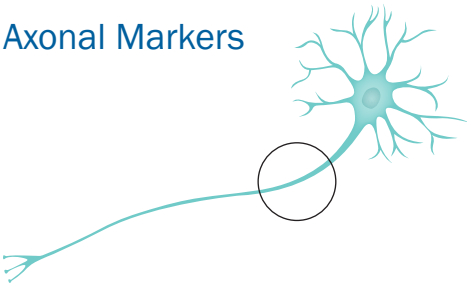
Cytoplasmic

ARC/ARG3.1
Drebrin 1
MAP2
SAP102

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	ARC/ARG3.1	NBP1-56929	H	Poly	WB, IHC
◆	Drebrin 1	NB100-1951	H M R +	Mono	WB, ICC, IHC, IP
◆		AF7739	H	Poly	WB, ICC, SW
◆	MAP2	NBP1-92711	H M R +	Mono	WB, ICC
◆		MAB8304	H	Mono	ICC, IHC
◆	SAP102	NBP1-87691	H M R	Poly	WB, IHC

Axonal Markers



Cytoplasmic

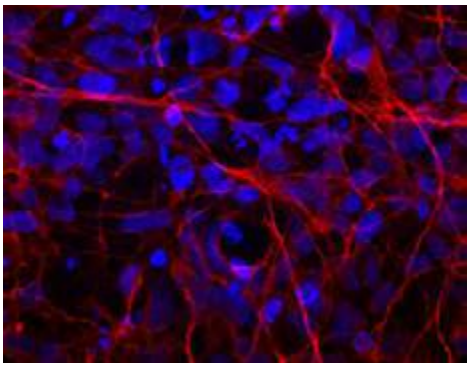
Kinesin 5A
Kinesin 5B
L1CAM
NF-H
NF-L
Peripherin
Tau
β-III Tubulin

Cell Surface

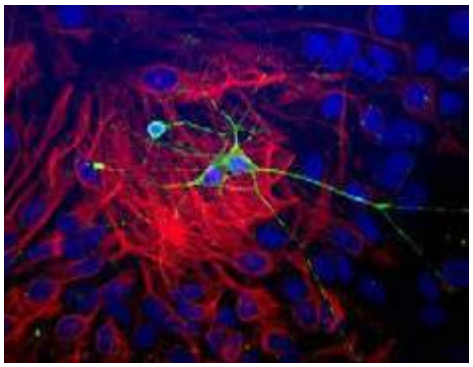
L1CAM

Select R&D Systems® and Novus Biologicals® Antibodies

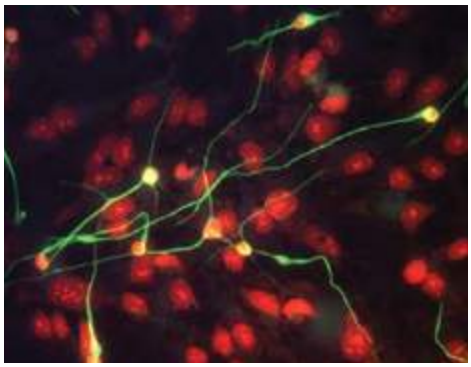
	Marker	Catalog #	Species	Clonality	Applications
◆	Kinesin 5A	NBP1-76816	H M R	Poly	WB, ICC, IHC, ELISA
◆	Kinesin 5B	NBP2-58451	H M R	Poly	ICC, IHC
◆	L1CAM	NB100-2682	H M	Mono	WB, ICC, IHC, CyTOF, ELISA, FC, IP
◆		AF277	H	Poly	WB, IHC
◆	NF-H	NB300-135	H M R +	Poly	WB, ICC, IHC, ELISA
◆		AF3108	H	Poly	WB, IHC
◆	NF-L	NB300-131	H M R +	Poly	WB, ICC, IHC
◆		MAB2216	H	Mono	WB, IHC
◆	Peripherin	NB300-137	H M R +	Poly	WB, ICC, IHC, ELISA
◆	Tau	MAB3494	Ms	Mono	WB, IHC
◆		AF3494	Ms	Poly	WB, IHC
◆	β-III Tubulin	NB100-1612	H M R	Poly	WB, ICC, IHC
◆	β-III Tubulin (Clone TuJ-1), Neuron-Specific	MAB1195	All Species	Mono	WB, ICC, SW



MAP2 in Human Embryonic Stem Cells. Microtubule-Associated Protein 2 (MAP2) was detected in immersion-fixed human embryonic stem cells/neurospheres using a Mouse Anti-Human MAP2 Monoclonal Antibody (Catalog # MAB8304). The cells were stained using the NorthernLights™ 557-Conjugated Donkey Anti-Mouse IgG Secondary Antibody (Catalog # NL007; red) and counterstained with DAPI (blue). All cited reagents are from R&D Systems.

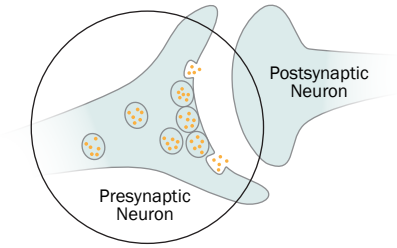


βIII Tubulin in Neonatal Mouse Neurons. βIII Tubulin was detected in fixed dissociated cell cultures of neonatal mouse brain using a Chicken Anti-Human/Mouse/Rat βIII Tubulin Antigen Affinity-Purified Polyclonal Antibody (Novus Biologicals, Catalog # NB100-1612; green). The cells were also stained for GFAP (red) and counterstained with DAPI (blue).



βIII Tubulin in Differentiated Human Neural Progenitor Cells. βIII Tubulin was detected in immersion-fixed differentiated human neural progenitor cells using a Mouse Anti-Neuron-Specific βIII Tubulin (Clone TuJ-1) Monoclonal Antibody (R&D Systems, Catalog # MAB1195). The cells were stained (green) and counterstained (red).

Presynaptic Markers



***Cytoplasmic (plasma membrane)**

GAP-43
SNAP23
SNAP25
Syntaxin 1A

***Cytoplasmic (synaptic membrane)**

SV2A
Synapsin I
Synapsin II
Synaptogyrin 1
Synaptophysin
Synaptotagmin-1
Synaptotagmin-4
VAMP-1
VAMP-2

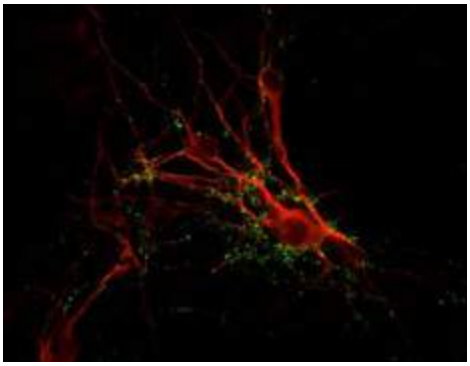
Cell Surface

Neurexin 3/NRXN3
VGLUT1/SLC17A7
VIAAT/SLC32A1/VGAT

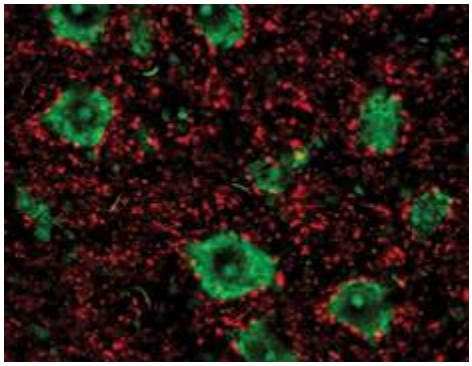
*Cytoplasmic marker is found associated with the membrane of the listed cell structure.

Select R&D Systems® and Novus Biologicals® Antibodies

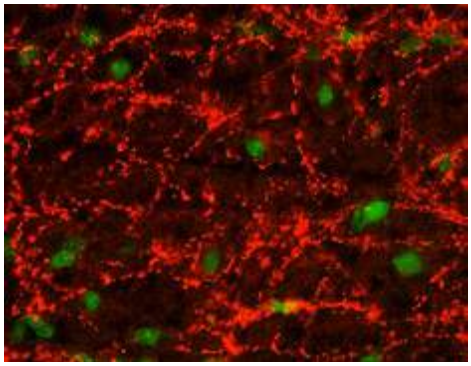
	Marker	Catalog #	Species	Clonality	Applications
◆	GAP-43	NB300-143	H M R +	Poly	WB, ICC, IHC
◆	Neurexin 3/NRXN3	AF5269	H M	Poly	WB, IHC
◆	SNAP23	AF6306	H	Poly	WB, ICC
◆	SNAP25	AF5946	H M R	Poly	WB, ICC
◆	SV2A	NBP1-82964	H M R	Poly	WB, ICC, IHC, IP
◆	Synapsin I	NB300-104	H M R +	Poly	WB, ICC, IHC, IP
◆	Synapsin II	NBP2-58134	H M R	Poly	ICC
◆	Synaptogyrin 1	NBP1-77371	H M R	Poly	WB, ICC, IHC, ELISA
◆	Synaptophysin	NBP2-25170	H M R +	Poly	WB, ICC, IHC
◆		MAB5555	H	Mono	ICC, IHC
◆	Synaptotagmin-1	NBP1-91499	M +	Poly	WB, ICC
◆		MAB43641	R	Mono	WB, IHC, IP
◆	Synaptotagmin-4	NBP2-13408	H	Poly	WB, ICC, IHC
◆	Syntaxin 1A	MAB7237	H	Mono	WB, IHC
◆		AF7237	H M R	Poly	WB, ICC
◆	VAMP-1	AF4828	H M	Poly	WB, IHC
◆	VAMP-2	MAB5136	H M	Mono	WB, IHC
◆	VGLUT1/SLC17A7	NBP2-46627	H M R	Mono	WB, IHC
◆		MAB9054	H	Mono	IHC
◆	VIAAT/SLC32A1/VGAT	NBP2-20857	H M R	Poly	ICC, IHC
◆		MAB6847	H	Mono	ICC



Synapsin I in Rat Caudate Neurons. Synapsin I was detected in fixed rat caudate neurons using a Rabbit Anti-Human/Mouse/Rat Synapsin I Polyclonal Antibody (Novus Biologicals, Catalog # NB300-104). The cells were stained (green) and then counterstained for MAP proteins (red).



Synaptotagmin-1 in Rat Spinal Cord. Synaptotagmin-1 was detected in perfusion-fixed frozen sections of rat spinal cord using a Mouse Anti-Rat Synaptotagmin-1 Monoclonal Antibody (R&D Systems, Catalog # MAB43641). The tissue was stained (red) and counterstained (green).



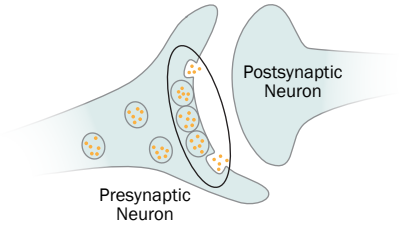
VAMP-1 in Mouse Spinal Cord. Vesicle-Associated Membrane Protein 1 (VAMP-1), also called Synaptobrevin-1, was detected in perfusion-fixed frozen sections of mouse spinal cord using a Goat Anti-Human/Mouse VAMP-1 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF4828). The tissue was stained with the NorthernLights™ 557-Conjugated Donkey Anti-Goat IgG Secondary Antibody (Catalog # NL001; red) and counterstained (green). All cited reagents are from R&D Systems.

Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

Active Zone Markers



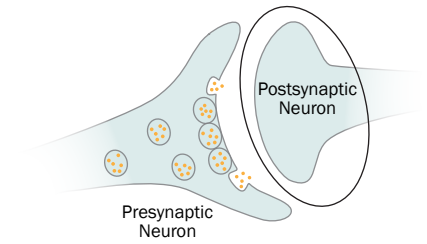
Cytoplasmic

Bassoon
Piccolo

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	Bassoon	NB120-13249	M R	Mono	WB, ICC, IHC, IP
◆	Piccolo	NBP1-49453	M	Mono	WB, ICC, ELISA
◆		AF7935	H	Poly	IHC

Postsynaptic Markers



Cytoplasmic

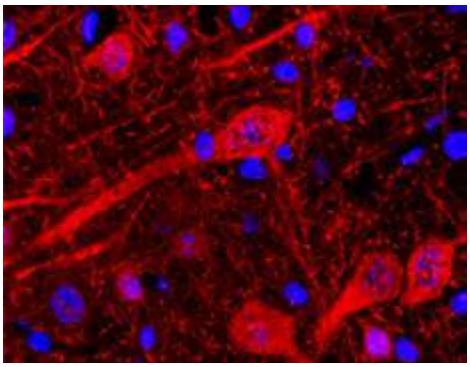
Gephyrin/GPHN
HOMER1
PSD-95
SAP102
Shank1
Shank2
Shank3

Cell Surface

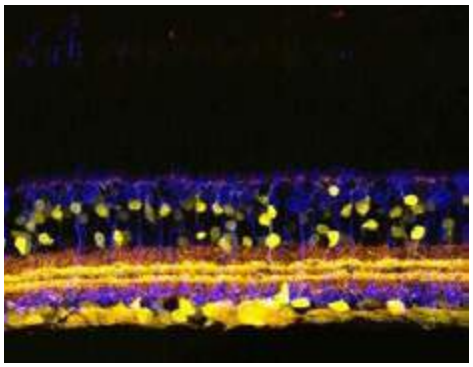
Neuroligin 1/NLGN1
Neuroligin 2/NLGN2

Select R&D Systems® and Novus Biologicals® Antibodies

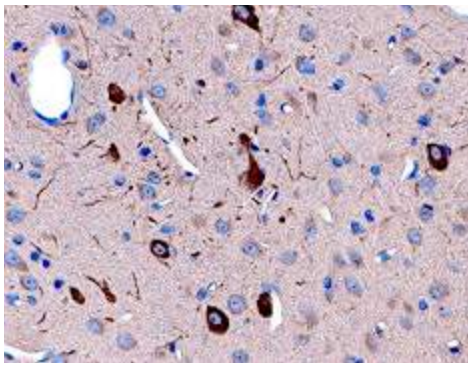
	Marker	Catalog #	Species	Clonality	Applications
◆	Gephyrin/GPHN	MAB7519	H M	Mono	WB, IHC
◆		AF7519	H	Poly	WB, IHC
◆	HOMER1	NBP1-44999	H M R +	Poly	WB, ICC
◆	Neuroligin 1/NLGN1	AF4340	H R	Poly	WB, IHC
◆	Neuroligin 2/NLGN2	NBP2-41299	H M R	Poly	WB, ICC, IHC, ELISA
◆	PSD-95	NB300-556	H M R +	Mono	WB, ICC, IHC, B/N, ChIP, FC, IP
◆	SAP102	NBP1-87691	H M R	Poly	WB, IHC
◆	Shank1	NB300-167	H M R	Poly	WB, ICC, IHC
◆	Shank2	MAB7035	H	Mono	IHC
◆		AF7035	H	Poly	IHC
◆	Shank3	NBP2-42189	H R	Mono	WB, ICC, IHC



NLGN1 in Rat Brain. Neuroligin 1 (NLGN1) was detected in perfusion-fixed frozen sections of rat brain using a Sheep Anti-Rat Neuroligin 1/NLGN1 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF4340). The tissue was stained using the NorthernLights™ 557-Conjugated Donkey Anti-Sheep IgG Secondary Antibody (Catalog # NL010; red) and counterstained with DAPI (blue). Specific staining was localized to neuronal cell bodies, processes, and dendritic spines. All cited reagents are from R&D Systems.

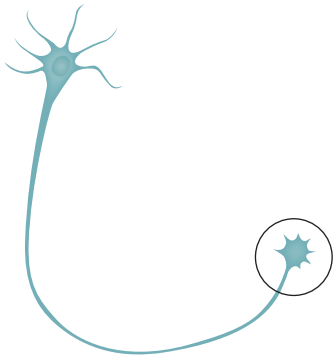


SHANK1 in Mouse Retina. SHANK1 was detected in fixed sections of mouse retina using a Rabbit Anti-Human/Mouse/Rat SHANK1 Antigen Affinity-Purified Polyclonal Antibody (Novus Biological, Catalog # NB300-167; yellow).



Neuropilin-1 in Rat Brain. Neuropilin-1 was detected in immersion-fixed paraffin-embedded sections of rat brain using a Goat Anti-Mouse/Rat Neuropilin-1 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF566) and a Donkey Anti-Goat IgG VisUCyte™ HRP Polymer Antibody (Catalog # VC004). The tissue was stained using DAB (brown) and counterstained with hematoxylin (blue). Specific staining was localized to the cytoplasm in neuronal cell bodies and projections. All cited reagents are from R&D Systems.

Growth Cone Markers



Nuclear

STRAP

Cytoplasmic

Coactosin-like Protein 1/ COTL1
CRMP1
CRMP2
CRMP5
DCLK1
Doublecortin
Drebrin 1
FABP7/B-FABP
FARP2
Growth Cone Antibody (2G13)
STRAP

***Cytoplasmic (plasma membrane)**

BASP1
CAP1
GAP-43
GO Protein α
G Protein α Inhibitor 2
SNAP25

***Cytoplasmic (endoplasmic reticulum)**

RTN1/NSP
SPG3A

***Cytoplasmic (early endosome)**

Syntaxin 7

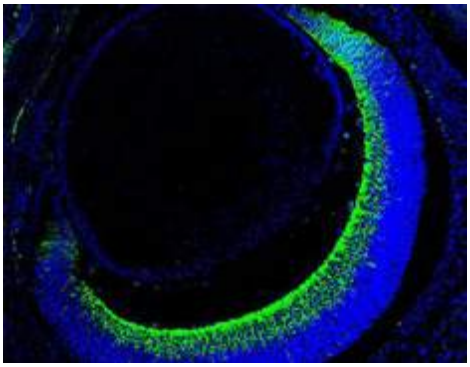
Cell Surface

L1CAM
NCAM-1/CD56
Neuropilin-1

*Cytoplasmic marker is found associated with the membrane of the listed cell structure.

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	BASP1	NBP2-14347	H M R	Poly	ICC, IHC
◆	CAP1	NBP1-31718	H M R +	Poly	WB, IHC
◆	Coactosin-like Protein 1/ COTL1	AF7865	H M R	Poly	WB, ICC
◆	CRMP1	NBP1-76982	H M R	Poly	WB, ICC, IHC, ELISA
◆	CRMP2	NBP1-85448	H M R	Poly	WB, ICC, IHC
◆	CRMP5	NB100-74394	H M R +	Mono	WB, ICC, IHC
◆	DCLK1	NBP1-77127	H M R	Poly	WB, ICC, IHC, ELISA
◆	Doublecortin	NBP1-92684	H M R +	Mono	WB, ICC
◆	Drebrin 1	NB100-1951	H M R +	Mono	WB, ICC, IHC, IP
◆		MAB7739	H	Mono	WB, ICC, SW
◆	FABP7/B-FABP	NBP1-88648	H R	Poly	WB, ICC, IHC
◆		AF3166	H	Poly	WB, IHC, SW
◆	FARP2	NBP1-84680	H	Poly	WB, IHC
◆	GAP-43	NB300-143	H M R +	Poly	WB, ICC, IHC
◆	GO Protein α	NBP2-16703	H M	Poly	WB, ICC, IHC, IP
◆	G Protein α Inhibitor 2	NBP1-89771	H M R	Poly	ICC, IHC
◆	Growth Cone Antibody (Clone 2G13)	NB600-785	M R +	Mono	IHC
◆	L1CAM	NB100-2682	H M	Mono	WB, ICC, IHC, CyTOF, ELISA, FC, IP
◆		AF277	H	Poly	WB, IHC
◆	NCAM-1/CD56	MAB24081	H	Mono	WB, IHC, CyTOF, FC
◆		AF2408	H M	Poly	WB, ICC, CyTOF, FC, SW
◆	Neuropilin-1	AF3870	H	Poly	WB, IHC. B/N, CyTOF, FC
◆		AF566	M R	Poly	WB, IHC, B/N, CyTOF, FC
◆	RTN1	NBP1-97677	H M R +	Mono	WB, ICC, IHC
◆	RTN1-A/NSP	MAB5996	R	Mono	IHC
◆	SNAP25	AF5946	H M R	Poly	WB, ICC
◆	SPG3A	NBP1-90234	H M R	Poly	IHC
◆	STRAP	NBP2-24740	H M +	Poly	WB, IHC
◆	Syntaxin 7	AF5478	H M R	Poly	WB, ICC



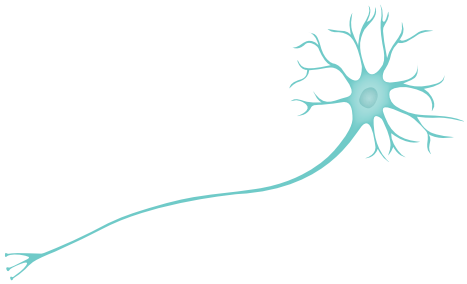
GAP-43 in Embryonic Mouse. GAP-43 was detected in immersion-fixed paraffin-embedded sections of embryonic mouse tissue (E15.5) using a Rabbit Anti-Human/Mouse/Rat Antigen Affinity-Purified Polyclonal Antibody (Novus Biologicals, Catalog # NB300-143). The tissue was stained with an Alexa Fluor® 488-conjugated secondary antibody (green) and counterstained (blue).

Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

Cholinergic Neuron Markers



Cytoplasmic

Acetylcholinesterase/ACHE

Choline Acetyltransferase/ ChAT

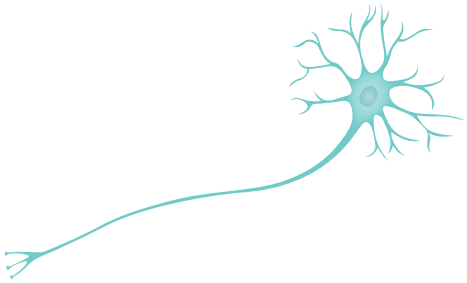
Cell Surface

VAChT/SLC18A3

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	Acetylcholinesterase/ACHE	NBP2-22449	H M R +	Mono	WB, ICC, IHC, ELISA, FC, GS, IP
◆		AF7574	H	Poly	IHC
◆	Choline Acetyltransferase/ ChAT	NBP1-30052	H M R +	Poly	WB, ICC, IHC
◆		AF3447	H	Poly	WB, IHC
◆	VAChT/SLC18A3	NB110-74764	H M R	Poly	WB, IHC

Dopaminergic Neuron Markers



Nuclear

HNF-3β/FoxA2

LMX1b

Nurr1/NGFI-Bβ/NR4A2

Cytoplasmic

Tyrosine Hydroxylase

***Cytoplasmic (storage vesicle)**

Dopamine β-Hydroxylase

Cell Surface

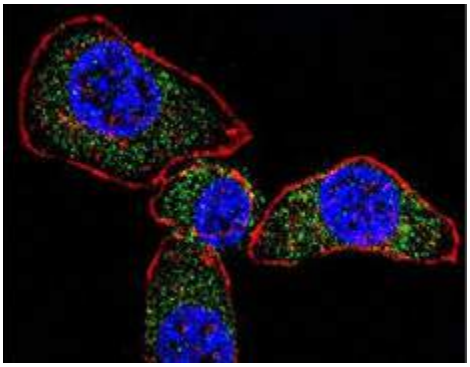
FOLR1

SLC6A3/DAT1

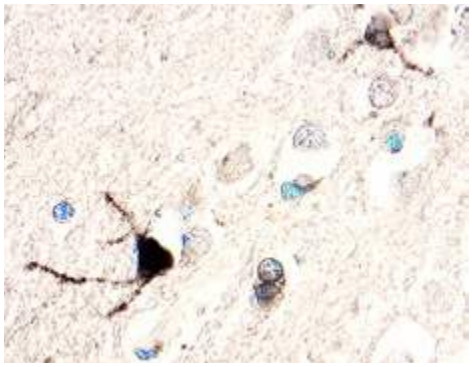
*Cytoplasmic marker is found associated with the membrane of the listed cell structure.

Select R&D Systems® and Novus Biologicals® Antibodies

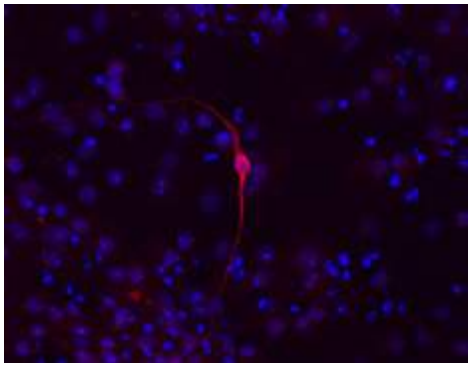
	Marker	Catalog #	Species	Clonality	Applications
◆	Dopamine β-Hydroxylase	NBP1-31386	H M R	Poly	WB, ICC, IHC
◆	FOLR1	MAB5646	H	Mono	WB, ICC, CyTOF, ELISA, FC
◆		AF6936	M	Poly	ICC
◆	HNF-3β/FoxA2	MAB240	H M R	Mono	WB, IHC, FC
◆		AF2400	H	Poly	WB, ICC, ChIP
◆	LMX1b	NBP2-41194	H M R	Poly	WB, ICC, IHC, ELISA
◆	Nurr1/NGFI-Bβ/NR4A2	AF2156	H M	Poly	WB, IHC
◆	SLC6A3/DAT1	NBP2-22164	M R (H -ve)	Mono	WB, ICC, IHC, ELISA, IP
◆	Tyrosine Hydroxylase	NB300-109	H M R +	Poly	WB, ICC, IHC, SW
◆		AF7566	H M R	Poly	WB, ICC, SW



ACHE in U-251 Human Glioblastoma Cells. Acetylcholinesterase (ACHE) was detected in immersion-fixed U-251 human glioblastoma cells using a Mouse Anti-Human/Mouse/Rat Acetylcholinesterase/ACHE (Clone ZR3) Monoclonal Antibody (Novus Biologicals, Catalog # NBP2-22449). The cells were stained using a DyLight® 488-conjugated anti-mouse secondary antibody (green). The cells were also stained for F-Actin (phalloidin; red) and counterstained with DAPI (blue).

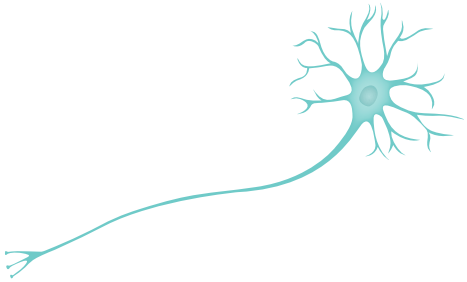


ChAT in Human Brain. Choline Acetyltransferase (ChAT) was detected in immersion-fixed paraffin-embedded sections of human brain using a Goat Anti-Human Choline Acetyltransferase/ChAT Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF3447). The tissue was stained with the Anti-Goat HRP-DAB Cell & Tissue Staining Kit (Catalog # CTS008; brown) and counterstained with hematoxylin (blue). All cited reagents are from R&D Systems.



Tyrosine Hydroxylase in D3 Mouse Embryonic Stem Cells. Tyrosine Hydroxylase was detected in immersion-fixed D3 mouse embryonic stem cells using a Sheep Anti-Human Tyrosine Hydroxylase Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF7566). The cells were differentiated into dopaminergic neurons using the Human/Mouse Dopaminergic Neuron Differentiation Kit (Catalog # SC001B). Cells were stained using the NorthernLights™ 557-Conjugated Donkey Anti-Sheep IgG Secondary Antibody (Catalog # NL010; red) and counterstained with DAPI (blue). Specific staining was localized to dopaminergic neurons. All cited reagents are from R&D Systems.

GABAergic Neuron Markers



Cytoplasmic

GAD1/GAD67
GAD2/GAD65

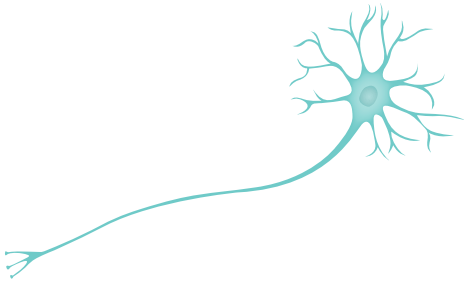
Cell Surface

$GABA_B$ R1
$GABA_B$ R2
GAT-1/SLC6A1
VIAAT/SLC32A1/VGAT

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	$GABA_B$ R1	AF7000	H M R	Poly	WB, IHC
◆		MAB7000	R	Mono	IHC
◆	$GABA_B$ R2 (N-Terminus)	AF1188	R	Poly	WB, IHC
◆	GAD1/GAD67	NBP2-46639	H M R	Mono	WB, IHC
◆		AF2086	H M R	Poly	WB, IHC, SW
◆	GAD2/GAD65	NBP1-33284	H M R +	Poly	WB, ICC, IHC
◆		AF2247	H	Poly	WB, IHC
◆	GAT-1/SLC6A1	NBP1-89802	H M R	Poly	WB, IHC
◆	VIAAT/SLC32A1/VGAT	NBP2-20857	H M R	Poly	ICC, IHC
◆		MAB6847	H	Mono	ICC

Glutamatergic Neuron Markers



Cytoplasmic

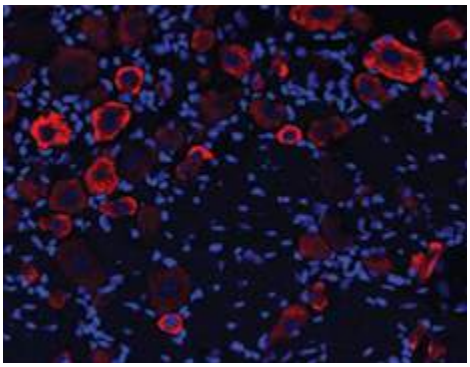
Glutamine Synthetase

Cell Surface

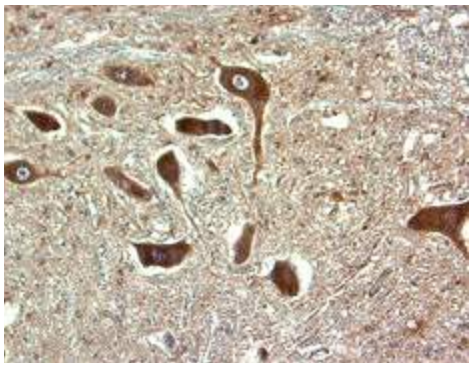
GRIN1/NMDAR1
GRIN2B/NMDAR2B
VGLUT1/SLC17A7
VGLUT2/SLC17A6

Select R&D Systems® and Novus Biologicals® Antibodies

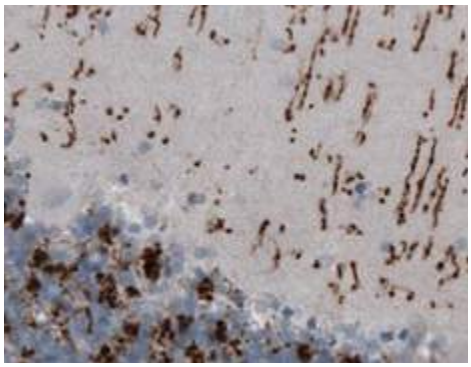
	Marker	Catalog #	Species	Clonality	Applications
◆	Glutamine Synthetase	NB110-41404	H M R +	Poly	WB, IHC
◆	GRIN1/NMDAR1	NB300-118	H M R	Mono	WB, ICC, IHC, IP
◆	GRIN2B/NMDAR2B	NB300-106	H M R	Poly	WB, ICC, IHC, FC, IP
◆	VGLUT1/SLC17A7	NBP2-46627	H M R	Mono	WB, IHC
◆		MAB9054	H	Mono	IHC
◆	VGLUT2/SLC17A6	NBP2-46641	H M R	Mono	IHC



$GABA_B$ R1 in Rat DRG. $GABA_B$ R1 was detected in perfusion-fixed frozen sections of rat dorsal root ganglia (DRG) using a Sheep Anti-Human/Mouse/Rat $GABA_B$ R1 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF7000). The tissue was stained using the NorthernLights™ 557-Conjugated Donkey Anti-Sheep IgG Secondary Antibody (Catalog # NL010; red) and counterstained with DAPI (blue). Specific staining was localized to the cell bodies of DRG neurons. All cited reagents are from R&D Systems.



GAD1 in Human Spinal Cord. GAD1, also called GAD67, was detected in immersion-fixed paraffin-embedded sections of human spinal cord using a Goat Anti-Human/Mouse/Rat GAD1/GAD67 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF2086). The tissue was stained with the Anti-Goat HRP-DAB Cell & Tissue Staining Kit (Catalog # CTS008; brown) and counterstained with hematoxylin (blue). All cited reagents are from R&D Systems.



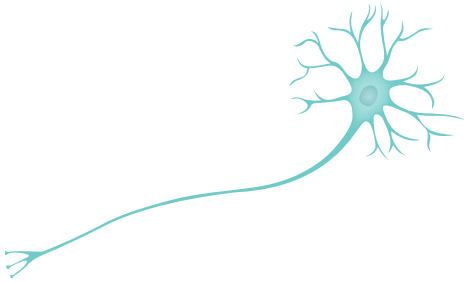
VGLUT2 in Human Brain. The Vesicular Glutamate Transporter 2 (VGLUT2) was detected in immersion-fixed paraffin-embedded sections of human brain (cerebellum) using a Mouse Anti-Human/Mouse/Rat VGLUT2 Monoclonal Antibody (Novus Biologicals, Catalog # NBP2-46641). The cerebellar tissue was stained using HRP and DAB (brown) and counterstained with hematoxylin (blue). Specific staining was localized to glutamatergic synapses in the molecular and granular layers of the cerebellum.

Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

Glycinergic Neuron Markers

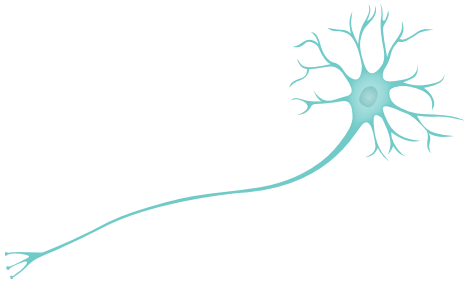


Cell Surface
VIAAT/SLC32A1/VGAT

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	VIAAT/SLC32A1/VGAT	NBP2-20857	H M R	Poly	ICC, IHC
◆		MAB6847	H	Mono	ICC

Serotonergic Neuron Markers



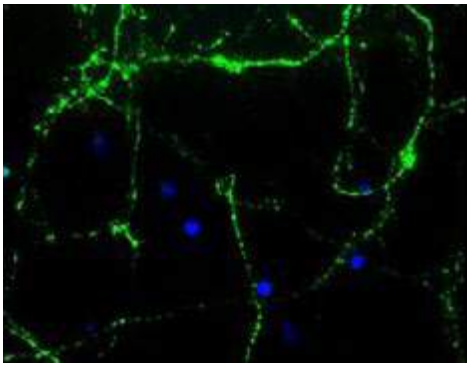
Nuclear
Pet1

Cytoplasmic
Dopa Decarboxylase/DDC
Tryptophan Hydroxylase/ TPH-1

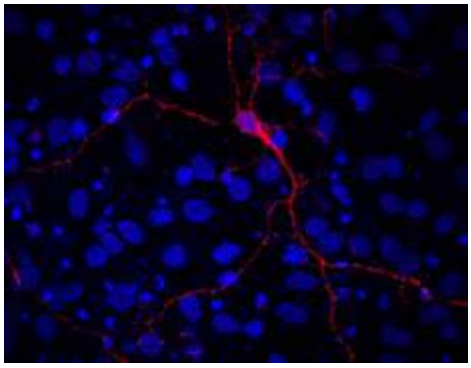
Cell Surface
SLC6A4/5-HTTLPR/ Serotonin Transporter
VMAT2

Select R&D Systems® and Novus Biologicals® Antibodies

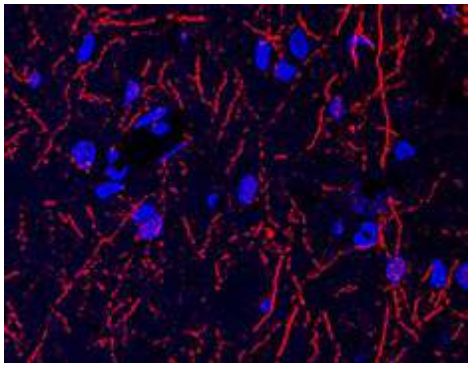
	Marker	Catalog #	Species	Clonality	Applications
◆	Dopa Decarboxylase/DCC	AF3564	H M R	Poly	WB, ICC, IHC, IP
◆	Pet1	NBP2-55967	H M R	Poly	ICC
◆	SLC6A44/5-HTTLPR/ Serotonin Transporter	NBP1-78989	M R	Mono	IHC, (WB–ve)
◆	Tryptophan Hydroxylase 1/ TPH-1	NB300-176	H M R (Rb -ve)	Poly	WB, IHC
◆		AF5276	H	Poly	WB, IHC
◆	VMAT2	NB110-68123	H M R +	Poly	WB, IHC
◆		MAB8327	H	Mono	WB, IHC, CyTOF, FC



VIAAT in Rat Cortical Neurons. Vesicular Inhibitory Amino Acid Transporter (VIAAT), also called SLC32A1 and VGAT, was detected in immersion-fixed rat cortical neurons (E18) using a Rabbit Anti-Human/Mouse/Rat VIAAT/SLC32A1/ VGAT Antigen Affinity-Purified Polyclonal Antibody (Novus Biologicals, Catalog # NBP2-20857; green). The cells were counterstained with DAPI (blue).



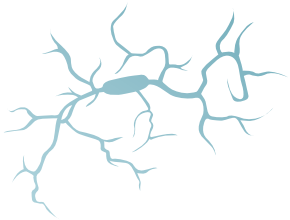
VIAAT in Rat Cortical Stem Cells. VIAAT was detected in immersion-fixed 7-day differentiated rat cortical stem cells using a Mouse Anti-Human VIAAT/SLC32A1 Monoclonal Antibody (Catalog # MAB6847). The cells were stained using the NorthernLights™ 557-Conjugated Donkey Anti-Mouse IgG Secondary Antibody (Catalog # NL007; red) and counterstained with DAPI (blue). Specific staining was localized to neurons. All cited reagents are from R&D Systems.



TPH-1 in Rat Brain. Tryptophan Hydroxylase 1 (TPH-1) was detected in perfusion-fixed frozen sections of rat brain using a Goat Anti-Human Tryptophan Hydroxylase 1/TPH 1 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF5276). The tissue was stained using the NorthernLights™ 557-Conjugated Donkey Anti-Goat IgG Secondary Antibody (Catalog # NL001; red) and counterstained with DAPI (blue). Specific staining was localized to neurons. All cited reagents are from R&D Systems.

Microglia Markers

Steady-State Microglia Markers



Cytoplasmic

AIF-1/Iba1

Cell Surface

CD11b/Integrin αM
CD45^{low}
CX3CR1
F4/80/EMR1
Fcγ RI/CD64
FCRL4/FcRH4
M-CSF R/CD115
Mer
P2Y12/P2RY12
Siglec-H
TMEM119

Secreted

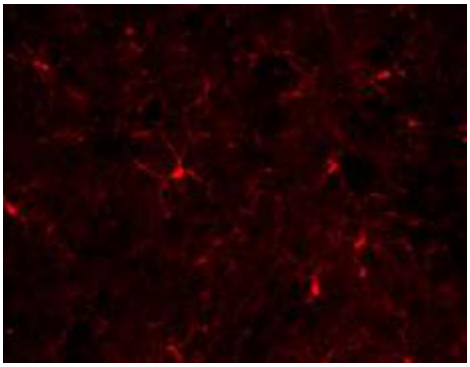
BDNF
IGF-I

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	AIF-1/Iba1	NB100-1028	H M R +	Poly	WB, ICC, IHC, PEP-ELISA
◆		MAB7308	H	Mono	IHC
◆	CD11b/Integrin αM	NB110-89474	H M R +	Poly	WB, ICC, IHC, FC, SW
◆		MAB16991	H +	Mono	ICC, IHC, CyTOF, FC
◆		MAB1124	M	Mono	ICC, IHC, CyTOF, FC, IP
◆	CD45	NB100-77417	M	Mono	WB, ICC, IHC, CyTOF, FA, FC, IP, IV
◆		MAB1430	H	Mono	ICC, CyTOF, FC
◆		AF114	M	Poly	WB, ICC, CyTOF, FC
◆	CX3CR1	NBP1-76949	H M R	Poly	ICC, IHC, ELISA, FC
◆	F4/80/EMR1	NB600-404	H M	Mono	WB, ICC, IHC, EM, FC, IP, RI
◆	Fcγ RI/CD64	MAB1257	H	Mono	ICC, CyTOF, FC
◆		MAB20741	M	Mono	CyTOF, FC
◆	FCRL4/FcRH4	AF2426	H	Poly	WB, IHC
◆	M-CSF R/CD115	NBP2-37289	H	Mono	WB, IHC, CyTOF, ELISA, FC
◆		MAB3818	M	Mono	CyTOF, FC
◆		AF3818	M	Poly	ICC, WB
◆	Mer	NBP2-58025	H	Poly	ICC
◆		MAB591	M	Mono	WB, ICC
◆	P2Y12/P2RY12	NBP1-78249	H R +	Poly	WB, ICC, IHC, DB, ELISA, IP
◆	Siglec-H	NBP2-27061	M	Mono	WB, IHC, CyTOF, FC
◆	TMEM119	NBP2-30551	H	Poly	IHC

R&D Systems® Quantikine® ELISA Kits

Marker	Catalog #	Species
BDNF (Free)	DBD00	H
BDNF (Total)	DBNT00	H M R +
IGF-I	DG100	H
	MG100	M R
IGF-I (Free)	DFG100	H



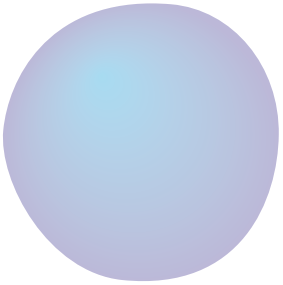
AIF-1/Iba1 in Mouse Spinal Cord. AIF-1/Iba1 was detected in perfusion-fixed sections of mouse spinal cord using a Goat Anti-Human/Mouse/Rat AIF-1/Iba1 Polyclonal Antibody (Novus Biologicals, Catalog # NB100-1028). The tissue was stained using an Alexa Fluor® 555-conjugated donkey anti-goat IgG secondary antibody (red).

Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

M1 Microglia Markers



Cytoplasmic

iNOS

***Cytoplasmic (endoplasmic reticulum)**

COX-2

Cell Surface

B7-1/CD80
B7-2/CD86
CD11b/Integrin αM
CD36/SR-B3
CD40/TNFRSF5
CD68/SR-D1
Fcγ RII/CD32
Fcγ RIII/CD16
HLA-DR
MHC Class II

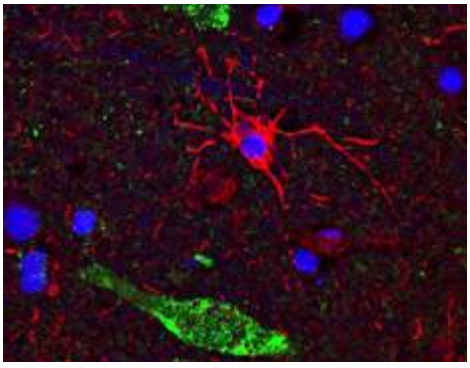
Secreted

CCL2/JE/MCP-1
CCL4/MIP-1β
CXCL1/GROα/KC/CINC-1
CXCL10/IP-10
IFN-γ
IL-1β/IL-1F2
IL-6
IL-12
IL-17/IL-17A
IL-18/IL-1F4
Nitric Oxide
TNF-α

*Cytoplasmic marker is found associated with the membrane of the listed cell structure.

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	B7-1/CD80	MAB140	H	Mono	IHC, B/N, CyTOF, ELISA, FC
◆		AF740	M	Poly	WB, ICC, B/N, CyTOF, ELISA, FC
◆	B7-2/CD86	AF-141-NA	H	Poly	WB, IHC, B/N, CyTOF, FC
◆		MAB741	M	Mono	WB, B/N, CyTOF, FC
◆		AF1340	R	Poly	WB, IHC, CyTOF, ELISA, FC
◆	CD11b/Integrin αM	NB110-89474	H M R +	Poly	WB, ICC, IHC, FC, SW
◆		MAB16991	H +	Mono	ICC, IHC, CyTOF, FC
◆		MAB1124	M	Mono	ICC, IHC, CyTOF, FC, IP
◆	CD36/SR-B3	NB400-144	H M R +	Poly	WB, ICC, IHC
◆		MAB19551	H	Mono	ICC, CyTOF, FC
◆		MAB25191	M	Mono	IHC, CyTOF, FC
◆	CD40/TNFRSF5	MAB6321	H	Mono	ICC, CyTOF, FC, FA
◆		MAB440	M	Mono	CyTOF, FC, FA, IP
◆		AF440	M	Poly	WB, ICC
◆	CD68/SR-D1	NB100-683	H M R	Mono	WB, ICC, IHC, FC, IP
◆		MAB20401	H	Mono	ICC, CyTOF, FC
◆	COX-2	NB100-689	H M R	Poly	WB, IHC, SW
◆		AF4198	H M	Poly	WB, ICC, CyTOF, FC
◆	HLA-DR	NB100-77855	H +	Mono	WB, IHC, CyTOF, FC, IP
◆		MAB4869	M	Mono	CyTOF, FC
◆	Fcγ RII/CD32	AF1330	H	Poly	WB, ICC, B/N, CyTOF, FC
◆		AF1460	M	Poly	WB, ICC
◆	Fcγ RIII/CD16	NBP2-42228	H M R	Mono	ICC, IHC, ELISA, FC
◆		AF1960	M	Poly	WB, ICC, B/N
◆	Fcγ RII/RIII (CD32/CD16)	MAB1460	M	Mono	WB, CyTOF, FC
◆		AF1460	M	Poly	ICC, WB
◆	MHC Class II	NBP2-34848	H +	Mono	IHC, FC, IP
◆		NBP1-43312	M	Mono	WB, IHC, FC, IP
◆		NB200-418	R	Mono	WB, ICC, IHC, CyTOF, FC, IP
◆	iNOS	NB300-605	H M R	Poly	WB, ICC, IHC
◆		MAB9502	H M R	Mono	WB, IHC



CD11b/Integrin αM in Human Brain. CD11b/Integrin αM was detected in immersion-fixed paraffin-embedded tissue sections of human brain using a Mouse Anti-Human/Equine CD11b/Integrin αM Monoclonal Antibody (Clone 238446; Catalog # MAB16991). The tissue was subjected to antigen retrieval using Antigen Retrieval Reagent-Basic (Catalog # CTS013) and stained using the NorthernLights™ 557-Conjugated Donkey Anti-Mouse IgG Secondary Antibody (Catalog # NL007; red). Nuclei were counterstained with DAPI (blue). Specific staining was localized to the cytoplasm of microglia (red color). The tissue was double-stained with a Sheep Anti-Human/Mouse/Rat Neurogranin Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF7947) and an Alexa Fluor® 488-conjugated donkey anti-sheep IgG secondary antibody (green).

R&D Systems® Quantikine® ELISA Kits

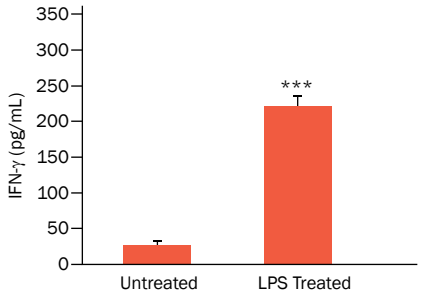
Marker	Catalog #	Species
CCL2/JE/MCP-1	DCP00	H
	MJE00	M R
CCL4/MIP-1β	DMB00	H
	MMB00	M
CXCL1/GROα/KC/CINC-1	DGR00B	H
	MKC00B	M
	RCN100	R
CXCL10/IP-10	DIP100	H
IFN-γ	DIF50	H
	MIF00	M
	RIF00	R
IL-1β/IL-1F2	DLB50	H
	MLB00C	M
	RLB00	R

Marker	Catalog #	Species
IL-1β/IL-1F2 (Pro form)	DLBP00	H
IL-6	D6050	H
	M6000B	M
	R6000B	R
IL-12 p70	D1200	H
	M1270	M
IL-12/IL-23 p40 Homodimer	DP400	H
IL-12/IL-23 p40 (Allele-Specific)	M1240	M
IL-12/IL-23 p40 (Non Allele-Specific)	MP400	M
IL-17/IL-17A	D1700	H
	M1700	M
IL-18/IL-1F4	DL180	H

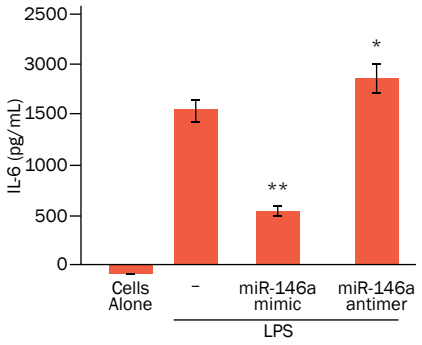
Marker	Catalog #	Species
TNF-α	DTA00C	H
	MTA00B	M
	RTA00	R

R&D Systems® Parameter™ ELISA Kits

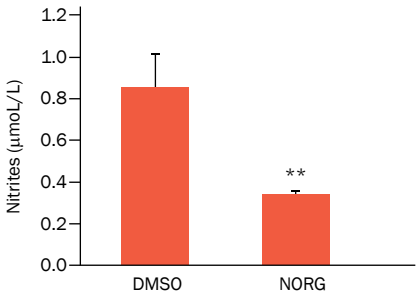
Marker	Catalog #	Species
Nitric Oxide (Total)	KGE001	Ms



Detection of IFN-γ in LPS-Treated Rat Microglia Cultures. Microglia were isolated from newborn rat brains. The cultured cells were treated with 500 ng/mL LPS for 24 hours, and IFN-γ levels were measured in the conditioned medium using the Rat IFN-γ Quantikine® ELISA Kit (R&D Systems, Catalog # RIF00). ****P<0.001* LPS Treated versus untreated. *Graph adapted from Mäkelä, J. et al. (2010) PLoS One* **5**:*e11091.*



Detection of IL-6 in the Supernatant of EOC13.31 Cell Cultures. The EOC 13.31 mouse microglia cell line was transfected with miR-146a mimics to over-express miR-146a (miR-146a mimic) or a scrambled control RNA (miR-146a antimer). Transfected and non-transfected cells were stimulated with 10 ng/mL LPS for 24 hours. Levels of IL-6 were measured in the cell culture supernatant of treated and untreated (Cells Alone) cells using the Mouse IL-6 Quantikine® ELISA Kit (R&D Systems, Catalog # M6000B). **P<0.01* miR-146a antimer, LPS treated versus non-transfected, LPS treated. ***P<0.001* miR-146a mimic versus miR-146a antimer. *Graph adapted from Saba, R. et al. (2012) PLoS One* **7**:**e**30832.



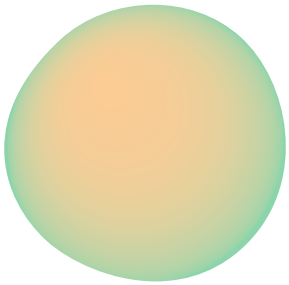
Detection of Nitrites in the Media of Norgestrel-Treated rd10 Mouse Microglia. Microglia were isolated from retinas of rd10 mice (P16), a mouse model of retinitis pigmentosa. Microglia were treated with 20 µM of the synthetic progesterone analogue Norgestrel (NORG) or DMSO for 24 hours, and nitrite levels were measured in the culture media using the Total Nitric Oxide and Nitrate/Nitrite Parameter™ Assay Kit (R&D Systems, Catalog # KGE001). *Graph adapted from Roche, S.L. et al. (2016) PLoS One 11:e0165197.*

Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

M-2 Microglia Markers



Nuclear

PPARγ/NR1C3

Cytoplasmic

Arginase 1/ARG1
Transglutaminase 2/TGM2

Cell Surface

CD163
CLEC10A/CD301
DC-SIGN/CD209
HLA-DR
MHC Class II
MMR/CD206
Siglec-3/CD33
SR-AI
TREM-2

Secreted

BDNF
FIZZ1/RELMα
IGF-I
IL-1ra/IL-1F3
IL-4
IL-10
IL-13
TGF-β
YM1/Chitinase 2-like 3

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	Arginase 1/ARG1	NBP1-32731	H M R +	Poly	WB, ICC, IHC, FC, IP
◆	CD163	NBP1-30148	H	Mono	ICC, IHC
◆		MAB1607	H	Mono	WB, CyTOF, FC
◆	CLEC10A/CD301	NBP1-84591	H	Poly	WB, IHC
◆		NB100-64874	M	Mono	ICC, IHC, FC
◆	DC-SIGN/CD209	MAB161	H	Mono	WB, ICC, IHC, B/N, CyTOF, FC
◆		MAB8345	M	Mono	CyTOF, FC
◆	FIZZ1/RELMα	NBP2-29355	M	Poly	WB, ICC, IHC, FC
◆		MAB1523	M	Mono	WB, ICC
◆	HLA-DR	NB100-77855	H +	Mono	WB, IHC, CyTOF, FC, IP
◆		MAB4869	M	Mono	CyTOF, FC
◆	MHC Class II	NBP2-34848	H +	Mono	IHC, FC, IP
◆		NBP1-43312	M	Mono	WB, IHC, FC, IP
◆		NB200-418	R	Mono	WB, ICC, IHC, CyTOF, FC, IP
◆	MMR/CD206	MAB25342	H	Mono	WB, CyTOF, FC
◆		AF2534	H	Poly	WB, ICC
◆		AF2535	M	Poly	WB, IHC, CyTOF, FC
◆	PPARγ/NR1C3	NB120-19481	H M R +	Poly	WB, IHC
◆	Siglec-3/CD33	NBP2-29619	H	Poly	WB, IHC, ELISA, FC
◆	SR-AI/MSR	NBP1-00092	H M R +	Poly	WB, ICC, IHC
◆	Transglutaminase 2/TGM2	NBP2-20698	H M	Poly	WB, ICC, IHC
◆	TREM-2	AF1828	H	Poly	WB, ICC, CyTOF, FC
◆		AF1729	M	Poly	WB, ICC

R&D Systems® Quantikine® ELISA Kits

Marker	Catalog #	Species
BDNF (Free)	DBD00	H
BDNF (Total)	DBNT00	H M R +
IGF-I	DG100	H
	MG100	M R
IGF-I (Free)	DFG100	H
IL-1ra/IL-1F3	DRA00B	H
	MRA00	M
IL-4	D4050	H
	M4000B	M
	R4000	R

Marker	Catalog #	Species
IL-10	D1000B	H
	M1000B	M
	R1000	R
IL-13	D1300B	H
	M1300CB	M
TGF-β1	DB100B	H
	MB100B	M R +
TGF-β2	DB250	H
	MB200	M R +

R&D Systems® DuoSet® Development Systems

Marker	Catalog #	Species
YM1/Chitinase 3-like 3	DY2446	M

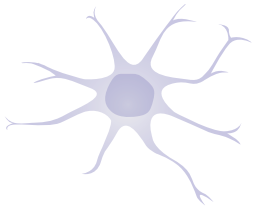
Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

Astrocyte Markers

General Markers



Nuclear

Galectin-3
HES-1
Notch-1
SOX9
Survivin

Cytoplasmic

ALDH1L1
Aldolase C
Astrocytomas
GFAP
Glutamine Synthetase
NDRG2
Notch-1
S100B
Survivin

***Cytoplasmic (plasma membrane)**

GAP-43

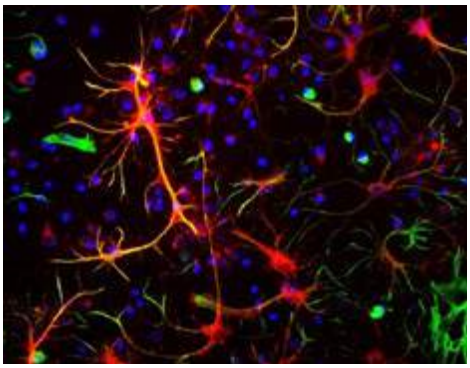
Cell Surface

A2B5
Aquaporin-4
Connexin 43/GJA1
EAAT1/GLAST-1/SLC1A3
EAAT2/GLT1

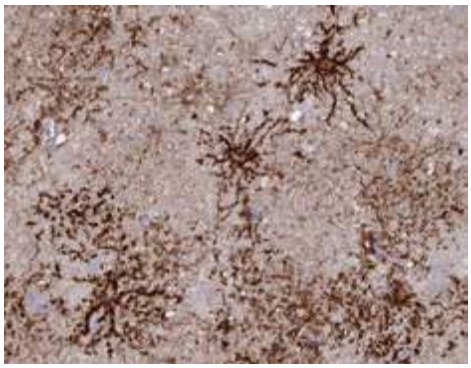
*Cytoplasmic marker is found associated with the membrane of the listed cell structure.

Select R&D Systems® and Novus Biologicals® Antibodies

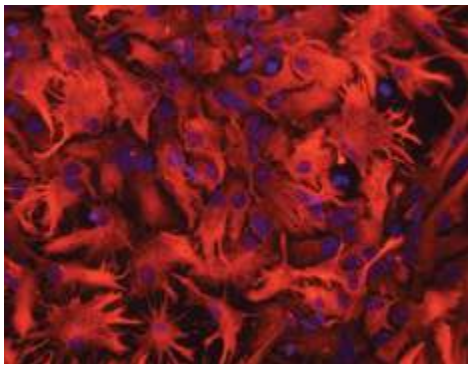
	Marker	Catalog #	Species	Clonality	Applications
◆	A2B5	MAB1416	H M R +	Mono	ICC, CyTOF, FC
◆	ALDH1L1 (Clone 2E7)	NBP2-50033	H M R +	Mono	WB, ICC
◆	Aldolase C	NBP1-90954	H M R	Poly	WB, ICC, IHC
◆	Astrocytomas (Clone J1-31)	NBP2-29820	H R	Mono	WB, ICC, IHC
◆	Aquaporin-4	NBP1-87679	H M R	Poly	WB, ICC, IHC
◆	Connexin 43/GJA1	NB100-81867	H M R	Poly	WB, IHC
◆	EAAT1/GLAST-1/SLC1A3	NB100-1869	H M R +	Poly	WB, ICC, IHC, ELISA, FC
◆		AF6048	H	Poly	WB, IHC
◆	EAAT2/GLT1	NBP1-20136	H M R	Poly	WB, ICC, IHC, FC, IV
◆	Galectin-3	MAB11541	H	Mono	WB, IHC, ELISA, SW
◆		AF1154	H	Poly	WB, IHC, CyTOF, FC, SW
◆		AF1197	M	Poly	WB, IHC, SW
◆	GAP-43	NB300-143	H M R +	Poly	WB, ICC, IHC
◆	GFAP	NB300-141	H M R +	Poly	WB, ICC, IHC, SW
◆		MAB2594	H	Mono	WB, ICC
◆	Glutamine Synthetase	NB110-41404	H M R +	Poly	WB, IHC
◆	HES-1	NBP1-30912	H M R +	Poly	WB, ICC, IP
◆		MAB3317	H	Mono	ICC, IHC
◆		AF3317	H	Poly	WB, IHC
◆	NDRG2	NBP1-81424	H M R	Poly	WB, IHC, ICC
◆	Notch-1	AF1057	M R	Poly	WB, ICC, IHC, B/N, CyTOF, FC
◆	S100B	NBP2-45224	H M R +	Mono	WB, ICC, IHC, FC
◆		AF1820	H	Poly	WB, IHC
◆	SOX9	AF3075	H	Poly	WB, ICC
◆	Survivin	NB500-201	H M R +	Poly	WB, ICC, IHC, ChIP, ELISA, FC, IP, SW
◆		AF886	H	Poly	WB, IHC, SW



ALDH1L1 in Cultured Astrocytes. Aldehyde Dehydrogenase 1-L1 (ALDH1L1) was detected in immersion fixed neuron-glial cell cultures using a Mouse Anti-Human/Mouse/Rat ALDH1L1 Monoclonal Antibody (Clone 2E7; Catalog # NBP2-50033). Cells were stained (red) and counterstained with DAPI (blue). Specific staining was localized to the cell bodies and processes of astrocytes. The cells were co-stained using a Chicken Anti-Human/Mouse/Rat Vimentin Polyclonal Antibody (Catalog # NB300-223; green). Astrocytes positive for both ALDH1L1 and Vimentin appear yellow. All cited reagents are from Novus Biologicals.



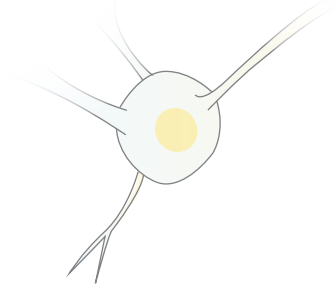
Aquaporin-4 in Human Brain. Aquaporin-4 was detected in immersion-fixed paraffin-embedded sections of human brain using a Rabbit Anti-Human/Mouse/Rat Aquaporin-4 Antigen Affinity-Purified Polyclonal Antibody (Novus Biologicals, Catalog # NBP1-87679). The tissue was stained with DAB (brown). Specific staining was localized to astrocytes.



GFAP in Rat Astrocytes. Glial Fibrillary Acidic Protein (GFAP) was detected in immersion-fixed rat astrocytes using a Sheep Anti-Human/Rat GFAP Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF2594). The cells were stained using the NorthernLights™ 557-Conjugated Donkey Anti-Sheep IgG Secondary Antibody (Catalog # NL010; red) and counterstained with DAPI (blue). Specific staining was localized to the cytoplasm. All cited reagents are from R&D Systems.

Oligodendrocyte Markers

Oligodendrocyte Precursor Cell Markers



Nuclear

NKX2.2
Olig2
SOX10

Cytoplasmic

Olig2

Cell Surface

A2B5
NG2/MCSP
Oligodendrocyte Marker O4
PDGF Rα

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	A2B5	MAB1416	H M R +	Mono	ICC, CyTOF, FC
◆	NG2/MCSP	NB100-2688	H	Mono	WB, ICC, IHC, FC, IP
◆		MAB2585	H	Mono	WB, IHC, CyTOF, FC
◆	NKX2.2	MAB8167	H M R	Mono	WB, ICC
◆	Olig2	AF2418	H	Poly	WB, ICC, IHC, ChIP
◆	Oligodendrocyte Marker O4	MAB1326	H M R +	Mono	ICC, CyTOF, FC
◆	PDGF Rα	NBP1-44581	H	Mono	ICC, CyTOF, FC
◆		AF1062	M	Poly	WB, IHC, B/N
◆	SOX10	MAB2864	H R	Mono	ICC, IHC

Immature Oligodendrocyte Markers

***Cytoplasmic (plasma membrane)**

CNPase

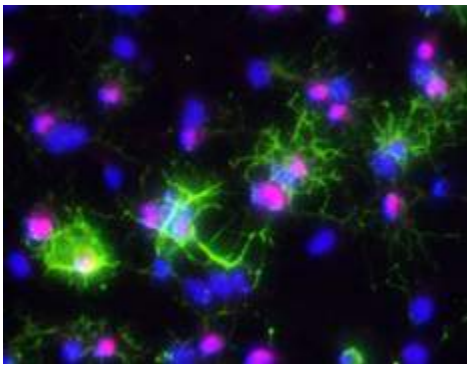
Cell Surface

Oligodendrocyte Marker O1
Oligodendrocyte Marker O4

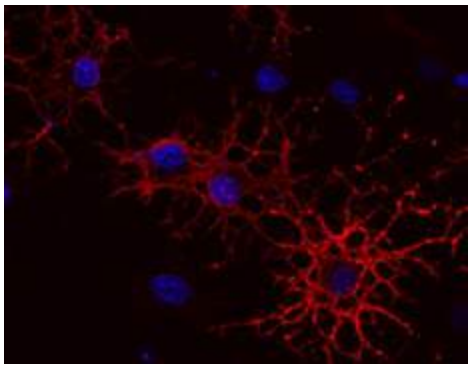
*Cytoplasmic marker is found associated with the membrane of the listed cell structure.

Select R&D Systems® and Novus Biologicals® Antibodies

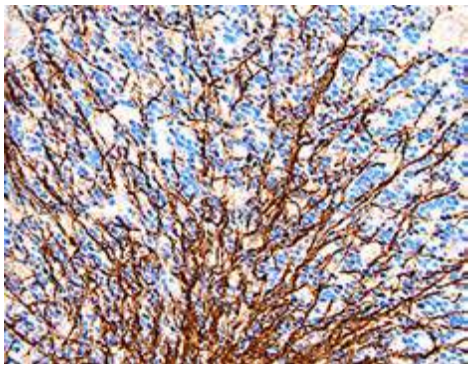
	Marker	Catalog #	Species	Clonality	Applications
◆	CNPase	NBP2-46617	H M R	Mono	WB, IHC
◆	Oligodendrocyte Marker O1	MAB1327	H M R +	Mono	ICC, CyTOF, FC
◆	Oligodendrocyte Marker O4	MAB1326	H M R +	Mono	ICC, CyTOF, FC



Olig2 and Oligodendrocyte Marker O4 in Rat Cortical Stem Cells. Olig2 and Oligodendrocyte Marker O4 were detected in 7 day differentiated rat cortical stem cells using a Goat Anti-Human Olig2 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF2418) and a Goat Anti-Human/Mouse/Rat Oligodendrocyte Marker O4 Monoclonal Antibody (Catalog # MAB1326). The cells were stained for Olig2 using the NorthernLights™ 637-Conjugated Donkey Anti-Goat IgG Secondary Antibody (Catalog # NL002; red), and stained for Oligodendrocyte Marker O4 using an anti-mouse IgM secondary antibody (pseudo-stained green). All cited reagents are from R&D Systems.

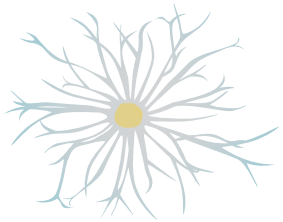


Oligodendrocyte Marker O1 in Rat Cortical Stem Cells. Oligodendrocyte Marker O1 was detected in immersion-fixed 7 day differentiated rat cortical stem cells using a Mouse Anti-Human/Mouse/Rat Oligodendrocyte Marker O1 Monoclonal Antibody (Catalog # MAB1327). The cells were stained using the NorthernLights™ 557-Conjugated Donkey Anti-Mouse IgM Secondary Antibody (Catalog # NL019; red) and counterstained with DAPI (blue). Specific staining was localized to oligodendrocytes. All cited reagents are from R&D Systems.



MAG in Rat Brain. Myelin-Associated Glycoprotein (MAG), also called Siglec-4a, was detected in perfusion-fixed frozen sections of rat brain a Goat Anti-Rat MAG/Siglec-4a Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF538). The tissue was stained with the Anti-Goat HRP-DAB Cell & Tissue Staining Kit (Catalog # CTS008; brown) and counterstained with hematoxylin (blue). Specific labeling was localized to processes of oligodendrocytes. All cited reagents are from R&D Systems.

Mature, Non-Myelinating Oligodendrocyte Markers



Cytoplasmic

APC

***Cytoplasmic (plasma membrane)**

CNPase

***Cytoplasmic (endoplasmic reticulum)**

Nogo-A

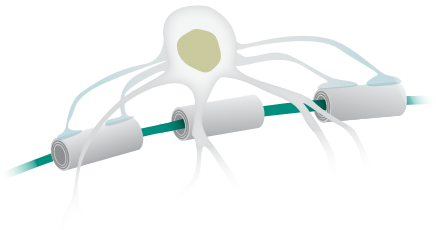
Cell Surface

Oligodendrocyte Marker 01
Oligodendrocyte Marker 04
Myelin PLP

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	APC	NB100-91662	H M R	Poly	WB, ICC, IHC
◆	CNPase	NBP2-46617	H M R	Mono	WB, IHC
◆	Oligodendrocyte Marker 01	MAB1327	H M R +	Mono	ICC, CyTOF, FC
◆	Oligodendrocyte Marker 04	MAB1326	H M R +	Mono	ICC, CyTOF, FC
◆	Myelin PLP	NBP1-87781	H M R	Poly	WB, IHC
◆	Nogo-A	MAB3098	R	Mono	IHC
◆	Nogo-A (aa 566-748)	AF3515	H	Poly	WB, ICC

Mature, Myelinating Oligodendrocyte Markers



Cytoplasmic

APC
TPPP/p25

***Cytoplasmic (plasma membrane)**

CNPase
OMgp

***Cytoplasmic (myelin)**

MBP

***Cytoplasmic (endoplasmic reticulum)**

Nogo-A

Cell Surface

Caspr2
MAG/Siglec-4a
MOG
Myelin PLP

*Cytoplasmic marker is found associated with the membrane of the listed cell structure.

Select R&D Systems® and Novus Biologicals® Antibodies

	Marker	Catalog #	Species	Clonality	Applications
◆	APC	NB100-91662	H M R	Poly	WB, ICC, IHC
◆	Caspr2	AF5145	H M R	Poly	WB, IHC
◆	CNPase	NBP2-46617	H M R	Mono	WB, IHC
◆	MAG/Siglec-4a	AF538	R	Poly	WB, IHC
◆	MBP	NB110-79873	H M R	Poly	WB, ICC, IHC, ELISA, SW
◆		MAB42282	H M R	Mono	WB, ICC
◆	MOG	AF2395	H	Poly	WB, IHC
◆		AF2439	M	Poly	WB, IHC
◆	Myelin PLP	NBP1-87781	H M R	Poly	WB, IHC
◆	Nogo-A	MAB3098	R	Mono	IHC
◆	Nogo-A (aa 566–748)	AF3515	H	Poly	WB, ICC
◆	OMgp	NBP1-82483	H M R	Poly	WB, IHC
◆	TPPP/p25	NBP1-49833	H M R	Poly	WB, IHC, ELISA

MOG in Mouse Brain. Myelin Oligodendrocyte Glycoprotein (MOG) was detected in perfusion-fixed frozen sections of mouse brain using a Goat Anti-Mouse MOG Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF2439). The tissue was stained with the Anti-Goat HRP-DAB Cell & Tissue Staining Kit (Catalog # CTS008; brown) and counterstained with hematoxylin (blue). All cited reagents are from R&D Systems.

Species Key: **H** Human **M** Mouse **R** Rat **Ms** Multispecies **+** Additional Species Available

Applications Key: **B/N** Blocking/Neutralization **ChIP** Chromatin Immunoprecipitation **CyTOF** CyTOF-Ready **DB** Dot Blot **ELISA** (ELISA Capture and/or Detection) **EM** Electron Microscopy **FA** Functional Assay **FC** Flow Cytometry **GS** Gel Shift **ICC** Immunocytochemistry **IHC** Immunohistochemistry **IP** Immunoprecipitation **IV** *In Vitro* **PEP-ELISA** Peptide-ELISA **RI** Radioimmunoassay **SW** Simple Western™ **WB** Western blot

◆ Indicates an R&D Systems® antibody ◆ Indicates a Novus Biologicals® antibody

Additional Tools for Visualizing and Identifying Neural Cells

Conjugated Primary Antibodies

R&D Systems and Novus Biologicals together offer over 85,000 primary antibodies directly conjugated to 18 different fluorescent and enzymatic labels including Alexa Fluor® and DyLight® dyes. This expansive selection of conjugated primary antibodies will help simplify the design of your multiplex experiments. Please visit our website at **novusbio.com/conjugatedantibodies** to learn more.

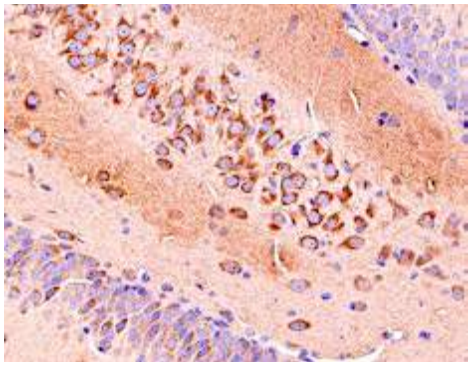
VisUCyte™ HRP Polymer

VisUCyte™ HRP Polymer is an anti-IgG secondary antibody conjugated to a polymer backbone that has multiple Horseradish Peroxidase (HRP) molecules attached to it. It is a Biotin-free detection reagent that overcomes the problems associated with Avidin-Biotin detection chemistry, such as the extra quenching steps required to inhibit endogenous Biotin and Avidin staining. Please visit our website at **rndsystems.com/visucyteHRPpolymer** to learn more.

Benefits of the VisUCyte™ HRP Polymer

- Improved Chromogenic IHC Staining
- More Sensitive, So Use Less Primary Antibody
- Reduced Background Staining
- Save Time Because Fewer Steps Than the ABC Method
- Compatible with Most Fixation Methods

Description	Catalog #
Mouse IgG VisUCyte™ HRP Polymer Antibody	VC001
Mouse/Rabbit IgG VisUCyte™ HRP Polymer Antibody	VC002
Rabbit IgG VisUCyte™ HRP Polymer Antibody	VC003
Goat IgG VisUCyte™ HRP Polymer Antibody	VC004
Rat IgG VisUCyte™ HRP Polymer Antibody	VC005
Sheep IgG VisUCyte™ HRP Polymer Antibody	VC006

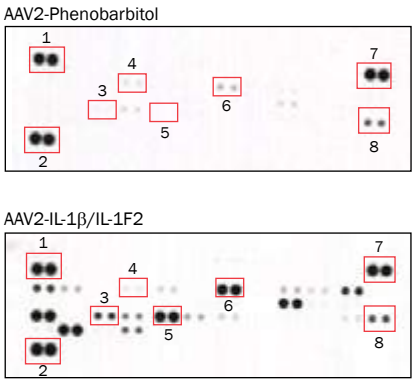


Neuropilin-1 in Rat Brain. Neuropilin-1 was detected in immersion-fixed paraffin-embedded sections of rat brain using a Goat Anti-Mouse/Rat Neuropilin-1 Antigen Affinity-Purified Polyclonal Antibody (Catalog # AF566) and a Donkey Anti-Goat IgG VisUCyte™ HRP Polymer Antibody (Catalog # VC004). The tissue was stained using DAB (brown) and counterstained with hematoxylin (blue). Specific staining was localized to cytoplasm in neuronal cell bodies and projections. All cited reagents are from R&D Systems.

Multiplex Assays

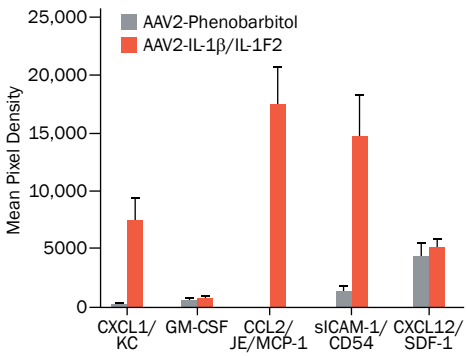
In addition to the single analyte ELISAs for the detection of secreted factors, R&D Systems offers multiplex assay options for simultaneously detecting multiple target analytes in qualified sample types. These assays include the membrane-based Proteome Profiler™ Antibody Arrays and the bead-based Luminex® Assays and High Performance Assays. Please visit our website at **rndsystems.com/proteomeprofiler** or **rndsystems.com/luminex** for more information.

A.



1. Reference Spot
2. Reference Spot
3. CXCL1/KC
4. GM-CSF
5. CCL2/JE/MCP-1
6. sICAM/CD54
7. Reference Spot
8. CXCL12/SDF-1

B.



Cytokine Expression Induced by IL-1β/IL-1F2 in Mouse Brain. C57BL/6 mice received a bilateral intrahippocampal injection of adeno-associated virus (AAV2) vector expressing either a single chain antibody to phenobarbital (for a control) or IL-1β/IL-1F2. After 4 weeks, brains of the mice were collected, and cytokine expression in brain homogenates was analyzed using the Proteome Profiler™ Mouse Cytokine Antibody Array (Catalog # ARY006). Representative arrays (**A**) and histogram profiles (**B**) for select analytes from control (gray bars) and IL-1β/IL-1F2 treated (orange bars) mice. Data were generated by analysis of the mean pixel density of individual antibody spots using image software analysis. *Data courtesy of Dr. Jonathan Cherry, University of Rochester Medical Center, Rochester, NY.*

Tocris® Products to Investigate Neural Function

Tocris offers a variety of highly bioactive small molecule agonists, antagonists, modulators, and blockers, as well as fluorecent probes, to functionally characterize the receptors and ion channels expressed by neural cells.

Small Molecules

Product	Description	Catalog #
A 803467	Selective $Na_v1.8$ channel blocker	2976
α, β-Methyleneadenosine 5′ triphosphate	P2 agonist	3209
DL-AP5	Potent, selective NMDA antagonist	0105
(+)-Bicuculline	Potent $GABA_A$ antagonist	0130
nor-Binaltorphimine dihydrochloride	Standard selective κ opioid receptor antagonist	0347
CGP 35348	Brain penetrant, selective $GABA_B$ antagonist	1245
(+)-MK 801 maleate	Non-competitive NMDA antagonist, acts at ion channel site	0924
MPEP hydrochloride	$mGlu_5$ antagonist and positive allosteric modulator at $mGlu_4$	1212
RS 127445 hydrochloride	Selective, high affinity $5\text{-}HT_{2B}$ antagonist	2993
SCH 23390 hydrochloride	Standard selective D_1-like antagonist; also $5\text{-}HT_{2C}$ agonist	0925
Tetrodotoxin	Na^+ channel blocker	1078
Cis-6-Hydroxynorketamine hydrochloride	Enhances AMPA currents: antidepressant and lacks ketamine-related side effects	5982
Varenicline tartrate	Orally active, subtype-selective α4β2 partial agonist	3754
JNJ 47965567	Potent and selective $P2X_7$ antagonist; brain penetrant	5299

Caged Compounds

Product	Description	Catalog #
DPNI-caged-GABA	Nitroindoline-caged GABA	2991
MNI-caged-D-aspartate	Caged D-aspartate	2277
MNI-caged-L-glutamate	Stable photoreleaser of L-glutamate	1490
MNI-caged-NMDA	Caged NMDA	2224
NPEC-caged-(S)-AMPA	Caged (S)-AMPA	3840
NPEC-caged-D-AP5	Caged D-AP5 (Cat.No. 0106)	4230
NPEC-caged-dopamine	Caged dopamine	3992

Product	Description	Catalog #
RuBi GABA trimethylphosphine	Caged GABA; inhibits neural activity	4709
RuBi-Dopa	Caged dopamine; exhibits two-photon sensitivity	4932
RuBi-Glutamate	Caged glutamate; excited by visible wavelengths	3574
MDNI-caged-L-glutamate	Stable photoreleaser of L-glutamate	5785

Photoswitchable Ligands

Product	Description	Catalog #
AAQ	Photoswitchable K_v channel blocker	5462
PA1	Photoswitchable ENa C blocker	5463
QAQ	Photoswitchable Na_v, K_v, and Ca_v channel blocker	5470

Fluorescent Probes

Target Molecule	Description	Catalog #
MitoPY1	Fluorescent mitochondrial hydrogen peroxide indicator	4428
Methoxy-X04	Fluorescent amyloid β detector; brain penetrant	4920
FFN 102 mesylate	Selective fluorescent substrate of DAT and VMAT2	5200
FFN 206 dihydrochloride	Fluorescent VMAT2 substrate	5043
FFN 511	Fluorescent substrate for VMAT2	3878
FURA-2AM	Fluorescent $Ca2^+$ indicator	2220
L 012 sodium salt	Chemiluminescent ROS and RNS indicator	5085
SynaptoRed™ C2	Fluorescent dye; stains synaptic vesicles	5118
Tocrifluor T1117	Novel fluorescent cannabinoid ligand; fluorescent form of AM 251 (Cat. No. 1117)	2540

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