

Stem Cell Markers Antibodies to Neural Stem Cells

Multipotent self-renewing neural stem cells are present throughout the development of the central nervous system, persist into adulthood in defined locations and can be derived from more primitive embryonic stem cells. Acris Antibodies offer an extensive range of antibodies for stem cell research, including selected antibodies to neural stem cell related proteins:

Nestin

Nestin (NES) is an intermediate filament protein that was first identified in 1985. It is expressed predominantly in stem cells of the central nervous system in the neural tube. Upon terminal neural differentiation, nestin is downregulated and replaced by neurofilaments.

Noggin

Noggin is an antagonist of bone morphogenetic proteins. Inhibiting BMP signaling with noggin is sufficient to accelerate long-term hippocampal cell self-renewal, increased proliferation, and multipotential differentiation.

Vimentin

The intermediate filament protein vimentin is found in different non-epithelial cells, especially in a variety of mesenchymal cell types like fibroblasts, endothelial cells and is detected in many cells from the neural crest and neural stem cells of the CNS. In addition, it is the first to be expressed during cell differentiation. Vimentin is present in many different neoplasms but is particularly expressed in those originated from mesenchymal cells. Sarcomas e.g., fibrosarcoma, malignant fibrous histiocytoma, angiosarcoma, and leiomyosarcoma, as well as lymphomas, malignant melanoma and schwannoma, are virtually always vimentin positive. Mesoderm derived carcinomas like renal cell carcinoma, adrenal cortical carcinoma and adenocarcinomas from endometrium and ovary usually express vimentin. Thyroid carcinomas are also vimentin positive. Any low-differentiated carcinoma may express some vimentin.

Transcriptional factors: Pax6, Sox2, HMG2, MSX1, NeuroD1

Pax6 is a transcription factor with important functions in the development of the eye, nose, central nervous system and pancreas. It competes with Pax4 in binding to a common element in glucagon, insulin and somatostatin promoters. It regulates specification of the ventral neuron subtypes by establishing the correct progenitor domains. Pax6 Isoform 5a appears to function as a molecular switch that specifies target genes.

Sox2 is a transcription factor that is essential to maintain self-renewal of undifferentiated embryonic stem cells. Sox2 is expressed in multipotent neural stem cells at all stages of ontogeny.

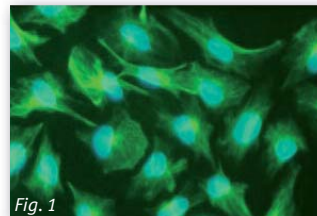


Fig. 1

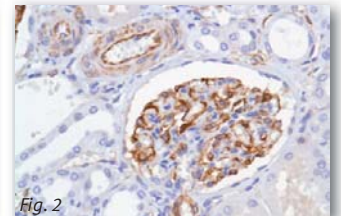


Fig. 2

Fig. 1: Immunofluorescence staining of the human glioma cell line U251 with monoclonal nestin antibody **Cat.-No. BM4546**, nuclei stained with bisbenzamide (blue)

Fig. 2: Formalin-fixed and paraffin-embedded (FFPE) human kidney stained with nestin antibody **Cat.-No. AM20271PU-S**

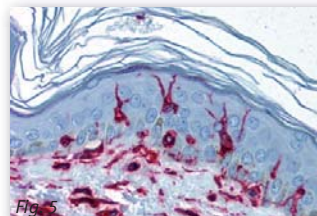


Fig. 3

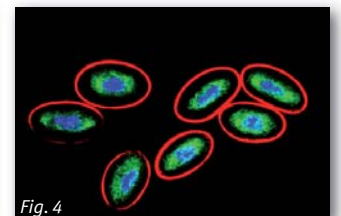


Fig. 4

Fig. 3: Human skin (FFPE) stained with vimentin antibody **Cat.-No. AP08378PU-N**; biotinylated secondary antibody, alkaline phosphatase-streptavidin and chromogen

Fig. 4: Immunofluorescence staining of chicken postnatal erythrocytes: tubulin (red) was stained with anti- α -tubulin clone TU-01 **Cat.-No. BM753S**, vimentin (green) with anti-vimentin clone VI-10 **Cat.-No. SM3166P**; Nuclei are stained with DAPI (blue)

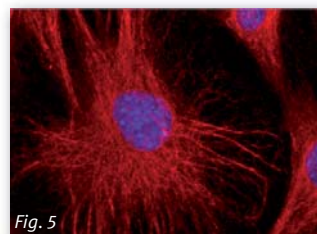


Fig. 5

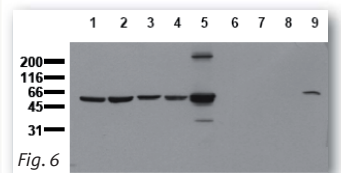


Fig. 6

Fig. 5: Immunofluorescence staining of 3T3 mouse embryonal fibroblast cell line with anti-vimentin (VI-01) Dy-547 **Cat.-No. SM3128D5**. Nuclei are stained with DAPI (blue)

Fig. 6: Detection of endogenous vimentin: Whole cell lysates of serum starved tumor cells were used. The immunoblot was probed with monoclonal vimentin antibody clone 11H6 **Cat.-No. AM00158PU-N**: Lane 1: HeLa; Lane 2: HepG2; Lane 3: HEK293; Lane 4: SH-SY5Y; Lane 5: MDCK; Lane 6: PC12; Lane 7: CMT 93; Lane 8: Neuro 2A; Lane 9: 3T3

Another transcriptional factor which is highly expressed during embryogenesis and in some cancers is **HMGA2**, which belongs to the high mobility group family and contains 3AT hook DNA-binding domains. It has been shown that HMGA2 expression is high in fetal neural stem cells (1). Homeobox protein **MSX1**, also called Hox7, functions as a transcriptional repressor.

As a transcriptional activator, the differentiation factor **NeuroD1** or Neurogenic differentiation factor 1 acts during neurogenesis and has been suggested to have a function in neuronal differentiation. The basic-helix-loop-helix (bHLH) protein requires for efficient DNA binding dimerization with another bHLH protein. It regulates insulin gene expression by binding to the insulin gene E-box (2,3).

The table below summarizes Acris Antibodies neural stem cell antibodies. Refer to www.acris-antibodies.com and our other FocusOn antibody panel for a comprehensive listing of our products for stem cells research:

FocusOn 104: Primordial Germ Cells and Ectoderm

FocusOn 105: Neural Stem Cells

FocusOn 106: Embryonic Stem Cells

FocusOn 053: Mesenchymal Stem Cells

FocusOn 054: Hematopoietic Stem Cells

FocusOn 055: Induced Pluripotency (iPS)

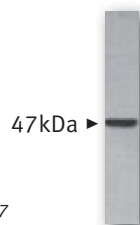


Fig. 7

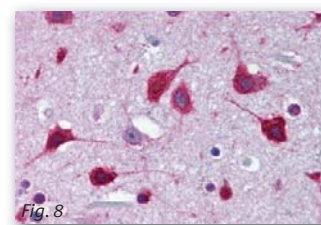


Fig. 8

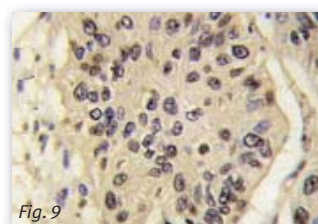


Fig. 9

Fig. 7: Western blot of Pax6 on rat whole eye extract using Cat.-No. SP5290P

Fig. 8: Brain (cortex) tissue (FFPE) using Sox2 antibody Cat.-No. AP08354PU-N

Fig. 9: Human lung carcinoma tissue (FFPE) reacted with Sox2 antibody Cat.-No. AM11050PU-N

References

- (1) Nishino J et al; Cell, Oct 2008; 135(2):227-39 [PMID 18957199]
- (2) Breslin MB et al; J Biol Chem, Oct 2003; 278(40): 38991-7 [PMID 12890672]
- (3) Malecki MT et al; Acta Diabetol, 2003; 40(2): 109-111 [PMID 12861411]

Selected Acris Antibodies Panel to Neural Stem Cell Markers

Name	Property	Host/Isotype	Clone	Reactivity	Application	Format	Catalog-No.
HMGA2	C-term	Rabbit	-	Hu	WB	Purified	AP15598PU-S
	-	Rabbit	-	Hu	P	Purified	AP15599PU-S
	-	Goat	-	Hu	E, WB	Aff-Purified	AP09627PU-N
MSX1	N-term	Goat	-	Bov, Hu, Ms, Rt	E, P, WB	Aff-Purified	AP16247PU-N
	-	Rabbit	-	Hu, Mky, Ms, Rt	P, WB	Purified	AP21895PU-N
Nestin	-	Mouse IgG1	2C1.3A11	Hu	F, IF, IP, P, WB	Purified	BM4546
	C-term	Rabbit IgG	SP103	Hu	P, WB	Purified	AM20271PU-S
	-	Mouse IgG1	10C2	Hu	C, P, WB	Purified	AM05803PU-N
	-	Rabbit	-	Hu	E, WB	Aff-Purified	AP11887PU-N
	1484-1500	Rabbit	-	Bov, Can, Hst, Hu, Mky, Ms, Rb, Rt	E, IF, P, WB	Aff-Purified	AP07829PU-N
	-	Rabbit IgG	-	Hu	P	Aff-Purified	AP09573PU-S
	-	Rabbit	-	Hu, Mky	E, WB	Aff-Purified	R1555P
NeuroD1	N-term	Rabbit	-	Hu	E, P	Purified	AP11888PU-N
Noggin	-	Rabbit IgG	-	Hu, Ms, Rt	E, P, WB	Aff-Purified	AP08597PU-N
Pax6	-	Rabbit	-	Rt, Sh	WB	Aff-Purified	SP5290P
	-	Goat	-	Hu, Ms, Rt	WB	Aff-Purified	AP16563PU-N
Sox2	N-term	Rabbit IgG	SP76	Hu	P	Purified	AM09112PU-N
	-	Mouse IgG1	57CT23.3.4	Hu	E, IF, P, WB	Purified	AM11050PU-N
	Center	Rabbit	-	Hu	E, WB	Aff-Purified	AP11919PU-N
	N-term	Rabbit	-	Hu, Ms, Zf	E, F, IF, P, WB	Purified	AP11920PU-N
	N-term	Rabbit IgG	-	Hu	P, WB	Aff-Purified	AP08354PU-N
	N-term	Rabbit	-	Hu	P	Purified	AP15787PU-S
	100-150	Rabbit	-	Chk, Fe, Hu, Mky, Ms, Op, Por, Rt, Xen, Zf	WB	Aff-Purified	AP22241PU-N
Vimentin	50-100	Rabbit	-	Hu, Ms	P	Purified	AP22240PU-N
	-	Mouse IgM	VI-10	Chk, Hu, Por, Rt	IF, IP, P, WB	Purified	SM3166P
	-	Mouse IgM	VI-01	All species	IF, WB	Purified	SM3128P
	-	Mouse IgG2a	VIM 3B4	Amph, Bov, Chk, Hu, Mky	C, E, IF, P, WB	Purified	BM5501
	-	Mouse IgG	11H6	Can, Hu, Ms	WB	Purified	AM00158PU-N
	-	Rabbit	SP20	Hu	P	Supernatant	AM11201PU-S
	-	Rabbit	-	Hu	P, WB	Purified	AP15856PU-S
	-	Rabbit IgG	-	Hu	P, WB	Aff-Purified	AP08378PU-N

Reactivity: Amph: Amphibia, Bov: Bovine, Can: Canine, Chk: Chicken, Hst: Hamster, Hu: Human, Mky: Monkey, Ms: Mouse, Op: Opossum, Por: Pig, Rb: Rabbit, Rt: Rat, Sh: Sheep, Xen: Xenopus, Zf: Zebrafisch; **Application:** C: Immunohistochemistry on frozen sections, E: ELISA, F: Flow cytometry, IF: Immunofluorescence, IP: Immunoprecipitation, P: Immunohistochemistry on formalin-fixed, paraffin-embedded tissue sections, WB: Western blot

Acris Antibodies GmbH ▶ Schillerstraße 5 ▶ 32052 Herford, Germany ▶ Tel: +49 (0)5221 34606-0 ▶ info@acris-online.de

Acris Antibodies, Inc. ▶ 6815 Flanders Drive, Ste 140 ▶ San Diego, CA 92121, USA ▶ Tel: +1 858 888 7900 ▶ US-info@acris-antibodies.com