

## Stem Cell Markers Antibodies to Embryonic Stem Cells

Embryonic stem cells are derived from the inner cell mass (ICM) of the blastocyst. They can proliferate indefinitely *in vitro* (self renewal) and differentiate into cells of all three germ layers (pluripotency).

### Sox1 and Sox2

SOX1 and 2 belong to the Sox (Sry-related HMG-box) family of transcription factors. Having about 20 members in multiple species, the Sox family is characterized by the DNA-binding HMG domain. Sox proteins are involved in different developmental processes like embryonic development and determination of cell fate. Sox2, Oct3/4 and Nanog are a self-stabilizing network of transcription factors which maintain the stem cell phenotype of human and murine stem cells. Sox2 belongs to the structurally similar group B with their members Sox1 and Sox3, showing overlapping expression in the fetal nervous system, suggested to have similar functions.

### Oct3/4

Oct3/4 is also known as POU5F1. This protein is a mammalian POU transcription factor expressed by early embryo cells and germ cells. Oct3/4 is essential for the identity of the pluripotential founder cell population in the mammalian embryo. A critical amount of Oct3/4 is required to sustain stem-cell-renewal, and up- or downregulation induces divergent developmental programmes.

### Nanog

The homeobox transcription factor Nanog is specific to early embryos and pluripotential stem cells including mouse and human embryonic stem and embryonic germ cells. It is a key molecule involved in the signaling pathway for maintaining the capacity for self-renewal and pluripotency, bypassing regulation by the STAT3 pathway.

### SSEA

Stage-specific embryonic antigen-1 (SSEA-1) is expressed on murine and human germ cells, murine embryonic stem cells and murine embryonal carcinoma cells. SSEA-4, a glycolipid carbohydrate epitope, is a widely used marker to monitor the differentiation of pluripotent embryonic stem cells.

### Frizzled-5

Frizzled proteins (Frizzled; FZD) are 7-transmembrane receptors which act as receptors for Wnt proteins. At present, at least ten different human Frizzled genes have been described, playing essential roles in the regulation of embryonic development, tissue and cell polarity, formation of neural synapses and the regulation of proliferation. The signalling pathway has been shown to be implicated in the genesis of numerous human cancers.

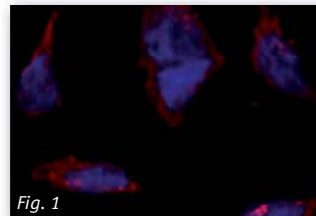


Fig. 1

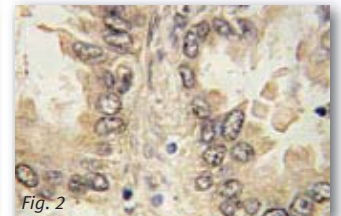


Fig. 2

**Fig. 1:** Immunofluorescence analysis of Sox2 antibody Cat.-No. AP11920PU-N in HeLa cells

**Fig. 2:** Formalin-fixed and paraffin-embedded (FFPE) human lung carcinoma tissue reacted with Sox2 antibody (N-term) Cat.-No. AP11920PU-N; peroxidase-conjugated secondary antibody / DAB staining

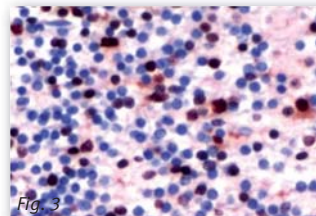


Fig. 3

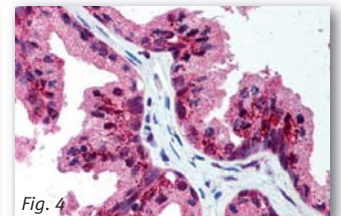


Fig. 4

**Fig. 3:** Human newborn brain stained with Sox2 antibody Cat.-No. AM09112PU-N

**Fig. 4:** Human prostate (FFPE) stained with Oct3/4 antibody Cat.-No. AP07188PU-N

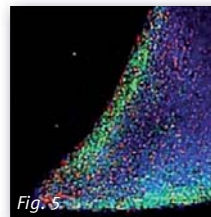


Fig. 5

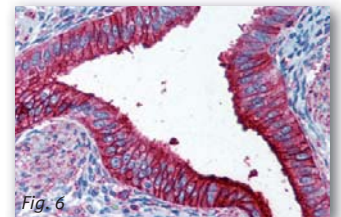
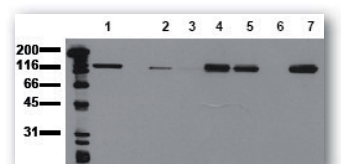


Fig. 6

**Fig. 5:** Immunofluorescence staining of a colony of induced pluriform stem cells derived from human keratinocytes labelled with Nanog antibody Cat.-No. AP16396PU-N (green staining). Data kindly provided by CMRB, Center of Regenerative Medicine in Barcelona, Spain

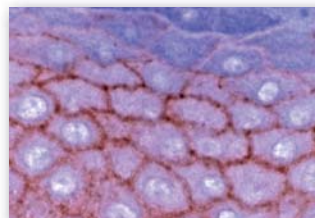
**Fig. 6:** Staining of human uterus (FFPE) with SSEA-1 antibody Cat.-No. AM08357-PU-N at 1:50; biotinylated secondary antibody, alkaline phosphatase-streptavidin and chromogen

**Fig. 7:** Detection of endogenous E-cadherin: Whole cell lysates of serum starved tumor cells (20.000 cells per lane) were applied to SDS-PAGE and transferred to a PVDF membrane. The immunoblot was probed with E-cadherin antibody clone 22F8 Cat.-No. AM00010PU-N (0.5 µg/ ml) for 1h at RT and developed by ECL (exp. time: 30 sec): Lane 1: A431; Lane 2: SW480; Lane 3: SW620; Lane 4: HT29; Lane 5: MCF-7; Lane 6: MDA-MB 231; Lane 7: T47D



## E-cadherin

E-cadherin, a calcium dependent cell adhesion molecule, is expressed predominately in epithelial tissues and plays an important role in the growth and development of cells via the mechanisms of control of tissue architecture and the maintenance of tissue integrity. It is concluded that E-cadherin protein stabilizes cortical actin cytoskeletal arrangement in ES cells (Spencer, 2007).



**Fig. 8:** Formalin-fixed, paraffin-embedded human skin stained with E-cadherin antibody Cat.-No. AP15381PU-S

## HMGA2

The HMGA2 protein (High Mobility Group family) is expressed exclusively during mammalian embryonic development and in some cancers. It belongs to the group of high mobility chromosomal proteins that have the AT-hook DNA-binding motif. The expression of HMGA2 is high in neural stem cells and decreases with age.

## References

- Bowles J, 2000 [PMID 11071752]      Pan G, 2007 [PMID 17211451]  
 Schulz WA, 2007 [PMID 17965618]      Spencer HL, 2007 [PMID 17507657]  
 Wiebe MS, 2002, [PMID 12637543]      Ye F, 2010 [PMID 20683402]

The table below summarizes Acris Antibodies embryonic stem cell antibodies. Refer to [www.acris-antibodies.com](http://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)

## Selected Acris Antibodies Panel to Embryonic Stem Cell Markers

Name	Property	Host/Isotype	Clone	Reactivity	Application	Catalog-No.
E-cadherin / CD324	-	Mouse IgG1	22F8	Hu	WB	AM00010PU-N
	600-707	Rabbit IgG	SP64	Hu	P	AM09345PU-S
	-	Mouse	SPM471	Hu	P	AM11094PU-S
	-	Rabbit	-	Hu	P	AP15381PU-S
Frizzled-5 / FZD5	3rd Extracell. Dom.	Rabbit	-	Hu	P	SP4146P
	N-term, Extrac. Dom.	Rabbit	-	Hu, Rt	P	SP4145P
	N-term, Extrac. Dom.	Rabbit	-	Hu	P	AP06950PU-N
HMGA2	C-term	Rabbit	-	Hu	WB	AP15598PU-S
	-	Rabbit	-	Hu	P	AP15599PU-S
	-	Goat	-	Hu	E, WB	AP09627PU-N
Nanog	-	Mouse IgG2a	5A10	Hu	E, P, WB	AM09023PU-N
	-	Mouse IgG1	60CT70.5.12	Hu	E, WB	AM11049SU-N
	N-term	Rabbit	-	Hu	E, WB	AP11497PU-N
	Center	Rabbit	-	Hu	E, IF, P, WB	AP11498PU-N
	Internal	Goat	-	Can, Hu	E, IF, WB	AP16396PU-N
Oct3/4	-	Mouse IgG2b	NRG1.1	Hu	P	AM03173PU-S
	-	Rabbit	-	Hu	P	AP15694PU-S
	N-term	Rabbit	-	Hu	P, IF, WB	AP11910PU-N
	-	Rabbit	-	Hu	P, WB	AP07188PU-N
	-	Rabbit	-	Bov, Hu, Ms, Por, Rt	IP, P, WB	AP00249PU-N
	-	Rabbit IgG	-	Eq, Hu, Mky, Ms	E, WB	AP09402PU-N
	-	Rabbit IgG	-	Hu, Ms, Rt	E, P, WB	AP30685PU-N
	230-244	Rabbit	-	Bov, Can, Hu, Mky, Ms, Rt	WB	AP21525PU-N
Sox1	Center	Rabbit	-	Hu	E, IF, P, WB	AP12397PU-N
	100-150	Rabbit	-	Eq, Hu, Mky, Ms, Xen	P, WB	AP22236PU-N
	350-400	Rabbit	-	Bov, Can, Hu, Ms, Xen	WB	AP22237PU-N
Sox2	N-term	Rabbit IgG	SP76	Hu	P	AM09112PU-N
	-	Mouse IgG1	57CT23.3.4	Hu	E, IF, P, WB	AM11050PU-N
	N-term	Rabbit IgG	-	Hu	P, WB	AP08354PU-N
	N-term	Rabbit	-	Hu, Ms, Zf	E, IF, F, P, WB	AP11920PU-N
	Center	Rabbit	-	Hu	E, WB	AP11919PU-N
	N-term	Rabbit	-	Hu	P	AP15787PU-S
	100-150	Rabbit	-	Chk, Hu, Mky, Ms, Por, Rt, Xen, Zf	WB	AP22241PU-N
50-100	Rabbit	-	Hu, Ms	P	AP22240PU-N	
SSEA-1 / CD15	-	Mouse IgM	MC-480	Hu, Ms	F, IF, IP, P	AM20366PU-S
	-	Mouse IgM	SPM119	Hu	P	AM11099PU-N
	-	Mouse IgM	Hi98	Hu, Mky	C, F, IF, P	AM08357PU-N
	-	Mouse IgM	Bu28	Hu	F	AM05626PU-N
SSEA-4	-	Mouse IgG3	MC-813-70	Can, Chk, Hu, Mky, Ms, Rb	F, IF, IP, P, WB	AM20368PU-S

Bov: Bovine, Can: Canine, Chk: Chicken, Eq: Horse, Hu: Human, Mky: Monkey, Ms: Mouse, Por: Pig, Rb: Rabbit, Rt: Rat, Xen: Xenopus, Zf: Zebrafish  
 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

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