Mouse mAb to Doublecortin/DCX

MCA-3E1

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Immunofluorescent analysis of cortical neuron-glial cell culture from E20 rat stained with mouse mAb to Doublecortin (DCX), MCA-3E1, dilution 1:1,000 in red, and costained with chicken pAb to Microtubule Associated Protein2 (MAP2), CPCA-MAP2, dilution 1:10,000 in green. The blue is DAPI staining of nuclear DNA. DCX antibody reveals strong cytoplasmic staining in a population of small developing neurons and their processes, while MAP2 antibody stains dendrites and perikarya of mature neurons. Therefore DCX antibody is an excellent marker of developing neuronal cells.

Background: Doublecortin was originally discovered since defects in the gene encoding it are causative of X-linked lissencephaly, a rare group of brain malformations resulting in a smooth cerebral cortex caused by aberrant neuronal migration during development (1,2). The name Doublecortin comes from the unusual layering of the cortex in this form of lissencephaly, which appears to have a second deep cortical layer of neurons. This layer consists of neurons which did not migrate from the subventricular zone to the normal cortical layer. Patients with this defect suffer from seizures and mental retardation. The HGNC name for Doublecortin is DCX, and it is also known as Doublin, Lissencephalin-X, DBCN and Lis-X. Four proteins encoded by the DCX produce bands of about 35 kDa and 45 kDa on Western blots (see the Uniprot page here). The 45 kDa form is known as Lis-XA while the smaller forms are generated by alternate transcription, are all missing the first 81 amino acids of Lis-XA, and are referred to as Lis-XB, Lis-XC, Lis-XD. There are minor amino acid sequence differences between these three smaller isoforms. All of these protein contain two so-called Doublecortin domains, each about 90 amino acids long, which are believed to function in binding to microtubules, a C-terminal serine and proline rich region which may become phosphorylated in vivo. The doublecortin protein appears to function as a microtubule and actin binding protein and may interact with Lis-1, a member of the β-transducin or WD protein family, a protein mutations of which are also associated with

References:
lissencephaly. DCX is expressed very early in neuronal development, as neuroblasts become post-mitotic, but is lost as neurons mature. Developing neurons start to lose DCX expression about the time that they begin to express NeuN, a neuronal specific protein characteristic of more mature neurons, now known to correspond to the RNA binding protein Fox3.

Antibodies to DCX are used to identify stem cells in sections and in tissue culture, and to see if neurogenesis is taking place. Our antibody stains identically to the Doublecortin (C18): sc-8066 polyclonal peptide antibody available from Santa Cruz.