# Doublecortin

Neuronal migration protein doublecortin, also known as doublin or lissencephalin-X is a protein that in humans is encoded by the DCX gene and is widely regarded as a marker of immature and migrating neurons during development. While DCX expression persists in adults, particularly in the temporal lobe and neurogenic regions, it is unknown how seizures influence its expression.

The aim of a study of Liu et al., from London was to explore the distribution and characteristics of DCX-expressing cells in surgical and postmortem samples from 40 adult and paediatric patients, with epilepsy and with or without hippocampal sclerosis (HS), compared to post mortem controls. The hippocampus (pes and body), parahippocampal gyrus, amygdala, temporal pole and temporal cortex were examined with DCX immunohistochemistry using four commercially-available DCX antibodies, labelled cells were quantified in different regions of interest as well as their co-expression with cell type specific markers (CD68, Iba1, GFAP, GFAP delta, nestin, SOX2, CD34, OLIG2, PDGFRB, NeuN) and cell cycle marker (MCM2). Histological findings were compared with clinical data, as well as gene expression data obtained from the temporal cortex of 83 temporal lobe epilepsy cases with HS. DCX immunohistochemistry identified immature (Nestin-/NeuN-) neurons in layer II of the temporal neocortex in patients with and without epilepsy. Their number declined significantly with age but was not associated with the presence of hippocampal sclerosis, seizure semiology or memory dysfunction. DCX+ cells were prominent in the paralaminar nucleus and periamygdalar cortex and these declined with age but were not significantly associated with epilepsy history. DCX expressing cells with ramified processes were prominent in all regions, particularly in the hippocampal subgranular zone, where significantly increased numbers were observed in epilepsy samples compared to controls. DCX ramified cells co-expressed Iba1, CD68 and PDGFRβ, and less frequently MCM2, OLIG2 and SOX2, but no co-localization was observed with CD34, nestin or GFAP/GFAP ∂. Gene expression data from neocortical samples in patients with TLE and HS supported ongoing DCX expression in adults.

They conclude that DCX identifies a range of morphological cell types in temporal lobe epilepsy, including immature populations, glial and microglial cell types. Their clinical relevance and biological function requires further study but they show some evidence for alteration with age and in epilepsy [1].

1)
Liu JYW, Matarin M, Reeves C, McEvoy AW, Miserocchi A, Thompson P, Sisodiya SM, Thom M. Doublecortin-expressing cell types in temporal lobe epilepsy. Acta Neuropathol Commun. 2018 Jul 13;6(1):60. doi: 10.1186/s40478-018-0566-5. PubMed PMID: 30005693.