Poster 4.12

Doublecortin Positive Cells in the Temporal Cortex of the Epileptic Adult Human Brain

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Doublecortin (Dcx) is a microtubule associated protein expressed in migrating new neurons during development (Gleeson et al., 1999). Recent studies have shown that Dcx is also a marker of new neurons in neurogenic regions of the adult animal (Brown et al 2003) and human brain (Jin et al., 2003; Fahrner et al., 2007). The expression of Dcx outside neurogenic regions has yet to be investigated in the adult human brain. The present study shows for the first time that Dcx positive cells are present in the temporal cortex of the normal and epileptic adult human brain. Quantitative studies reveal a significant increase in the number of Dcx positive cells in the middle temporal cortex of the epileptic brain compared to the normal brain. Interestingly, triple immunofluorescence labelling using the markers Dcx, proliferating cell nuclear antigen (PCNA) (a proliferative cell marker) and III-tubulin (an early neuronal marker) demonstrate that many cells immunopositive for Dcx in the epileptic temporal cortex also co-express PCNA and III-tubulin. Taken together, these results suggest that epilepsy may increase the expression of Dcx positive cells in the adult human brain and provide evidence suggestive of cortical neurogenesis in the adult human brain.

Poster 4.13

An Examination of the Extent of Adult Neurogenesis in the Carpet Shark *(Cephaloscyllium Isabellum)*

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Following Altman's and Kirsche's challenge to the dogma that no new neurons could be produced during adulthood in the 1960's, adult neurogenesis was shown in most vertebrate lineages. From a phylogenetic point of view, adult neurogenesis is not an uncommon event, having been demonstrated in reptiles and birds, amphibians, bony fishes and mammals. At present, however, adult neurogenesis has not been examined in cartilagineous fishes, the stem line of vertebrates. Sharks are an ideal group in which to study the extent of adult neurogenesis for several reasons: (i) they exhibit continuous body growth throughout life; (ii) in the stingray the number of peripheral axons and neurons continues to increase into adult life; and (iii) in adult gray reef sharks the number of inner ear hair cells also continues to increase. We have begun to evaluate the extent of adult neurogenesis in the carpet shark *(Cephaloscyllium isabellum)*. A specimen of *C isabellum* was injected i.p. with 230 mg/kg of BrdU, anaesthetised and perfused after 2 hrs. The brain was cryoprotected and cut at 40 µm, and processed following standard immunocytochemical techniques. BrdU was found in a small number of nuclei in close proximity to the ventricular surface, in a similar position than occasional cells labelled with an antibody aginst β-tubuline (III). Some BrdU labelled nuclei were also found throughout the brain that were not stained with our neuronal marker. These preliminary data suggest that adult neurogenesis occurs in sharks and that like in bony fishes, but unlike birds and mammals, it may also occur in non-telencephalic areas. If widespread adult neurogenesis can be unequivocally demonstrated in sharks, it would indicate that it represents the primitive condition. This therefore raises the question of what modifications in brain evolution of modern vertebrate lineages led to the restriction of this ability to specific forebrain areas.