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### Title

Synapses appear on doublecortin-immunolabeled hilar basal dendrites of newborn dentate granule cells obtained from epileptic adult rats

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**2.089****SYNAPSES APPEAR ON DOUBLECORTIN-IMMUNOLABELED HILAR BASAL DENDRITES OF NEWBORN DENTATE GRANULE CELLS OBTAINED FROM EPILEPTIC ADULT RATS**

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**Rationale:** Neurogenesis in the subgranular zone of the dentate gyrus persists throughout the lifespan of mammals, and the resulting newborn neurons are incorporated into existing hippocampal circuitry. Recently, we showed that newborn neurons had longer basal dendrites extending into the hilus than those from control rats. The present study was designed

to determine whether the longer hilar basal dendrites from epileptic rats had synapses on them.

**Methods:** Doublecortin (DCX) immunocytochemistry was used to label newborn neurons and their processes in adult rats with pilocarpine-induced seizures. Electron microscopic preparations were analyzed to determine the features of DCX-immunolabeled cell bodies and dendritic processes. In addition, the apical and basal dendrites were examined for synapses.

**Results:** DCX-immunolabeled apical and basal processes from the newborn neurons were apposed by glial membranes to varying extents. No synapses were found on the apical dendrites within the granule cell layer and these apical dendrites were >75% apposed by glial processes. In contrast, DCX-immunolabeled basal dendrites were < 50% apposed by glial processes, and synapses were found on several basal dendrites in the hilus. This finding is in contrast to control animals where there were no synapses found on any of the DCX-labeled hilar basal dendrites.

**Conclusions:** The observation of synapses on DCX-labeled basal dendrites in the dentate hilus of epileptic rats contrasts with the lack of synapses on those from normal rats. This difference may provide a basis for the formation of hilar basal dendrites that are found to persist following epileptic seizures (Spigelman et al. 1998; Ribak et al. 2000; Buckmaster and Dudek, 1999). It is likely that sprouted mossy fiber collaterals initially form synapses with hilar basal dendrites, because Ribak et al (2000) showed using biocytin labeling that mossy fibers synapsed on hilar basal dendrites emanating from granule cells located at the base of the granule cell layer. Basal dendrite synapses were later shown to provide the basis for additional recurrent excitatory circuitry (Austin & Buckmaster 2004). (Supported by NIH grant NS 38331.)