Gender differences in dentate granule cell proliferation after febrile seizures in immature rats

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Background. Febrile seizures are the most common type of early-life seizures, and are thought to play a causative role in the development of temporal lobe epilepsy. Several experimental paradigms of seizure induction that produce epilepsy as a consequence have been shown to be associated with the proliferation of dentate granule cells. We investigated granule cell proliferation after hyperthermia-induced seizures in immature male and female rats.
Methods. On postnatal day (PN) 10, hyperthermia-induced seizures (HT, 41-42°C core temperature) were evoked in male and female Sprague-Dawley rats by exposure to a regulated stream of heated air. Littermates were used as normothermia controls (NT, 35°C core temperature). From PN11 to PN16, rats were given bromodeoxyuridine (BrdU; 25 mg/kg body weight, intraperitoneal) twice daily to label dividing cells. At PN17 or PN66 rats were perfusion fixed, and BrdU immunoreactive cells in the dentate gyrus were counted.
Results. At PN17, female HT rats had 10% less BrdU positive cells than female NT rats ($p<0.05$), whereas in males there was no difference between HT and NT rats. At PN66, female HT rats had the same number of BrdU immunoreactive cells as female NT rats, while in males HT rats had significantly more (25%) BrdU immunoreactive cells compared to NT controls ($p<0.01$).
Conclusion. These data indicate that early-life seizures differently affect granule cell production and survival in male and female rats. Since gender is not considered to be associated with the development of temporal lobe epilepsy following febrile seizures, our results suggest that the effect of febrile seizures on granule cell cytogenesis and survival does not determine epileptogenesis.

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