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Temporal and extratemporal grey matter density reductions in two paediatric populations with temporal lobe epilepsy

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Background

Reductions in grey matter density across both temporal and extratemporal structures have been reported in adults, and more recently children, with temporal lobe epilepsy (TLE) and hippocampal sclerosis (HS). It is not known to what extent these reductions represent the impact of ongoing epilepsy on brain structure, or interference with development as a consequence of loss of normal hippocampal input.

To investigate this issue we studied grey matter density reductions in two paediatric groups with unilateral TLE associated with distinct pathologies: one group with HS and one group with temporal lobe Dysembryoplastic Neuroepithelial Tumour (DNET). We reasoned that if both groups exhibited similar widespread structural pathology, the grey matter reductions reported in HS are more likely to be the result of ongoing seizures during development, rather than the disconnection of the pathological hippocampus from its targets.

Materials and methods

Magnetic resonance T1 weighted 3D data sets were obtained for 20 children with a temporal lobe DNET (12 left and 8 right sided) and for 30 children with HS pathology (20 left and 10 right sided). Subjects were diagnosed as having TLE based on clinical evaluation, ictal and interictal EEG, and neuropsychiatric evaluation. The two paediatric groups were selected on the basis of their pathology and their similar clinical history i.e. age at onset, seizure type etc. Grey matter density in both TLE groups was compared to 22 neurologically normal subjects using VBM, implemented in SPM99 (Wellcome Department of Cognitive Neurology, http://www.fil.ion.ucl.ac.uk).

Results

Bilateral grey matter decreases were detected in both paediatric populations, albeit these were more pronounced for the HS group. Specifically, grey matter density reductions in the thalamus and the lateral surfaces of the temporal lobe were present in both paediatric groups, however, the HS group made evident further areas of grey matter reduction in regions such as the cingulum, the parahippocampal gyrus and the frontal opercular cortex.

Discussion

These findings are consistent with the adult literature where it has been found that patients with HS have widespread pathology that involves regions outside the temporal lobe (Keller *et al.*, 2002; Moran *et al.*, 2001). Moreover, the absence of widespread pathology in the DNET group supports the hypothesis that the grey matter reductions in the HS group are related to loss of normal hippocampal input during a critical period of development, rather than the presence of ongoing seizures.

References

1. Keller S, Mackay CE, Barrick TR, Wieshmann UC, Howard MA, Roberts N: **Voxel-Based Morphometric Comparison of Hippocampal and Extrahippocampal Abnormalities in Patients with Left and Right Hippocampal Atrophy.** *NeuroImage* 2002, **16:**23-31.
2. Moran NF, Lemieux L, Kitchen ND, Fish DR, Shorvon SD: **Extrahippocampal temporal lobe atrophy in temporal lobe epilepsy and mesial temporal sclerosis.** *Brain* 2001, **124:**167-175.