Neuropsychology Abstracts

Title: CORTICAL OSCILLATORY PATTERNS AND DYSGENESIS OF THE CORPUS CALLOSUM IN CHILDREN WITH SPINA BIFIDA AND HYDROCEPHALUS

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Background: Cortical oscillatory rhythms result from synchrononous activation of highly interconnected cell assemblies. In children with spina bifida myelingocele (SBM), cortico-cortical connectivity is compromised due to the partial agenesis of the corpus callosum. We studied the relation between cortical oscillatory rhythms and the structural integrity of the corpus callosum in children with spina bifida and hydrocephalus (SBH) using structural and functional imaging techniques.

Method: Twenty one children (age mean ± SD = 12.20 ± 2.90 years) with SBM (and different degrees of agenesis of the corpus callosum) underwent evaluations which included resting state Magnetoencephalographic (MEG) recordings, high resolution Magnetic Resonance Imaging (MRI) and Diffusion Tensor Imaging (DTI). MEG-derived spectral power at different regions (anterior, central, temporal and posterior) was calculated for four frequency bands (delta, theta, alpha, beta) and compared to the measurements obtained from a group of aged-matched healthy volunteers (N=11). Areas of three segments of the corpus callosum (genu, body, splenium) were derived from the patients' MRIs.

Results: The repeated measurements ANOVA with group as between-subjects factor and region and frequency band as within-subject variables yielded a main effect of group ($P < 0.013$), frequency ($P < 0.04$) and region ($P < 0.02$). There was a significant interaction effect of group x region ($P = 0.05$). Topographically the reduction in power was significant in posterior and temporal regions. The analysis did not reveal significant differences between the groups in anterior and central areas for any of the frequency bands. Associations between areas of the CC and spectral power were explored within the group with SBH. Significant correlation was found between the area of the splenium and the alpha spectral power in the posterior regions ($r = 0.67$; $p < 0.05$).

Conclusion: Our results indicate that children with SBM present with atypical regional patterns of cortical oscillatory activity associated with reduced regional transcallosal connectivity.