**Volumetric analysis of hippocampal subfields in mesial temporal lobe epilepsy: evidence of bilateral disease in patients with left hippocampal sclerosis**

Braga, B.P.1, Yasuda C.L.1, Morita, M.E.1 , Bergo, F.1 and Cendes, F.1

1Department of Neurology, Laboratory of Neuroimaging – Unicamp – São Paulo

**Introduction:** Mesial temporal lobe epilepsy (MTLE) is the most common epileptic syndrome in adults, and in approximately 65% of cases is associated with hippocampal sclerosis (HS). Among hippocampal subfields, neuronal loss is usually greatest in CA1, intermediate in CA3 and CA4, and more subtle in CA2 areas. Previous studies had already shown more widespread pattern of atrophy in patients with left MTLE, associated with poor seizure control and longer duration of epilepsy. The aim of this study is to compare the different patterns of atrophy in hippocampal subfields between patients with right and left unilateral HS (RTLE and LTLE, respectively).

**Materials and Methods:** The subjects were divided in three groups: 223 controls (78 males), 106 patients with LTLE (41 males) and 84 patients with RTLE (30 males). T1 high-resolution images from 3T scanner were submitted to automatic segmentation of hippocampal subfields (CA1, CA2, CA4/dentate gyrus, pre-subiculum, subiculum and fimbria), with Freesurfer 5.3. The statistic analysis was performed with SPSS 22, using Mixed Model Anova. We searched for interactions between side, volume and groups. Significance was considered at p<0.05, with Bonferroni adjustment for multiple comparisons.

**Results:** Groups of patients (LTLE and RTLE) were balanced for age, gender, seizure frequency, age of onset and duration of epilepsy. Compared to controls, RTLE group presented atrophy within all ipsilateral subfields (p<0.01), and more subtle atrophy in the contralateral pre-subiculum and fimbria (p<0.032). On contrary, LTLE presented significant atrophy of all six subfields in both hemispheres (all p<0.01), most evident unilateral.

**Conclusion:** The most evident bilateral involvement of the hippocampal subfields detected in LTLE may be likely related with the most severe cognitive impairment found in these patients. These findings may also have important implications in long term post-operative prognostic, as bilateral alterations may be associated with persistent seizures.

**References:** [1] References: Babb TL. Synaptic reorganizations in human and rat hippocampal epilepsy. *Advances in Neurology*. 1999;79:763–779.

[2] Cendes F, Kobayashi E. Epilepsia de lobo temporal. In: Guerreiro CAM, Guerreiro MM, Cendes F, Cendes IL, editors. *Epilepsia*. São Paulo, Brazil: Lemos Editorial; 2000

[3] Cendes F. Progressive hippocampal and extrahippocampal atrophy in drug resistant epilepsy. *Current Opinion in Neurology*. 2005;18(2):173–177.

[4] A. C. Coan, S. Appenzeller, L. M. Li, and F. Cendes, “Seizure frequency and lateralization affect progression of atrophy in temporal lobe epilepsy,” *Neurology*, vol. 73, no. 11, pp. 834– 842, 2009

[5] Steve TA, Jirsch JD and Gross DW. Quantification of subfield pathology in hippocampal sclerosis: a systematic review and meta-analysis. Epilepsy  Research, 2014; 108(8):1279-85.