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Characterization of Incomplete Hippocampal Inversions in a large dataset of young healthy subjects

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INTRODUCTION

Incomplete hippocampal inversion (IHI) is an atypical anatomical pattern of the hippocampus.

It has been mostly described in patients with epilepsy, malformations of cortical development and in temporal lobe epilepsy (Bajic et al. 1998; Bernasconi et al. 2005; Bajic et al. 2009), with a prevalence of 30%-50%. IHI are also found in healthy subjects, although with an apparently lower frequency (Bajic et al. 2008). However, these studies include a small number of subjects or included patients without epileptic seizures but referred for other neurological conditions.

The purpose of our study was to investigate the prevalence of IHI in a large population of normal subjects.

METHODS

→ We studied 2008 subjects of the European database IMAGEN (Schumann et al. 2010). IHI was assessed using a visual scale on T1-MRI. We adapted existing criteria to make feasible the evaluation of a large dataset. Each criterion have a note between 0 and 2.

→ A global criterion CO indicates the presence of IHI on the global aspect of the hippocampus: 0 if there is no IHI, 2 if there is an IHI and 1 if the IHI is not obvious.

- CO: No IHI Partial IHI IHI

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<td>70.9%</td>
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- CO vs CO
- CO vs FC1
- CO vs FC2

→ The reproducibility was beyond 0.64 (substantial agreement).

→ Very strong agreement (>80%) were observed in the majority of cases.

Frequency of IHI, according to the global criterion CO, for left and right hippocampi. Confidence intervals (CI) are at 95%.

CONCLUSION

→ Our results demonstrate that IHI are a common phenomenon in healthy subjects. Thanks to the study of a large dataset of over 2000 subjects, we were able to provide reliable estimates of the frequency.

→ We also proposed a visual scale of IHI that is applicable to large datasets.

→ IHI were much more frequent in the left hemisphere.

→ The IHI score shows a continuum between the absence and the presence of IHI and therefore using a IHI score seems to be more adapted for the study of IHI than a global criterion.

REFERENCES


The consortium IMAGEN

Results of Kappa test for the inter and intra reproducibility of the criteria

Results

- CO vs CO: 0.80, 0.74, 0.78, 0.81, 0.73
- CO vs FC1: 0.89, 0.71, 0.82, 0.87, 0.87
- CO vs FC2: 0.79, 0.64, 0.81, 0.86, 0.86
- FC1 vs FC2: 0.87, 0.82, 0.88, 0.87, 0.80

→ Based on criterion CO, we computed the frequency of IHI.

→ IHI were more frequent for the left than for the right hippocampus (q2 test = 129.2, DF=2, p=8.5e-29)

→ IHI did not differ between males and females nor depend on handedness.