Shift in hippocampal medial position and increased fissure volumes in individuals affected by Developmental Topographical Disorientation

Agustina Fragueiro, F. Santacroce, Ford Burles, Claire Cury, Giuseppe Laria, Giorgia Committeri

To cite this version:

Agustina Fragueiro, F. Santacroce, Ford Burles, Claire Cury, Giuseppe Laria, et al.. Shift in hippocampal medial position and increased fissure volumes in individuals affected by Developmental Topographical Disorientation. FESN HNPS 2023 - 8th Scientific Meeting of the Federation of European Societies of Neuropsychology & 2nd Panhellenic Conference on Neuropsychology, Sep 2023, Thessaloniki, Greece. pp.1-1. hal-04314408

HAL Id: hal-04314408
https://inria.hal.science/hal-04314408
Submitted on 29 Nov 2023

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Distributed under a Creative Commons Attribution 4.0 International License
Shift in hippocampal medial position and increased fissure volumes in individuals affected by Developmental Topographical Disorientation

A. Fragueiro1, F. Santacroce2, F. Burles3, C. Cury1, G. Iaria3, G. Commiteri2

1. Univ Rennes, CNRS, Inria, Inserm, IRISA UMR 6074, Empenn - ERL U 1228, F-35000 Rennes, France.
2. Department of Neuroscience, Imaging and Clinical Sciences, University G. d’Annunzio of Chieti-Pescara, Italy.
3. Department of Psychology, University of Calgary, Calgary, AB, Canada.

Developmental topographical disorientation (DTD) refers to the lifelong inability of individuals to orient in familiar surroundings despite the absence of any neurological disorder. Despite reporting no gross volumetric or structural brain abnormalities, studies have reported reduced functional connectivity between the hippocampus and other brain regions (1).

Aims: Here, we aim at investigating differences in morphological and morphometric hippocampal features between DTDs and healthy controls (HC).

Method: We measured incomplete hippocampal inversion (IHI) (i.e., a developmental atypical anatomical pattern characterized by the incomplete infolding of the hippocampal subfields(2)) in T1 acquired from DTDs (N=20) and HC (N=390). We rated criterion C1 (roundness and verticality of the hippocampal body), C2 (verticality and depth of the collateral sulcus), C3 (medial positioning of the hippocampus), and C5 (depth of the collateral and the occipitotemporal sulcus), and calculated a total IHI score for each hemisphere. We conducted Mann-Whitney tests between groups for all criteria independently and for the global IHI score. We used FreeSurfer7 to run the automatic segmentation for hippocampal subfields. We compared volumes from (1)CA1, (2)CA2,3,4+DG, (3)fissure, (4)subiculum, (5)tail, (6)head, (7)body, and (8) the whole hippocampus between DTD and HC and used Bonferroni for multiple comparison correction.

Results: IHI prevalence in both DTD and HC was similar to those previously reported in the healthy population. A significant difference was found only for criteria 3 (p=0.026). We also found a difference between DTD and HC for the hippocampal fissure bilaterally (both p<0.001).

Discussion: Although no differences were found in IHI total score between DTD and HC, in DTDs the hippocampus was more medially positioned with larger hippocampal fissures. These findings are foundational to further investigate their relationship with functional and behavioral characteristics of DTD.

Conclusions: The hippocampus of individuals affected by DTD is more medially positioned with larger hippocampal fissure volumes as compared to healthy individuals.

Keywords: developmental topographical disorientation, hippocampus, incomplete hippocampal inversion

References