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PII: S2213-1582(18)30305-X
DOI: doi:10.1016/j.nicl.2018.09.030
Reference: YNICL 1557

To appear in: *NeuroImage: Clinical*

Received date: 6 May 2018
Revised date: 17 August 2018
Accepted date: 25 September 2018

Please cite this article as: Andreas Nowacki, T.A. Khoa Nguyen, Gerd Tinkhauser, Katrin Petermann, Ines Debove, Roland Wiest, Claudio Pollo , Accuracy of different three-dimensional subcortical human brain atlases for DBS –lead localisation. Ynicl (2018), doi:10.1016/j.nicl.2018.09.030

Accuracy of Different Three-Dimensional Subcortical Human Brain Atlases for DBS –Lead Localisation

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Abstract

Background: Accurate interindividual comparability of deep brain stimulation (DBS) lead locations in relation to the surrounding anatomical structures is of eminent importance to define and understand effective stimulation areas. The objective of the current work is to compare the accuracy of the DBS lead localisation relative to the STN in native space with four recently developed three-dimensional subcortical brain atlases in the MNI template space. Accuracy is reviewed by anatomical and volumetric analysis as well as intraoperative electrophysiological data.

Methods: Postoperative lead localisations of 10 patients (19 hemispheres) were analysed in each individual patient based on Brainlab software (native space) and after normalisation into the MNI space and application of 4 different human brain atlases using Lead-DBS toolbox within Matlab (template space). Each patient`s STN was manually segmented and the relation between the reconstructed lead and the STN was compared to the 4 atlas-based STN models by applying the Dice coefficient. The length of intraoperative