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Auditory Midbrain Implant (AMI) - Design of a new Double Shank Electrode

M. Pietsch, H. Lim (1), R. Calixto, T. Lenarz, O. Majdani, F. Götz (2), S Balster

Medizinische Hochschule Hannover / HNO,

(1) University of Minnesota / Institute of Translational Neuroscience,

(2) Medizinische Hochschule Hannover / Neuroradiologie

Introduction: A total of 5 NF2 patients have been safely implanted with the current single shank AMI array. Although all AMI patients benefit from their device, only one patient outperforms the average performance for ABI NF2 patients (40-50% correct on a closed-set vowel test, average ABI score is about 35%). This patient is actually implanted into the target region, the ICC. Objectives: Based on MHH's human and animal findings, we propose that a two-shank AMI array will be the appropriate design for the next patients. The dimensions and properties of the new design of a double-shank AMI array need to be specified to ensure that an accurate and safe implantation can be achieved. Methods: Two human cadaver heads are scanned with CT and MRI to achieve native datasets of the anatomy. The surgical approach to the colliculus inferior (IC) is performed by a subtentorial craniotomy, which is enlargened caudally and medially. According to the anatomical conditions two AMI shanks are implanted into the ICC and fixed in place. To achieve implanted datasets the heads are re-scanned with CT and MRI. The midbrain is explanted with implanted electrode shanks in place and histology of the ICC is performed. The orientation and insertion angle and depth in respect of the ICC layer structure of the implanted AMI shanks are determined. The native and implanted CT and MRI datasets are compared to optimize the surgical approach and implant design. Results: We present the results of anatomical conditions, histology and imaging. Discussion: We discuss the need for a two-shank array and propose accurate design properties.