A New Hearing Implant Targeting The Auditory Midbrain: Initial Clinical Trial Results

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The cochlear implant is considered one of the most successful neural prostheses to date. However, patients without a functional auditory nerve cannot benefit from a cochlear implant. A new central auditory prosthesis was developed that targets the inferior colliculus (auditory midbrain implant, AMI). The first AMI device consisted of a single-shank array with 20 electrodes and was implanted in five neurofibromatosis type II (NF2) patients during 2006-2008. The AMI achieved encouraging results in terms of safety and improvements in lip-reading capabilities and environmental awareness, but it has not yet provided sufficient speech perception comparable to cochlear implants. Additional animal and human studies were performed demonstrating that a two-shank AMI array can potentially improve hearing performance by targeting specific neurons of the inferior colliculus and minimizing suppressive effects induced by temporal stimulation patterns presented on individual electrodes. A new two-shank AMI device (11 electrodes along each shank) has been developed and is currently being investigated in a clinical trial performed in Germany that is funded by the National Institutes of Health in United States. Two NF2 patients have been recently implanted with the new AMI, in which each patient will be evaluated over a 2-year period. The device has shown to be safe and is providing useful hearing sensations to the patients. Activation properties, pitch percepts, temporal coding capabilities and speech perception performance in these patients will be presented and compared to hearing performance achieved with the previous AMI device and auditory brainstem implants. Overall, the initial results are encouraging in terms of safety and functionality, and hopefully hearing performance continues to improve in these AMI patients over time. Up to five NF2 patients will be implanted with the AMI in this clinical trial.