

**Cochlear Implant Impedance Telemetry Measurements and Model calculations to estimate modiolar currents**

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The use of impedance and neural response telemetry measurements through stimulation and recording of electrical signals can facilitate device fitting and parameter adjustments, especially in young children. However, the detailed configuration of electrical impedances and current distributions around the electrode array is unknown and has not been able to be determined using standard impedance telemetry measures. We therefore attempted to improve the impedance measurement procedure by applying a more detailed model of electrical impedances of stimulation and recording electrodes within the cochlea and by developing more sophisticated measurement protocols to identify the model parameters in a given implant subject. In particular, the modiolar currents, the portion of the currents assumed to be responsible for activating the neural elements, are determined and evaluated. Their predictive value for device fitting parameters is currently being investigated and first results have been obtained. In its present form the measurement takes about two minutes. As a next step, a series of postoperative measurements are planned which will allow us to estimate changes of the modiolar current distributions over the first weeks after implantation. This approach is mainly based on a published patent and makes use of the Nucleus Matlab Toolbox and the Nucleus Implant Communicator (NIC) software. The ultimate goals of a refined model and more specific impedance measurements are semiautomatic fitting and of programming parameter update procedures for CI users with varying intracochlear electrical stimulation conditions. **Keywords:** Cochlear implant, Impedance Measurement, Telemetry

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