

Use of commercial cochlear implants for chronic stimulation of laboratory animals

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Introduction: Decades of research and engineering refinements have resulted in the current generation of commercially available cochlear implant systems being capable of producing a wide range of stimulus paradigms. Additionally, many implants now also have some telemetry facilities. These features make them an attractive prospect for use in a wide range of studies involving neural prosthesis.

Methods: We adapted and packaged a commercial cochlear implant for chronic laboratory experiments using cats and guinea pigs. The modifications included static discharge protection, lead-wire connections, monitoring connections and encapsulation of the entire assembly in silicon rubber for protection. A portable computer-based system was also developed to aid direct measurements of electrode currents and voltages. The system can be assembled with off-the-shelf components, and requires only a modestly equipped workshop.

Results: Data is presented on the use of the system for providing environmentally derived chronic intracochlear electrical stimulation in the cat. Additionally, data on evoked potential recordings is also presented.

Conclusions: We developed a flexible stimulation and recording system, based on a commercial cochlear implant, for use in laboratory animals. The system enables studies involving chronic intracochlear electrical stimulation to use environmentally derived stimuli identical to those used clinically. In addition, the system should prove to be a useful platform in other fields of biomedical research involving neural prosthesis.

Support provided by the NIDCD (HHS-N-263-2007-00053-C), The Bionic Ear Institute and the Victorian State Government.

Word Count (max 250) = 230