

1999 CONFERENCE ON IMPLANTABLE AUDITORY PROSTHESES
ABSTRACTS FOR INVITED SPEAKER PRESENTATIONS

SESSION 2
Speaker 2
Elaine Saunders

DEVELOPMENT OF SAFE AND EFFECTIVE ELECTRODES:
A RISK MANAGEMENT APPROACH

Elaine Saunders, Michael Tykocinski, Lawrence Cohen, Claudiu Treaba,
Robert Briggs, Peter Gibson, Graeme Clark, and Robert Cowan

Co-operative Research Centre for Speech, Hearing and
Cochlear Implant Research, Australia

Results from studies on experimental animals, computer modelling and preliminary psychophysical studies with three patients, have confirmed the potential for subjective improvement with electrode arrays which lie closer to the modiolus than does the Nucleus straight array. Results of psychophysical studies with three cochlear implant patients, using developmental pre-curved arrays, confirm the feasibility of improving patients' performance through improvements in electrode design. In particular, it was found in psychophysical tests, with patients using a developmental pre-curved electrode array, that both maximum comfortable level and threshold reduced with decreasing distance of a stimulated electrode from the modiolus, and that the dynamic range increased. More intense neural excitation patterns were obtained with the closer electrodes. From this it is inferred that the development of more sophisticated electrode arrays, positioned closer to the modiolus than is currently the case with the Nucleus standard array, will enable the development of improved speech processing strategies. There are technical constraints in the design of a peri-modiolar array, and currently a number of approaches to this problem have been investigated. Whilst the goal of the design is that it be effective for sophisticated and variable manners of stimulus delivery, a primary constraint is safety.

This paper addresses electrode insertion safety through risk management techniques. Developed in high technology industries, risk management techniques may be utilised to give both qualitative and quantitative characterisation of risk, in the design, development, insertion and evaluation of electrode arrays for cochlear implants. Risk management techniques are used to ensure, as far as possible, that due diligence can be demonstrated for the electrode array development process. Risk management techniques assist in ranking risks according to normally accepted criteria; in this case, utilising knowledge, sourced from contemporary physiological and histological studies, of likely sources of damage, and the severity of the consequences. In this paper, an overview of a staged approach to the design and development of a series of electrodes that are "reasonably" safe is described.



Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:

Clark, Graeme M.; COWAN, ROBERT; Saunders, Elaine; TYKOCINSKI, MICHAEL; Cohen, Lawrence; Treaba, Claudiu; Briggs, Robert S.; GIBSON, PETER

Title:

Development of safe and effective electrodes: a risk management approach [Abstract]

Date:

1999

Citation:

Saunders, E., Tykocinski, M., Cohen, L., Treaba, C., Briggs, R. S., Gibson, P., et al. (1999). Development of safe and effective electrodes: a risk management approach [Abstract]. In Program & Abstracts of the 1999 Conference on Implantable Auditory Prostheses, California.

Persistent Link:

<http://hdl.handle.net/11343/27058>

File Description:

Development of safe and effective electrodes: a risk management approach [Abstract]