PARAMETER SELECTION AND PROGRAMMING RECOMMENDATIONS FOR THE ACE AND CIS SPEECH PROCESSING STRATEGIES

Kerrie L Plant, Lesley A Whitford, C E Psarros, A E Vandal, G M Clark

CRC for Cochlear Implant. Speech and Hearing Research, Melbourne, Australia

The Nucleus 24 Cochlear Implant system with the SPrint processor provides access to multiple speech processing strategies and a wide range of programming parameters. Strategy comparison studies have suggested that the optimal parameter set and coding strategy varies from individual to individual. It is necessary, however, to establish some default programming parameters and fitting guidelines. Therefore we have investigated the effect of stimulation rate and the number of channels or maxima in the ACE or CIS strategies, as well as the optimal programming strategy for subjects with a limited number of available electrodes. Speech perception was tested using monosyllabic words and sentences in noise, with the evaluation protocol designed to take into account learning effects. Take-home experience was provided with all programs, and subjects were asked to complete a comparative performance questionnaire regarding program preference. Six or eight subjects were enrolled in each study.

The effect of the number of channels in the CIS strategy was investigated using 6, 8, 12 and 16 channels, at a stimulation rate of 900 Hz. Analysis of group mean results for monosyllabic word testing revealed a significant decrease in performance for the 16-channel condition (mean 32.4%), compared to the 6 and 12 channel conditions (mean 37.1% and 38.4% respectively). Similarly, for sentence testing in noise, a significant decrease in performance was seen for the 16-channel condition (mean 35.6%), compared to the 8 and 12 channel conditions (mean 42.4% and 41.8% respectively). Additional data comparing the effect of number of maxima in the ACE strategy will also be presented.

The effect of stimulation rate in the ACE strategy was investigated using three rates (approximately 250, 800 and 1600 Hz) with the number of maxima held constant (eight). Mean open-set sentence recognition in noise for the 1600 Hz condition was significantly lower (61.0%) compared to the 250 and 800 Hz conditions (67.8% and 65.5% respectively). Mean monosyllabic word scores were not significantly different. Additional data comparing the effect of stimulation rate in the CIS strategy will also be presented.

A further study investigated the optimal programming strategy for subjects with a limited number of available electrodes. All conditions used the ten most basal channels, in an attempt to simulate a partial insertion of the electrode array. The strategies evaluated were a moderate rate ACE strategy (6 maxima at 900 Hz per channel), a lower rate ACE strategy (6 maxima at 250 Hz per channel) and CIS (10 channels at 900 Hz per channel). Mean open-set sentence recognition in noise was significantly higher for the CIS strategy (25.9%) compared to the lower rate ACE strategy (15.8%). No other significant differences were observed.