

Continuous improvement in Mandarin lexical tone perception as the number of channels increased: a simulation study of cochlear implant.

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摘要

Abstract

CONCLUSION: With reference to English phoneme recognition, where performance usually does not improve after six or eight channels in cochlear implants (CIs), increasing total channel numbers continuously improved perception of Mandarin tones. **OBJECTIVE:** To test our hypothesis that current CI strategies might be modified to improve Mandarin lexical tonal perception. **MATERIALS AND METHODS:** Lexical tonal perception tests using 48 monosyllables in Mandarin Chinese were conducted in 32 native Mandarin speakers with normal hearing. The performance of tonal perception was compared among the controlled factors, which were total channel number, number of channels allocated to the F0 spectrum, and whether there were spectral shifts in the electrode configuration. The experimental condition that preserves fine structure was used as a comparison. **RESULTS:** The signal processing strategy using 16 channels--which is technically possible with current CI devices--produced better tonal perception than those using 12 or 8 channels. Increasing the number of fundamental channels did not improve tonal perception, and spectral shifts did not change tonal perception. An experimental condition (FiC12) that preserves the fine structure produced significantly better overall scores for tone perception than other experimental conditions with envelope strategies.