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Evaluation of the Benefit for Cochlear Implantees of Two Assistive Directional Microphone Systems in an Artificial Diffuse Noise Situation.

Research Articles

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Abstract:

Objective: People with cochlear implants have severe problems with speech understanding in noisy surroundings. This study evaluates and quantifies the effect of two assistive directional microphone systems compared to the standard headpiece microphone on speech perception in quiet surroundings and in background noise, in a laboratory setting developed to reflect a situation whereby the listener is disturbed by a noise with a mainly diffuse character due to many sources in a reverberant room.

Design: Thirteen postlingually deafened patients, implanted in the Leiden University Medical Centre with the Clarion CII device, participated in the study. An experimental set-up with 8 uncorrelated steady-state noise sources was used to test speech perception on monosyllabic words. Each subject was tested with a standard headpiece microphone, and the two assistive directional microphones, TX3 Handymic by Phonak and the Linkit array microphone by Etymotic Research. Testing was done in quiet at a level of 65 dB SPL and with decreasing signal-to-noise ratios (SNR) down to -15 dB.

Results: Using the assistive directional microphones, speech recognition in background noise improved substantially and was not affected in quiet. At an SNR of 0 dB, the average CVC scores improved from 45% for the headpiece microphone to 67% and 62% for the TX3 Handymic and the Linkit respectively. Compared to the headpiece, the Speech Reception Threshold (SRT) improved by 8.2 dB SNR and 5.9 dB SNR for the TX3 Handymic and the Linkit respectively. The gain in SRT for TX3 Handymic and Linkit was neither correlated to the SRT score with headpiece nor the duration of CI-use.

Conclusion: The speech recognition test in background noise showed a clear benefit from the assistive directional microphones for cochlear implantees compared to the standard microphone. In a noisy environment, the significant benefit from these assistive device microphones may allow understanding of speech with greater ease.

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