Effect of sensation level on speech intelligibility and cortical auditory evoked potentials (CAEPs) in noise.

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Context

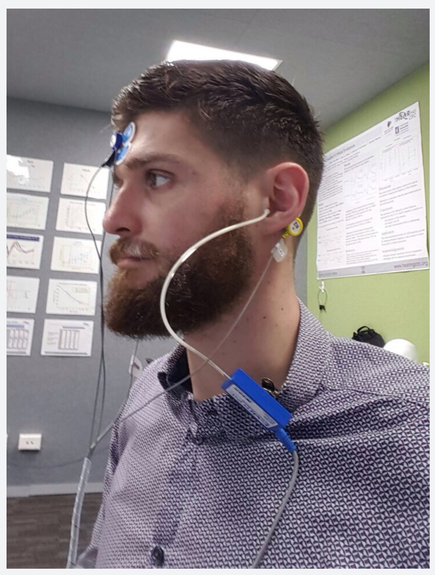
This study investigated **the encoding of sound in noise at the cortex level** by recording cortical auditory evoked potential (CAEP) and measuring speech intelligibility for several stimulus intensities in normal hearing (NH) and hearing impaired (HI) subjects.

Method

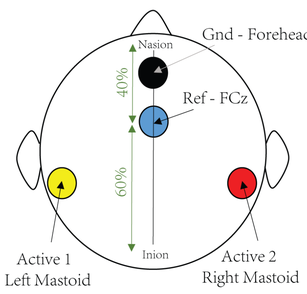
Behavioral testing
- Audiometry
- Speech intelligibility in quiet and noise

Objective testing
- Cortical auditory evoked potentials (CAEPs) in noise
- Sensation level: 10, 20, 30, 40 dB
- SNR fixed at 15 dB

Participants: Seventeen subjects
- 7 Normal Hearing (NH)
- 10 Sensory Neural Hearing Loss SNHL)

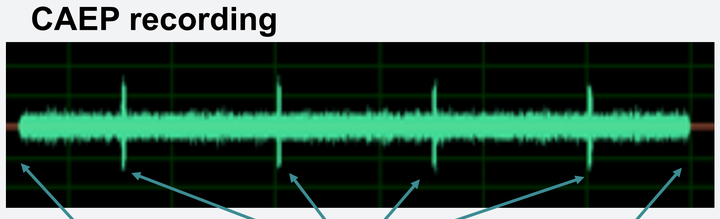


A participant during CAEP recording

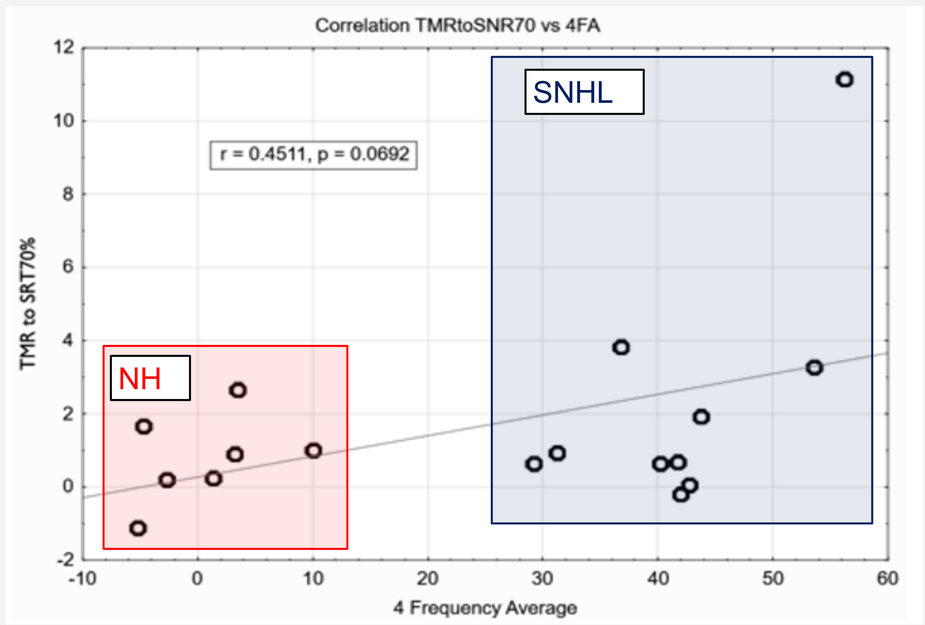


Electrode positions for CAEP recording

Waveform of the tone in noise used for CAEP recording



Target-to-masker ratio to Speech Reception Threshold at 70%



No significant correlation between the TMR-to-SRT70% and the 4 Frequency Average

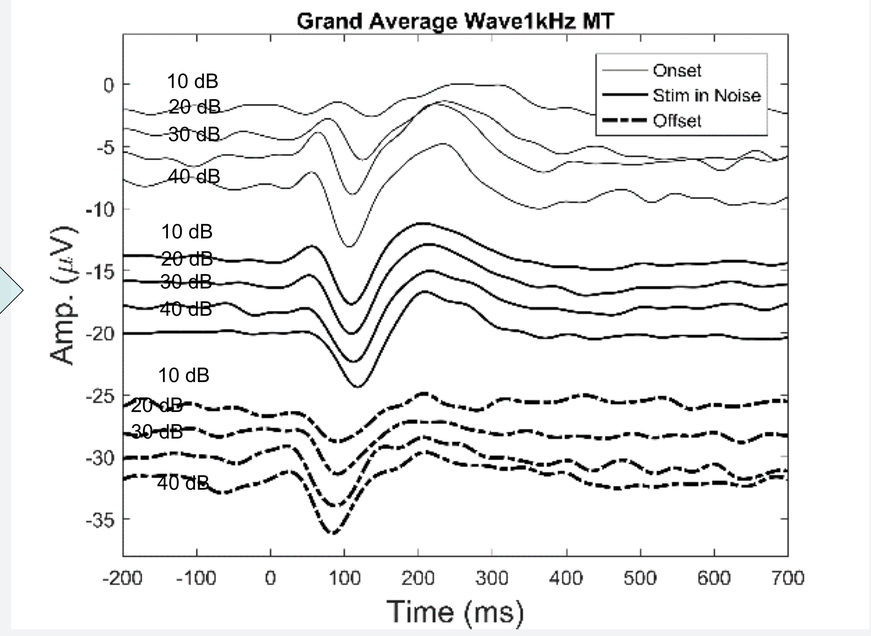
CAEP waveforms

CAEP grand average in Normal Hearing subjects for Onset, Stimulus-in-Noise and Offset for four sensation levels (10 to 40 dB SL)

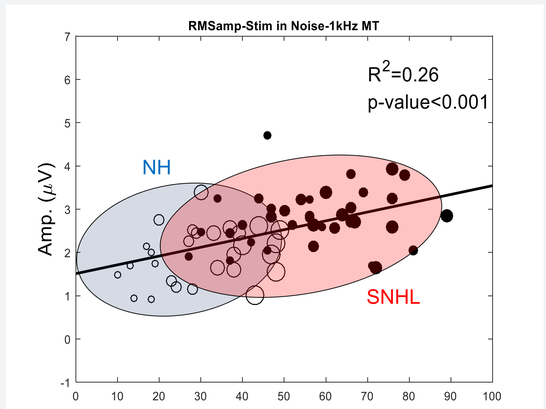
Onset CAEP

CAEP in Noise

Offset CAEP

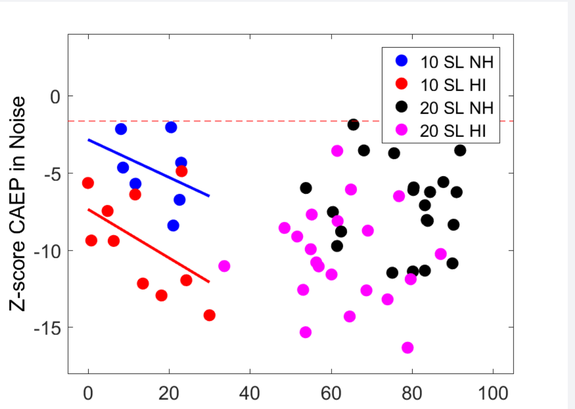


CAEP in Noise response amplitude



A significant correlation was found between the amplitude of the CAEP in noise and the stimulus level expressed in dB SPL

CAEP in noise vs. Speech intelligibility



CAEP response detection expressed in Z-score were significantly lower for normal hearing compared to hearing impaired subjects.

Conclusion

The current study allows to better understand how parameters such as intensity, sensation level and SNR affect cortical responses recorded in normal hearing and hearing impaired subjects. It will contribute in the development of new objective method for the assessment of auditory neuropathy type hearing loss