Title: OAE-based Measurement of Middle Ear and Olivocochlear Efferent Reflexes Using Higher Noise Activator Levels

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Sound energy entering the auditory system can be modified at peripheral stages of processing (the middle ear and inner ear) to help improve detectability of signals in noise, as well as to protect the system from damage. Two different efferent auditory reflexes act as “automatic gain control” in this regard: the medial olivocochlear reflex (MOCR) and the middle-ear muscle reflex (MEMR). The two reflexes act with different mechanisms on different parts of the peripheral auditory system. The MOCR works by altering the motility of cochlear outer hair cells, reducing cochlear gain. The MEMR works by causing stapedius muscle contraction, stiffing the middle ear system.

In humans, MOCR effects are assessed primarily using otoacoustic emissions (OAEs). OAEs are measured with and without the presence of contralateral acoustic stimulation (CAS). Differences in OAE amplitude and/or phase between these conditions are then attributed to the MOCR.

However, the MEMR is also activated by higher levels of CAS, and the effects of MEMR are difficult to disentangle from those of the MOCR. Consequently, when assessing MOCR using OAEs, CAS is typically kept to low levels (~30-35 dB SL) to avoid contaminating the MOCR response with MEMR. One disadvantage of using low CAS levels is that the resulting MOCR effects are small and have poor signal-to-noise ratio. Additionally, how the MOCR works in these low-level noise situations may not be an accurate indicator of how it works at higher, possibly more ecologically valid noise levels (50-80 dB SL).

In this presentation we examine the possibility of measuring MOCR effects at higher CAS levels. It may be possible to avoid unwanted MEMR effects by choosing analysis frequencies carefully so that they fall in regions that are minimally affected by MEMR.

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