



**THE EFFECT OF THE MEDIAL OLIVOCOCHLEAR REFLEX ON AUDITORY NERVE AND AUDITORY BRAINSTEM POTENTIALS IN HUMANS**

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**Abstract**

**Background:** Despite modern hearing aids and cochlear implants, individuals with hearing loss struggle to understand speech in noisy backgrounds. Animal studies reveal that the medial olivocochlear reflex (MOCR) attenuates outer hair cell amplification of background noise (BN), freeing-up neural resources to code sounds of interest, such as speech. This effect is yet to be confirmed in humans. Studies on humans found that contralateral noise (CN), which is known to evoke the MOCR, has been shown to suppress auditory nerve (Compound Action Potential [CAP], Smith et al. 2017) and brainstem (Envelope Following Response [EFR]) potentials (Mertez et al. 2016). Although this suppression is consistent with the MOCR, it is unclear whether additional central mechanisms contribute to the effects of CN on brainstem potentials.

**Purpose:** This study determined the relationship between CN suppression of auditory nerve and brainstem responses in humans. We hypothesize that the CAP and EFR potentials will decrease in the presence of CN.

**Research Design:** Four normal-hearing adults (1 male) between 19 to 24 years participated. CAPs and EFRs were measured from electrodes on the scalp and the tympanic membrane. The primary variable of interest was the effect of CN on CAP and EFR amplitude. This effect was measured under three repetition rates of the probe stimulus. Each participant received these conditions in random order.

**Data Analysis:** A sliding average of the CAP and EFR amplitudes across time was obtained and expressed as percent maximum amplitude. In order to test the hypothesis of reduced CAP and EFR amplitudes in the presence of CN a paired t-test of the mean amplitudes from the baseline and CN analysis windows was run.

**Results:** Only EFR amplitudes in the fast-rate condition showed a significant reduction in amplitude.

**Conclusions:** The suppression of EFR, but not the CAP amplitudes suggest either 1) the mechanism is central to the auditory nerve, or 2) the CAP is not sensitive to MOCR-based suppression by CN. Further research is needed to evaluate these possibilities.