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**The effects of noise exposure on temporary damage in hair cells of Mongolian gerbils evaluated by the cochlear microphonics**

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**Keywords:** Cochlear nonlinearity, Outer hair cells, Awake preparation, Round window, Hearing sensitivity, SPL dependency

High intensity noise exposure can cause temporary or permanent hearing loss. In this study, we evaluated the temporary damage in hair cells by the cochlear microphonics (CM) in Mongolian gerbils (*Meriones unguiculatus*), which communicate with each other with vocalizations and have an audible range similar to humans. Adult gerbils received surgical implantation of a silver wire electrode on the round window of their cochlea through the middle ear to record CM. After the surgery, they were exposed to broadband noise (0.5 to 45 kHz) at 90 dB SPL for 5 minutes. CMs were recorded for tone bursts of 1 to 45 kHz. The following results were obtained. First, we observed the largest CM reduction just after the noise exposure. Second, decrements in CM amplitude depended on frequency sensitivity. In other words, low sensitivity frequency range above 22 kHz produced large reduction in CM amplitude. Third, decrease in CM amplitude was greater for lower stimulus intensities. Fourth, for testing frequencies, which produced large CM decrements, it took a longer period to recover back to pre-noise exposure amplitude levels. These findings indicate that reduction in CM amplitude appeared to be related to the cochlear nonlinearity generated by the outer hair cells.



Fig. 1 CM amplitude shift levels in dB compared with pre and post noise exposures. **A**: 80 dB SPL sound stimuli. **B**: 40 dB SPL sound stimuli. Black bar: noise bandwidth. For both **A** and **B**, slight temporary damages were observed. For 80 dB SPL (**A**), CM decreased equally at all frequency. On the other hand, with 40dB SPL (**B**), remarkable CM shift was observed in the high frequency range (22 kHz to 45 kHz).