

## **Using otoacoustic emissions to explore cochlear tuning and tonotopy in the tiger**

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Stimulus-frequency otoacoustic emissions (SFOAEs) have been shown to provide reliable correlates of cochlear tuning in a variety of mammalian and non-mammalian species, including the domestic cat (*Felis catus*). Here, we apply the same methodology to explore peripheral auditory function in the largest member of the cat family, the tiger (*Panthera tigris*). We measured SFOAEs in 9 unique ears of 5 anesthetized tigers. The tigers, housed at the Henry Doorly Zoo, were of both sexes and ranged in age from 3-10 yrs. Probe levels were fixed at 40 dB SPL in the ear canal and probe frequencies were swept over a four-octave range (0.7-13 kHz). Measured SFOAE phases were corrected for acoustic propagation delays using estimates of the residual ear canal length (~7 cm). Our results indicate that overall SFOAE levels in the tiger are similar to those in the domestic cat. Tiger SFOAE phase-gradient delays, however, are significantly longer than in the cat, by approximately a factor of two above 2 kHz and even more at lower frequencies. Based on the correlations between tuning and delay established in other species, our results imply that cochlear tuning in the tiger is significantly sharper than in the cat. Furthermore, if the excitation pattern produced by a low-level tone at corresponding cochlear locations has a similar width in these two members of the cat family, as argued for other more phylogenetically disparate mammalian species (Shera et al. JARO 2010), then our data imply that the space constant (mm/octave) of the cochlear tonotopic map is larger in the tiger than the cat by roughly the same factor of two that relates their SFOAE delays. A longer space constant in tiger is consistent both with ABR thresholds, which suggest a lower upper limit of hearing in the tiger, and with measurements of basilar-membrane (BM) length, which at roughly 36-39 mm in the tiger is about 1.5 times longer than the BM in the cat (~25 mm). [Work supported by NSF Grant #0823417 and NIH grant R01 DC003687]