

Poster No. 42

ONSET OF OTOTOXICITY IN THE CAT IS RELATED TO THE ONSET OF AUDITORY FUNCTION

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Cats are altricial mammals, they are born deaf and undergo rapid maturation of the auditory system within the first three weeks of life. In the present report we describe the use of ototoxic drugs to deafen kittens early in their auditory development as part of a separate study that required deaf animal models without prior auditory experience. Nine healthy kittens were deafened by the co-administration of kanamycin (300 mg/kg) and ethacrynic acid (25 mg/kg) at a dose level sufficient to profoundly deafen adult cats (1). Their ages varied from six to 16 days after birth (DAB). All animals made an uneventful recovery and were returned to their mothers within three hours of the procedure. At 26 DAB each animal was anaesthetized with ketamine (20 mg/kg) and xylazine (3.8 mg/kg), and auditory brainstem responses to both click and tone pip stimuli were recorded. Two kittens deafened at 6 DAB exhibited a 60 - 70 dB hearing loss at high frequencies (24, 12 & 8 kHz), while for frequencies at and below 4 kHz thresholds were similar to those in control animals. In contrast, the remaining seven animals, deafened at 8 DAB or older, exhibited a profound hearing loss (i.e. no response to a click-evoked ABR at an intensity of 92 dB p.e. SPL). While these findings require confirmation from additional animals, they imply that the onset of ototoxicity is related to the onset of auditory function, as both single unit and autoradiographic studies have indicated that the onset of auditory function in the kitten is first observed at 7 DAB (2 & 3). Moreover, maturation of the mammalian cochlea occurs initially in the base and proceeds in an apical direction (4). Such a maturation profile may explain the high frequency hearing loss observed in the two 6 DAB animals. While the mechanism responsible for these age dependent changes in ototoxic susceptibility remains unknown, it is possible that the immature hair cell has not developed the metabolically active transport system thought to be responsible for the uptake of aminoglycosides in mature hair cells (5).

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