

FREQUENCY RESOLUTION IN NOISE EXPOSED MUSICIANS

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Studies suggest that the measurement of frequency resolution may be used as a sensitive early indicator of noise-related auditory damage (West and Evans, 1990; Bergman et al., 1992). Unfortunately, the current research literature falls short in providing data on the musician population.

This study was designed to investigate the possibility of using a measure of frequency resolution as an early indicator of auditory damage in musicians resulting from exposure to loud music.

Researchers investigating frequency resolution in musicians have centered their attention on the possibility that the auditory filters in musicians are narrower than non-musicians as proposed by Soderquist (1970), perhaps due to musical training and experience. This proposed "narrower" filter could have an effect on the reliability of using a measurement of frequency resolution as an early detector of noise related auditory damage in musicians, especially in terms of producing normative frequency resolution data.

Five groups of ten adult subjects twenty to forty years of age were studied. The subject groups included; a control group of non-musician subjects with normal hearing (limited exposure), untrained musicians (low exposure), untrained musicians (exposed), trained musicians (low exposure), and untrained musicians (exposed). Subjects were placed into the appropriate groups on the basis of responses to a questionnaire. The questionnaire was designed to document the individual's otologic history, noise exposure history, musical training, and performance experience. Individuals with significant otological histories or exposure to other potentially hazardous noise sources were excluded from the study. Pure tone audiometry was used to exclude all subjects with a high frequency average (1, 2 & 4 kHz) greater than 20 dB HL.

Frequency resolution was measured using the notched noise paradigm suggested by Patterson (1976). A computer program developed by Glasberg and Moore (1990) was used to estimate the bandwidth, filter slope

and detection efficiency parameters of the underlying auditory filters.

Results from this study revealed a significant widening of the bandwidths of the auditory filters of the exposed musicians consistent with a deterioration of frequency resolving abilities. The equivalent rectangular bandwidth of the filters were 13% wider for exposed musicians than for low exposure musicians. The slope of the lower filter skirt was significantly shallower for exposed musicians as compared with low exposure musicians. No significant effects of musical training or exposure-training interactions were found.

These results are encouraging and suggest that there is an effect of noise exposure on the bandwidth and lower slope of the auditory filters of musicians. Research into the clinical applications of such measures is underway.

ACKNOWLEDGEMENTS

Financial support for this study was provided by an NSERC grant to the second author, and from Unitron Canada Ltd.

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