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An Acoustical Analysis of the Frequency-Attenuation Response of Musician Earplugs

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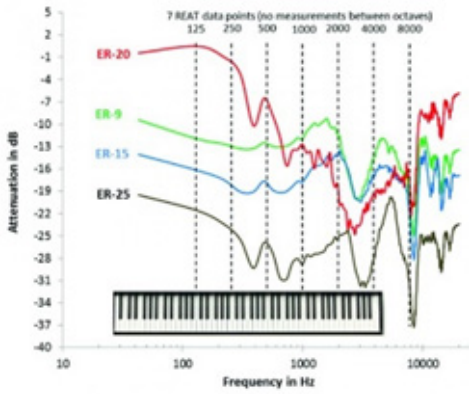
Abstract

Musician earplugs (MEP) are intended to reduce the risk for noise induced hearing loss among musician populations while providing flat attenuation characteristics. However, survey data suggest that low use rates among musicians are associated with negative listening experiences due to perceived alterations in the spectral characteristics of music. These shortcomings warrant the assessment of how a MEP processes the full frequency and complex spectral nuances of musical sounds. The goal of this study was to assess the influence of musician earplugs on musical stimuli using an acoustic test fixture in order to characterize objectively the influence of custom and non-custom-fit MEPs on both the attenuation levels and the spectral characteristics of music in and over a wide range of intensity levels in a simulated human ear canal. Our objective measurements inside ear of KEMAR confirm that the spectral characteristics of music are altered by MEPs, regardless of whether the earplug was a non-custom or custom earplug. The findings suggest that the claims used to market MEPs to musicians and music schools are misleading and that the discrepancies for claiming attenuation characteristics in response to musical stimuli are related, in part, to the use of the REAT testing procedure. New testing protocols are recommended.



Biography

Kris Chesky is a Professor of Music and Founding Co-Director of the Texas Center for Performing Arts Health at the University of North Texas. He is an active jazz trumpeter with a unique academic focus on the occupational health challenges associated with learning and performing music. His efforts over the past 20 years, funded and recognized by the National Institutes of Occupational Safety and Health, Grammy Foundation, National Endowment for the Arts, the National Institutes of Health, and others, are contributing to the ongoing transformation of the music discipline.

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