

Current Issues in High-Frequency Amplification for Infants and Children

Recently, there has been discussion among researchers of the benefit of providing high frequency amplification to individuals with acquired severe to profound sensorineural hearing loss. Briefly, recent investigations suggest that high-frequency speech information may not benefit speech perception in listeners with severe-to-profound high-frequency hearing loss. The logical next question is whether or not these data obtained from adults can be generalized to infants and young children with the same audiometric configurations. This section presents three highly provocative chapters that address this important issue, one that directly impacts the practice of pediatric amplification fitting.

The first chapter by Teresa Ching and her colleagues from the National Acoustics Laboratory (NAL) presents one view on this question. These authors ask “Do Children Require More High-Frequency Audibility than Adults with Similar Hearing Losses?” Viewed collectively, the NAL studies of adults and children with severe hearing loss found no benefit of audible high-frequencies for speech perception and in adults, subjective preference for low- frequency versus high-frequency emphasis. Based on their body of research in this area, Ching and colleagues conclude that children do not require more audibility in high frequency speech regions than adults.

The next chapter by Brian Moore provides intriguing new data on the issue of high frequency amplification for listeners with severe and profound sensorineural hearing loss. Dr. Moore and his colleagues at Cambridge are well known for their recent seminal research describing regions (high-frequency basal) of the cochlea with no functioning inner hair cells or auditory neurons in adults with severe and profound hearing loss. Further, he and his colleagues have devised a clinical method for delineating ‘cochlear dead regions.’ In his chapter “Dead Regions in the Cochlea: Implications for the Choice of High-Frequency Amplification,” Brian Moore presents the results of his most recent studies suggesting there are individual differences in the benefit adult listeners with cochlear dead regions receive from high-frequency amplification. The speech perception of some subjects improved significantly when high frequency information was available.

In the third and final chapter of this thought-provoking Section, Patricia Stelmachowitz describes “The Importance of High-Frequency Amplification for Young Children.” She posits that the need for high-frequency speech information may be greater in children with congenital hearing loss who are learning language for the first time than in adults with similar degrees of hearing loss but established language users. Dr. Stelmachowitz reviews the ongoing work in her laboratory at Boystown National Research Hospital on the extent to which high-frequencies can provide perceptual information, effects mediated by age of the child, hearing status (normal hearing versus hearing loss), and talker (male versus female). In contrast to the Ching et al. argument, Stelmachowicz concludes that the speech perception abilities of children with hearing loss does improve when high-frequency speech energy can be made audible.

Collectively, the evidence presented in these three chapters challenge audiologists to examine their approach to selecting the electroacoustic response characteristics of the hearing instruments they fit to infants and children with severe and profound hearing loss. This important question is clearly an issue that will require further study.

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