Benefits Associated with Extended Bandwidths in Hearing Aids

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Although traditional hearing aids were often restricted to bandwidths of 4000 to 6000 Hz, hearing aid manufacturers have recently incorporated extended bandwidths to approximately 10,000 Hz into commercially available hearing aids (Beck & Olsen, 2008). These important changes resulted from improved signal processing power, sophisticated receiver-in-the-ear (RITE) technologies, and improved receiver technologies. As a result, qualitative and quantitative advances attributable (in whole or part) to extended bandwidths have been demonstrated by many authors and researchers and include; sound quality enhancement, improved perceptions of speech and music in quiet and noise and improved spatial perception – which also serves to improve speech intelligibility in adverse listening conditions (Beck and Olsen, 2008).

Lindley (2009) reported children can obtain additional benefit while using extended bandwidth hearing aids and recommended using extended bandwidths in all appropriate pediatric fittings. He noted improved speech intelligibility in adults and children has been attributed to extended bandwidths. Pittman (2008) reported on 36 children with normal hearing (NH) and 14 children with moderate–to-severe hearing loss (HL). Learning was measured across limited (4000 Hz) and extended bandwidth (9000 Hz) conditions. Statistical analysis demonstrated bandwidth was a significant variable, but grouping (NH versus HL) was not. Pittman reported children in the limited bandwidth group needed three times as many exposures to learn new words as did children in the extended bandwidth group and she suggested children benefit from extended bandwidths regardless of hearing status.

With specific regard to the relationship between spatial hearing and extended bandwidths, for the human brain to locate the origin of sound in space, the brain compares and contrasts the sounds perceived from the two ears. Although there are a number of important factors, the primary acoustic factor (above 1500 Hz) is the interaural loudness difference (ILD). The ILD provides significant acoustic differences of some 20 dB or more at 6000 to 8000 Hz. However, appreciation of these high frequency ILDs by the brain can only be appreciated if the hearing aid delivers these vitally important acoustic cues to the ears (Neher, Behrens and Beck, 2009 and Culling and Akeroyd, 2010).

Extended bandwidths provide significantly more acoustic information to the ears, thus permitting improved sound quality, enhanced speech intelligibility, additional spatial information and more efficient learning.

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