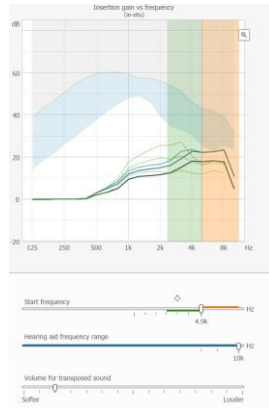


Abstract

Frequency lowering is a well known technique which can provide significant improvements on speech recognition¹, aided thresholds or decrease of phoneme confusion in silence and noise². Manufacturers have developed different techniques such as frequency compression or linear frequency transposition. The Audibility Extender (AE) from Widex has been on the field for several years and consists of transposing the signal down by one octave.

14 patients have been involved in this observational study where the following parameters have been analyzed: fittings, data logging, aided thresholds, speech scores in quiet and noise with and without the AE. All patients reported an improvement regarding their aided thresholds, speech in quiet and speech in noise. Frequency lowering is a technique that deserved to be tried for patients with ski slope hearing loss and carefully monitored over time

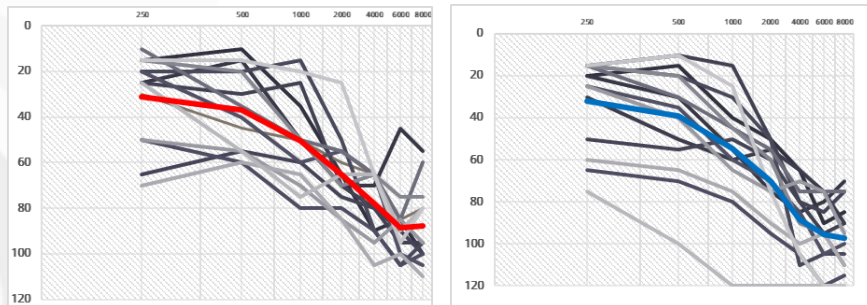


Objectives

The aim of the observational study is to perform a review of the 14 cases that required frequency lowering, so we can identify some preliminary patterns on when to perform frequency lowering, the type of expected fittings and the expected outcomes.

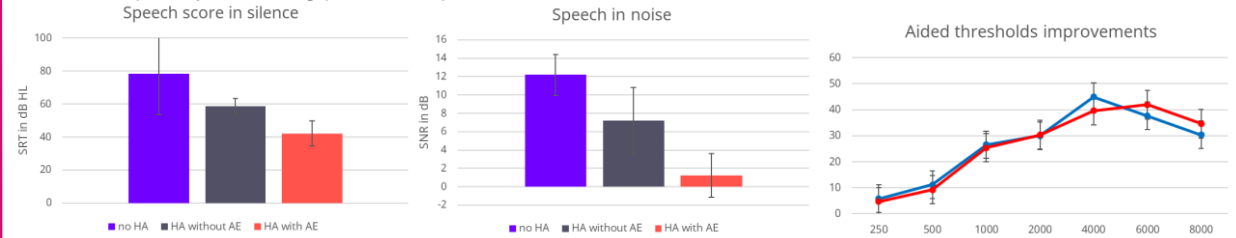
Material & Methods

14 patients with ski slope progressive hearing loss using the Audibility Extender from Widex for at least 6 months have been tested in quiet (Lafon - Female) and noise (Adaptative Lafon using ILTASS noise). Fittings have done using real ear measurements approach with NAL-NL2 target. Their fittings and data logging have been analyzed in order to develop more concrete fittings recommendations. Speech in quiet and in noise have been performed and compared with and without frequency lowering



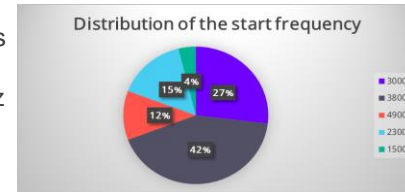
Results

Patients involved in this analysis can present very interesting results with their hearing aids, especially in noise. Frequency Lowering provide superior outcomes when activated.



According to Widex, AE takes the first (or lowest) frequency that has a 70 dB HL threshold and an audiogram slope between 500 Hz and 4000 Hz that exceeds 10 dB/octave in order to calculate the start frequency, then the audiologist will adjust the fitting to ensure maximum individual benefit.

- 100% of the time, patients have been fitted with a custom hard ear tips
- 70% of the time, volume of the transposed sound has been reduced
- 60% of the time; the hearing aid frequency range is active up to 10kHz
- 70% of the time, the start frequency is between 3000 and 3800Hz



Conclusion

Audibility extender is a good technique and provide interesting benefits +6dB in noise for patients with ski slope hearing loss.(vs no frequency lowering)
Regarding the fitting, despite a majority of patients with a start frequency between 3kHz and 4kHz, the need to carefully adjust this parameter is essential. Volume of the transposed sound should not be too loud in order to avoid some confusions.
Patients with limited ski slope can also benefit from frequency lowering.

References

- 1 J Gou, J Smith, J Valero, I Rubio .The effect of frequency transposition on speech perception in adolescents and young adults with profound hearing loss. Deafness Educ Int. 2011;13(1):17-33
- 2 Kuk F, Keenan D, Korhonen P, Lau CC. Efficacy of linear frequency transposition on consonant identification in quiet and in noise. J Am Acad Audiol. 2009;20(8):465-79.