Contemporary digital hearing aids typically provide substantial benefit to children with mild to moderately severe hearing loss. However, for many hearing-impaired children, difficulty remains with certain aspects of speech recognition and production, such as the phonemes /s/ and /z/. The Phonak Nios micro-hearing aid utilises non-linear frequency compression (NLFC) technology, designed to lower frequencies within the designated range, with clinician-programmable cut-off frequency and compression ratio. The primary objective of NLFC is to restore audibility of high-frequency inputs up to approximately 8000 Hz utilizing an algorithm that implements compression of acoustic input exceeding the programmed cut-off frequency, shifting high frequencies to a lower more audible range without interfering with frequencies below the cut-off.

This paper reported the initial results of baseline comparisons using the University of Western Ontario (UWO) Plural Test, an open-set, speech-recognition task, developed with the specific purpose of evaluating hearing aids with frequency-lowering technology. The test contains 15 separate monosyllabic and bisyllabic words in both the singular and plural form. In order for the child to correctly identify the plural of each word, access to acoustic energy in the range of 4000 to 8000 Hz is required. Two lists comprising a total of 60 words are presented, both with the children’s own aids and with the study aids utilizing NLFC technology.

The study included 16 children with mild to moderately severe sensorineural hearing loss up to 4000 Hz; results for the first 12 children were reported. All children found the NLFC acceptable and, in addition to reported positive subjective comments, there were improvements in average recognition of plural words and many children reported better speech understanding. The children achieved a UWO test score of 67.7 % correct with their own hearing aids and 98.6 % correct after using the test hearing aids with NLFC enabled for approximately 15 minutes.

Conclusion: The preliminary findings of this study suggest that NLFC has the potential to improve acquisition and identification of high-frequency speech signals and environmental sounds substantially compared to conventional high-end digital amplification. As this type of full-time access to inputs covering the entire speech range is critical in the development of age-appropriate speech, language, and auditory skills, the use of NLFC may enable young children to overcome many of the deficits observed in children with mild to moderate hearing loss. Further studies are to be performed to compare performance with the study aid between the NLFC-enabled and -disabled conditions and to determine parameters that influence the beneficial effects of NLFC in children with moderate hearing loss. Meanwhile, the researchers suggest that NLFC should be considered an option for children with mild to moderately severe hearing loss.