

Field Study News

Power SlimTube

Cosmetically attractive fit without losing performance

Summary

The new Power SlimTubes now offer Naída S wearers the benefits from advances in acoustic coupling design without a significant loss in gain and output. The goal of this study was to investigate if Power SlimTubes provide a more cosmetically attractive solution on the ear than the standard tubing, but without any changes to the audiological performance. The results of objective measurements of the Naída S with Power SlimTube or standard tube as acoustic coupling show that the speech intelligibility and output on the ear were not significantly influenced by tubing type.

Introduction

The launch of the slim tube has brought a cosmetic revolution for hearing impaired people with a mild to moderate hearing loss. The cosmetic improvements achieved were based on the most visible part of a BTE from the front, the tone hook and tubing. Mueller (2006) described that, in addition to audiological performance, cosmetic appearance and comfort of an open-fit hearing system are the most relevant factors in the client's purchasing decision. Power wearers, clients with a severe to profound hearing loss, have previously been excluded from improved cosmetics because using a slim tube results in a significant reduction in gain and output, impacting audibility. But power wearers also take the cosmetic appearance of a hearing system into consideration during the purchasing decision. With the new Power SlimTube Naída S wearers can now benefit from advances in acoustic coupling design. The Power SlimTube, offered with a standard earmold, provides all the cosmetic advantages while minimizing the loss of gain and output. In this study, the results of the objective real ear measurements and the speech tests in quiet and noise shows little or no changes in audiological performance for Power SlimTubes compared to a tone hook and standard tubing.

Goal of the Trial

The aim of this study was to investigate if the fit of the Power SlimTubes are cosmetically more attractive on the ear than a tone hook and standard tube. The cosmetic benefit of Power SlimTube on the ear should not influence the audiological

performance when compared to the known acoustic coupling of the standard tube.

Set-up of the Study

All subjects received two pairs of similar earmolds, one pair with the standard tube and one pair with Power SlimTube as the acoustic coupling. The hearing aid setting was the same. The only differences were the settings of the correct acoustic coupling in the software (standard tube or Power SlimTube including the length), and the measured feedback test for both acoustic couplings, which affected the hearing aid precalculation.

The following objective measurements were done to compare the Power SlimTube with the standard tube:

1. Real ear aided response measurements were done with the Siemens Unity measurement equipment. An International Speech Test Signal (ISTS) of 65 dB was used for the measurement.
2. Speech test in quiet with monosyllabic words were presented from a loudspeaker in front of the subject at 1m in distance. The speech level was 50, 65 and 80 dB for the measurements. The results were expressed in percentage of correct discrimination.
3. An adaptive speech test in noise with an uncorrelated background noise at 65 dB was measured. The speech signal was presented at starting level of 65 dB in front of the subject. The uncorrelated background noise was presented from 5 loudspeakers around the subject. The subject was sitting in the circle of the loudspeakers at a distance of 1.4m from all loudspeakers. The results were expressed as SNR (speech to noise ratio) in dB.

Additionally, for all subjects photographs were taken to show the fit on the ear using a Naída S with a tone hook and standard tube and a Naída S with a Power SlimTube. The subjects answered in a questionnaire if they rated the Power SlimTube more cosmetically attractive as the standard tube, and which acoustic coupling they preferred after first week wearing time.

Subject and Devices

18 subjects (16 male and 2 female) with severe to profound hearing loss took part in the study. Half of the subjects were fitted with Naída S SP and the other half with Naída S UP hearing aids. All subjects had two pairs of similar earmolds, one pair with the standard tube and one pair with the Power SlimTube as the acoustic coupling.

Results

Picture 1 and 2 show the fit of the standard tube compared to the Power SlimTube on the ear for one subject. The results from the questionnaire show that all subjects rated the Power SlimTube spontaneously as cosmetically more attractive. After one week of wearing time, 67% of the subjects preferred the Power SlimTube.



Pic. 1: Naída S with standard tube Pic.2: Naída S with Power SlimTube

The averaged curves of real ear aided response measurement (figure 1) show nearly the same amplification on the ear for Naída S with both acoustic couplings.

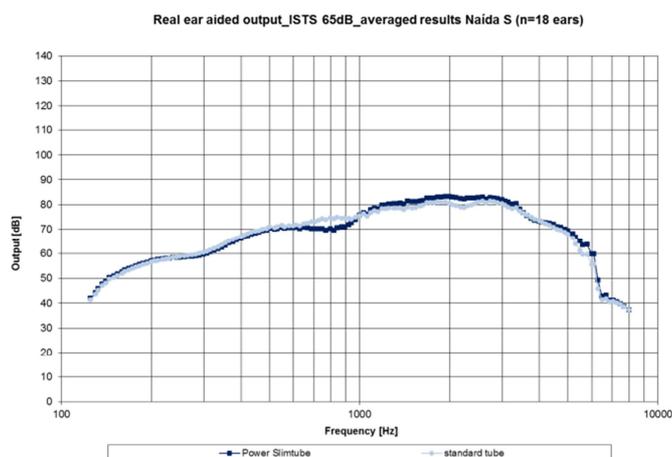


Figure 1: Real ear aided response measured with ISTS at 65 dB for Naída S with Power SlimTube compared to standard tube for n=18.

Figure 2 shows the results of the speech test in quiet for Power SlimTube compared to standard tube coupling. There was no significant difference between both acoustic couplings.

Speech intelligibility in noise was not significantly different ($p=0.925$; Wilcoxon matched pairs test) for both acoustic couplings. Figure 3 show the averaged data for both acoustic couplings for n=14 subjects with Naída S SP and UP. 4 subjects with a profound hearing loss could not finish the speech in noise test due to an exclusion criteria of SNR > +15dB. The speed of the speech presentation together with the background noise was too difficult for those 4 subjects.

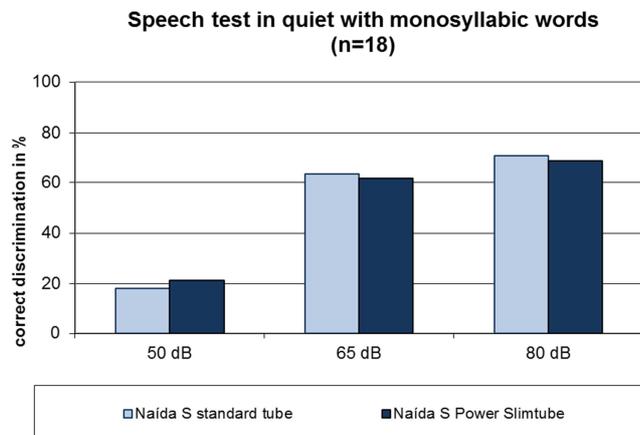


Figure2: Speech test in quiet measured at 50, 65 and 80 dB speech level with Power SlimTube compared to standard tube coupling.

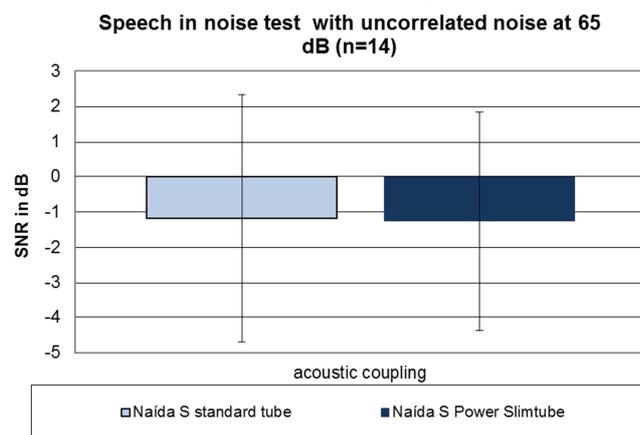


Figure3: Speech test in noise measured with Power SlimTube compared to standard tube coupling.

Conclusion

The outcome of this study shows that Power SlimTubes are not only cosmetically more attractive on the ear compared to standard tubing and tone hook but objective measurements are nearly the same results for both acoustic couplings. The cosmetic advances of the Power SlimTube for Naída S are a feasible option for power wearers without affecting gain or speech intelligibility.

References

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