Field Study News

Power CIC

Completely-In-the-Canal-Power for everyone

Summary

The Power CIC product line was introduced with Versáta and Certéna in fall 2008 and is also available for Exélia. It offers a fitting range up to 85dB HL in the low frequencies below 1 kHz and 95 dB HL for the high frequencies above 1kHz. This exceeds the fitting range of a regular CIC by 15 dB HL for the whole frequency range and is therefore able to offer discrete amplification even for severe hearing losses. The validation trial showed that the initial acceptance of Power CIC was high and previous BTE-wearers could quickly adapt to the in-ear solution. Compared to a Power BTE, Power CIC showed similar results regarding speech intelligibility in noise and in quiet. After four weeks of acclimatization, satisfaction levels of subjects were high. It revealed that even in demanding listening situation or for music enjoyment, Power CIC could meet the needs of the subjects.

Introduction

With a Power CIC, persons with hearing losses are able to profit from an invisible hearing system solution who were not able to wear CIC devices in the past. PowerProcessing in combination with WhistleBlock and Acoustically Optimized Vent (AOV), CIC solutions are available now for a whole new customer segment. Feedback does no longer create a problem for CIC-fittings while the AOV helps wearers to increase sound quality for both, own voice and external sounds as well as wearing comfort. The Power CIC also offers the possibility to be remote controlled by the KeyPilot, WatchPilot or SmartLink (optional) and therefore provides convenient access to customized manual programs.

Subjects and Hearing Instruments

20 subjects were chosen for the study to cover the whole fitting range of the Power CIC. They were fitted with Versáta-Power CIC devices and a remote control to have access to manual programs as well as volume changes. The average hearing loss is shown in
Fig. 1, also including the fitting range marked in green. The age range of the subjects went from 29 to 80 years with a mean of 61.5 years. 6 subjects were female, 14 male. 18 subjects were experienced users who owned hearing instruments for more than 3 years. One subject owned instrument for less than 3 years, one subject had no own instruments. The Power CICs were worn for approx. 2 months by all subjects. Except one subject were all wearing BTEs before.

Hearing loss range of test clients and Power CIC fitting range

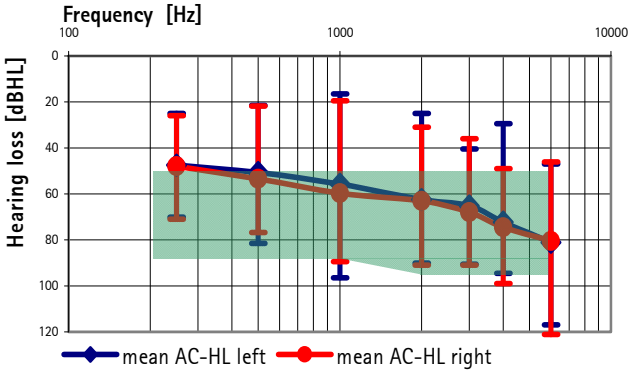

Fig. 1: Average hearing loss and range of hearing losses of participants in the fitting range of Power CIC (green).

As benchmark for speech intelligibility assessment, Versáta BTE SP was chosen. Subjects received a custom shell with the same venting as their Power CIC to ensure the same acoustic coupling for the measurements. One subject did not receive a Power CIC because his ears were too small to fit instruments. He received a Versáta BTE SP for the duration of the trial.

Method

All subjects had four in-house appointments to check the instruments. For the subjective measures, questionnaires for the fitter during fittings and the subjects during take-home periods have been used. All subjects were asked to wear the devices all the time during the trial. For speech intelligibility measures in quiet and in noise, the Freiburg monosyllable test and the Oldenburg sentence test (OLSA) were chosen.

Results

First measurements were done to ensure correct functionality and to compare the Power CIC to competitor devices.

Fig.2 shows that the Power CIC is able to provide more gain over the complete frequency range, especially in the low frequencies, than competitors. It is therefore offering the widest fitting range in the market and suitable for a wide range of hearing losses.

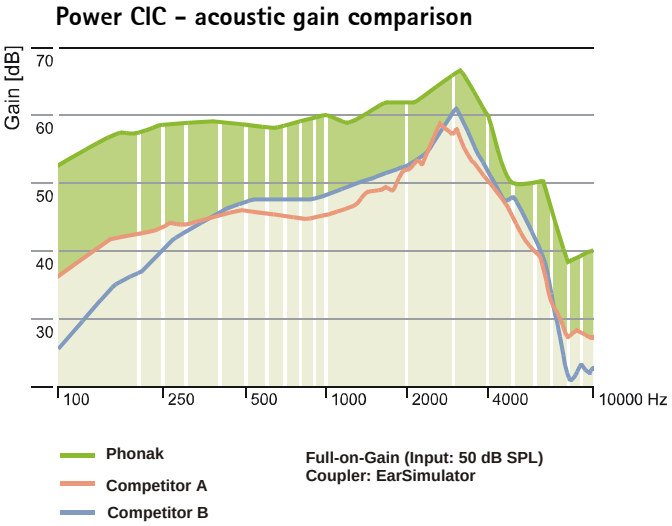

Fig.2: Gain comparison of Power CIC vs. two competitor products at the ear simulator with Full-On-Gain

For an objective assessment of the Power CIC, speech tests were conducted and benchmarked to Versáta BTE SP. Fig. 3 shows the mean values of right answers in the Freiburg monosyllable test and indicates that the Power CIC was performing as the according Power BTE with the same acoustic coupling.

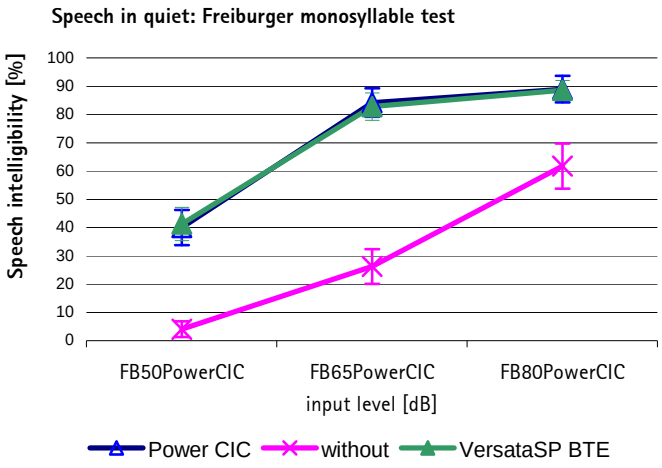

Fig. 3: Speech intelligibility in quiet compared to BTE SP and without hearing instrument assessed in the Freiburg monosyllable test (average of n=19 for Power CIC, n=20 for Versáta SP BTE, n=20 for without). Figure depicts the averages ±SEM.

For speech intelligibility in noise, a similar result yielded (Fig. 4). The Power CIC is only outperformed by the BTE SP when switched to VoiceZoom where beamforming to the front was provided.
Subjective questionnaires showed a high initial and longterm satisfaction with the Power CIC. Especially when switching from BTEs to Power CIC, subjects liked the feeling of the CIC without wearing a device behind the ear. Besides physical wearing comfort, the Power CIC was also able to suppress feedback effectively for all subjects during the trial if the instruments were inserted correctly and the feedback

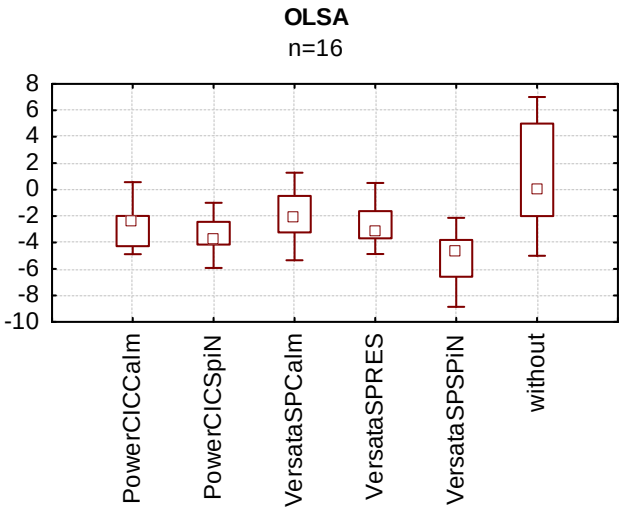

Fig. 4: Speech intelligibility in noise compared to BTE SP and without hearing instruments assessed with the OLSA. Squares highlight medians, rectangles represent 25-75% confidential interval and lines depict non-outlier ranges.

suppression system was activated. The highly effective suppression also enabled the subjects to use the PowerCIC when talking at the phone. They were able to hold the receiver normally at the ear instead of over the ear when using BTEs. At the same time, internal noise or other artefacts were not perceived at all by any of the subjects during the trials.
Sound quality was assessed in different situations. Results showed that after three weeks of adaptation to the Power CIC devices, 93% of the subjects are in the "comfort zone" regarding loudness if they are in noisy situations, which is the most challenging situation for hearing instrument wearers. Over 60% state to understand "most" or "anything". A similar development can be seen when asking for loudness and sound quality for music. After three weeks, 85% of the subjects are satisfied with the loudness while 93% rate the sound quality as "good / pleasant / natural". Finally, the proven SoundFlow-algorithm of Versáta was not reported to be bothersome when applying changes to any of the subjects.

Conclusions

With the Power CICs, Phonak has created an alternative to BTEs in the severe hearing loss segment. Customers who were wearing BTEs could quickly adapt to the new devices and were positive about the size compared to the BTEs and the wearing comfort. While performing like a BTE, Power CIC offers a more discrete and invisible solution even with the possibility to be remote controlled.

References

Wagener K, Brand T & Kollmeier B (1999) Z für Audiologie 38(3): 86-95.

For further information, please contact:
jens.tenholder@phonak.com