

A. Natalizia, M. Casale, E. Guglielmelli, F. Salvinelli. *Hearing loss in older adults: Perspectives for rehabilitation with customised hearing aids and a follow-up fitting procedure.* *Gerontechnology* 2008; 7(2):173. Hearing loss is a common problem in modern society due to the combined effects of noise, ageing, disease, and heredity. Hearing is a complex sense involving both the sensitivity of the ear as well as the ability to understand speech¹. According to 2005 estimates by the World Health Organization (WHO), 278 million people worldwide have moderate to profound hearing loss in both ears. 80% of deaf and hearing-impaired people live in low- and middle-income countries. The number of people worldwide with some levels of hearing impairment is rising mainly due to a growing global population and longer life expectancies. Approximately 31.4% of people over age 65 have hearing loss². Modern technology offers individuals with hearing loss options for rehabilitation and assistance with hearing. The use of acoustic hearing aids for compensating neurosensorial hearing loss is an effective solution for rehabilitation, but a specific effort should be devoted to customization and follow-up procedures in order to guarantee the best effectiveness and long-term acceptability. **Methods** We have designed new prototypes of CIC hearing aids (Completely In the Channel) with microphones, receivers and DSPs (Digital Sound Processors) based on the most advanced off-the-shelf technology. The DSP module features 32 independent channels for signal processing, fine frequency resolution, adaptive fast feedback canceller (time of reaction less than 1 s) and 8 kHz bandwidth. The DSP compression system automatically reduces background noise levels and ensures speech at an audible and intelligible level³. The hearing aid is fully customised to the patient needs. The choice of the circuit components and the output power is based on the patient hearing audiometry (HTL, MCL and MUL)⁴. The design of the shell is based on the ear channel impression, with the inner part laying in the bony zone of the ear channel in order to reduce the occlusion effect⁵. The fitting of the hearing aid is based on a follow-up procedure. The hearing aid is initially regulated based on the patient audiometry and then it is refined by using 3 clinical tests: the free field pure tone audiometry, speech understanding and the subjective measures of hearing aid performance⁶. The hearing aid is fitted again after 2 days, and then every month, for four months. This procedure has been tested with over 20 patients with age between 45 and 85, with just 2 cases of drop-out. **Results and discussion** Positive results in terms of functional recovery and acceptability have been obtained so far. The hearing aids used have showed enhanced features in terms of rehabilitation for hearing loss in older adults. The fitting procedure leads to an optimized tuning of the hearing aid, for instance, the sound level is always optimized to be within the most comfortable dynamic range of the listener. The hearing aid provides added benefit in suppressing background noise, enhanced speech intelligibility and has improved sound quality compared to state-of-the-art hearing aids. Due to the DSP that provides up to 18 dB of additional stable gain the ventilation can be up to 4 mm, thus reducing the occlusion effect.

References

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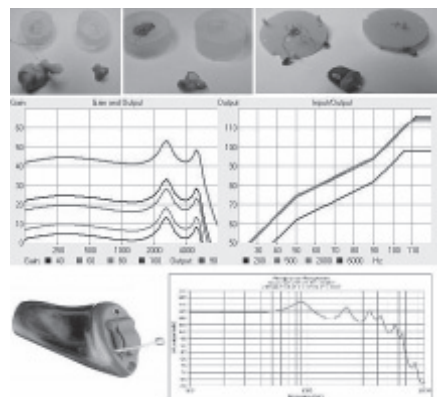


Figure 1 Production, fitting and characteristics of our hearing aid