Sound localization with combined use of a Cochlea-Implant and a hearing aid in different ears

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After successful cochlear implantation on one ear, some patients continue to use their hearing aid at the opposite side. They report an improved understanding of speech especially in noise as well as a better perception of music when hearing aid and cochlear implant are worn in combination. A survey with 11 bimodal subjects was carried out to assess speech understanding and localization ability. Ten subjects were users of the MED-EL Combi 40 plus implant, one subject with a COCHLEAR CI24M. The subjects were provided with the same type of hearing aid (PHONAK PZ A4). One of the two program options of the hearing aid made use of a directional microphone. A week after the initial fitting a fine tuning of the hearing aid program was performed and speech tests were conducted subsequently. The localization tests were carried out in an anechoic room in complete darkness. To minimize non-binaural hints a roving level paradigm was used. Subjects pointed to the direction of sound incidence by use of a trackball with a computer-controlled laser-pointer. The high precision of the method permits the discussion of the displayed localization results in terms of the accuracy of localization.
Results: The additional usage of a hearing aid improved speech understanding in 9/11 subjects of the bimodal supported group. Two subjects with substantial residual hearing of the bimodal group also showed improved localization ability, five subjects were able to differentiate the side of sound origin. The use of the directional microphone of the hearing aid improved speech understanding in some subjects. No influence on localization performance was observed with the directional microphone program. Interaural level differences seem to carry enough directional coding information although different compression schemes might distort the interaural envelope differences to some extent.

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