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Influence of the mixing ratio of a FM-system on speech understanding in noise for CI user

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Introduction: Hearing in noise is one of the most important challenges in everyday life for cochlear implant users. Understanding of a speaker in noise can be improved by using a FM system.

The aim of this study is the investigation of the influence of the mixing ratio between fm and microphone signal on speech understanding. As a result there should be made suggestions for optimal FM mixing ratio for different listening conditions like learning in classrooms or hearing a lecture.

Methods: The acoustical situation in a classroom was imitated by an audiological setup. Using a two loudspeaker setting we simulated the acoustical situation of a pupil equipped with a FM system, sitting in front of a teacher and being among other pupils making "noise". Two situations were investigated: (cond 1) Teacher is speaking through the FM system and the surrounding pupils making noise and (cond 2) one pupil in the classroom is speaking, being disturbed by the other pupils. The FM mixing ratio was varied for both conditions from 1:1 up to 5:1 (fm : microphone). The speech understanding was evaluated using the adaptive Oldenburger sentence test in noise.

11 experienced postlingually deafened CI patients using the Freedom cochlear implant system (Cochlear Ltd) took part in this investigation. The FM system „Microlink for Freedom“ together with the Campus transmitter (Phonak) were used.

Results: The speech understanding in noise without FM system served as a individual base value for further normation of the data. The results show that speech understanding of the teacher (cond 1) is continuously increasing with mixing ratio. On the other hand the understanding of the pupil (cond 2) is decreasing for mixing ratios greater then 2:1.

Discussion: The understanding of different speakers for the two investigated listening conditions show reverse direction. This may lead to different suggestions for different listening conditions. The optimal choice for a classroom condition may be the 2:1 mixing ratio.

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