

# RECDdirect – easy and accurate

## Summary

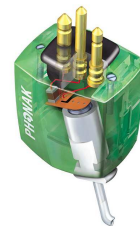
RECDdirect was evaluated in 54 hearing impaired children between 3 months and 16 years. The results show high test-retest reliability, and only little differences compared to RECDs measured with standard equipment. In addition, there were considerable deviations between individual RECDdirect measures and age-related average RECDs, which reflects the need to measure individual RECDs in children.

## Introduction

The performance of a hearing instrument in the ear can be accurately predicted by adding the Real-Ear-to-Coupler Difference (RECD) to the response of the instrument in a 2-cc coupler. This method is particularly useful in pediatric fittings, as real-ear measures of hearing aid performance in children are often impractical. Although age-related average RECDs are widely used, the deviation from average values can be considerable. Inappropriate real-ear performance can be avoided by measuring the individual RECD [1].

RECDdirect is an optional fitting tool for use with the Phonak high-power hearing system Supero. It is integrated in the fitting software and allows for easy measurement and implementation of the individual RECD to calculate hearing aid settings. Apart from the RECDdirect module, which is attached to the hearing system, no extra equipment is required. RECDdirect was evaluated in a pediatric clinical trial\*. The goals of the study were the following:

- To test RECDdirect reliability
- To compare RECDdirect values with standard measurement equipment
- To compare individual RECDdirect measures with average, age-related RECDs

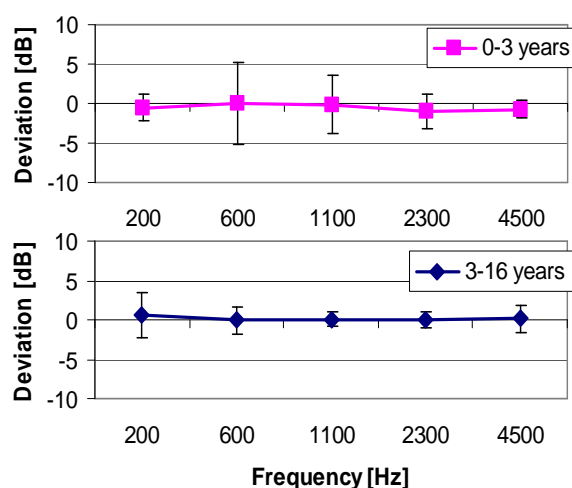


## Method

In total, 54 hearing-impaired children and adolescents from 3 months to 16 years (average: 6.8 years) participated in the study. RECDdirect was measured twice for each subject (in most cases, the measures were made by different audiologists). RECDs also were measured using a standard measurement system (Audioscan RM500) using the subject's individual earmolds in a subset of 35 subjects.

## Results

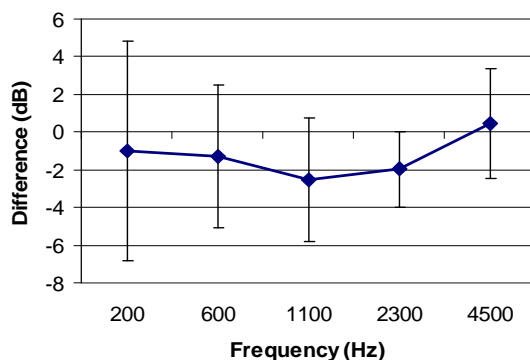
The reliability of RECDdirect measures (i.e., the test-retest deviation) for the two age groups is shown below.



As expected, the average test / retest deviation for both groups was close to 0 dB. The standard deviations are lower for the older group, because the measurements were not influenced by movement or babbling, as in the younger children. In five of the very young children, the measurement was possible, but not reliable, because the children were too noisy. Two of these children had additional needs.

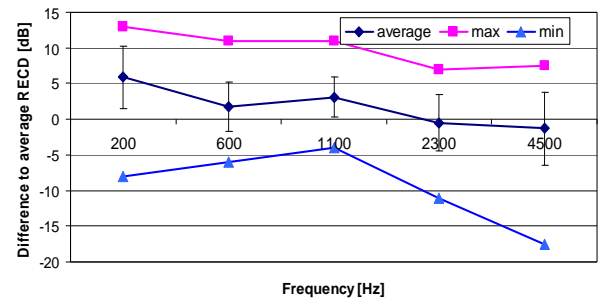
## Comparison to standard test equipment

In 35 children, the RECD also was measured with standard measurement equipment (Audioscan RM500), using the children's own earmolds. The average differences between RECDs measured with RECDdirect and Audioscan are shown below. In general, the differences between both methods are very small. The average difference across all frequencies is 1.3 dB. Deviations in the low frequencies are largely due to leakage around the earmold.



## Comparison to age-related average RECDs

When individual RECDs are not measured, the fitting software assumes average values, which depend on age and venting. These average values do not consider individual characteristics of the ear canal. The following graph shows the differences between individual RECDdirect measures and the respective age-and vent-related



average values. The standard deviation of the difference across frequencies was between 3 and 5 dB. In some cases, the child's individual RECD differed considerably from average values. One three month old subject with Down Syndrome had particularly short and narrow ear canals often seen in these cases, the individual RECD differed markedly from the age-related average RECD. Without considering the individual acoustic characteristics of the ear canal in this case, the sound pressure level at the ear drum would be much higher than expected.

## Conclusion

In general, RECDdirect can be measured in children as young as 3 months old. This optional fitting tool is particularly useful for hearingcare professionals who may not have access to conventional RECD measurement equipment. It allows for easy and accurate measurement of the individual RECD and thus reduces the risk of over or under-amplification. Due to the variable size and shape of children's ear canals, which often differ considerably from age-related averages, it is recommended that the individual RECD is measured wherever possible in pediatric fittings.

\* The study was conducted by Andrea Bohnert and Petra Brantzen, University Hospital Mainz, Germany

## Reference

[1] Moodie S., Seewald RC., Sinclair S (1994) American Journal of Audiology, 3: 23-31

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