The Use of Clinical Speech Measures for Verification of a Receiver-in-the-Ear Hearing Aid
Kristin A. Vasil, B.A., Erika L. Nair, M.A., & Kathleen M. Cienkowski, Ph.D.
University of Connecticut

Introduction
Current research on receiver-in-the-ear (RITE) hearing aids has focused on reduction of the “occlusion effect,” directional microphones, and the use of real ear measures. There is little research available regarding clinical speech measures as fitting verification tools even though complaints of individuals with high frequency hearing loss often include listening in background noise and/or hearing high frequency weighted speech.

In this study, two tests were used to evaluate RITE benefit. First, the Gardner’s High Frequency Word Lists were used to assess audibility or specifically, the perception of high frequency consonants.

Gardner’s High Frequency Word Lists
Designed specifically to meet the need for assessing amplification benefit in cases of high frequency hearing loss. Two 25-word lists are spoken by a female speaker and include seven voiceless consonants.

Method
• 10 participants were fit with Sebotek Voice-Q 720 RITE hearing aids.
• Hearing aid settings were manipulated until real ear aided responses (REARs) were within 5 dB SPL of the NAL-NL1 targets. Settings were adjusted for patient comfort.
• Behavioral speech tests were conducted in both unaided and aided conditions. Word and sentence lists were randomized.
  1. Gardner’s High Frequency Word Lists were presented at 50 dB HL.
  2. Performance S/N: the HINT protocol at 65 dB SPL determined the S/N at which 50% of the material was understood.
  3. Perceptual S/N: With noise at 65 dB SPL, participants responded “yes,” “no,” or “unsure” to determine the S/N.

Participants
• 10 adults (3 females, 7 males)
• High frequency sensorineural hearing loss within hearing aid fitting range
• Mean age 60.8 (SD 12.7)
• Normal otoscopic evaluation

Results
Paired T-tests indicated that there was an overall significant difference between the unaided and aided Gardner’s list conditions.

Figure 1. Mean (1 SD) thresholds for right and left ears of all participants.

Discussion
Gardner’s High Frequency Lists
• Performance differences for unaided and aided conditions can be observed for patients with high frequency hearing loss.
• Statistically only 2 subjects fell outside the 95% confidence interval.

PPT-Discrepancy
• Differences in PPT-Di were observed among participants.
• Norms for the PPT-Di for hearing-impaired, non-hearing aid users are approximately 0.5.
• Subjects that did not pursue amplification fell within or close to this value for unaided PPT-Di.
• Norms for PPT-Di were less than 1.5 for hearing aid users. Subjects that pursued amplification had unaided PPT-Di values greater than the norm and aided PPT-Di values within the norm.

Conclusions & Clinical Implications
The Gardner’s Lists may be useful for validating audibility benefit from amplification. Normative data needs to be obtained for normal hearing and hearing-impaired individuals. Results regarding phonemic errors will be addressed in the future.

The PPT-Di may be useful in distinguishing candidates for amplification. Individuals with high unaided PPT-Di values and significantly reduced aided PPT-Di values pursued amplification following this study. Additional subjects are needed to determine if this trend is significant.

Selected References


We would like to acknowledge Sebotek for the use of their products for this research study.