

TO INVESTIGATE: EXTENDED BANDWIDTH REAL EAR MEASUREMENT (REM) ACCURACY AND REPEATABILITY

I Dee Tan¹, Emma Mackenzie², Keri Barker³

¹ Institute of Sound and Vibration Research, Faculty of Engineering and the Environment, University of Southampton, United Kingdom

² Institute of Sound and Vibration Research, Faculty of Engineering and the Environment, University of Southampton, United Kingdom

³ Institute of Sound and Vibration Research, Faculty of Engineering and the Environment, University of Southampton, United Kingdom

ABSTRACT

Introduction: Real ear measurement (REM) is an important verification process during hearing aid fitting. Many factors affect the accuracy and reliability of the measurement, for example the standing waves interaction and the probe tube placement. At frequencies above 2000Hz, the standing waves create the pressure maxima and minima along the ear canal; and placement of the probe tube at these point would measure the sound pressure level (SPL) 10-15dB lower than the eardrum. Previous researches have validated the repeatability and accuracy of REM up to 6000Hz; nevertheless this is not applicable for extended bandwidth (EB) hearing aid that amplifies up to 10 or 12kHz. Therefore, the study aimed to investigate the effect of probe tube placement on REM accuracy and reliability up to 10kHz using EB hearing aid.

Method: Real ear aided responses (REARs) was measured in 21 participants using 30, 27, 24mm insertion depths and an insertion depth of 5mm from the eardrum, which was estimated through 6000Hz acoustic method.

Results: For EB REM accuracy, study revealed that mean REAR at 30 and 27mm insertion depths relative to the TM were within 2dB permissible error. Also, the test-retest reliabilities for the four different insertion depths were not significantly different across frequencies. Study concluded that using the probe tube insertion depth at 5mm from the TM correctly represent the REAR at the TM.

Conclusions: For accurate and reliable REM up to 10kHz, clinician is advisable to place the probe tube near to TM based on estimated ear canal length for each individual.

KEYWORDS: Extended bandwidth, hearing aid, real ear measurement (REM)

Corresponding author: I Dee Tan (allyssatan@yahoo.com)