

Is Manufacturers' Click Fit Equitable to Real Ear Measurements?

Katherine Green, supervised by Dr Hannah Cooper (UCL Ear Institute)

Special thanks to Dr Gareth Smith, Ebru Zeren and the Audiology Team at Mid and South Essex Hospitals

Introduction:

- Real Ear Measurement (REM) is the "gold standard" for verifying hearing aid gain in the UK [1].
- Recent research by Almufarrij et al. [2,3] suggests the overall gain difference between manufacturers click fit (CF) and REM is small for adults with a mild-moderate sensorineural hearing loss, when using the NAL-NL2 prescription rule.

Aim:

To investigate the accuracy of CF compared to REM.

Method:

A clinical audit of 325 adult patients (582 hearing aids) fitted with appropriate hearing aids by qualified audiologists at Mid and South Essex Hospitals. All patients were fitted using the NAL-NL2 prescription rule. During the fitting process CF and final REM outputs were saved. Both settings were then compared to NAL-NL2 prescription targets at 65 and 80dB SPL input levels to determine accuracy.

Results:

There is a significant difference between CF and REM ($p < 0.01$), particularly at 4 to 6KHz, at both 65 and 80dB SPL input levels (see figures 1 & 2). Overall, 40% of CF fittings met the BSA recommended tolerance (falling within 5dB of prescription) at 65dB SPL and 58% at 80dB SPL. After REM 86% of fittings were within tolerance at both input levels (see figures 3 & 4).

Discussion & Conclusion:

Manufacturers' CF is not statistically equitable to REM using NAL-NL2, particularly around 4 to 6KHz. On average CF output is lower than REM (below prescription target) so it is unlikely to cause damage, however, audibility is likely to be impacted if relying on CF alone. REM should be recommended for adult patients during hearing aid fitting to ensure accurate and appropriate amplification for the hearing aid user.

References: 1. British Society of Audiology (2018). 'Guidance on the verification of hearing devices using probe microphone measurements. *Online*. The British Society of Audiology. Available at: www.thebsa.org.uk (Accessed: 6 October 2024). 2. Almufarrij, I., Dillon, H., Adams, B., Greval, A. and Munro, K. J. (2023). 'Listening Preferences of New Adult Hearing Aid Users: A Registered, Double-Blind, Randomized, Mixed-Methods Clinical Trial of Initial Versus Real-Ear Fit'. *Trends in Hearing*. SAGE Publications, 27. doi: 10.1177/23312165231189596. 3. Almufarrij, I., Sindi, N., Pepler, A. and Munro, K. J. (2024). 'Is the role of probe-tube, real-ear measurements changing for adults with mild-to-moderate hearing loss?' *International Journal of Audiology*, pp. 1–5. doi: 10.1080/14992027.2024.2435588.

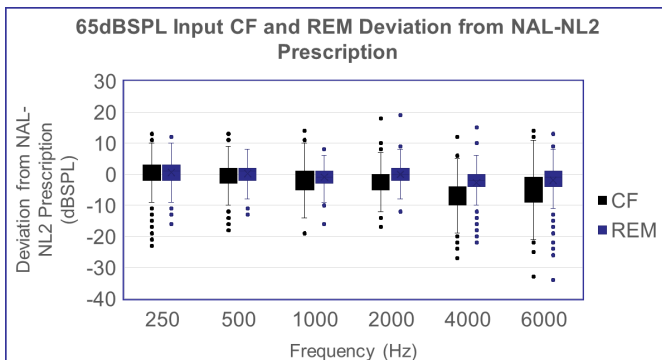


Figure 1: Grouped box and whisker plots showing 65dB SPL input CF and REM deviation from NAL-NL2 prescription by frequency

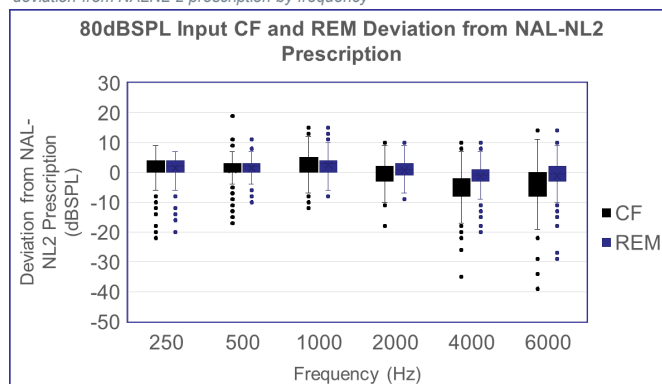


Figure 2: Grouped box and whisker plots showing 80dB SPL CF and REM deviation from NAL-NL2 prescription by frequency

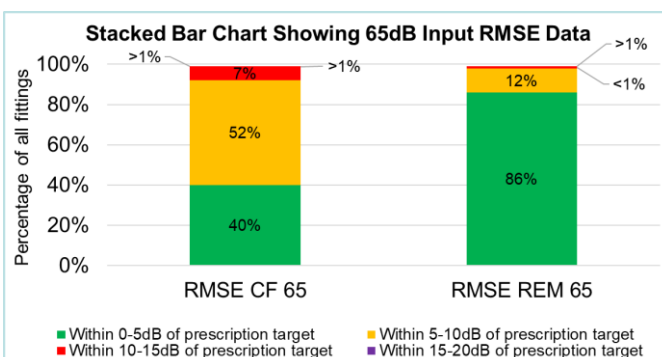


Figure 3: Stacked bar charts showing RMSE data for CF and REM grouped by deviation from target at 65dB SPL input. Green data is within BSA tolerances.

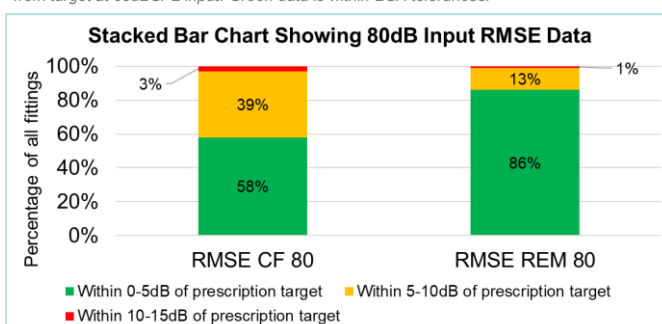


Figure 4: Stacked bar charts showing RMSE data for CF and REM grouped by deviation from target at 80dB SPL input. Green data is within BSA tolerances.