

# Correlation between Auditory Steady-State Response And Auditory Brainstem Response for 1&4kHz Chirps in a Clinical Setup



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## Introduction

- ❖ Auditory Steady-State Responses (ASSRs) are evoked potentials that are used for the subjective estimation of hearing threshold in patients of all ages
- ❖ Clinical applications include: timely hearing threshold estimation for hearing aid fitting, corroborating Auditory Brainstem Response (ABR) results, hearing level monitoring for CMV patients, assessment of older children and adults with learning difficulties or suspected non organic hearing loss, theatre recordings.
- ❖ The current ongoing project looks into how well ABR and ASSR results correlate when the BSA ASSR guidance is followed.

## Methods

- ❖ Neonates (<12 weeks old) referred by the Newborn Hearing Screening Programme were assessed with ABR and ASSR under natural sleep. A total of 65 comparisons were made for 4kHz and 18 for 1kHz.
- ❖ CE-Chirps were used with both techniques for improved comparability.
- ❖ Hearing levels ranged from normal to moderate (classification was based on the ABR dBeHL level)
- ❖ Results reflecting a conductive hearing loss were included only when both tests were conducted on the same session.
- ❖ The differences between the results obtained with the two techniques were analysed in dBeHL and dBnHL (before and after corrections were applied)

	1kHz		4kHz	
	dBnHL	dBeHL	dBnHL	dBeHL
<b>N</b>	18	18.0	64	65
<b>Mean</b>	1.7	3.6	-3.8	5.4
<b>Median</b>	0	5.0	-5.0	5.0
<b>Mode</b>	0	10.0	-10.0	0.0
<b>SD</b>	5.1	5.9	6.7	6.6
<b>Range</b>	15	20.0	25.0	30.0
<b>Min</b>	-5	-10.0	-15.0	-10.0
<b>Max</b>	10	10.0	10.0	20.0

Table 1 Statistics for the differences between ABR and ASSR results for 1kHz (left) and 4kHz right

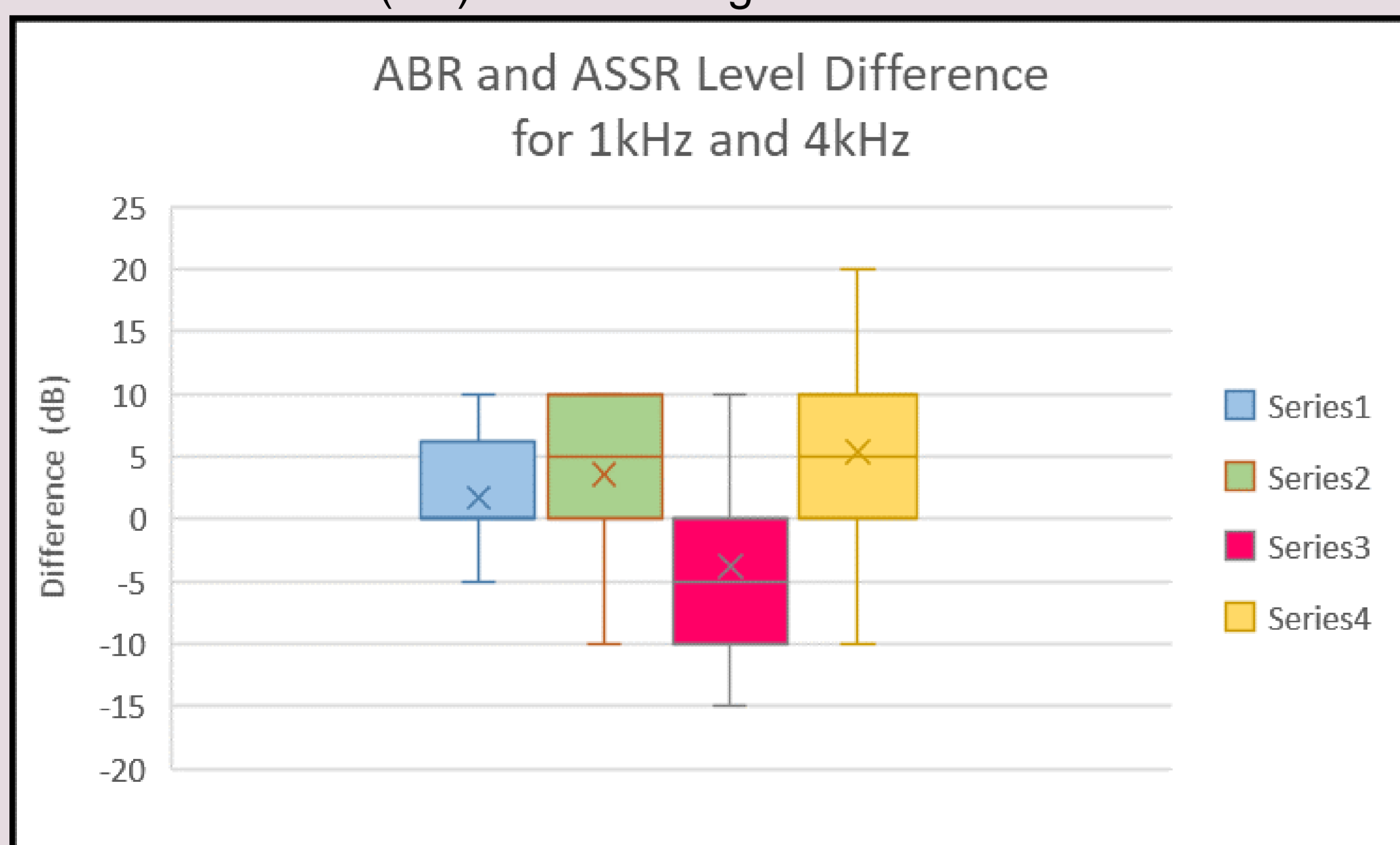


Fig 1 Threshold Differences between ABR and ASSR results, without corrections (left) and after corrections (right) were applied.

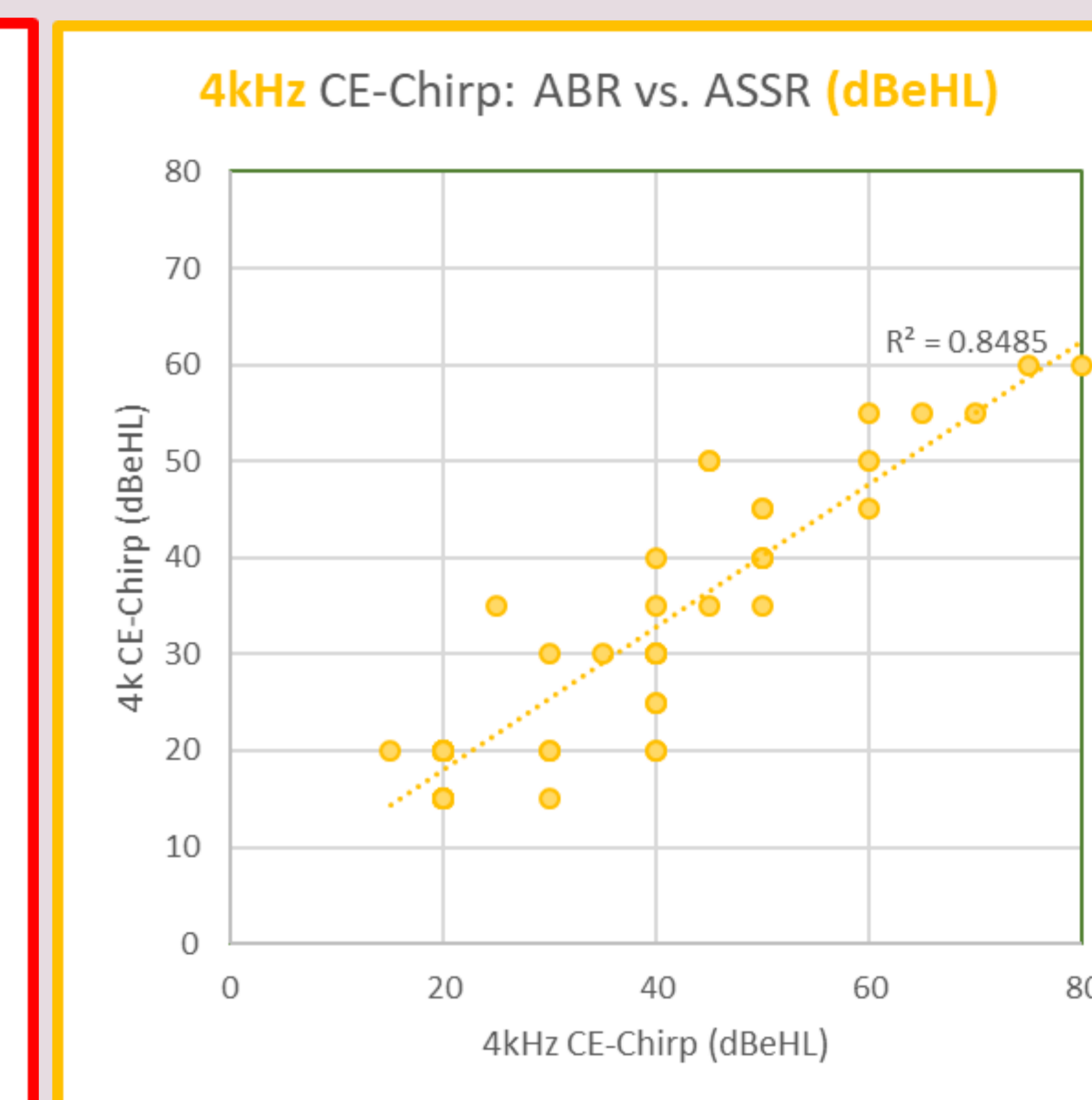
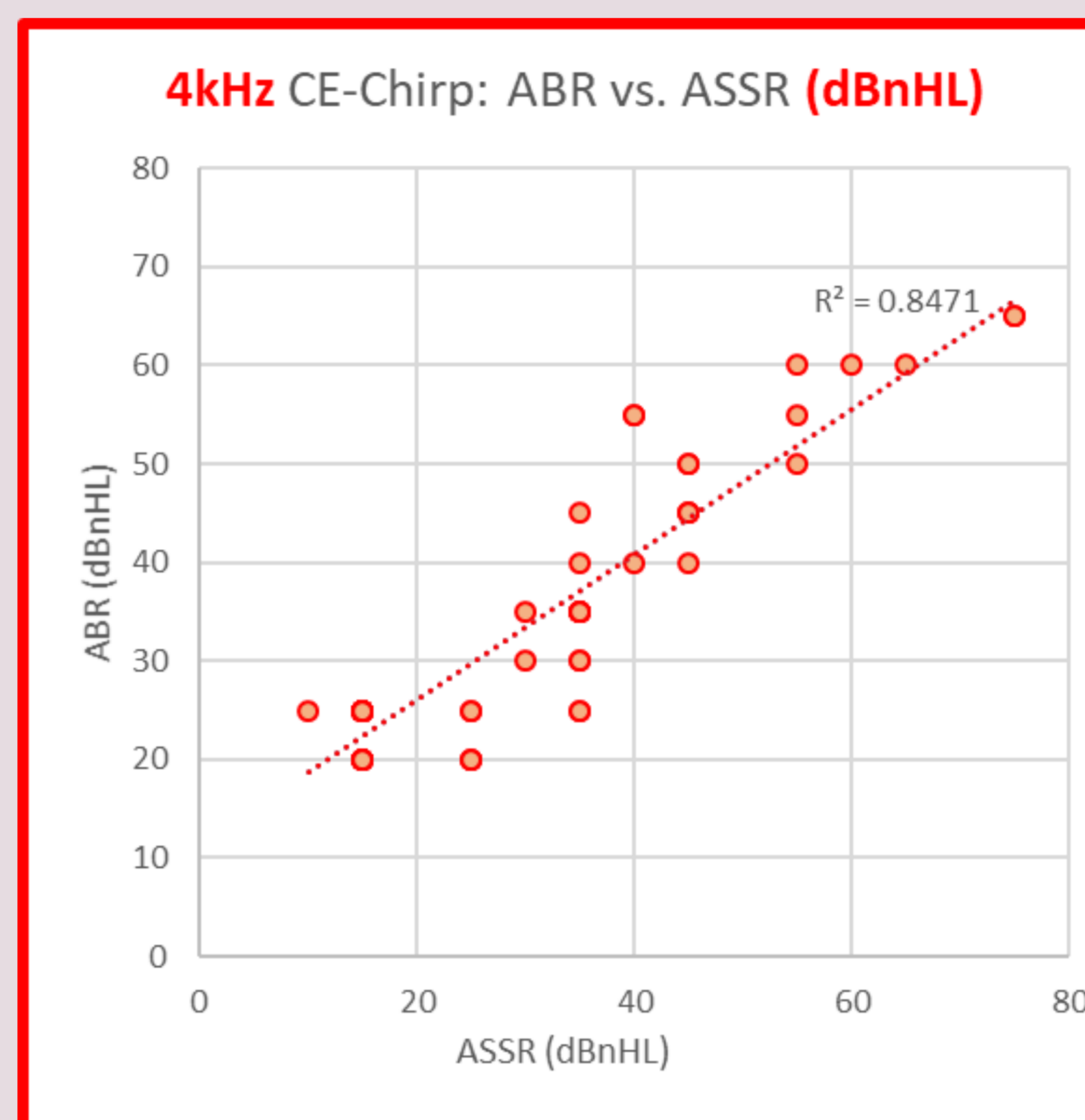
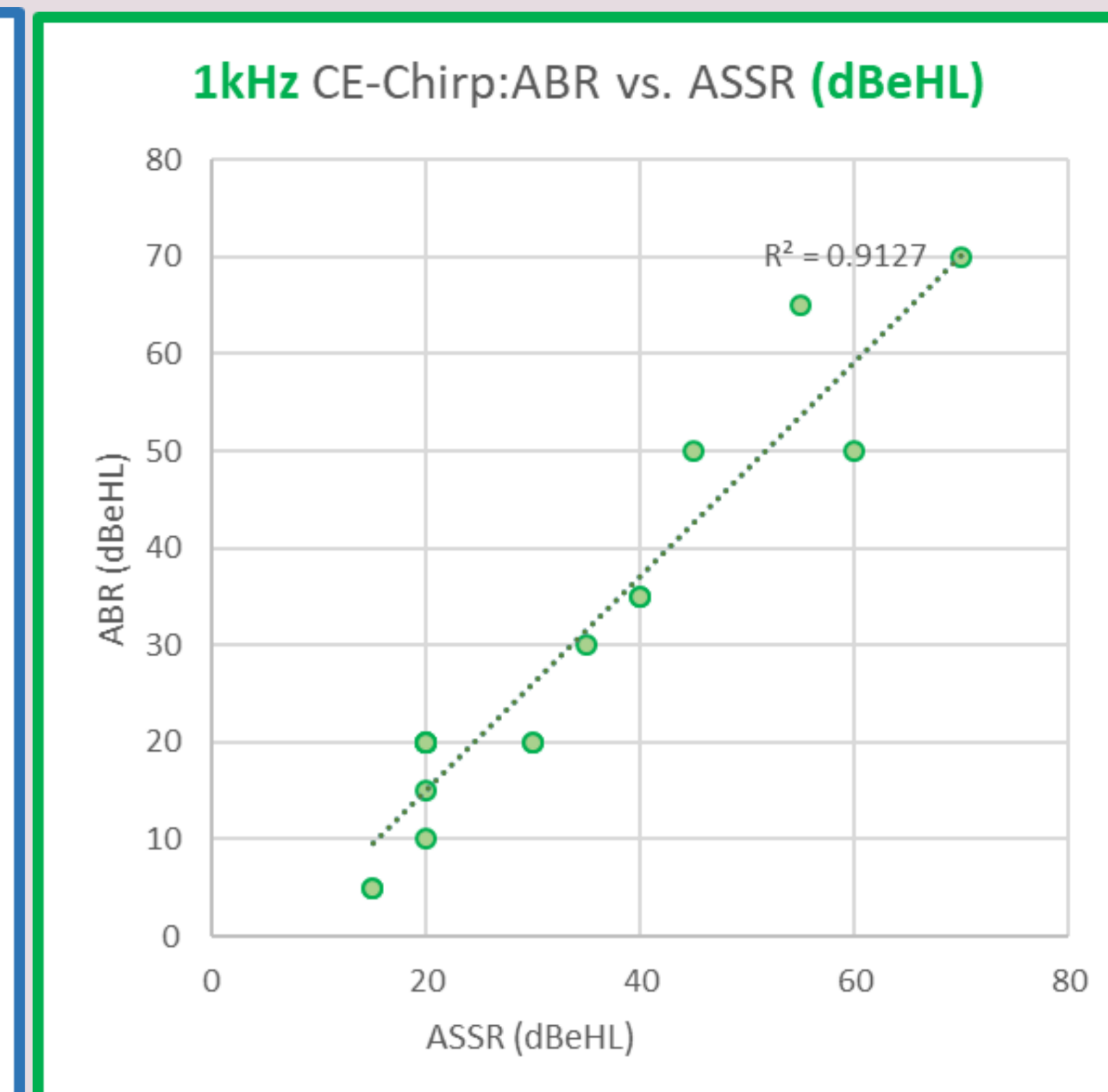
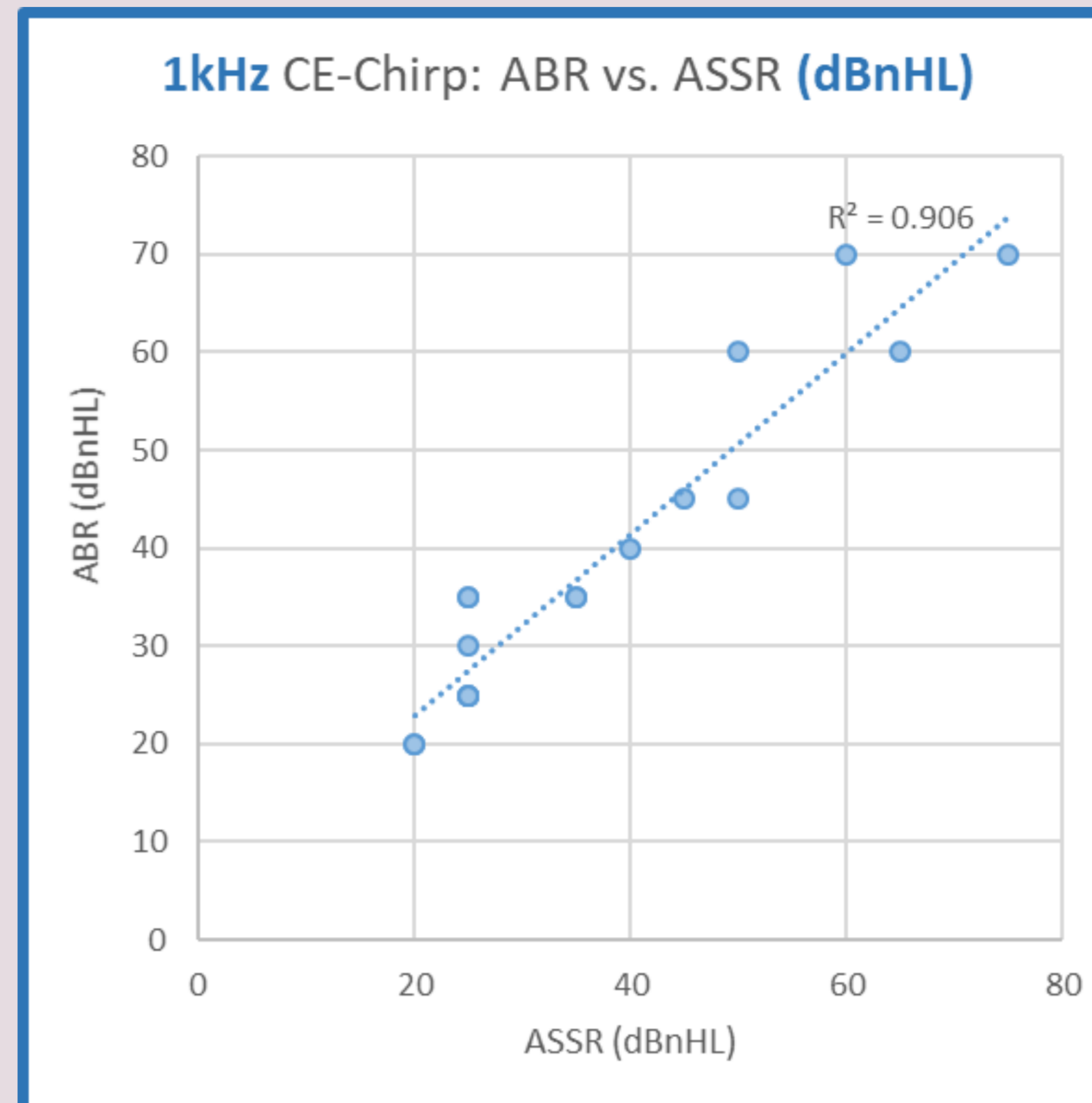


Fig 2 Correlation between ABR (vertical axis) and ASSR (horizontal axis). Results are for 1kHz (top) and af4kHz (bottom). Results before corrections were applied (left) and after (right).

## Results

- ❖ There is a strong correlation between ABR and ASSR results (0.9 for both 1 and 4kHz (Fig. 2)

## Discussion

- ❖ Using the BSA Guidance, ASSR technique is accurate method for threshold estimation when compared to the ABR.
- ❖ Results could
- ❖ The mean differences between ABR and ASSR results were better before corrections were applied. This could be due to the fact that both techniques use the same stimulus and believed to have same generators, corrections applied for each technique however come from diverse studies. This becomes apparent for 4kHz where for infants <12m the absolute correction difference between ABR (-5) and ASSR (+5) is 10dB and the absolute mean difference between the two techniques following correction is 9.2 (3.8+5.4).
- ❖ Due to the above, it is suggested that when results from one technique is used to inform a starting point for the other, the dBnHL levels are used.

## References

1. BRITISH SOCIETY OF AUDIOLOGY (2022), Auditory Steady State Response (ASSR) Testing. Available at: <https://www.thebsa.org.uk/resources/> [2022]

