Correction factors in ABR

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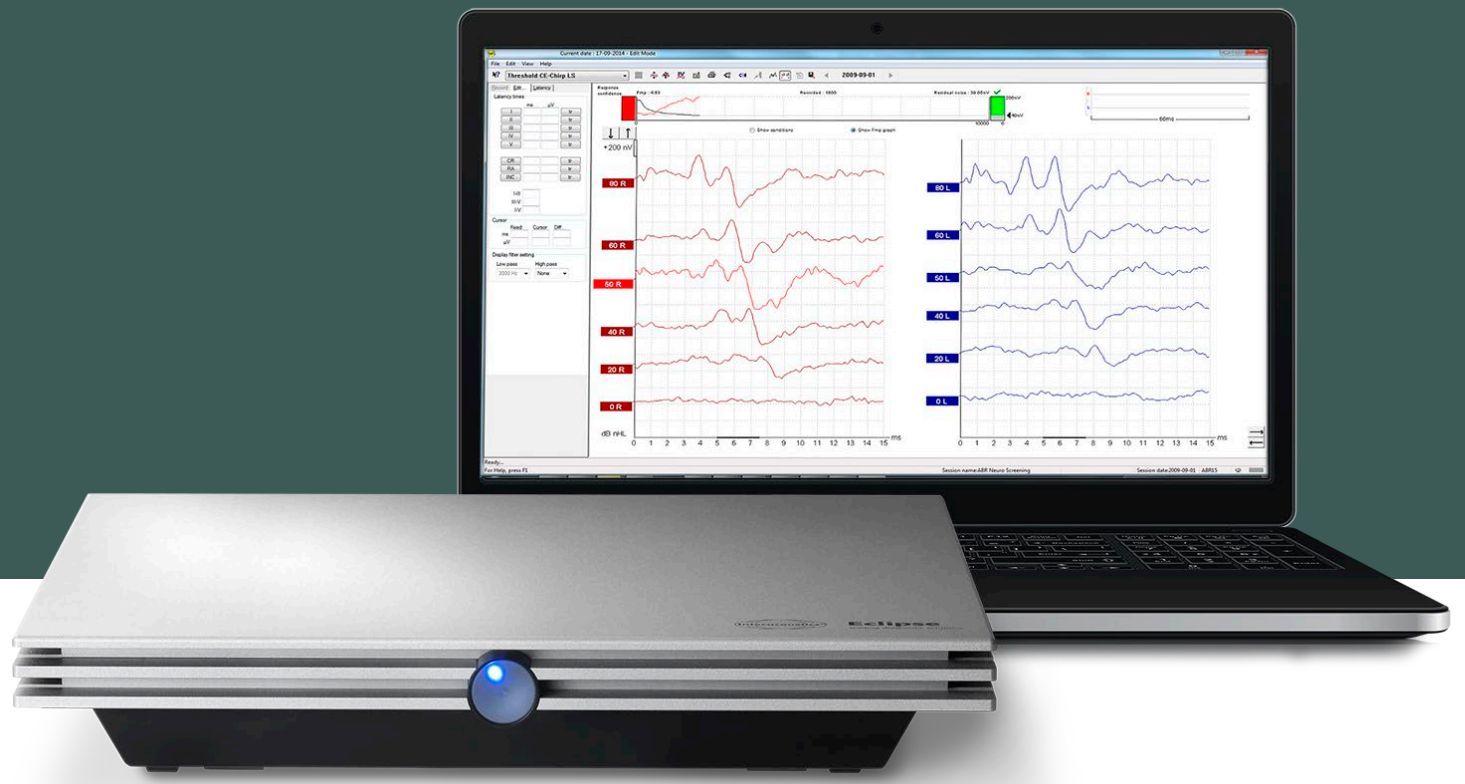
ABR testing: correction factors



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Why do correction factors matter?

What correction factors do we have?

ABR

Examples

Where do they come from?

Why do correction factors matter?

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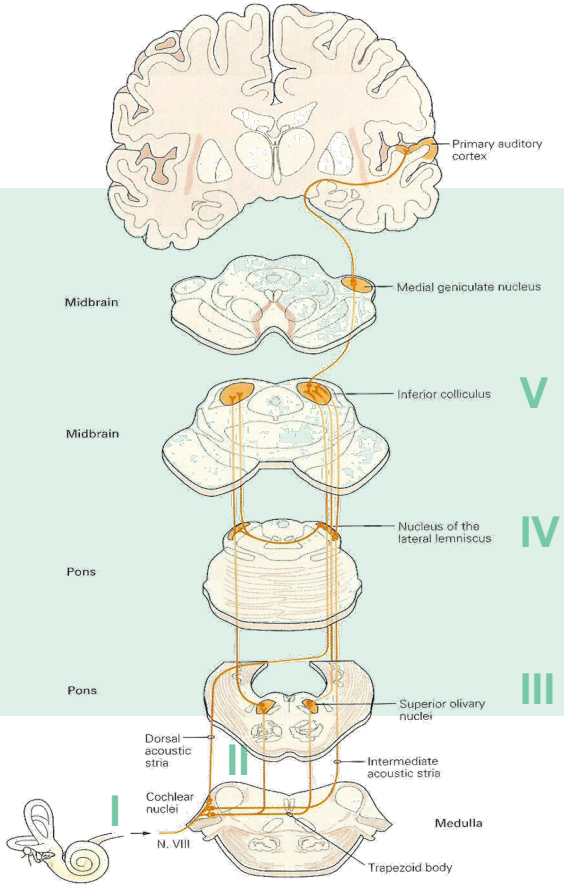

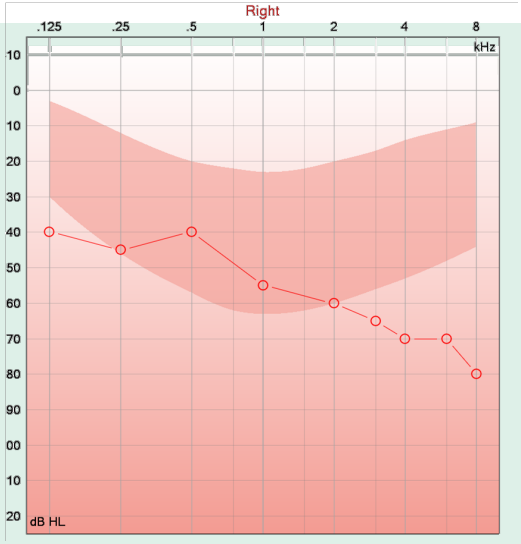

Why do correction factors matter?

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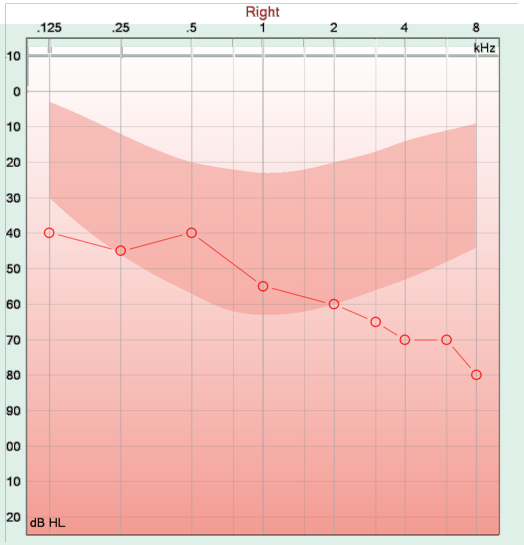
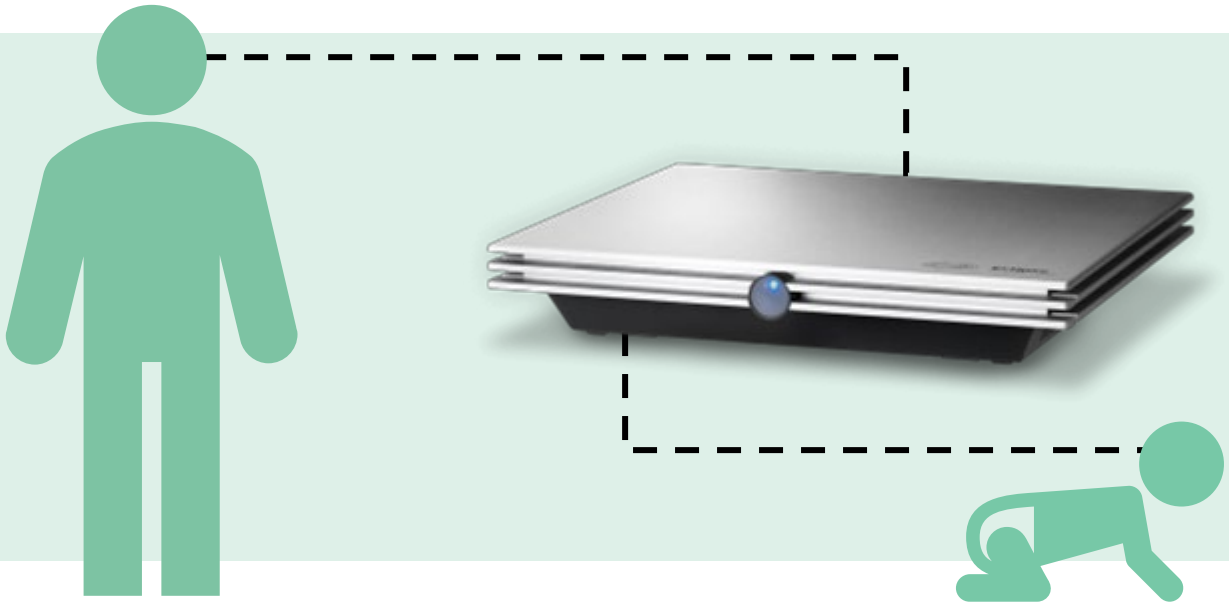
ABR offset



Why do correction factors matter?



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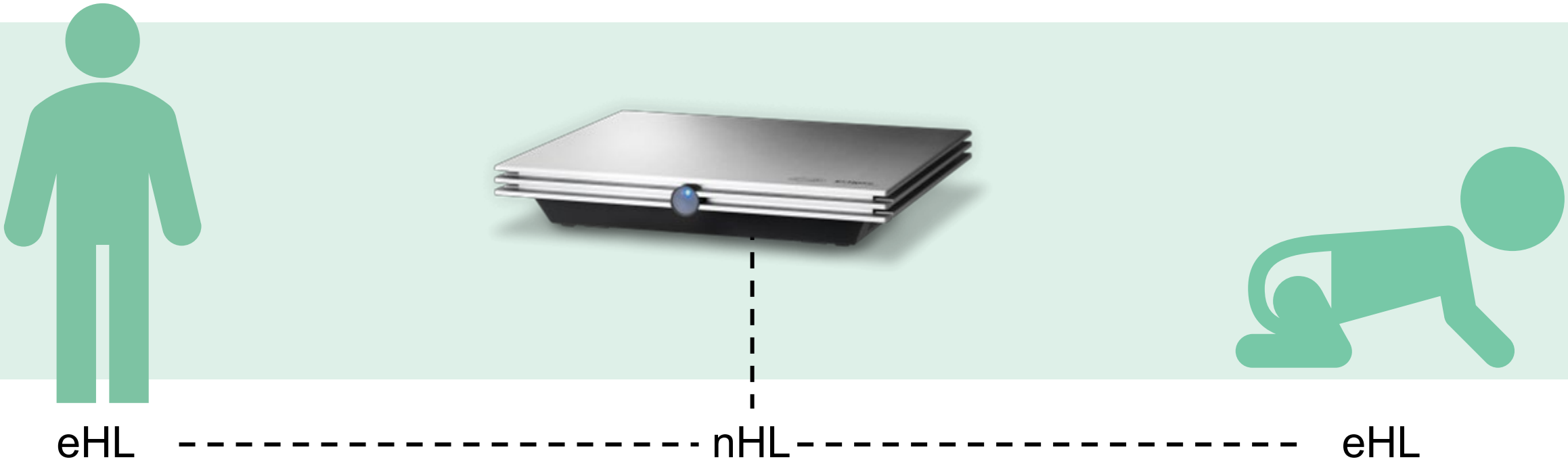

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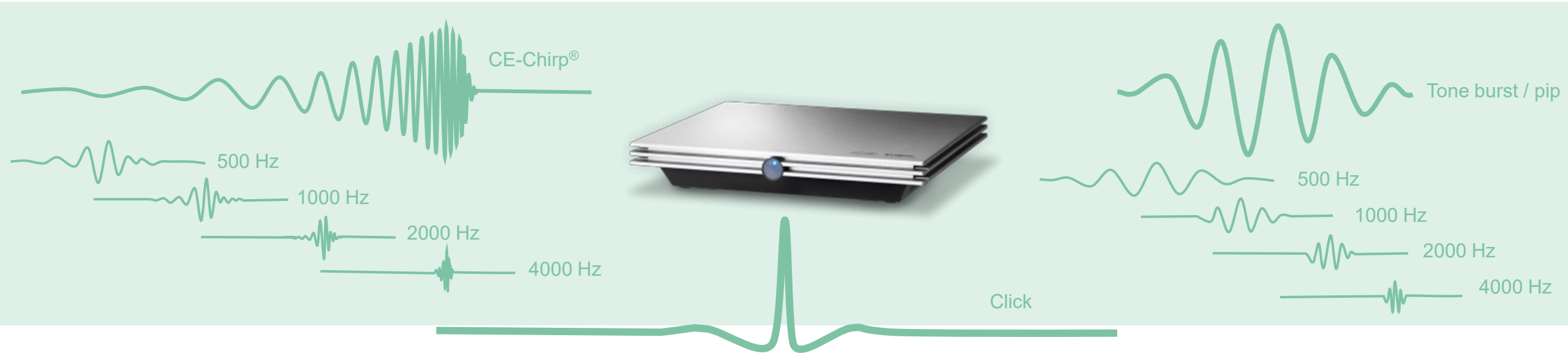

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ABR

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Appendix I: Combined ABR dBnHL to dBeHL correction values – by transducer

In the tables below, combined corrections are **added** to the thresholds in dBnHL to give the estimated threshold in dBeHL. Derivation is explained in section 8.

AC - INSERTS	Tone pip/click ABR					Chirp			
Corrected age	0.5k	1k	2k	4k	Click	0.5k	1k	2k	4k
≤12 weeks (≤84 days)	-15	-10	-5	0	5	-10	-5	0	5
13 to 24 weeks (85–168 days)	-20	-15	-10	-5	0	-15	-10	-5	0
> 24 wk (>168 days)	-20	-15	-10	-10	-5	-15	-10	-5	-5

AC - HEADPHONES	Tone pip/click ABR					Chirp			
Corrected age	0.5k	1k	2k	4k	Click	0.5k	1k	2k	4k
All ages	-20	-15	-10	-10	-5	-15	-10	-5	-5

BC	Tone pip/click ABR					Chirp			
Corrected age	0.5k	1k	2k	4k	Click	0.5k	1k	2k	4k
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13 to 24 weeks (85 - 168 days)	0	0	-10	-5	-5	5	5	-5	0
25 weeks to 2 years (169 - 730 days)	-5	-5	-10	-10	-5	0	0	-5	-5
>2 years (>730 days)	-20	-15	-10	-10	-5	-15	-10	-5	-5

BC Click

Corrected age	Gestational age	Click†
-4 weeks	36 weeks	+7
0 weeks	40 weeks	+4
6 weeks	46 weeks	0
12 weeks	52 weeks	-2

† For clicks, where the corrected age is between the values in the previous column, interpolation may be used (note that this is done in eSP).

What correction factors do we have?

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1370

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1375 **BC Click**

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Examples

Where do they come from?

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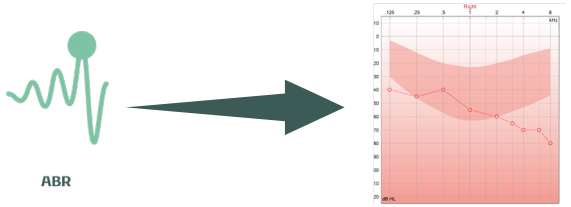


Where do they come from?

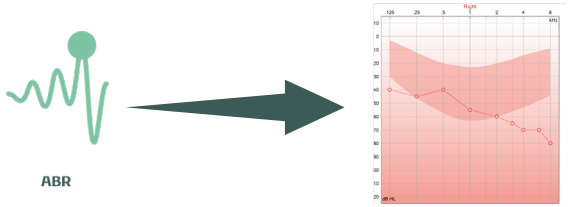
Stapells (2000)

Meta-analysis of 32 studies

1203 participants

Normal hearing

Hearing loss



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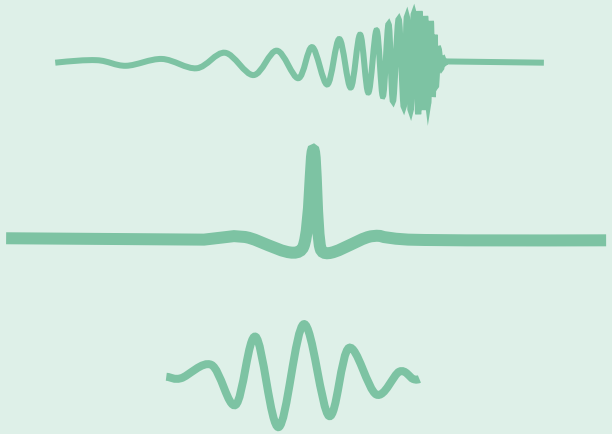
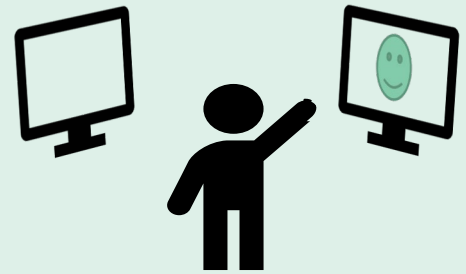
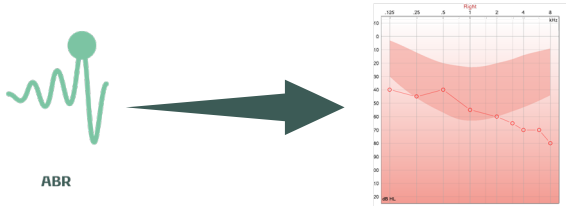


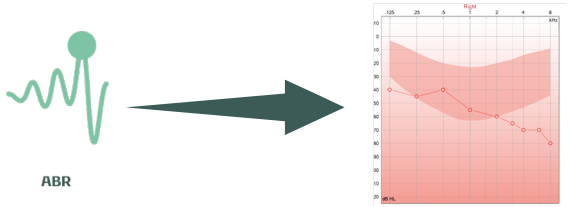




Where do they come from?

Table E1.1. Tone pip ABR. Results from Stapells (2000) meta-analysis show mean elevation of the tpABR thresholds (dBnHL) over the PTA thresholds

	Mean (95% CI of population mean) of difference between tpABR and behavioural thresholds (Stapells 2000)			
Subject group	0.5 kHz	1 kHz	2 kHz	4 kHz
Adults (normal hearing)	20.4 (18.8-21.9)	16.2 (14.9-17.4)	13.4 (12.3-14.4)	11.8 (10.7-12.8)
Adults (sensorineural)	13.4 (11.0-15.8)	10.3 (8.4-12.1)	8.4 (6.3.-10.3)	5.2 (2.4-8.0)
Infants/young children (normal hearing)	19.6 (18.8-20.5)	17.4 (16.0-18.7)	13.6 (11.8-15.5)	15.5 (14.1.-16.8)
Infants/young children (sensorineural)	5.5 (3.0-8.0)	4.9 (2.4-7.3)	0.6 (-1.6-+2.7)	-8.1 (-12.1- -4.1)

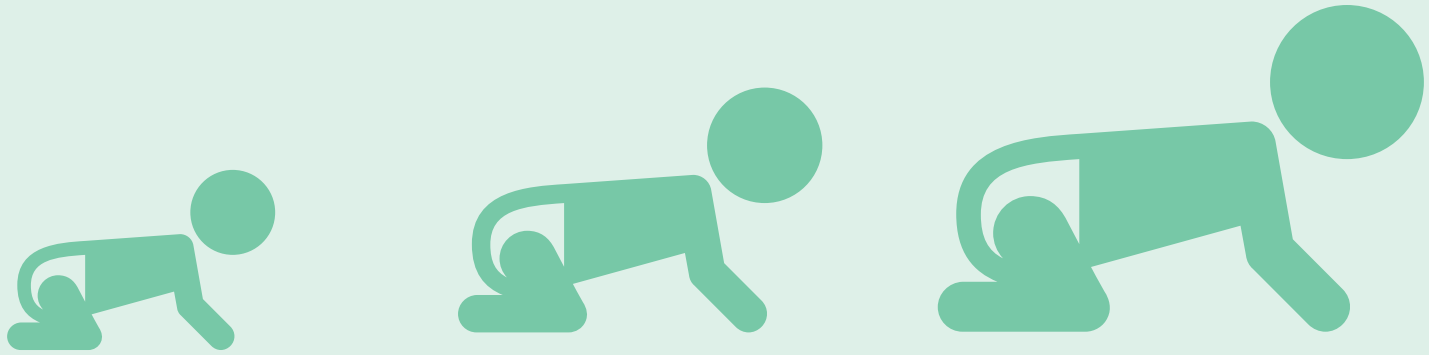


Where do they come from?

Table E1.4. Derivation of offset values (tpABR above PTA thresholds)

	0.5 kHz	1 kHz	2 kHz	4 kHz	click
Stapells(2000) + 5dB	-20	-15	-15	-10	----
Correction to align overall corrections with Ontario	0	0	+5	0	0
ABR click/tone pip offsets	-20	-15	-10	-10	-5
ABR chirp offsets	-15	-10	-5	-5	n/a

Where do they come from?



Where do they come from?

5–8 dB

Voss and Herrman (2005)

4 kHz: 27 dB
2 kHz: 27 dB
1 kHz: 4.7 dB
0.5 kHz: 0.8 dB

Sininger et al (1997)

4 kHz: 7 dB
2 kHz: 6 dB
0.5 kHz: 2 dB

Marcoux (2011)

Where do they come from?

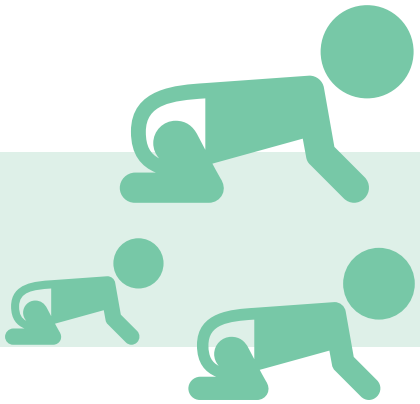
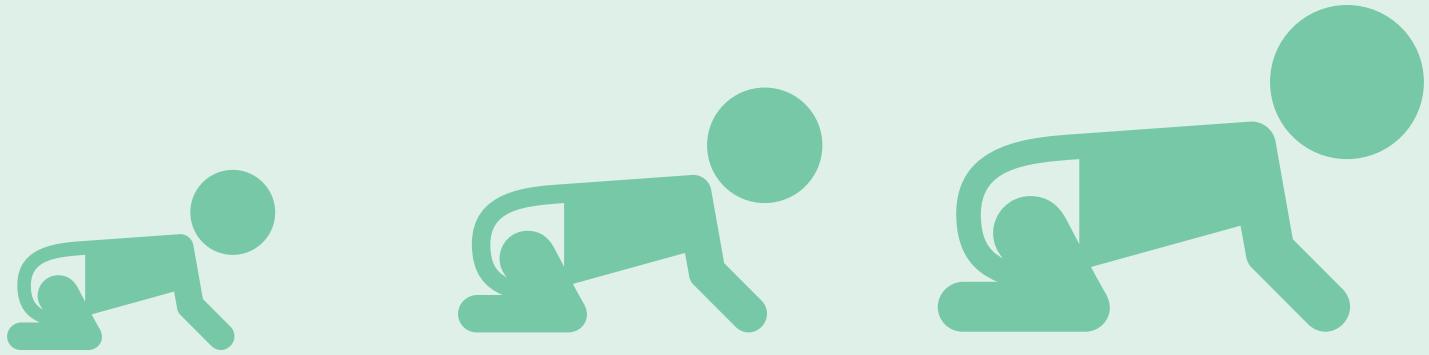


Table D1.3. Provisional stimulus correction for insert earphones by age.

Corrected age (days)	0.5 kHz	1 kHz	2 kHz	4 kHz	Click
≤84 days	5	5	5	10	10
85 to168 days	0	0	0	5	5
169 to 730 days	0	0	0	0	0
>730 days	0	0	0	0	0

Where do they come from?



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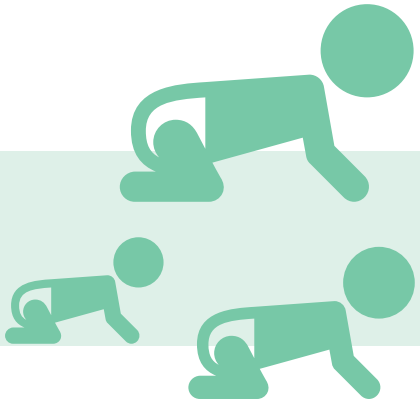


Table D1.1. BC stimulus corrections by age

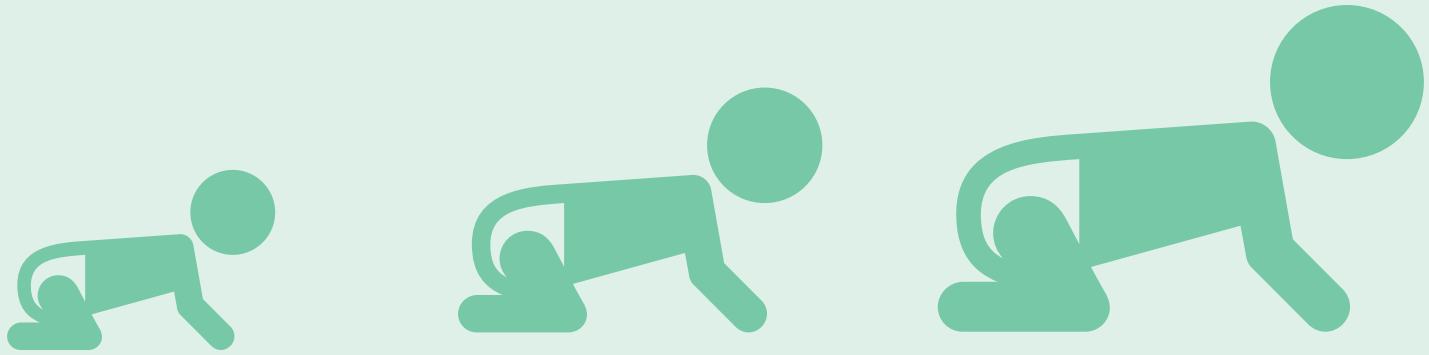
Corrected age (days)	0.5 kHz	1 kHz	2 kHz	4 kHz	Click
≤84 days	25	20	5	10	See Table D1.2
85 to 168 days	20	15	0	5	0
169 to 730 days	15	10	0	0	0
>730 days	0	0	0	0	0

Where do they come from?

Table D1.2. Stimulus level corrections by age for click BC (to 1 dB)

Gestational age	36 weeks	40 weeks	46 weeks	52 weeks
Corrected age	-4 weeks	0 weeks	6 weeks	12 weeks
Difference (dB)	12	9	6	3

Where do they come from?



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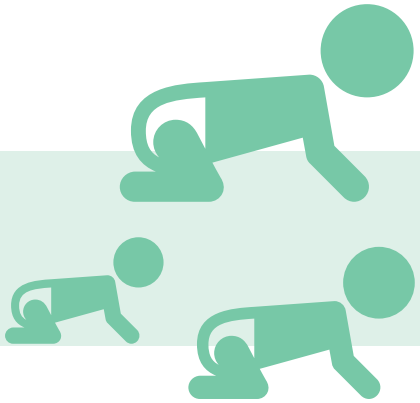
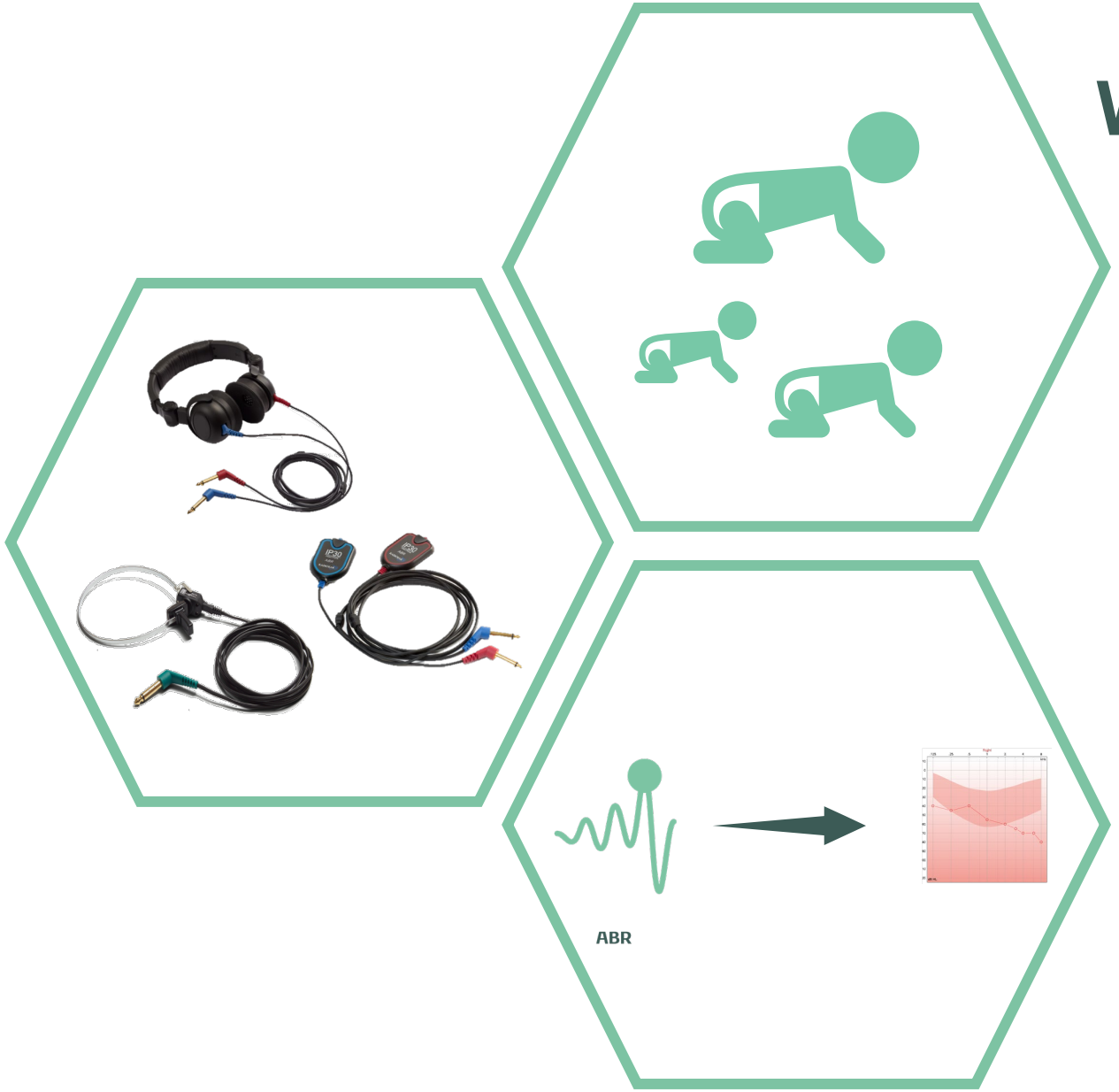


No correction of the stimulus level for headphones

Where do they come from?



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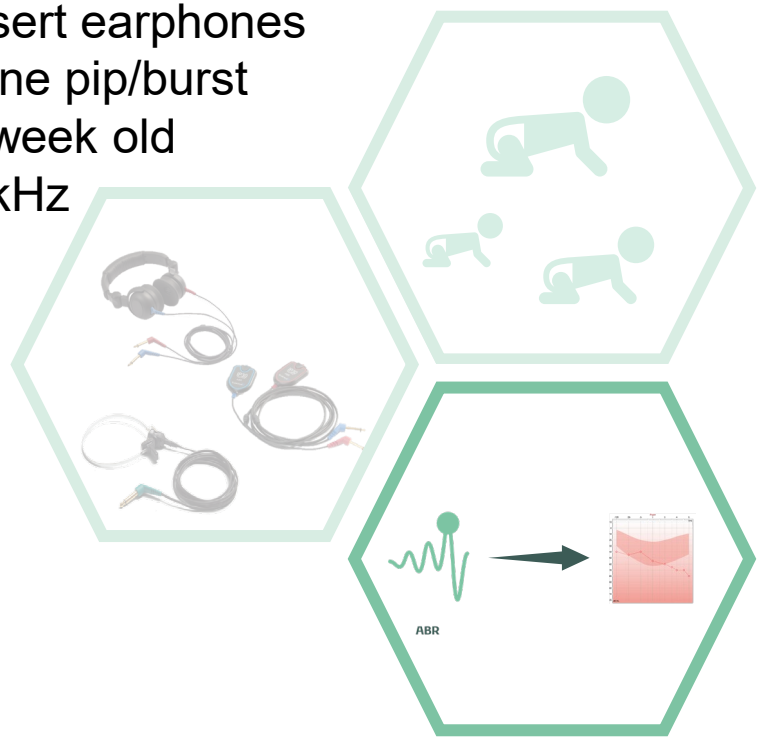
Insert earphones
Tone pip/burst
6 week old
4 kHz



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Where do they come from?

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Tone pip/burst
6 week old
4 kHz

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Appendix I: Combined ABR dBnHL to dBeHL correction values – by transducer

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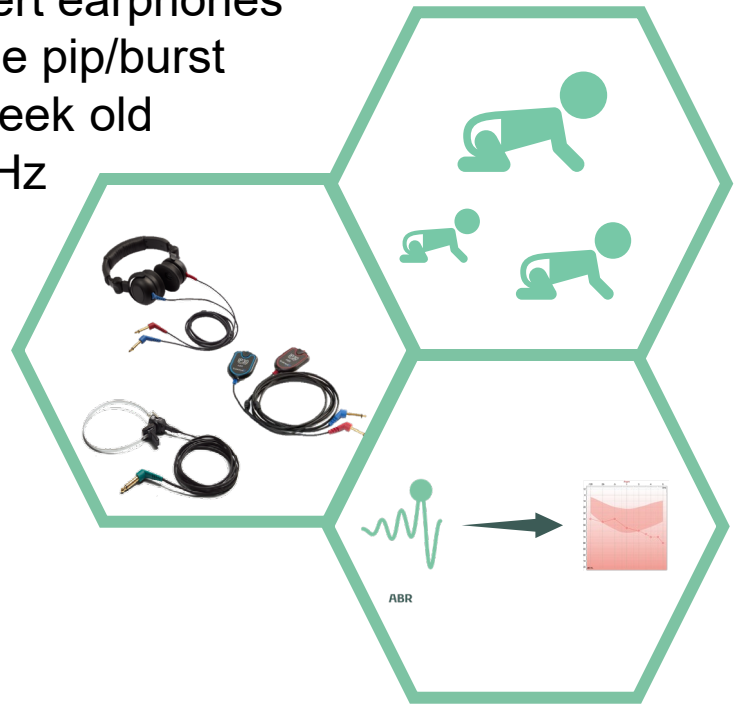
Corrected age	0.5k	1k	2k	4k	Click	0.5k	1k	2k	4k
≤12 weeks (≤84 days)	-15	-10	-5	0	5	-10	-5	0	5
13 to 24 weeks (85–168 days)	-20	-15	-10	-5	0	-15	-10	-5	0
> 24 wk (>168 days)	-20	-15	-10	-10	-5	-15	-10	-5	-5

Where do they come from?

Insert earphones
Tone pip/burst
6 week old
4 kHz



Why do correction factors matter?

What correction factors do we have?

ABR

Examples

Where do they come from?

Science **made** smarter

Interacoustics Academy

Examples

Appendix I: Combined ABR dBnHL to dBeHL correction values – by transducer

In the tables below, combined corrections are **added** to the thresholds in dBnHL to give the estimated threshold in dBeHL. Derivation is explained in section 8.

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AC - HEADPHONES	Tone pip/click ABR					Chirp			
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All ages	-20	-15	-10	-10	-5	-15	-10	-5	-5

BC	Tone pip/click ABR					Chirp			
Corrected age	0.5k	1k	2k	4k	Click	0.5k	1k	2k	4k
≤12 weeks (≤84 days)	5	5	-5	0	See below	10	10	0	5
13 to 24 weeks (85 - 168 days)	0	0	-10	-5	-5	5	5	-5	0
25 weeks to 2 years (169 - 730 days)	-5	-5	-10	-10	-5	0	0	-5	-5
>2 years (>730 days)	-20	-15	-10	-10	-5	-15	-10	-5	-5

BC Click

Corrected age	Gestational age	Click†
-4 weeks	36 weeks	+7
0 weeks	40 weeks	+4
6 weeks	46 weeks	0
12 weeks	52 weeks	-2

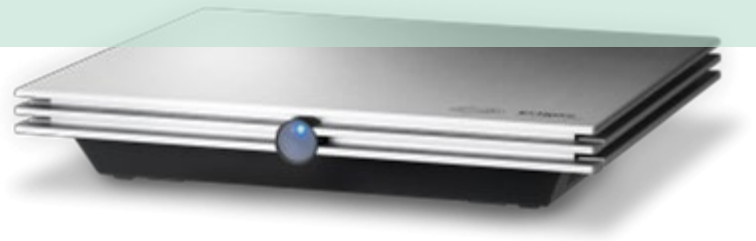
† For clicks, where the corrected age is between the values in the previous column, interpolation may be used (note that this is done in eSP).

4 week old
Born at 38 weeks gestation
2 weeks corrected
CE-Chirp®

4 kHz insert earphone threshold = 45 dB nHL

Correction factor =

4 kHz bone conduction threshold <= 10 dB nHL



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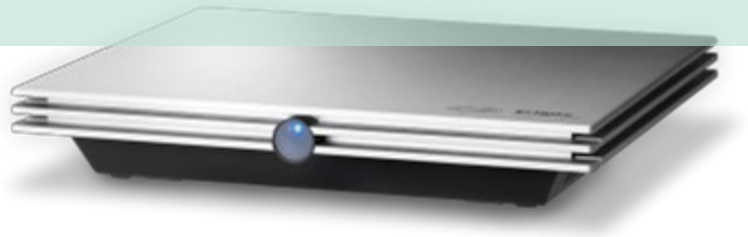
Correction factor = + 5 dB

Corrected threshold = 50 dB eHL

4 kHz bone conduction threshold <= 10 dB nHL



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4 kHz bone conduction threshold <= 10 dB nHL

Correction factor = + 5 dB

Corrected threshold <= 15 dB eHL

Examples

ABR Masking Noise Calculator 2019

Instructions:

Click in pale yellow cells to enter options and appropriate levels then press Enter / Return

Warning: some variables will be unknown (e.g. air-bone gaps) so enter several likely values; if in doubt use the higher noise level

This calculator is a time-saving guide; the user must carry clinical responsibility for any decisions they make

Result is the dB "dial" level of noise for the selected system, stimulus type, transducer, corrected age & stimulus level

Offset is an alternative way of specifying noise level: it is the dB noise level relative to the stimulus level

ABR System:	Interacoustics Eclipse
Stimulus Transducer:	BC
Noise Transducer:	Insert
Stimulus type:	4k CE-Chirp
Patient corrected age (weeks):	6 to 8
Test ear air-bone gap, dB:	0
Non-test ear air-bone gap, dB:	0
dBeHL non-test BC ABR threshold:	
dBnHL Stimulus Level:	5 dBeHL

No need to mask

Equation:	Stim(dBnHL)	+dBage	+RML	+ABGnt	-IA	-Nt	-Nc	Result	Offset
dB_{noise} =	0	10	28	0	20	10	-9	15	+15

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9 week old
Born at 39 weeks gestation
8 weeks corrected
CE-Chirp®

1 kHz insert earphone threshold = 55 dB nHL

Corrected threshold =

1 kHz bone conduction threshold = 40 dB nHL

Examples

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Non-test ear air-bone gap, dB:	0	
dBeHL non-test BC ABR threshold:		
dBnHL Stimulus Level:	55	50 dBeHL

Equation:	Stim(dBnHL)	+dBage	+RML	+ABGnt	-IA	-Nt
dB_{noise} =	55	5	28	0	66	5

9 week old
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8 weeks corrected
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Corrected threshold = 50 dB eHL

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dBnHL Stimulus Level:	40	50 dBeHL

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dB_{noise} =	40	20	28	0	20	5

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Interacoustics Academy offers training and access to materials related to audiological and vestibular technologies and their applications.

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