

ABR Protocol and Display Settings for Biologic NavPro, Vivosonic Eclipse and Evoked Potential Systems

Settings	Biologic NavPro	Vivosonic	Eclipse
Amplifier	100,000	Not required	80 dB
Tone Burst Filter settings	30-3000 Hz	30-3000 Hz	33-3000 Hz
Click Filter Settings	100-3000 Hz	100-3000 Hz	100-3000 Hz
Display gain	0.2 μ volts	0.1 μ volts	0.1 μ volts
Residual noise	NA	<0.20 μ volts	<0.20 μ volts
Max number of stimuli 1k 2k 4k	4000	33,930 1, 2 & 4kHz	4000
Max number of stimuli 500Hz	4000	31,860	4000
Time window 1k 2k 4k	0-21.3	0-25	0-20
Time window 500 Hz	0-27	0-27	0-28
Time window click	-1 to 15 ms	-1 to 15 ms	-2.0 to 14ms
Stimulus rate 1k 2k 4k	39.1/s	37.7/s	39.1/s
Stimulus rate 500	36.53/s	35.4/s	36.5/s
Stimulus rate click	17.1/s	17.1/s	17.1/s
Polarity tones	Alternating	Alternating	Alternating
Polarity click	Alternating	Alternating Split	Alternating

Statistical techniques to Auto stop recording	NA	Not used	Not used
Artifact reject	+/- 10 μ volts	Not routinely used	+/- 10 μ volts
Bayesian/Kalman weighted	NA	On	On for tone burst only Off for the click protocol
Notch Filter Eclipse uses the term “minimise interference”	On as required for excessive electrical noise	Off. If high electrical noise encountered switch to SOAP plus and consider using notch filter	On as required for excessive electrical noise
Display			
Printing Waves	<p>Use full page display for each frequency or click, do not split the screen into a left and right view</p> <p>Do not display more than one frequency on a page if this overly clutters the display with inadequate separation of the waveforms.</p> <p>For bone conduction recordings, print the ipsi above the contra.</p>	<p>Use full page display for each frequency or click, do not split the screen into a left and right view</p> <p>Do not display more than one frequency on a page if this overly clutters the display with inadequate separation of the waveforms.</p> <p>Supra threshold responses do not routinely require the AB waves being displayed.</p> <p>For waves near or at threshold print the A+B above the overlaid A and B waveforms. If a repeat is recorded overlay the 2 A+B waves and the 4 separate A and B waveforms. A-B can be displayed for clarity if required.</p> <p>For bone conduction recordings, print the ipsi A+B and the overlaid A and B above the contra A+B and its overlaid A and B.</p>	<p>Use full page display for each frequency or click, do not split the screen into a left and right view</p> <p>Do not display more than one frequency on a page if this overly clutters the display with inadequate separation of the waveforms</p> <p>If using the A and B waveforms print the A+B above the overlaid A and B waveforms</p> <p>For bone conduction recordings, print the ipsi above the contra.</p>

Click	Added at top of page, overlaid separate polarities beneath added, subtracted beneath separate polarities, on 1 page	Added at top of page, overlaid separate polarities beneath added, subtracted beneath separate polarities, on 1 page	Added at top of page, overlaid separate polarities beneath added, subtracted beneath on separate page
Bone conduction *: Blocked points/stimulus artefact management *	Adjusting starting point by moving cursor to end of artifact as required	Adjusting starting point by moving cursor to end of artifact as required	Adjusting starting point by moving cursor to end of artifact as required
Noise management and threshold determination			
Threshold determination	2 traces at threshold with good repeatability and a minimum of a third trace to show growth of the response	Use RN as a guide to decide if you need to repeat a wave with excessive movement and electrical artefact. Place the SS/SE markers on the active waveform while recording or post recording for correlation coefficient which calculates the repeatability of A and B within the SS/SE limits. The markers need to be at least 9ms apart.	Use Fmp and residual noise to assist in your threshold determination technique A and B waves can be displayed to assist in decision making with the A and B waves sitting beneath the A+B SNR for a single waveform should be >5.5
Fmp/Fsp	NA	Fsp not used in NZ as it requires artifact reject to be enabled. Use RN, Corr and SNR	Version EP 4.6.1 . Fmp \geq 2.65 97.5% level of confidence in the response
SNR	Not used		
Bayesian/Kalman weighted	NA	On	On for tone bursts, off for click stimulus as this disables showing the subtracted waveform

*Only use if stimulus artifact is obscuring part of a possible response which typically occurs with 500 Hz BC. Always check on screen for a possible wave V that may be close to the artifact before blocking is used

Masking in Bone Conduction ABR

A recent paper by Ricky Lau and Susan A. Small (2021) investigated bone conduction ABR in infants and adults and recommended *when comparisons of BC-ABR Wave V characteristics between EEG channels do not yield obvious asymmetries, for example, when amplitudes and/or latencies are similar in both channels or when the contralateral channel is too noisy to interpret, clinical masking is required to establish ear-specific BC-ABR thresholds.*

Their recommendations for infant testing masking bone conduction ABR at 500Hz and 2 KHz are:

(1) 500 Hz: 72 and 82 dB SPL at 20 and 30 dB nHL, respectively;

(2) 2000 Hz: 62, 72 and 82 dB SPL at 30, 40 and 50 dB nHL, respectively.

Reference

Lau and Small. Effective Masking Levels for Bone Conduction Auditory Brainstem Response Stimuli in Infants and Adults with Normal Hearing. *EAR & HEARING*, VOL. 42, NO. 2, 443–455