

# A specification for ABR systems used for post newborn hearing screening diagnostic testing

A special round table session on this topic was held on Monday 27 June 2011 during the XXII International Evoked Response Study Group (IERASG) symposium in Moscow. In attendance were symposium delegates and equipment manufacturers. There was general agreement that the establishment of such a specification was likely to be helpful to equipment manufacturers in developing ABR systems that provide the features that are needed in routine clinical practice, particularly for post-newborn screening hearing assessment.

This initiative developed from work undertaken by the English Newborn Hearing Screening Programme (NHSP) to assist testers to select equipment that was most appropriate for their needs. It has been extended to the international community via IERASG.

The table below is intended to be a living document and manufacturers are encouraged to provide updated information that describes their current systems.

IERASG and NHSP have collated this information from manufacturers in good faith but can accept no responsibility for any errors of detail, interpretation or omission.

Some users may wish their ABR system to be capable of performing other tests (e.g. neurological ABR assessment, ECochG, MLR, VEMP, long latency responses, ASSR, OAE and research applications) but these applications fall outside the scope of this document; users should seek appropriate specialist advice.

Updates & corrections will be coordinated by Guy Lightfoot. Send suggestions or queries by email to [g.lightfoot@liverpool.ac.uk](mailto:g.lightfoot@liverpool.ac.uk)

Key to systems (their order in this table carries no significance)

A: Biologic Navigator Pro. B: Interacoustics Eclipse C: Vivosonic Integrity D: CareFusion Synergy Plinth

E: ChartR EP200 F: GSI Audera G: Neurosoft Neuro-Audio H: IHS Smart EP

	Essential	Desirable	A	B	C	D	E	F	G	H
<b><u>General</u></b>										
Conformance with IEC 60645-7 type 1 ABR specification	✓		✓	✓	✓	X	X	X	✓	✓
<b><u>Number of channels</u></b>										
Minimum of 2 channels but able to select a single channel.	✓		✓	✓	X	✓	✓	✓	✓	✓
Able to do single channel recording for left ear and right ear assessment with 3 electrodes. (e.g. left and right mastoid and high forehead/vertex)	✓		✓	✓	✓	✓	✓	✓	✓	✓
<b><u>EEG amplifier</u></b>										
Data reject levels (after filtering) $\pm 5\mu\text{V}$ to $\pm 50\mu\text{V}$ . Steps sizes to include $\pm 5$ , 10, 20, 50 or equivalent.	✓		✓	✓	X	✓	✓	✓	✓	✓
Preference for continuous adjustment or finer data reject voltage steps.		✓	✓	✓	✓	✓	✓	✓	✓	✓
Reject disabled period after stimulus ('blocking'). Adjustable from 0 to 15ms in 1ms steps or finer.	✓		✓	✓	✓	✓	X	✓	✓	✓
EEG display to be of filtered data with rejects limits displayed.	✓		✓	✓	✓	X	X	✓	X	✓
Amplifier noise should be $<0.5\mu\text{V}$ RMS referred to input over bandwidth of 30 to 1500 Hz.	✓		✓	✓	✓	✓	✓	✓	✓	✓
<b><u>Filters</u></b>										
<b>Minimum of :</b>										
Low frequency (high pass): 20-30, 50, 100, Hz	✓		✓	X	✓	✓	✓	✓	✓	✓
High frequency (low pass): 1000, 1500, 2000, 3000 Hz	✓		✓	✓	✓	X	✓	✓	X	✓





Stimulus plateau cycles	✓		✓	✓	✓	✓	✓	X	✓	X	X
Stimulus rate	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Stimulus polarity	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Masking level (if masking is not enabled then this should be indicated)	✓		✓	✓	✓	✓	✓	✓	✓	X	✓
Validated objective score e.g. Fsp, correlation	✓		✓	✓	✓	X	X	X	X	X	✓
Validated residual noise measure.	✓		✓	✓	✓	X	X	X	X	X	✓
User-defined comment fields: one per level (or waveform) plus one multi-line field per patient	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Test parameters that are identical for all displayed waveforms should be listed once rather than listed for every waveform; only those parameters with different values across waveforms should be listed for every waveform, thus saving space and aiding review		✓	X	X	X	✓	X	X	X	X	X
Some means should be provided that allows up to 4 superimposed waveforms to be distinguished from each other (preserved when copied in monochrome)		✓	X	X	X	X	X	X	X	X	X
Printout format should be editable by the user		✓	✓	X	✓	✓	✓	X	✓	✓	✓
<b><u>Electronic record for review/audit</u></b>											
The facility to export the records and traces of an individual patient (option of a group of patients desirable) in a format suitable for review on a computer loaded with the appropriate software.		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Notes:

- a: ✓ if neither Fsp nor residual noise are enabled; if Fsp and/or residual noise auto stop are enabled the display is refreshed every 256 accepted sweeps
- b: If Fmp or Bayesian averaging are enabled the display is refreshed every 100 accepted sweeps, otherwise every 25 accepted sweeps