

What is ABR?

Auditory Brainstem Responses, also known as BAER, are potential differences generated when a subject's ear is stimulated with any kind of sound. These potential differences can be evoked using controlled stimulation, allowing acquisition of these differences by averaging the acquired EEG over a specified period of time. The ABR response is commonly found between one and fifteen milliseconds from the time of stimulation.

The recordings acquired will contain certain peaks and valleys, some more identifiable than others. In most species, Peaks I, III and V are the most identifiable. The amplitudes, latencies and relationship of those peaks and valleys can be used to diagnose certain pathological conditions. Animal ABR responses are usually acquired using Sub-dermal electrodes.

Why use ABR Screening?

Auditory brainstem responses may be used to diagnose certain auditory conditions. This type of testing can provide a healthcare professional with very useful information about hearing loss in a subject. This technique is especially helpful to test pets since no behavioral response is required.

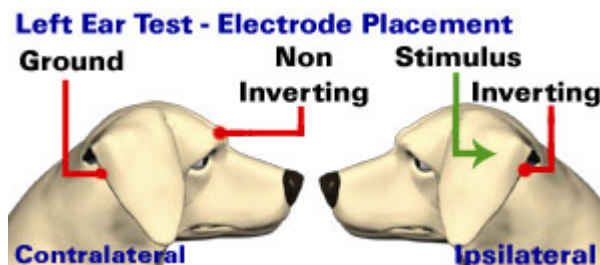
ABR testing can help determine the amount and type of hearing loss at specific frequencies, (i.e. hearing threshold), depending on the cause of hearing impairment. Unlike OAE testing, which only tests for cochlear function, ABR testing provides information of the complete hearing pathway, including the neural pathways in the brainstem, providing a more complete functional test, less susceptible to acoustical noise interference.

Pet Screener is preprogrammed with algorithms that detect responses automatically, labeling the responses as Pass or Refer, decreasing the probability of human error.

Patient Preparation

The subject must be placed in a comfortable and quiet environment, preferably a sound booth where the subject lies down on a comfortable space. It is recommended to acquire ABRs on sedated subjects to avoid artifact. Electrodes may be placed in the following configuration:

- Inverting (-) : Ipsilateral (Testing) Mastoid
- Non-Inverting (+) : High Forehead
- Ground: Contralateral Mastoid



When testing both ears, in a dual channel system, place the corresponding inverting electrodes on the mastoids, place the ground electrode on the lower forehead and place the two non-inverting leads, using a Y-adaptor, above the ground electrode. Consult the SmartEP and PetScreener manuals for additional electrode placement details. Other configurations may work better when testing particular species.

When using insert earphones as a stimulator, make sure the ear canal is clean of wax and other debris; if necessary, clean the ear canal taking care not to damage the tympanic membrane.

Electrode Usage

Sub-dermal electrodes are needed for acquiring ABR recordings on animals. Shaving the electrode site is often necessary to obtain reliable and secure electrode placement.

Creating your Test Protocol

Pet Screener ships with a standard testing protocol built-in and it is ready to start testing without the need to create a protocol. However, it may be necessary for some users to change the test settings as required by an institution, doctor or local law requirements. Creating a test set in smart screener is very easy:

- Click on System > Test Protocol Setup from the main menu to open the protocol setup screen (You must have a password to open this utility).
- Place check marks next to the intensities at which you need to test. You may modify the intensities in 1dB increments.
- Select the minimum and maximum number of sweeps for each intensity value.
- Make sure to select the right type of stimulus and stimulator.
- Save the protocol if necessary for use at a later date.

Acquiring with Pet Screener

ABR pet screening is the main function of PetScreener. The system is ready to start as soon as installed with a default test protocol. Refer to the previous section to create your own protocol. Complete the following steps to acquire data:

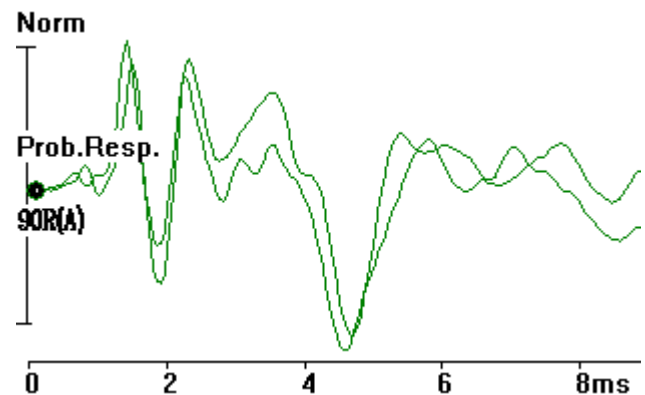
- Click the Name button and enter all the required information for the subject.
- Click on System > **EEG and Amplifier** option on the main menu and set the filters, notch filter, artifact rejection ratio and region and desired amplification for each channel, if necessary.
- Click on the Right or Left buttons to start acquisition for the corresponding ear.

Make sure to carefully select your filter settings in the EEG and Amplifier dialog box. Lack of filtering may result in excessive artifact, while excessive filtering may result in waveforms that are too smooth to assess. EEG and Amplifier

settings may not need to be adjusted more than once.

Analysis

PetScreener will automatically detect the presence of a probable response in every incoming recording. When acquiring, the program will stop once a probable response has been found and the minimum number of sweeps has been acquired. If PetScreener is unable to find a response, up to the maximum number of sweeps specified, it will label the recording as a non-response. The following image shows a good response for a canine subject.



Marking Peaks

To accurately diagnose a condition, you must first place the applicable labels on the recently acquired recording. Peaks may be marked when recognizable, follow these steps for each of the labels:

- Right click at the point of the recording where the label is to be placed.
- Select the peak to be marked
- Once placed, drag the top marker of the labels to the top of the peak.
- Drag the bottom marker to the valley following the peak.

Select Mark other peak to place custom labels.