

# QUICK GUIDE

# AUDERA PRO - eABR

The operating manual contains information pertinent to the use of the GSI Audera Pro, including safety information, as well as maintenance and cleaning recommendations. Read the manual in its entirety prior to use of the Audera Pro on a patient.

#### **TESTING ENVIRONMENT**

It is important that the test environment be conducive to collecting good quality test data free from excessive noise. The GSI Audera Pro should be used in a suitable acoustically quiet testing environment such as a sound booth or quiet room. To minimize the amount of electrical noise, it is recommended that the Audera Pro be plugged directly into a dedicated, earth-grounded electrical outlet. Any unnecessary equipment such as computer monitors, cellphones, fluorescent lights or electronic beds should be turned off during testing. To minimize muscle artifact and to encourage relaxation or sleep, a comfortable recliner or non-metal, comfortable bed should be used.

#### **SET UP**

Included with the GSI Audera Pro is a 3/5 mm adaptor that must be connected to the 'trigger in' BNC connector of the digital input/output (I/O) cable prior to collecting an eABR.

1. Attach the 3.5 mm adapter to the BNC port of the digital I/O as shown in Figure A.



- 2. Connect the digital I/O cable to the back of the base unit of the Audera Pro.
- 3. Connect the 3.5 mm adapter from step 1 to the cochlear implant hardware.

NOTE: The I/O cable has 2 additional endings that are not used for eABR testing.



# PREPARE THE AUDERA PRO AND CI SOFTWARE

- 1. Launch the Audera Pro software and select the search patient icon to select an existing patient. For new patients, select the new patient icon and enter the First Name and Last Name (required). Click OK.
- 2. Select the EP Icon to launch the evoked potential module.
- 3. Select the eABR protocol by going to Protocol, Modality Auditory, eABR Cochlear Implant, ABR (Figure B). It is also possible to click on Load Settings and select an eABR protocol.



**NOTE**: When collection is started with an eABR modality protocol, the Audera Pro waits for a TTL trigger pulse from the CI computer.

- 4. Select the EEG and Amplifier Settings icon and adjust the filter settings according to the patient's age: adults (100 1500 Hz), infants (30 1500 Hz).
- 5. Review the Amplifier, Amplifier Blanking Time setting which is automatically utilized with eABR test modalities. The amplifier blanking time is the time in the recording where the gain is reduced to prevent the amplifier from over saturating and will appear as a flat line at the beginning of the recording.
- 6. Other settings in the collection toolbar do not affect the collection but may be set to match the CI implant software for reporting purposes. These include intensity, polarity, rate and stimulus and number of sweeps.
- 7. Set up the cochlear implant computer and software according to CI manufacturer recommendations.

#### **PREPARE THE PATIENT**

To avoid electrical artifact, the eABR is recorded from the ear contralateral to the cochlear implant. It is also possible to place the reference electrode (red or blue) just below the inion on the back of the head. With the montages shown in Figures 3 and 4, the 'color' of the waveform will reflect the stimulus ear or cochlear implant ear. The electrode montage described below would utilize 3 electrode leads.

- 1. Explain the test procedure to the patient or family member.
- 2. Prepare the skin at the 3 electrode locations associated with the montage for the CI ear to be tested.
  - a. For right ear implants, apply the electrodes on the patients head and plug the corresponding electrode into the 5 lead patient cable as shown in Figure C.
  - b. For left ear implants, apply the electrodes on the patient's head as shown in Figure D.



- 3. Check the electrode impedance by selecting the impedance icon. Under 5K ohms is ideal. If necessary, re-prep the skin if impedance is higher than 5k ohms.
- 4. Place the patient in a comfortable position on the bed/recliner. Ensure there is separation between the patient cable, electrode leads and cochlear implant hardware.

#### **TEST SETTINGS**

Settings displayed in the collection toolbar of the Audera Pro do not affect the eABR recording but may be set to match the stimuli coming from the CI computer:

- Stimulus
- Rate
- Polarity
- Transducers (CI will be listed as the stimulator in the report tables.)
- Intensity

Audera Pro collection settings that do affect the eABR recording are shown below and should be set accordingly:

- Filter Settings Infant: 30 1500 or 3000 Hz
- Filter Settings Adult: 100 –1500 or 3000 Hz
- Notch Filter: OFF.
- Gain: 100K.
- Time Window: 12.8 milliseconds
- Sweeps: 2048 (1024 for large responses).

# **PERFORM THE eABR**

- 1. Select Acquire in the Audera Pro software which will wait for the trigger from the CI computer to begin the collection.
- 2. After starting the collection in the Audera Pro, start the CI stimulation from the CI computer.
- 3. Review the incoming eABR waveform and mark Waves III and V.

NOTE: Start collection in Audera Pro (Acquire) first, then turn on the CI stimulus.



**NOTE**: Wave V has a shorter latency and a larger amplitude compared to traditional ABR because the implant stimulates the cochlea directly bypassing the outer and middle ears.

4. To stop the collection, stop the CI stimulation then stop the collection in the Audera Pro.



**IMPEDANCE** 



# **PRINT THE REPORT**

- 1. Arrange the collected waveforms on the page by using the Waveform Sorting options or dragging the waveforms to the desired locations.
- 2. On the side toolbar, select the Page Settings icon and select "Send all data on this page to" the desired page (1-9).
- 3. To add report information such as case history, test findings, or recommendations select the Add Text icon.
- 4. To save the report select Report, Save Report.
- 5. Select Print, Print All Pages Preview to review the report and Print.

# TROUBLESHOOTING

- 1. Make sure the I/O cable is connected correctly to the CI hardware. Use the 3.5 mm connector that is attached to the BNC end of the I/O cable to connect to the CI hardware.
- 2. Remember to start collection in Audera Pro (Acquire) THEN turn on the CI stimulus.
- 3. Confirm that the CI is triggering by observing that the number of sweeps and artifacts are increasing.



