



## **Appendix 2: Guidelines for applying and using the Olympic Brainz amplitude integrated electroencephalogram (aEEG) monitor**

The Olympic Brainz Monitor amplitude integrated electroencephalogram (aEEG) monitor is a bedside Cerebral Function Monitor (CFM) that will be used per physician order, by trained clinicians. aEEG and EEG signals obtained by the Olympic Brainz Monitor must be reviewed and interpreted by qualified clinical practitioners.

### **Preparing for use of the Olympic Brainz Monitor – the user obtains:**

- Olympic Brainz Monitor device
- Neonatal Hydrogel leads
- NuPrep™ skin prep gel
- Cotton tipped applicators
- Skin marker
- 2x2 or 4x4 gauze pads
- Water
- Positioning measurement tape
- Cavilon -No Sting Barrier Film
- Non Woven adhesive bandage (Cover-Roll Stretch)
- Hair cleansing items
  - Bowl of water
  - Baby wash
  - Comb
  - Facecloths
- Back up supplies: cup electrodes set, and Elefix EEG paste tube

### **Starting the Olympic Brainz Monitor - the user:**

- Positions the Olympic Brainz Monitor close to the patient and checks that the connections are ok
- Hangs the data acquisition box (DAB) from a convenient hook or handle on the incubator or cot
- Powers on the Olympic Brainz Monitor and logs in
- Touches RECORD
- Selects 5 electrode configuration
- Enters patient details completely:
  - ID: MRN
  - Last Name
  - DOB



### **Preparing skin and placement of hydrogel electrodes –the user:**

- Verifies that the data acquisition box (DAB) is connected to the Olympic Brainz Monitor
- Gently washes as much hair as baby will tolerate to improve the application of the aEEG leads. Taking the time to do this will improve the quality of tracing and impedance.
- Uses the Positioning measurement tape to assist in electrode positioning
- Keeps the Positioning measurement tape vertical and parallel to the face, aligned so that the letter at the ear tragus is the same as the letter at the sagittal suture (the forward edge of the Positioning measurement tape should touch the tragus)
- Marks the two sensor sites, one on each side of the Positioning measurement tape, at the ends of the arrow
- Parts the hair vertically at the first mark with a damp gauze pad, (only with water), so that a small “bald” spot is created at the site
- Pats the site and surrounding hair dry, keeping the hair parted (Can also use a toothbrush to part hair). Use Cavilon to help parting the hair (not on the bald spot).
- Uses NuPrep™ with a q-tip to clean the exposed scalp, working up and down the length of the parting. Gently, but firmly rub the NuPrep on the exposed area.
- Removes NuPrep™ with a damp gauze pad, working outwards from the center to keep the hair parted
- Pats the site and surrounding hair dry, maintaining the bald spot
- Applies the sensor directly over the cleaned bald spot with the sensor wire upwards (away from the face)
- Provides warmth with finger tips or heal warmer can improve the hydrogel contact
- Prepares a site for the Reference sensor on the shoulder, neck, or behind the ear (choosing a site with no hair) by cleaning with and removing NuPrep™ gel
- Applies the reference sensor to the mastoid, chest or back
- Connects the electrode sensors into the appropriate left or right receptacle on the DAB and checks the contact quality
- Repeats the previous steps for the other side of the head
- Uses the wrap hat, Kling™, or Coban™ wrap to secure the sensors

### **Securing electrodes – the user:**

- Forms a strain relief to minimize motion artifact by collecting the four lead wires from the scalp electrodes into a bundle and tying the bundle into a small, loose loop near the electrodes (Note - the strain relief loop should be as close to the electrodes as possible, while remaining isolated from them)
- Secures the loop to the patient’s head with Coban™ or Kling™ wrap

### **Measures to augment aEEG electrodes:**

- The hypafix tape will be cut into a 2cm x 2cm squares. The tape will be applied to electrode to secure them especially if plan to continue as the primary modality.
- If unable to secure hydrogel electrode, cup electrodes, standard size, will be used: Put a small amount of Elefix EEG paste on cup, apply to skin, secure using hypafix tape +/- collodion if needed. Please put a mark on bedside to use collodion removal when electrodes are removed.

### Checking signal quality and starting an assessment – the user:

- Touches Electrode Impedance View to access the *Signal Status* screen
- Verifies two or four scalp electrodes display green or yellow indicators acceptable for monitoring (if indicator is red it may be necessary to reapply the electrode)
- Touches Start to begin the assessment

### Connecting the aEEG Monitor to the Network

- To be able to access the aEEG monitor remotely. The aEEG machine needs to be connected to a specific port in the NICU room

Make sure Green Cord is attached to the back of the monitor

Check the one port which says “Natus”- Available in all rooms

Connect the green cord to the “Natus” port

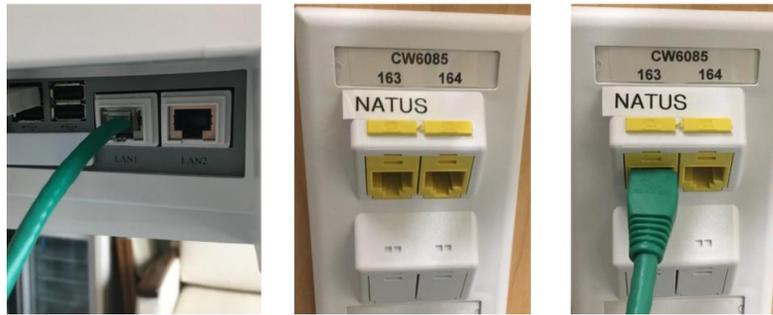


Figure 2: Connecting the aEEG monitor to the network

- To confirm that the aEEG is connected to the network, follow the steps of Archiving Data files without the need to actually archive study.

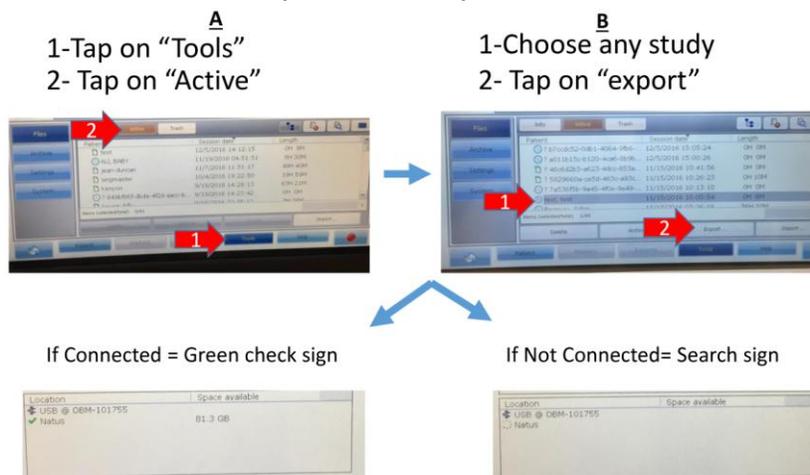
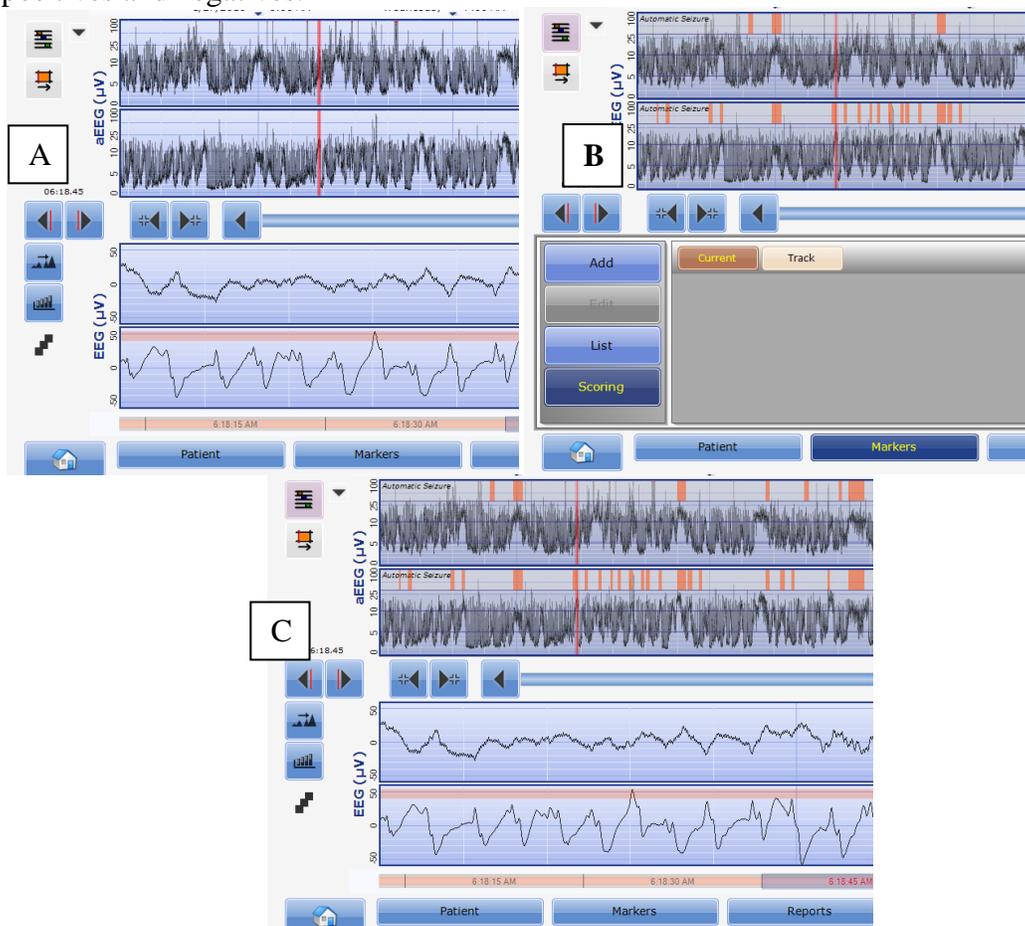


Figure 3: Confirming the aEEG monitor is connected to the network

**The Seizure Recognition Algorithm (Recognize)** is always running in the background, but the user should make its output visible. To do this:

- Press the Marker mode icon (  ) located to the left of the aEEG tracings (Figure A), so that it turns pink (  ).

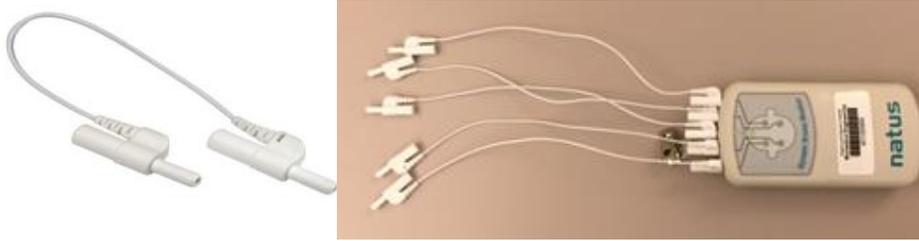
- The screen should now change, such that on the upper half of the aEEG trace there are three transparent grey boxes, the upper one of which is the Seizure Recognition Algorithm (Figure B).
- The lower portion of the screen, where the raw EEG or impedance is usually visible, will also have changed and now shows the MARKERS box (described below- this can be closed by pressing the home icon).
- Once the Seizure Recognition Algorithm's output is visible, an orange line will appear in this grey box on the aEEG trace at a point that the algorithm is concerned for a seizure (Figure B).
- Click on this point on the aEEG, and view the corresponding raw EEG. In the raw EEG trace, the software will have marked the duration of the area of concern, with an orange line along the top of the raw EEG trace (Figure C).
- Remember that the Recognize software should be used as an aid, but can have both false positives and negatives.



**Figure 4: Activating the seizure recognition algorithm (Recognize)**

**In cases where patient is going to be connected to conventional EEG (cEEG)**

- aEEG superuser will collect 5 jumper wires from the box where aEEG supplies



**Figure 5: Connecting cEEG to aEEG**

- When the EEG tech and EEG machine arrive, remove the gel electrodes and discard them
- Connect the jumper wires to the aEEG Data Acquisition Box
- Ask the EEG tech to connect the other end to the EEG box and the EEG electrodes (C3, C4, P3, P4 and ground)

**Marking an event – the user:**

- Touches MARKERS to display the predefined markers list
- Touches the appropriate marker from the predefined list, or
- Touches the comments area to display onscreen keyboard and types brief customized event details and touches ADD to mark the custom event

**Taking a snapshot – the user:**

- Touches REPORTS and touches SNAPSHOT to access the details page
- Selects details to be included in snapshot (Print Information, CFM Graph, EEG Graph, Impedance Graph, Marker Text)
- Selects option to Print, Copy, or Save
- Touches HOME icon on the Main Taskbar to return to live recording

**Suspending and resuming an assessment – the user:**

- Touches RECORD to put the recording into pause mode
- Touches RECORD again to put the recording to LIVE mode

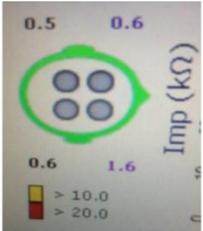
**Archiving data files and snapshots – the user:**

- Touches TOOLS on the Main Taskbar (when assessment is complete)
- Touches FILES and touches ACTIVE to view current log of active recordings and snapshots
- Selects the files and/or snapshots for export
- Touches EXPORT and selects export destination
- BEFORE STOPPING AN aEEG STUDY, THE STUDY SHOULD BE ARCHIVED TO SECURE DATABASE BY EXPORTING TO NATUS FOLDER ON NETWORK
- Checks that there is sufficient free space on the removable media if using USB memory stick
- Touches CONTINUE to export the file or snapshot

**Shutdown procedure – the user:**

- Touches PATIENT and touches CLOSE

- Touches CLOSE SESSION
- Removes electrodes from patient
- Turns off the OLYMPIC BRAINZ MONITOR
- Unplugs electrodes from the DAB and discards
- Unit Assistants will clean system with mild cleaning disinfectant, wiping exterior, screen, DAB, power cable, and jumper cable (if \used) (see reference manual for cleaning after use with infected baby)
- Stores OLYMPIC BRAINZ MONITOR per hospital protocol

<p>1</p> 	<p>2</p> 	<p>3</p> 
<p>- Prepare all supplies</p>	<p>- Wash and shampoo hair</p>	<p>- Prep skin &amp; Place the ground electrode</p>
<p>4</p> 	<p>5</p> 	<p>6</p> 
<p>- First identify the tragus of the ear and line up the positioning strip - Next identify your sagittal suture</p>	<p>- Gently slide the positioning strip up and down until the letter at the ear tragus matches the letter at the sagittal suture line</p>	<p>- Mark with a surgical marker at both the anterior and posterior sides of the positioning strip</p>
<p>7</p> 	<p>8</p> 	<p>9</p> 
<p>- Prep the hair so it is parted with cavilon exposing the marked dot</p>	<p>- Now prep the marked dot site with NuPrep, gently exfoliating the skin</p>	<p>- Apply the first hydrogel sensor directly over the prepped area with the sensor lead and wire facing upward.</p>
<p>10</p> 	<p>11</p> 	<p>12</p> 
<p>- 5- lead configuration of the leads</p>	<p>- Check Impedance (green= less than 10)</p>	<p>- Placement of a wrap around the head and an example of the creation of a strain relief loop</p>

**Figure 6: Summary of aEEG hydrogel electrode application**

## **aEEG Troubleshooting**

- 1. I cannot have a good reading or interpretation --> LOOK for ARTIFACTS**
  - If the aEEG trace looks odd or is not consistent with the clinical picture use the raw EEG display to check for artifacts.
  - Movement artifact associated with head bobbing due to breathing difficulty/mechanical ventilation may show up as a wide trace on aEEG. Changing the position of the head or supporting the head with a roll may decrease the artifact.
  - Artifact from the ECG may falsely elevate the lower margin of the trace or even the whole aEEG trace. Confirm by displaying the raw EEG.
  - Pulse artifact may be difficult to distinguish from seizure on the EEG. The pulse artifact is regular with the pulse while a seizure discharge frequency usually varies. Resetting the electrodes further away from the fontanelle may help.
  - Check for secure leads and impedance.
  
- 2. I cannot have good impedance**
  - Check for good connection of lead to adapter. Make sure there is no tension on lead.
  - Consider replacing the lead and using Nuprep to achieve better contact.
  - Consider apply Cavilon to facilitate adhesion.
  - Consider the use of collodion if unable to obtain secure adhesion. (See *Guidelines for applying and Using aEEG*).
  
- 3. I see asymmetry of waveforms**
  - Reasons include: unilateral cerebral injury (stroke), focal seizures, scalp edema, electrodes are too close to each other.
  - Check for integrity of skin and scalp edema, relocate electrodes.
  - If problem persists, order cEEG and consider brain imaging.
  
- 4. After administration of anticonvulsants I see a change in voltage and tracing appear discontinuous.**
  - This is a common finding. Anticonvulsants or sedatives (morphine) may transiently suppress aEEG.
  
- 5. I am still having trouble interpreting aEEG or obtaining a good tracing. Which resources do I have?**
  - Refer to CPG in NICU Pike Notes
  - Contact a member of Neuro-critical care Team to assist you with technical troubleshooting and interpretation.