

aEEG

What is it?

- Amplitude-integrated EEG (aEEG) is a method of monitoring basic brain function based on filtered and compressed EEG signals.

Indications

- Hypoxic ischemic encephalopathy (HIE) or rule-out HIE
- Seizures or rule-out seizures
- Significant neurological disorders (congenital brain malformations, vascular lesions) wherein seizure may occur
- Post cardiac arrest
- Other situations wherein brain activity may need to be monitored

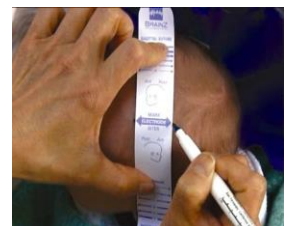
Materials

- Everything is in the storage room close to the transport bay (cooling room)
 - AEEG machine
 - AEEG leads (packaging contains 4 AEEG leads with needles)
 - AEEG lead positioning guide
 - Disinfecting swabs as per protocol
 - Small clamp
 - Hypafix
 - EKG leads
 - Fabric hat (please return used hats to cooling room as they can be washed and reused).

Procedure – Needle Insertion

○ How?

- Position infant supine
- Ensure head is clean, as baby's condition permits
- Place the head wrap under the baby's head
- Use the aEEG lead positioning guide to identify location for the electrodes: position the strip as shown in the photos above. Ensure the end marked "sagittal suture" is near the sagittal suture and the end marked "tragus" is near the ear tragus. Move the strip along the coronal suture until the letter (A-H) aligned with the sagittal suture matches the letter aligned with the ear tragus.
- Using a marker or pen, mark the two sensor sites at the ends of the arrows. Sites should be approximately 5-10 cm apart and evenly placed on both sides. Mark the insertion sites in the same way on the other side of the head. If there is bogginess or swelling on one side of the head, displace the insertion site onto normal scalp. The insertion site on the other side of the head needs to be displaced so that it is a mirror image of the first.



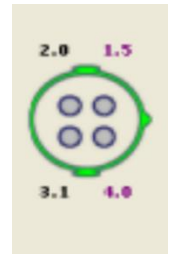
6. Carefully, pull out needle from blue cap, using a clamp if necessary, to maintain sterility
7. Clean insertion area with disinfecting swab
8. Insert the needles subcutaneously, into marked spots, ensuring that the needles are pointed towards the baby's feet. Needles should be **parallel** to each other and **should not touch each other**. The color of the wire does not matter – needles can be placed in to any site, as long as they are correctly plugged in at Step 11.
9. Secure needles in place with a strip of Hypafix, making a "cravate"
10. Place one EKG lead on the baby's upper back. (Again, the color of lead does not matter; any lead will work).
11. Plug all 5 leads into the data acquisition unit, as shown in the diagram. Clip data acquisition unit to bed near baby's head so that the leads do not pull



Procedure – Start Recording

○ How?

1. Plug monitor in.
2. Turn on the AC power switch (at back of monitor).
3. Touch red "Record" button and select "new session" if this is a new patient. If new patient, enter patient details, then press "accept changes". If not a new patient, chose "resume recording".
4. Select **5-Lead configuration**
5. Press "Start Recording"
6. ****Note: If this is a new session, you may have to go through steps 3-5 twice as there is a bug in the system.**
7. It will take a minute or two for the signal to pick up. Ensure that little head on lower left of screen is green, and once green, close head wrap to protect needles. If any circle in little head appears red, this is an indication that the corresponding electrode is displaced or not reading correctly. Fix accordingly

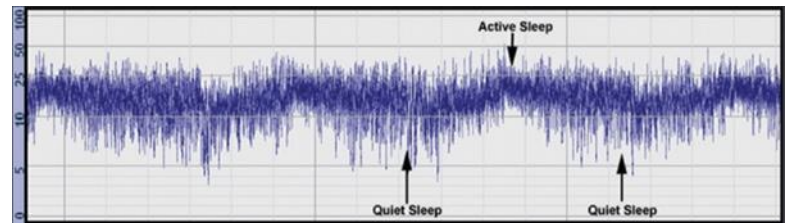


Examples

○ EEG background activity:

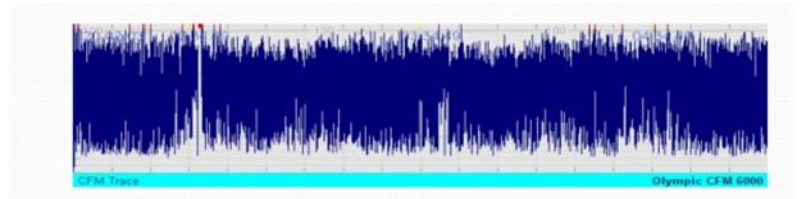
❖ Normal tracing

- Lower margin > 5 μ V
- Upper margin > 10 μ V
- Widening and narrowing of the trace within the above margins (Sleep Wake Cycling, SWC), variation from approximately 10-40 μ V
 - Trace wider during quiet sleep
 - Trace narrower in active sleep or when awake



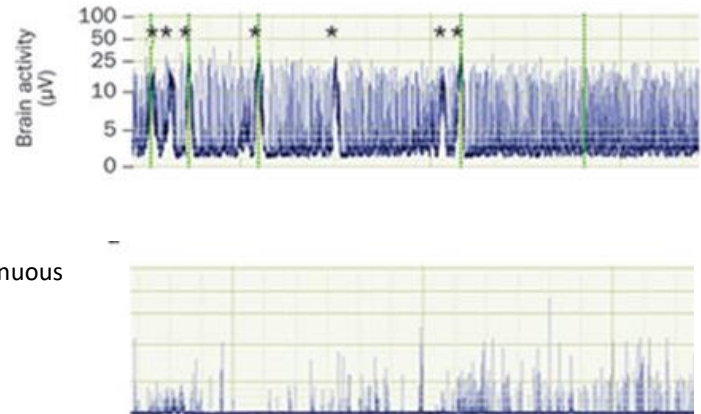
❖ Moderately abnormal function

- Lower margin < 5 μV
- Upper margin > 10 μV
- No sleep wake cycling
 - Corresponds to discontinuous voltage on standard EEG



❖ Severely abnormal function

- Lower margin < 5 μV
- Upper margin < 10 μV
- No sleep wake cycling
- Periodic bursts of higher voltage electrical activity (spikes)
 - Corresponds with burst suppression or continuous low voltage on standard EEG



○ Seizure activity on aEEG

- Sudden rise and narrowing pattern in the aEEG tracing (prolonged periods of sudden elevation in both the lower and upper margins)
 - Suspicion of seizures (increase in EEG voltage?)
 - Look at EEG tracing in the gaps of the rising and narrowing:
 - if distinct repetitive spike and wave discharge pattern on EEG tracing: **seizures**
- The trace returns to the previous appearance when seizure activity stops
- Seizures may only be identified if sufficiently prolonged (more than 2-3 min)
 - shorter lasting discharges may be missed since the aEEG is recorded at a very slow speed
- Note: difficult to distinguish burst suppression from brief seizures in a severely abnormal trace
- Note: it may be difficult to comment on background aEEG amplitude if very frequent seizures

