

Subject: NEUROLOGICAL TESTING CENTER	Pages 4	NTC Policy # 3
Title: Neonatal EEG Protocol	Revision of: NEW	Effective Date:

I. PURPOSE:

To provide guidelines for the recording of electroencephalogram (EEG) on neonatal patients in accordance with the American Clinical Neurophysiology Society (ACNS).

II. PERSONS AFFECTED:

Neurological Testing Center technical staff, Attending Neurophysiologist, Attending Neonatologists.

III. PROCEDURE GUIDELINES:

1. Documentation:

The baby's gestational age at birth and conceptional age (gestational age at birth plus time since birth) on the day of recording, stated in weeks, are absolutely essential to interpretation and must be included, together with chronological age since birth in the information available to the electroencephalographer. All other available relevant clinical information (including current medications) should be noted for the electroencephalographer's use.

2. Additional variables:

a. EKG

b. Respiration

Respirogram can be recorded by any of the following means: (1) abdominal and/or thoracic strain gauges, (2) changes in impedance between thoracic electrodes (impedance pneumogram), or (3) airway thermistors/thermocouples.

c. Eye movements

For recording eye movements, one electrode should be placed 0.5 cm above and slightly lateral to the outer canthus of one eye and another 0.5 cm below and slightly lateral to the outer canthus of the other eye. Both lateral and vertical eye movements can be detected by linking (referring) eye movement to auricular electrodes: **L eye** to A1 and **R eye** to A2.

d. Submental EMG

For submental EMG: two electrodes under the chin, each 1-2 cm. on either side of the midline. (3) For EKG, lead 1 (right arm-left arm) is preferred. If submental EMG is being recorded and if only heart rate is of interest, the EKG channel can often be omitted because the R wave is usually visible in the EMG channel.

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3. Electrode coverage:

Electrodes Fp1, Fp2, C3, C4, T7, T8, O1, O2, Cz, A1, A2 should be placed in addition to the electrodes for monitoring Ekg, Chin EMG and EOG.

Determining electrode sites by measurement is just as important in infants and children as in adults. Deviation from this principle is permissible only in circumstances in which it is impossible or clinically undesirable to manipulate the child's head to make the measurements. If an electrode placement must be modified due to intravenous lines, pressure bolts, scalp hematomas, and the like, the homologous contralateral electrode placement should be similarly modified. If no measurements are made, the technologist should note this on the recording.

4. Safety:

- a) Before recording the EEGs of inpatients, especially those in so precarious condition, the recording must be done at bedside, the technician should consult with the nursing staff concerning the patient's condition and any limitations on recording procedures.

5. Filter and sensitivity settings:

- a. In young infants' EEGs, the most appropriate sensitivity is usually 7 uV/mm, but adjustments up or down are more often needed than in the case of older patients. At least a portion of the recording should be run at a sensitivity adequate to display low-voltage fast activity. The low-frequency filter setting should be 0.53Hz for at least part of the recording.
- b. For EOG, a sensitivity of 7 uV/mm and the same time constant as for the concomitantly recorded EEG derivations are recommended.
- c. For respirogram, amplification should be adjusted to yield a clearly visible vertical deflection, and a low-frequency filter setting of 0.53Hz.
- d. For the submental EMG recording, a sensitivity of 3 uV/mm, a low-frequency filter setting of about 5.3 Hz and a high-frequency filter setting of 70 Hz should be employed.

6. Duration:

Allow for extra recording time for the EEGs of neonates. Time is commonly lost due to a greater number of movement and other physiologic artifacts during wakefulness, and extra time is usually needed in order to obtain sufficient recording to permit evaluation of stages of the wake-sleep cycle and other states.

Recording length should be 60 minutes except when the EEG is grossly abnormal or followed by continuous Video/EEG recording. Adequate sampling of both major sleep states is important. The initial sleep state in the neonate is usually active sleep, which

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may last a very short time or continue for many minutes. An adequate sleep tracing must include a full episode of quiet sleep.

It is never necessary or desirable to use sedation to obtain a sleep recording in a neonate. Repetitive photic stimulation is rarely, if ever, clinically useful in neonates, and is not recommended.

The child's condition, including head and eyelid position, should be clearly indicated at the beginning of every montage. Continuous observations by the technologist, with frequent notations on the recording, are particularly important when recording from neonates.

7. Activation:

In stuporous or comatose patients and in those showing invariant EEG patterns of any kind, visual, auditory, and somatosensory stimuli should be applied systematically during recording, but only toward the end of the recording period, lest normal sleep cycles be disrupted or unexpected arousal-produced artifact render the tracings unreadable thereafter. The stimuli and the patient's clinical responses or failure to respond should be noted on the recording as near as possible to their point of occurrence.

8. Special Protocols:

Cooling (please see appendix C)

POLICY UPDATE SCHEDULE:

Minimum of every three years or more often as appropriate.

REFERENCES:

1. *Guideline 2: Minimum Technical standards for pediatric EEG, American Clinical Neurophysiology Society, 2006*

Appendix A:

Montages: RUN I - VI; TNO; HEADBAND; NEONATE; ECS

Appendix B:

Guidelines for ordering Emergency EEGs and cVEEG monitoring.

Appendix C:

Brain cooling nmh nicu

