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The Canadian Association of Electroneurophysiology Technologists, Inc
L'Association Canadienne des Technologues en Electroneurophysiologie, Inc

STANDARD FOUR:
MINIMAL TECHNICAL STANDARDS
CLINICAL ELECTROENCEPHALOGRAPHY
SUSPECTED BRAIN DEATH/
ELECTRO CEREBRAL SILENCE (ECS)

INTRODUCTION:

The following recommendations represent the minimum standards for electrocerebral silence (ECS) EEG recording and are consistent with the Entry-to-Practice Competencies for the Profession of Electroencephalography Technology

They have been prepared using published guidelines by the International Federation of Societies for Electroencephalography and Clinical Neurophysiology and the American Clinical Neurophysiology Society as well as other published standards of practice – see references

For the purpose of this document, electrocerebral silence or electrocerebral inactivity is defined as no electrographic activity greater than 2 microvolts (μV when recorded from scalp electrodes.)

ELECTROCEREBRAL SILENCE RECORDINGS

A: REQUIREMENTS

B: RECORDING PROCEDURE

A: REQUIREMENTS

1.0 TECHNOLOGIST

The recording must be performed by a Registered EEG Technologist.

2.0 EQUIPMENT

2.1 The EEG equipment should adhere to the parameters stated in CAET Standard One.

2.2 EEG recording must be performed on a digital system. Playback systems should show montage, filter settings, vertical voltage scale, horizontal time scale, technologist's comments, event markings, and page number or time. The playback unit should allow for post-hoc selection of montages, filters and sensitivity.

2.3 Amplification and channel acquisition must be available for a minimum of 24, preferably 32 channels, for extra derivation recording.

3.0 ELECTRICAL SAFETY

3.1 See CAET Standard One – Routine Adult.

B: RECORDING PROCEDURE

1.0 PATIENT PREPARATION

1.1 A complete set of 10-20 electrode set must be utilized

1.2 Interelectrode impedances should be ideally be under 5000 ohm and greater than 100 ohms, but in the case of obvious skin integrity issues, may be balanced to 10000 ohms.

1.3 Interelectrode distance should be at minimum 10 centimeters unless head size results in a less that 10 cm spacing, then a "double distance" should be utilized using a specific montage designed for the recording of ECS to reflect the longer inter-electrode distance.

1.4 Additional monitoring should be performed for identification of physiologic and non-physiologic artifacts.

2.0 DOCUMENTATION

2.1 The following must be documented on the digital file:

- Patient name
- Date of birth
- Hospital or patient identification number
- Date and time of recording
- Medications and sedation prior to and during procedure
- Patient's core temperature
- Patient history, both current and previous including pertinent family history
- Known metabolic conditions or the presence of any drugs which could potentially alter the function of the central nervous system.
- Name of Registered Technologist.

3.0 MONITORING AND CONTROLLING PHYSIOLOGIC AND NON-PHYSIOLOGIC ARTIFACTS

3.1 Artifacts from the patient and the environment can be differentiated from brain activity by using non-cephalic electrodes placed 10 cm apart on the dorsum of the hand. Filter settings and impedances should be equivalent to those used for recording from scalp electrodes.

3.2 All artifacts must be eliminated or proven and documented accordingly. Turning off and unplugging IVAC, warming blanket, bed, air mattress, etc., and temporarily turning off the ventilator may be required for confirmation, but only with permission from the care team.

3.3 When muscle potentials obscure the recording, a neuromuscular blocking agent should be utilized under the supervision and direction of the electroencephalographer.

4.0 TESTING REACTIVITY

4.1 Reactivity must be assessed using intense somatosensory, auditory and visual stimuli (i.e. using a bright light, loud sound and pain stimulation of the nail beds and trapezius muscle and/or supraorbital nerve).

5.0 TESTING INTEGRITY OF RECORDING SYSTEM

5.1 Integrity of the entire recording must be tested, including touching each electrode individually to create an artifact on the recording.

6.0 RECORDING PARAMETERS

6.1 Filter settings should be appropriate for the assessment of ECS. Sensitivity must be increased from 7uv/mm to at least 2 uv/mm for at least 20 minutes of the of artifact-free 30 minute recording.

7.0 MONTAGE

7.1 Specific montage design should implement double distance derivations.

*Repeat EEG if any doubt about the presence of ECS.

References:

CAET Minimum Standards 2008
American Clinical Neurophysiology Society, 2008.
Bennett Dr. Hughes JR, Korein J, Merlis JK, SuterC. An Atlas of electroencephalography in coma and cerebral death. New York; Raven Press, 1976
Chatrian GE, Electrophysiologic evaluation of brain death; a critical appraisal. In: Aminoff MJ, ed Electrodiagnosis in clinical neurology. New York; Churchill Livingston, 1980