



NATIONAL COMPETENCY SKILL STANDARDS FOR PERFORMING MAGNETOENCEPHALOGRAPHY (MEG)

Magnetoencephalography (MEG) Specialists practice in accordance with the facility policy and procedure manual which details every aspect and type of recording.

ASET – The Neurodiagnostic Society presents this document to provide the national criteria for evaluating competencies for technologists performing a Magnetoencephalogram (MEG). The technical components include those defined in the American Clinical Magnetoencephalography Society Clinical Practice Guidelines 1–4 published in August 2011 published in the *Journal of Clinical Neurophysiology*, Volume 28, Number 4.

Section I: MEG Core Knowledge Statements

The neurodiagnostic technologist who performs MEG (referred to as MEG Specialist in this document) has the knowledge base to interact with the patient and obtain a quality, interpretable MEG recording that will yield information about the brain's neuronal activity. The MEG Specialist possesses the appropriate knowledge level of diseases to correlate patient history and clinical symptoms to determine appropriate paradigms to be performed during the MEG.

TECHNICAL SKILLS AND OTHER ABILITIES:

1.1 The MEG Specialist provides a safe recording environment by:

- Verifying identity of patient (using two patient identifiers).
- Disinfecting electrodes¹ after each procedure or using disposable products.
- Following standard precautions for infection prevention¹ according to facility policy and procedures.
- Attending to patient needs as established by facility policy and procedures.
- Recognizing/responding to life-threatening situations.
- Maintaining certification in Basic Life Support (BLS) and following facility policy and procedures for respiratory or cardiopulmonary crisis.
- Following HIPAA policy and facility procedures for cybersecurity and safety of electronic records.

- Following facility policy and procedures for sedation.
- Complying with facility policy and procedures for emergency and disaster situations.
- Complying with hazardous material handling procedures.
- Maintaining instrument/equipment in good working order.
- Taking appropriate precautions to ensure safety.
- Having patient change into gown, paper pants, etc.
- Ensuring all metal has been removed from the patient's body.

1.2 The MEG Specialist establishes rapport with the patient and the patient's family by:

- Using personal communication skills to achieve patient relaxation/cooperation.
- Explaining all test procedures including activation procedures.
- Explaining the electrode application method (paste, collodion, etc.).
- Interacting on a level appropriate to patient's age and cognitive ability.
- Maintaining respect and patient confidentiality.

1.3 The MEG Specialist evaluates the patient to:

- Determine the patient's mental age, mental state and comprehension level.
- Note the patient's overall physical condition.
- Determine appropriate method of electrode application.
- Ascertain the patient's capacity to cooperate with activation procedures.
- Accommodate for disabilities or special needs.
- Determine the need for additional physiological monitors.
- Document unusual or inappropriate behavior suggestive of seizure or psychogenic nonepileptic event.
- Determine the possible need for restraints or emergency intervention.

1.4 The MEG Specialist prepares patient demographics that include:

- Patient's information (name, age, ID number, referring physician, etc.).
- Recording time, date and Specialist's name or initials.
- Pertinent patient history and familial medical history.
- Previous EEG reports.
- Current medication/sedation and time of last dosage.
- Time of last meal.
- Time, date, aura and circumstances of last seizure or symptoms.

- Patient's mental, behavioral and consciousness states.
- Diagram of skull defects or anomalies (if any).
- Diagram of any modifications in electrode placement.
- Note head size in relation to helmet.
- Note if head rest is removed.
- Diagram of head location if moved to each side, front or back of sensor helmet.
- Note if there is non-removable metal in the body.
- Note VNS settings prior to turning the system off.

The MEG Specialist's electrode application follows a method that includes:

- Following American Clinical Neurophysiology Society (ACNS) guidelines for head measurement, utilizing the International 10–20 and 10–10 Systems for electrode application.
- Properly cleaning the electrode site to reduce skin impedance prior to scalp electrode application.^{2,3}
- Applying surface electrodes with EEG conductive paste or with collodion and electrolyte.
- Verifying surface electrode impedances measure below 10 kΩ and are balanced.
- Verifying when sterile, disposable subdermal needle electrodes are used, impedances measure below 10 kΩ.
- Applying additional electrodes to record ECG and EOG.

Section II: Instrumentation

2.1 The MEG Specialist is responsible for MEG lab operations by:

- Preparing MEG lab for study.
- Ensuring equipment is on and ready for use.
- Ensuring the lab and supplies are ready.
- Cleaning the lab and restocks supplies and linen as needed.
- Checking Helium level.
- Performing Helium fill from liquid cylinder.
- Performing Helium fill from ATL.
- Changing and hooking up Helium tanks to ATL.
- Backing up data on external drive or server for long term storage.
- Exporting or creating files for other software analysis.
- Troubleshooting issues when the MEG is not recording.

- Troubleshooting issues with excessive noise without patient present.
- Assisting with studies on research patients/subjects.
- Looking up and preparing data for presentation.

2.2 The MEG Specialist 's recording procedures follows a method that includes:

- Following American Clinical Neurophysiology Society (ACNS) guidelines for head measurement, utilizing the International 10–20 and 10–10 Systems for electrode application.
- Applying head position indicator coils (HPI).
- Digitizing HPI coil locations and head shape.
- Arranging patient on the bed and in the sensor.
- Plugging in coils.
- Ensuring patient comfort as much as possible.
- Performing a patient noise run.
- Starting recording and noting relevant information in the logbook/record.
- Completing the recording independently with the ability to recognize magnetic noise, artifacts, machine/computer issues, seizures, patient issues, etc.
- Watching recording and patient during recording.
- Recognizing when recordings are satisfactory or unsatisfactory.
- Turning off equipment after study.
- Transferring MEG data to analysis computers.

2.3 The MEG Specialist assists with data analysis by:

- Filtering MEG data.
- Making ictal and interictal selections in the data.
- Performing dipole fits.
- Requesting needed MRI's to be DICOM pushed from Image Management.
- Moving outside MRI's into analysis software.
- Preparing data for physician review.
- Working with physician while they compose report.
- Creating 3D MRI with MEG dipole locations embedded and transferring to PACS if appropriate for Neurosurgery.
- Copying report and taking images to be sent to outside referring physicians, CD/DVD as appropriate.

Section III: Recording Principles

3.1 The MEG Specialist obtains a standard MEG that includes:

- A minimum of 30 minutes recording of spontaneous data (ACMEGS Guidelines) or as set forth by your institution.
- Collecting data for MEG evoked fields ordered by physician including somatosensory (SEF), language (LEF), motor (MEF), visual (VEF) and auditory (AEF).
- Reduces magnetic artifact by ensuring no external metallic or electronic items are brought into the MSR by the patient.
- Reduces magnetic artifact of internal metallic/electronic devices with appropriate measures (turning off VNS, degaussing dental work, etc.).

3.2 The MEG Specialist customizes the recording procedure by:

- Evaluating reason for referral and patient history.
- Observing waveforms during recording.
- Utilizing techniques to bring out or enhance clinical symptoms.
- Selecting appropriate instrument settings.
- Encouraging drowsiness and sleep.
- Recording ECG rhythms.

3.3 The MEG Specialist differentiates artifacts from cerebral waveforms by:

- Recognizing possible artifactual waveforms.
- Documenting (on the recording) patient movements.
- Applying/recording leads for eye movement.
- Replacing electrodes exhibiting questionable activity or contact.
- Troubleshooting for possible electrical interference.

3.4 The MEG Specialist:

- Reports critical test results* to the interpreting physician and supervisor and documents this communication according to facility policy and procedures.
- Documents sedation used, dosage and effects (if applicable).
- Removes HPI coils, electrode paste/collodion/adhesive from the patient's scalp and hair.

Section IV: Knowledge Base Statements

4.1 The MEG Specialist understands (has a working knowledge of):

- Medication effects on the MEG/EEG background and waveforms.
- Medical terminology and accepted abbreviations.
- Signs, symptoms, and MEG/EEG correlates for adult neurological disorders.
- Signs, symptoms, and MEG/EEG correlates for pediatric neurological disorders.
- Seizure manifestations, classifications, and MEG/EEG correlates.
- Psychiatric and psychological disorders and MEG/EEG correlates.

4.2 The MEG Specialist understands and follows technical criteria for

- Recording neonatal MEG/EEG.
- Recording pediatric MEG/EEG.

4.3 The MEG Specialist recognizes:

- Normal and normal variants awake and asleep patterns for each age range.
- Abnormal awake and asleep patterns for each age range.
- MEG/EEG patterns for levels of consciousness.
- Clinical and nonconvulsive seizure patterns.

* Critical test results – any values/interpretations where delays in reporting may result in serious adverse outcomes for patients. MA Coalition for Prevention of Medical Errors; www.macoalition.org/document/CTRPractices.pdf

References:

1. Bonner & Davidson. Infection Prevention: 2020 Review and Update for Neurodiagnostic Technologists. *Neurodiagn J.* 2020. Mar;60(1):11–3, and Technical Tips: Keeping It Clean During COVID-19. *Neurodiagn J.* 2020. Sep;60(3):195–207.
2. ASET Position Statement. Skin Safety During EEG Procedures – A Guideline to Improving Outcome. 2016. https://www.aset.org/files/public/Skin_Safety_During_EEG_Procedures.pdf
3. ASET Position Statement on Skin Safety during EEG Procedures – A Guideline to Improving Outcome Addendum: Neonatal Continuous EEG. 2017. https://www.aset.org/files/public/Neonatal_Skin_Safety_Addendum.pdf

-- Approved by ASET Board of Trustees November 11, 2020