

**EEG/EPILEPSY ROTATION
NEUROLOGY RESIDENT GUIDELINES
(Effective July 2024, Updated 7/09/24)**

Welcome to the EEG/Epilepsy rotation! We hope that the experience on this rotation will provide you with the basic skills necessary to utilize clinical neurophysiology tools to further your evaluation and treatment of patients. We recognize that it is impossible to master EEG and epilepsy in the brief amount of time allotted for this rotation. However, we have structured the rotation to provide the background necessary to effectively collaborate with clinical neurophysiologists, and as a basis for further self-study. The following outline lists the expectations and requirements for this rotation. During the rotation we will emphasize acquisition of clinical neurophysiology skills and enhancing expertise in the care of patients with epilepsy.

Weekly Schedule

**PGY2 & PGY3;
PGY4 (if only one resident on BSL EMU)**

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
07:00 AM	BSL EMU	BSL EMU	BSL EMU	BSL EMU	BSL EMU
08:00 AM		8:00 Adult Surgery Conference			
09:00 AM		BSL EMU			
10:00 AM					
11:00 AM					
12:00 PM	Grand Rounds	Neurology Lecture	Pediatric Neurology Grand Rounds	Neurology Lecture/ Neurophysiology Lecture Series	Neuroradiology Rounds and Noon Conference/Neurophysiology Lecture Series 12-2pm
01:00 PM	BSL EEG/IOM	BSL EEG/IOM	BSL EEG/IOM	BSL EEG/IOM	Book review with Dr. Ahn 2-3pm
02:00 PM					
03:00 PM					BSL EEG/IOM
04:00 PM					* End of rotation exam on last Friday
05:00 PM					

PGY4 (if two or more residents on BSL EMU)
Contact Dr. Lu Lin before rotation to arrange TCH EEG if interested

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
07:00 AM	BSL EMU	7:00 pediatric surgery conference	TCH EEG	BSL EEG/IOM	BSL EEG/IOM
08:00 AM		8:00 Adult Surgery Conference			
09:00 AM		BSL EEG/IOM			
10:00 AM					
11:00 AM					
12:00 PM	Grand Rounds	Neurology Lecture	Pediatric Neurology Grand Rounds	Neurology Lecture/ Neurophysiology Lecture Series	Neuroradiology Rounds and Noon Conference/Neurophysiology Lecture Series 12-2pm
01:00 PM	BSL EEG/IOM	TCH EEG	TCH EEG	BSL EEG/IOM	Book review with Dr. Ahn 2-3pm
02:00 PM					
03:00 PM					TCH EEG
04:00 PM					* End of rotation exam on last Friday
05:00 PM					

**** There needs to be at least one resident covering BSL EMU every day.**

Due to COVID19, lectures and patient management conferences are being conducted via Zoom. Attendance of the Pediatric Surgery Conference is optional.

Tuesday Pediatric Surgery Conference Location: 7:00 AM

Zoom meeting: <https://bcm.zoom.us/j/94748023063>

Password (all lowercase): spasm

Tuesday Adult Surgery Conference Location: 8:00 AM

Zoom meeting:

<https://bcm.zoom.us/j/382058435?pwd=WIF0ZHdYK2lmUEZNSUNZVUIPWG5TdZ09>

Password: 31880

Daily ICU-EEG reviewing: 3:30PM

Zoom meeting:

<https://bcm.zoom.us/j/96657393056?pwd=RXJ6bHhwOVhWbzVZMDZSaXZZS2FqUT09>

Friday Rowan's primer book review (with Dr. Ahn): 2pm

Zoom meeting: <https://bcm.zoom.us/j/93887797306>

Password: 118391

Training and Clinical Sites:

Baylor St. Luke's Medical Center

Clinical Areas

Neurophysiology Laboratory (EEG and Evoked Potentials)

23rd Floor, Yellow Elevators

Epilepsy Monitoring Unit

22nd Floor, Yellow Elevators

Texas Children's Hospital

Clinical Areas

Neurophysiology Laboratory (EEG)

21st Floor, West Tower

Epilepsy Monitoring Unit

10th Floor, West Tower

Michael E. DeBakey Veterans Affairs Medical Center

Clinical Areas

Neurophysiology Laboratory (EEG and Evoked Potentials, EMU)

2nd floor, next to Ward 2A

Seizure Clinic

2nd floor outpatient clinic area

Work Area

There are EEG review and multipurpose workstations available on the 23rd floor in the EEG reading room.

Skills: At the end of the rotation participants will be expected to have a working knowledge of the following:

- Clinical Neurophysiology
 - Fundamentals of the technical aspects of EEG recording
 - Fundamentals of the interpretation of EEG
 - Normal awake and sleep findings
 - Use of appropriate terminology to describe an EEG (symmetry, continuity, reactivity, organization)
 - Identification of epileptiform discharges
 - Indications for ordering an EEG
 - Understanding of the clinical impressions in EEG reports
 - Fundamentals of evoked potentials recording and interpretation

- Epilepsy
 - Understanding of the diagnosis and management of epilepsy in adults
 - Use of new antiepileptic drugs in adults with epilepsy
 - Strategies of management of women with epilepsy of child-bearing age
 - Patient selection for epilepsy surgery
 - Management of patients in the Epilepsy Monitoring Unit

Hours: Resident hours are from 7:00am through 5:00pm (may be asked to pre-round earlier at the discretion of the attending on service); excluding official Baylor Holidays. The residents are expected to provide weekend coverage of the epilepsy monitoring unit when open over the weekend. It is expected that when residents are not rounding with attendings or reading EEGs, the extra time will be used for personal study time. It is expected that residents will arrive at the designated assignments on time. Attendance and punctuality will be important considerations in resident evaluations. Residents should sign out to the floor general neurology resident when unavailable.

Rotation assignment: Assignment to the rotation must be done prior to the beginning of the academic year. Once a resident is assigned to the rotation the resident is considered to be committed to the rotation. Any changes in the schedule can only be made with approval of the Neurology Residency Director and Drs. Gavvala/Maheshwari and Cynthia Calija. This approval must be made in writing. If changes are made without such approval, an evaluation form will be placed in the resident's file indicating this deviation from accepted procedure.

Conferences: Residents are expected to attend all conferences required by the neurology training program. In addition, residents are also required to attend the weekly Adult Epilepsy Surgery conference where patient candidates are presented for evaluation for surgical intervention. Residents may be asked to comment on cases that are presented. The Pediatric surgical conference occurs every Tuesday beginning at 7am and is optional to attend. Due to the COVID19 pandemic, all lectures at present are conducted virtually via Zoom.

In-patient clinical duties:

- EMU at BSLMC
 - Initial evaluation. Residents will work in concert with the Neurophysiology/Epilepsy fellow to work-up all patients admitted to the EMU at Baylor St. Luke's Medical Center. Most patients are admitted Monday mornings, although others are admitted occasionally throughout the week. Responsibilities include obtaining and documenting a history and physical examination and performing medication reconciliation for each patient. The Epilepsy Monitoring Unit is located on the 22nd floor of SLEH, Yellow Elevators.
 - Follow-up. The resident will round with the EMU attending each morning, typically around 9-10 AM. Rounding and charting should be completed before going to the EEG laboratory for additional activities.
 - Orders: On admission, all patients should have CBC, CMP and potentially urine pregnancy test and ASM levels, if not checked recently in outpatient clinic. IV access should be obtained. The EMU orderset should be used in Epic for all EMU patients and prn Ativan 1-2 mg IV should be ordered for each patient. **ASM orders should be reviewed daily.**
 - Resident expectations: Following rounds, it is expected that residents will complete daily progress notes, enter any orders needed and communicate with the nursing staff. **At least one resident should physically be present in the hospital in case there is an emergency where an EMU patient needs to be assessed until 5pm.** Whenever residents leave for the day, the patients should be signed out to the neurology floor team in case of any issues.

Clinics: Residents will attend their regularly scheduled longitudinal clinics. On clinic days, the resident should inform the faculty reading EEGs of their absence and sign out to the neurology floor team.

EEG Reading Sessions: Schedules will be provided for reading times. It is expected that residents will plan to review **at least 1 EEG with a draft report each day** prior to the attending's arrival and be prepared to discuss the pertinent findings and clinical implications. Residents should identify one EEG study they will review in the afternoon session with the faculty at 1pm. Residents should coordinate with EEG fellow in the afternoon as to time of EEG review with attending. If no fellow is present, residents should email/call the faculty to coordinate time for review. Attendings will take the time necessary to demonstrate important clinical observations and discuss the findings of the EEGs with the residents. It is expected that residents on the rotation will independently read at least 10 EEGs (5 EEGs for PGY2) over the course of the 1 month rotation (see EEG template at end of document). Please maintain a log of all the EEGs that you review. This log will need to be shared with Dr. Goldsmith and Cynthia Calija.

EEG Scavenger Hunt: Residents are expected to make screenshots of select EEG findings that they encounter over the course of the month. These screenshots will be uploaded onto the EEG Master website (see section on EEG Master). Residents are expected to find 10 of the following findings (without duplicates), and residents are encouraged to view this as a fun exercise:

Normal Awake
Normal Drowsy

Normal Sleep
Focal Slowing

Generalized Slowing
Focal sharp/spike wave
Generalized Sharp/Spike wave
Focal Onset Seizure
Generalized onset seizure
Lateralized periodic discharge
Generalized periodic discharge
Lateralized rhythmic delta activity
Generalized rhythmic delta activity

Mu rhythm
Rhythmic midtemporal theta burst of
drowsiness (RMTD)
Chewing Artifact
Photoparoxysmal response
Focal Attenuation
Skull defect
Excessive fast activity

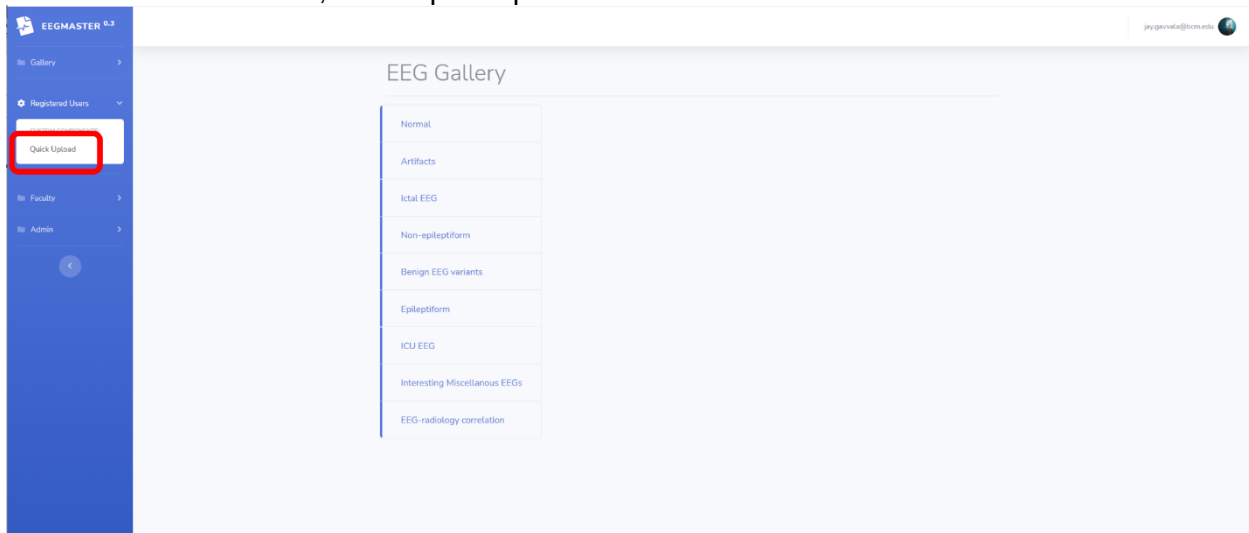
Other interesting EEG screenshots can be uploaded to EEG Master as well.

EEG tracings should be copied from NeuroWorkbench using the Edit -> Copy Page and there should be a calibration mark at bottom of page. If you don't see the calibration mark, go the EEG window. Select view -> display control -> and make sure display calibration mark is checked.

EEG Master: All residents should register for an account on EEG Master (<https://eegmaster.com/register.php>).

Uploading EEGs to EEG Master. It is expected that residents will upload EEG screenshots to EEG master during the EEG rotation. These can be the scavenger hunt findings or other interesting EEGs. The upload process is as follows:

1. On the left menu, select quick upload



2. On the quick upload page, select the category of EEG finding

The screenshot shows the 'quickUpload' form in EEGMASTER. The 'EEG category' dropdown menu is highlighted with a red box and contains the text '--Select category--'. Below it, the 'Upload file' section has a 'Choose File' button and the text 'No file chosen' and 'OR Copy/Paste image'. There are two text input fields for 'EEG finding (summary of finding):' and 'Description (more detailed description of finding)'. A 'Submit' button is located at the bottom right. A 'Testee comments' section contains instructions for users.

3. Once category is selected, select the EEG finding

This screenshot shows the 'quickUpload' form after the 'EEG category' has been set to 'Normal'. The 'EEG finding' dropdown menu is highlighted with a red box and contains the text '--Select finding--'. The 'Upload file' section remains the same. The 'EEG finding (summary of finding):' and 'Description (more detailed description of finding)' text input fields are now visible. The 'Submit' button and 'Testee comments' section are also present.

4. Select file to upload (SHOULD USE JPG FORMAT – can use either Snipping Tool or “Save as jpg” in Powerpoint)

EEGMASTER 0.3

Gallery >

Registered Users >

Faculty >

Admin >

quickUpload

EEG category: Normal | --Select finding--

Upload file: **Choose File** | No file chosen | OR Copy/Paste image

EEG finding (summary of finding):

Description (more detailed description of finding):

License CC BY-SA | Change

Submit

Testee comments

INSTRUCTIONS

- EEG tracings can be copied from NeuroWorkbench using the Edit -> Copy Page
- There should be a calibration mark at bottom of page. If you don't see the calibration mark, go the EEG window. Select view -> display control -> and make sure display calibration mark is checked.
- Please avoid personally identifiable information when uploading images

5. Fill in EEG finding summary and description.

EEGMASTER 0.3

Gallery >

Registered Users >

Faculty >

Admin >

quickUpload

EEG category: Normal | --Select finding--

Upload file: Choose File | No file chosen | OR Copy/Paste image

EEG finding (summary of finding):

Description (more detailed description of finding):

License CC BY-SA | Change

Submit

Testee comments

INSTRUCTIONS

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- Please avoid personally identifiable information when uploading images

6. Click submit

EEGMASTER 9.3

Gallery >

Registered Users >

Faculty >

Admin >

quickUpload

EEG category: Normal | --Select finding--

Upload file: Choose File | No file chosen | OR Copy/Paste image

EEG finding (summary of finding):

Description (more detailed description of finding):

License CC BY-SA | Change

Submit

Testee comments

INSTRUCTIONS

- EEG tracings can be copied from NeuroWorkbench using the Edit -> Copy Page
- There should be a calibration mark at bottom of page. If you don't see the calibration mark, go the EEG window. Select view -> display control -> and make sure display calibration mark is checked.
- Please avoid personally identifiable information when uploading images

EEG of the week: The residents on the EEG rotation will be responsible for assisting in creating the EEG of the Week. This is directed by Drs. Gavvala and Haneef. Each week, a select EEG screenshot with a question will be sent to all the residents and they are expected to answer it. Residents should use their EEG scavenger hunt screenshots and other interesting EEG patterns they encounter on the rotation to develop a question with 4-5 answer choices and an explanation for the correct answer. These are to be shared with Drs. Gavvala and Haneef who will review the images/questions. Educationally important files will be archived online for future reference.

Reading Materials: Recommended reading materials are as follows. The first five are available for check out. Please contact Cynthia Calija at 713-798-6628 or stop by her desk to check out textbooks. The subsequent journal articles are available via TMC Pubmed for review.

A concise manual of Epilepsy: 3rd Edition, Haneef

Rowan's Primer of EEG, Marcuse, Fields, and Yoo

- Available for free with TMC institutional login at Science direct:
<https://www.sciencedirect.com/book/9780323353878/rowans-primer-of-eeeg>

Invasive Studies of the Human Epileptic Brain: Principles and Practice, Lhatoo, Kahane, Luders

Handbook of ICU EEG Monitoring, Laroche, Haider

Niedermeyer's Electroencephalography

Tatum IV WO, Hussain AM, Benbadis SR, Kaplan PW. Normal adult EEG and patterns of uncertain significance. J Clin Neurophysiol 2006; 23: 194-207.

Mendez O, Brenner RP. Increasing the yield of EEG. J Clin Neurophysiol 2006; 23: 282-293.

Blume WT. Drugs Effects on EEG. J Clin Neurophysiol 2006; 23: 306-311.

Hrachovy RA, Frost JD Jr. The EEG in selected generalized seizures. J Clin Neurophysiol 2006; 23: 312-332.

Verma A, Radtke R. EEG of Partial Seizures. J Clin Neurophysiol 2006; 23: 333-339.

Benbadis SR. The EEG in Nonepileptic Seizures. J Clin Neurophysiol 2006; 23: 340 – 352.

Benbadis S. Overinterpretation of EEGs and Misdiagnosis of Epilepsy. J Clin Neurophysiol 2003; 20: 42-44.

Hirsch L, LaRoche S, Gaspard, N, et al. American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology: 2012 version. J Clin Neurophysiol. 2013 Feb;30(1):1-27.

Nuwer M. Fundamentals of evoked potentials and common clinical applications today. Electroencephalography and clinical Neurophysiology. 1998; 106: 142-148.

* Residents are expected to complete the AES EEG learning curriculum modules listed below by the end of the EEG rotation <https://www.aesnet.org/education/courses/aeselc/>.

Please go to this link to create a new user log in (<https://www.aesnet.org/login>) and then go to the above link to enter the course.

For residents on their 1st EEG rotation, please complete the following modules: Neurophysiology and Technical Aspects of EEG, Normal Adult EEG, Abnormal Non-epileptiform EEG, Abnormal Epileptiform EEG and Syndromic Approach to Abnormal EEG.

If a resident is on their 2nd EEG rotation, they are expected to complete the following modules: Pediatric EEG, Critical Care EEG, Clinical Application and Utility of EEG and Advanced EEG.

Assessment

Performance on the EEG rotation will be assessed by the following mechanisms:

1. Completion of the assigned AES EEG learning curriculum modules
2. Performance on end of rotation exam. This exam is conducted electronically and takes place at McNair 9th floor on the last Friday afternoon of your rotation. Cynthia Calija will provide you the link to access along with username/password near the end of the rotation.
3. Submission of EEG reports with attending feedback (5 reports for PGY2, 10 reports for PYG3/4).
4. Completion of EEG scavenger hunt with screenshots uploaded to EEG Master and contribution to EEG of the week
5. Log of EEG studies reviewed by resident

Evaluation

Each resident will be evaluated in Medhub by the faculty who interact with him/her.

Outpatient EEG template at St. Lukes/MEDVAMC

DATE OF TEST:
DATE OF REPORT:
ACC:
EEG:
Start time:
Stop time:
ICD-10:
CPT:

HISTORY:

MEDICATIONS:

TECHNICAL SUMMARY:

This is a digital video EEG recorded with 32 input channels reviewed with bipolar and referential montages using the modified combinatorial system nomenclature.

DESCRIPTION OF RECORD:

During the maximally alert state a 9 Hz posterior dominant rhythm was seen that was symmetric, reactive to eye opening and well regulated. More anteriorly, low voltage frontocentral beta predominated. Drowsiness was characterized by alpha attenuation and increased frontocentral theta, vertex sharp transients and POSTS. Stage 2 sleep was reached characterized by symmetric sleep spindles and K-complexes.

HV: Hyperventilation was not performed. Hyperventilation was performed for 3 minutes with good effort. No change was seen with HV.

PHOTIC STIMULATION: Flash stimulation was done from 1-30 Hz; no photic driving was seen; photoparoxysmal responses were absent.

IMPRESSION: Normal Awake and Asleep EEG

1. List abnormalities

CLINICAL CORRELATION: An EEG without epileptiform discharges does not exclude the possibility of epilepsy. If the clinical suspicion of epilepsy remains, consider additional EEG recordings.

xxxxxx
Neurology Resident, PGY-

I have personally reviewed this entire EEG and the report and I agree with the above note.

XXXX
Clinical Neurophysiology/Epilepsy Attending