



# **Surgical Case Presentation**

**Mohamad Z. Koubeissi, MD**  
Professor of Neurology  
Director, Epilepsy Center  
The George Washington University



**2023** GW  
***Epilepsy Board Review***  
***& Best Practices***

## **DISCLOSURES**

- **Disclosure of Financial Relationships:  
None related to the current talk**



# History



31 year-old right-handed man.



Full-term product of normal delivery with no perinatal complications, febrile convulsions, CNS trauma or surgery



Has history of neurocysticercosis



Seizures started at age 12.



# Antiseizure Medications

## At Presentation

- Brivaracetam 100 mg BID
- Lacosamide 200 mg BID
- Zonisamide 200 mg BID

## Past

- Carbamazepine: 1500 mg/day → “failure”
- Trial of Valproate → “failure”
- Levetiracetam: 750 mg BID → “failure & sedation”
- Eslicarbazepine → “cost & failure”

# Semiology



Initially, aura of “goose bumps” and/or “shivers” feeling that precedes most of his seizure which is mainly unilateral (left side) and occasionally bilateral in nature. **This aura stopped occurring years prior.**

Excessive swallowing and mouth movements → unawareness → sleep

His girlfriend described episodes of hand and mouth automatisms with decreased responsiveness



Semiology

Witnesses describe episodes of falling on the floor with muscle jerking

Reported urinary incontinence on 2 occasions.

Triggers: Stress, heat, and weather changes



Semiology

Episodes last for 1-2 minutes. Postictally: weak and exhausted.

Seizure frequency: 1-2 seizures daily

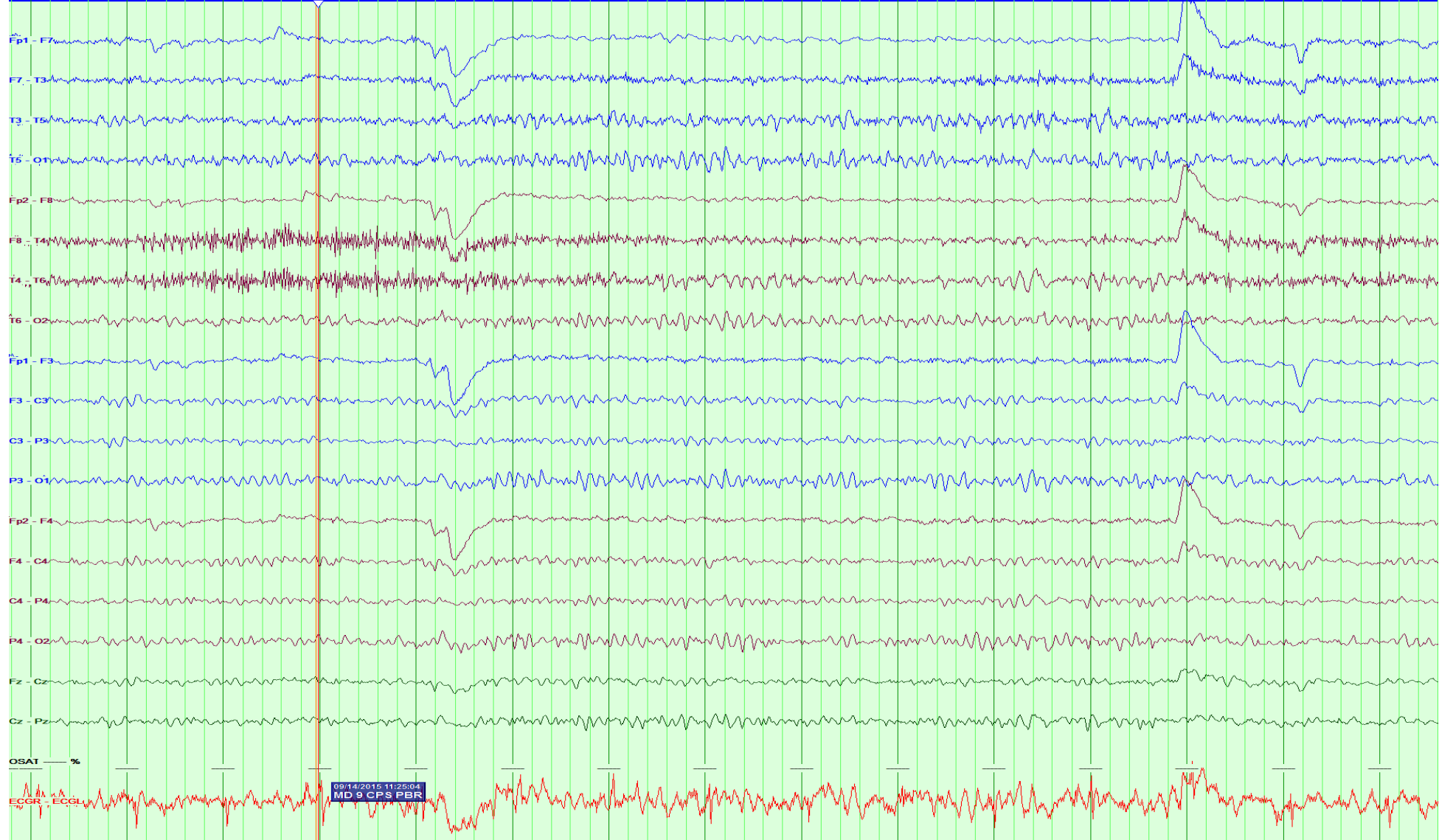


Semiology



# Video-EEG

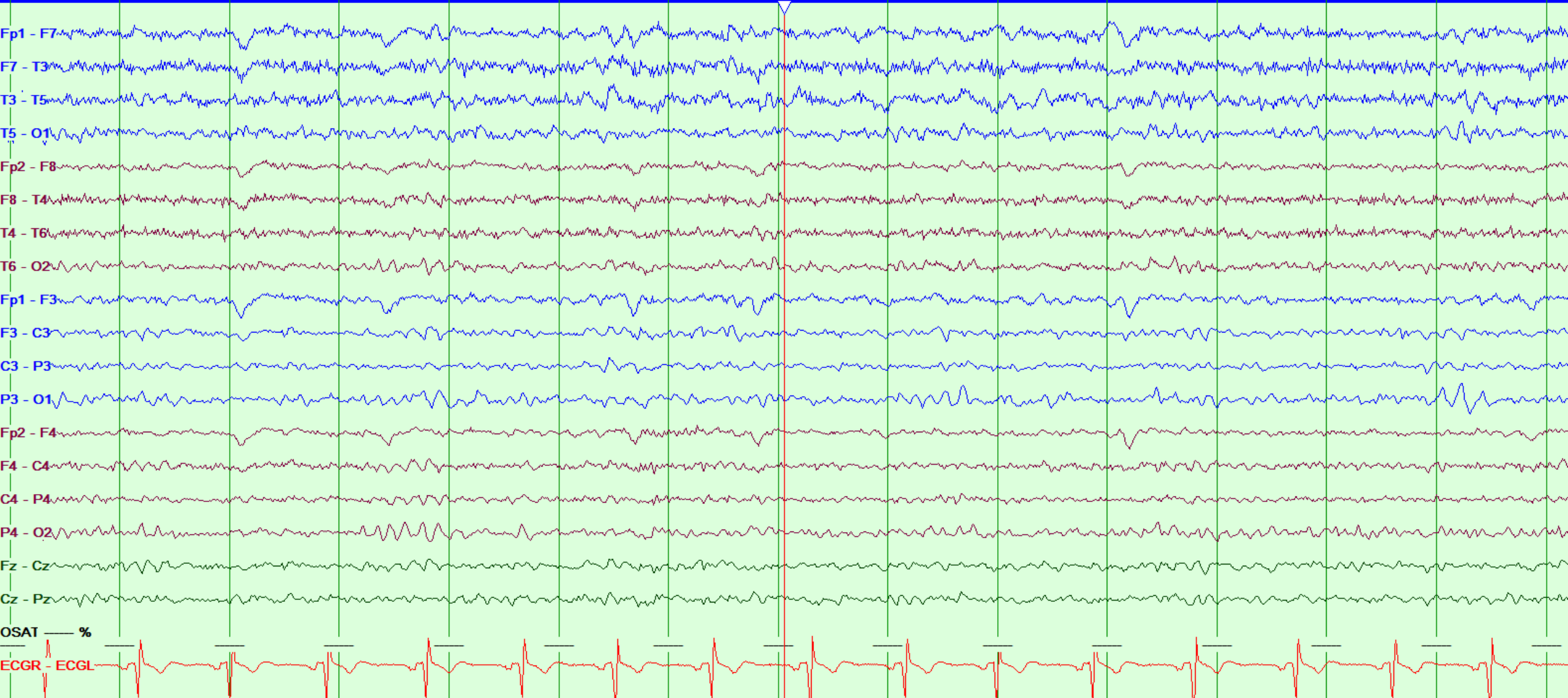




Posterior basic rhythm



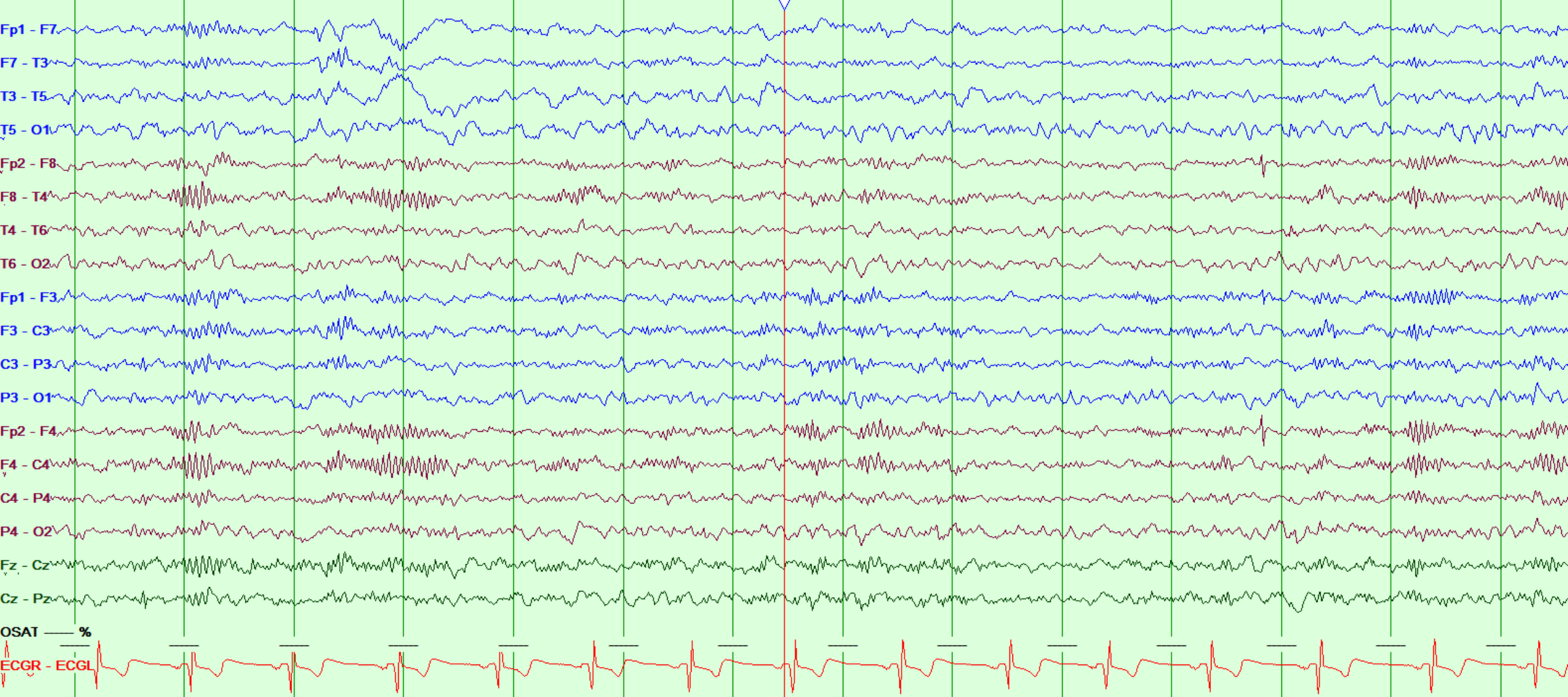
Scalp EEG



Left temporal slowing



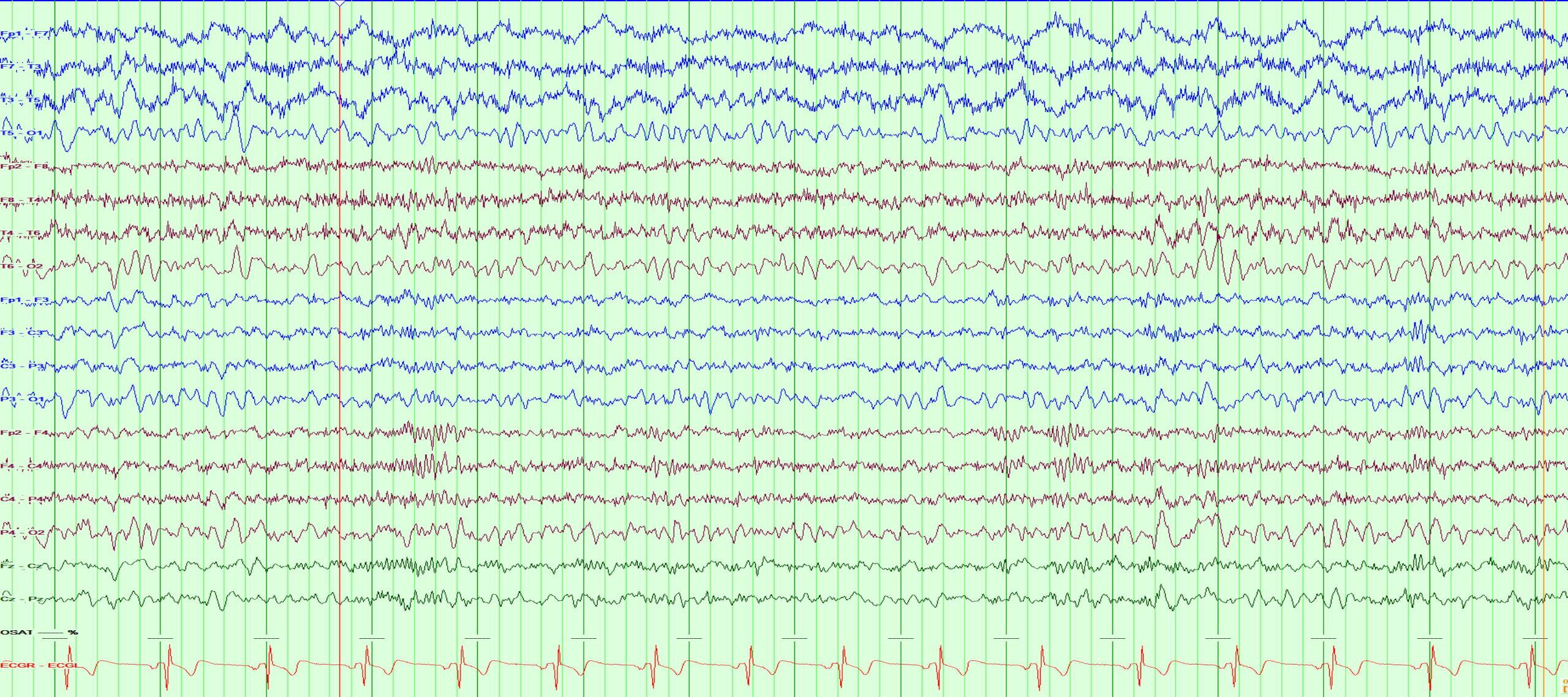
Scalp EEG



Left temporal slowing



Scalp EEG



Left TIRDA (Temporal Intermittent Rhythmic  
Delta Activity)



Scalp EEG

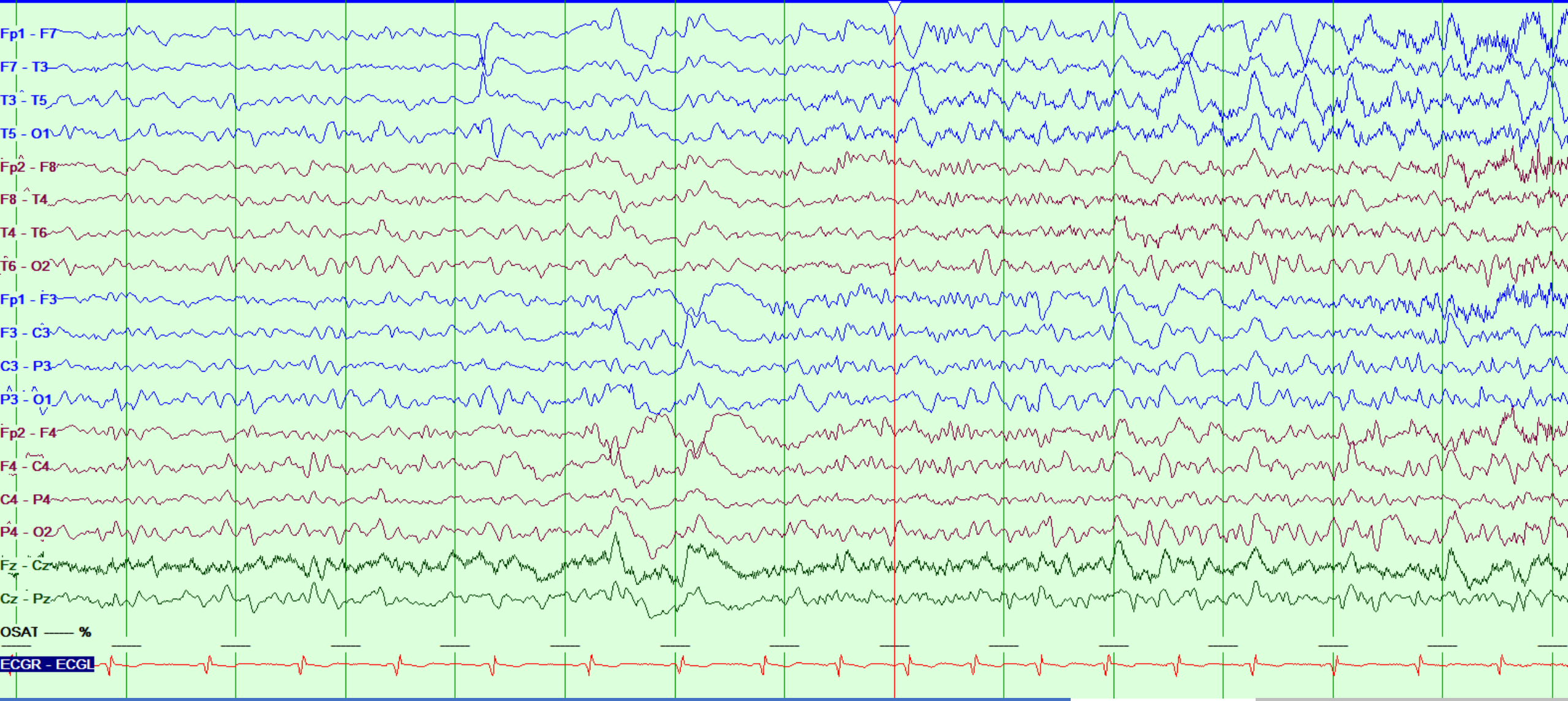


Left Anterior temporal sharp and slow waves



Scalp EEG



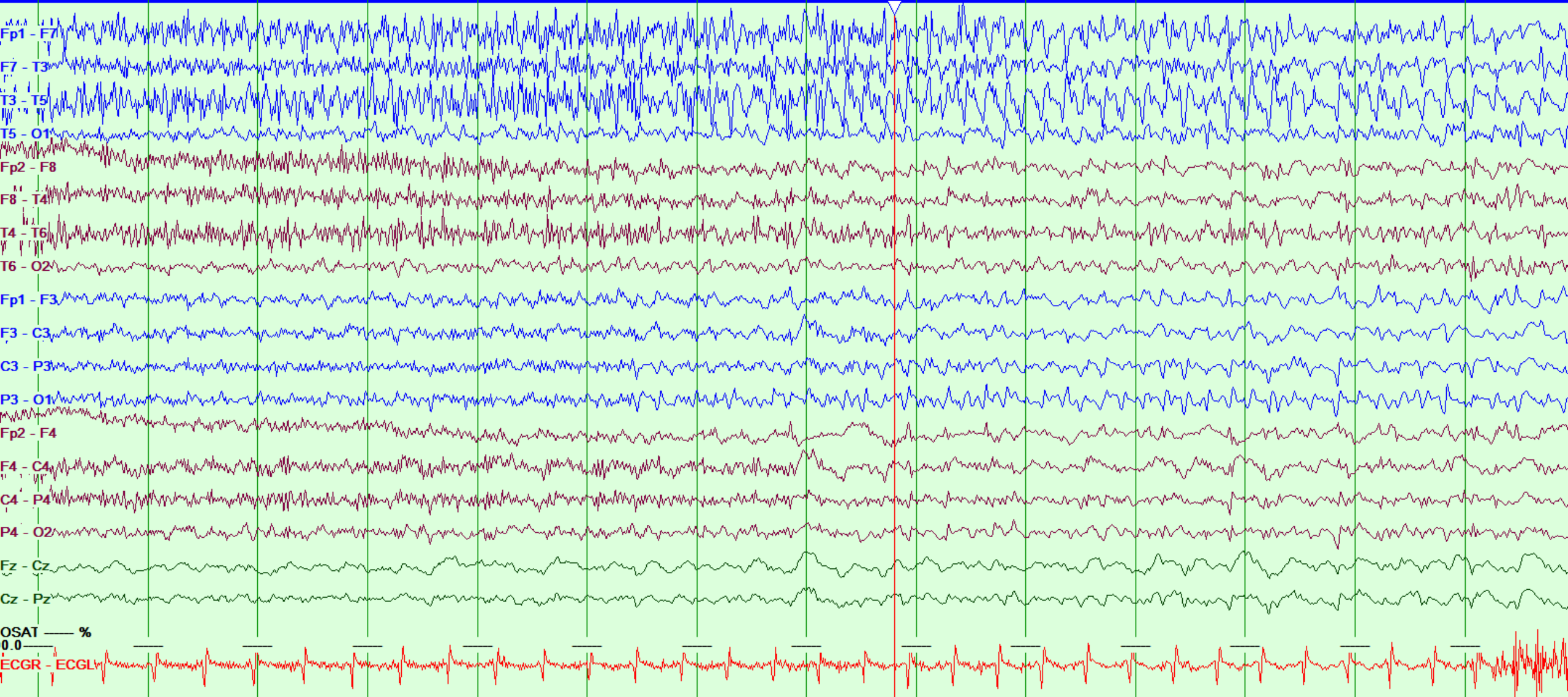


Left temporal seizure onset



Scalp EEG  
"Ictal"

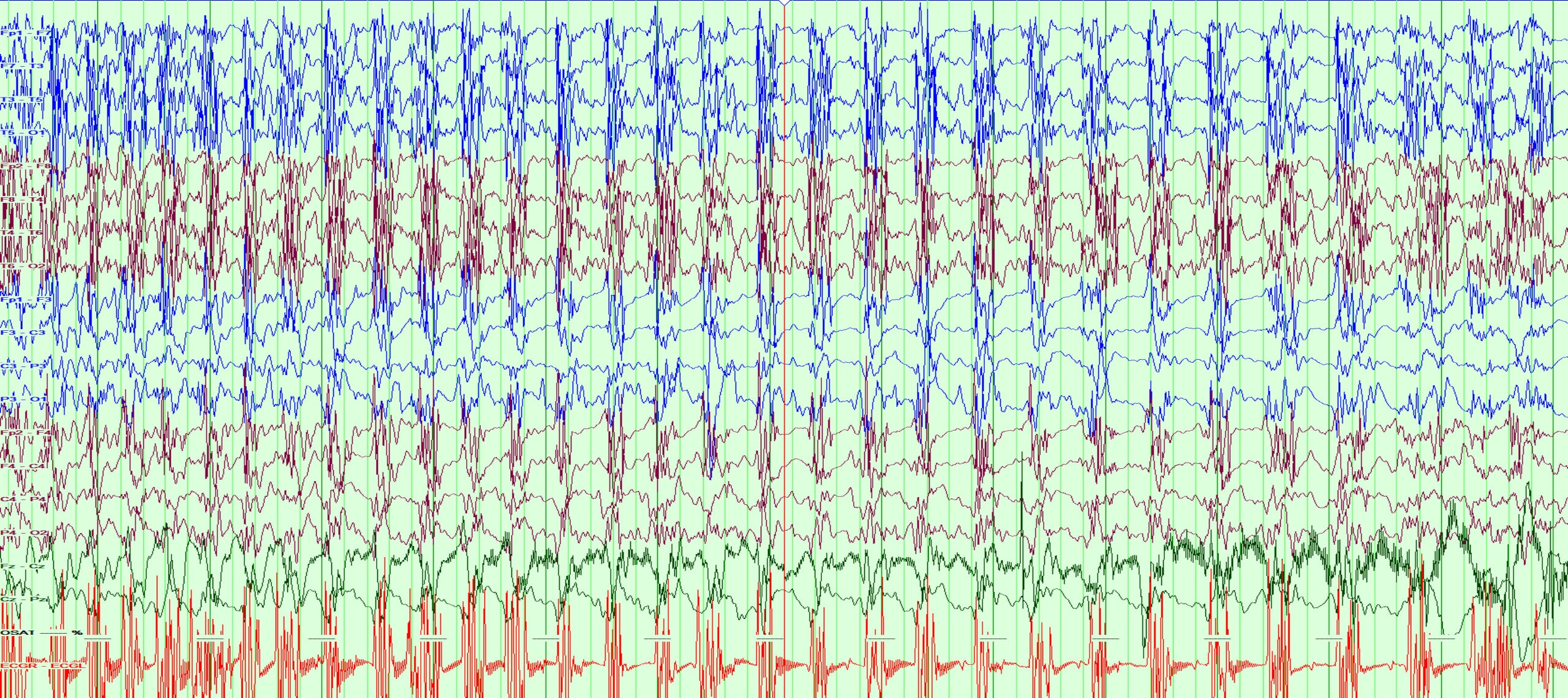




Left temporal seizure



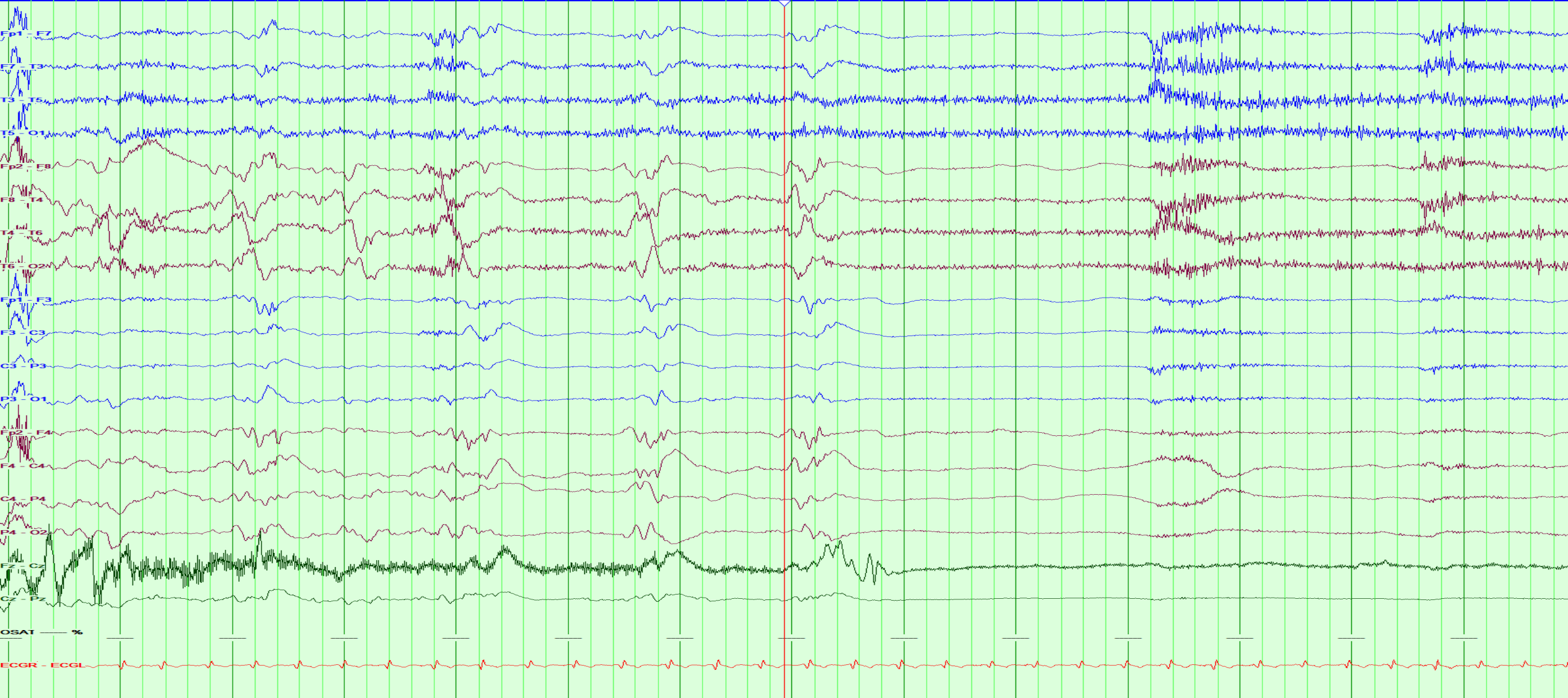
Scalp EEG  
"Ictal"



Secondary generalization



Scalp EEG  
“Ictal”



Post-ictal suppression



Scalp EEG

# Event 1: focal seizure

- EEG: Semi-rhythmic delta activity over the left temporal region → sharply contoured high amplitude rhythmic delta then later theta activity with spread to left parasagittal region. About 40 seconds later, ictal activity became semi-periodic sharp waves over the left hemisphere (temporal > parasagittal).



## Event 2: focal seizure 4 hours later

- Semiology: Patient was in the bathroom and not captured in the camera. He was helped to move out of the bathroom to his bed.
- EEG: Overall similar as Seizure 1, repetitive blinking artifact was noted prior to clear ictal EEG changes

Summary of EMU 2017: 3 seizures



Scalp EEG



## Event 3: focal seizure: 12 hours later

- Semiology: Pushed the event button → repetitive blinking → leaned forward and raised right arm with deep exhalation. He then lay back in bed and closed his eyes. He then appeared very tired and unable to follow commands.
- EEG: Similar as seizure 1.



# Discussion



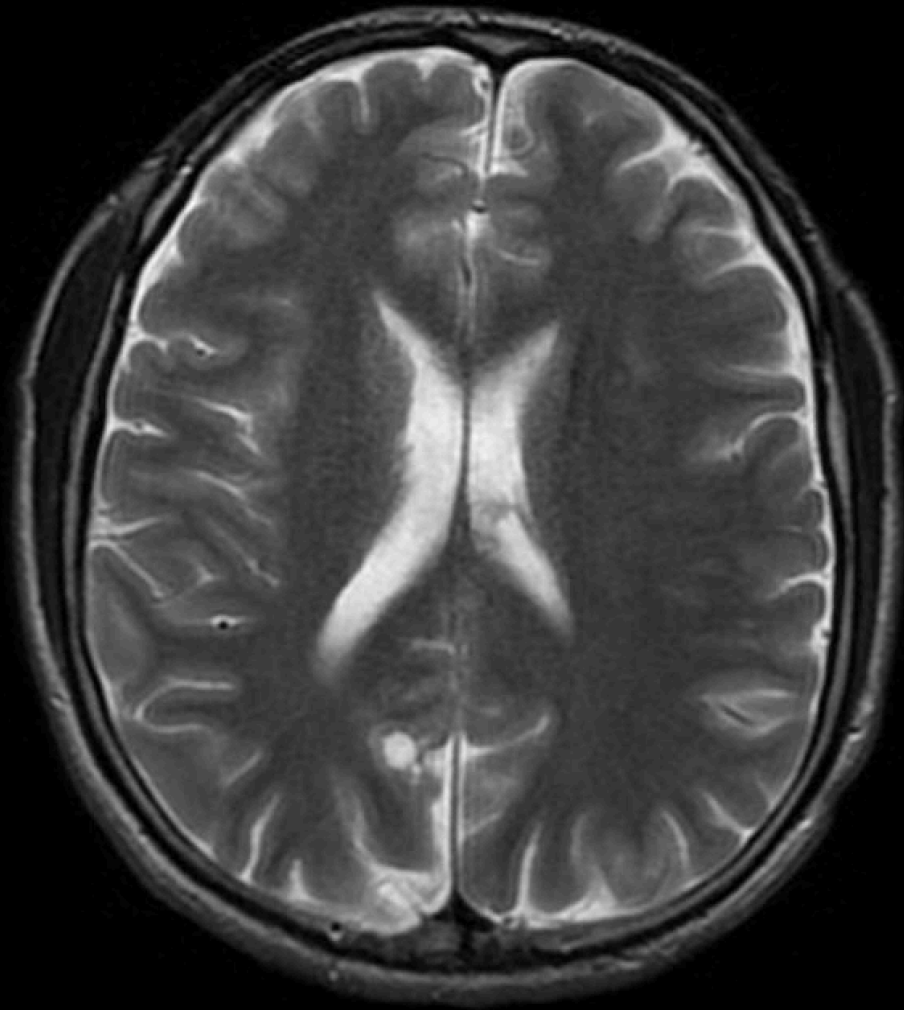


# Imaging





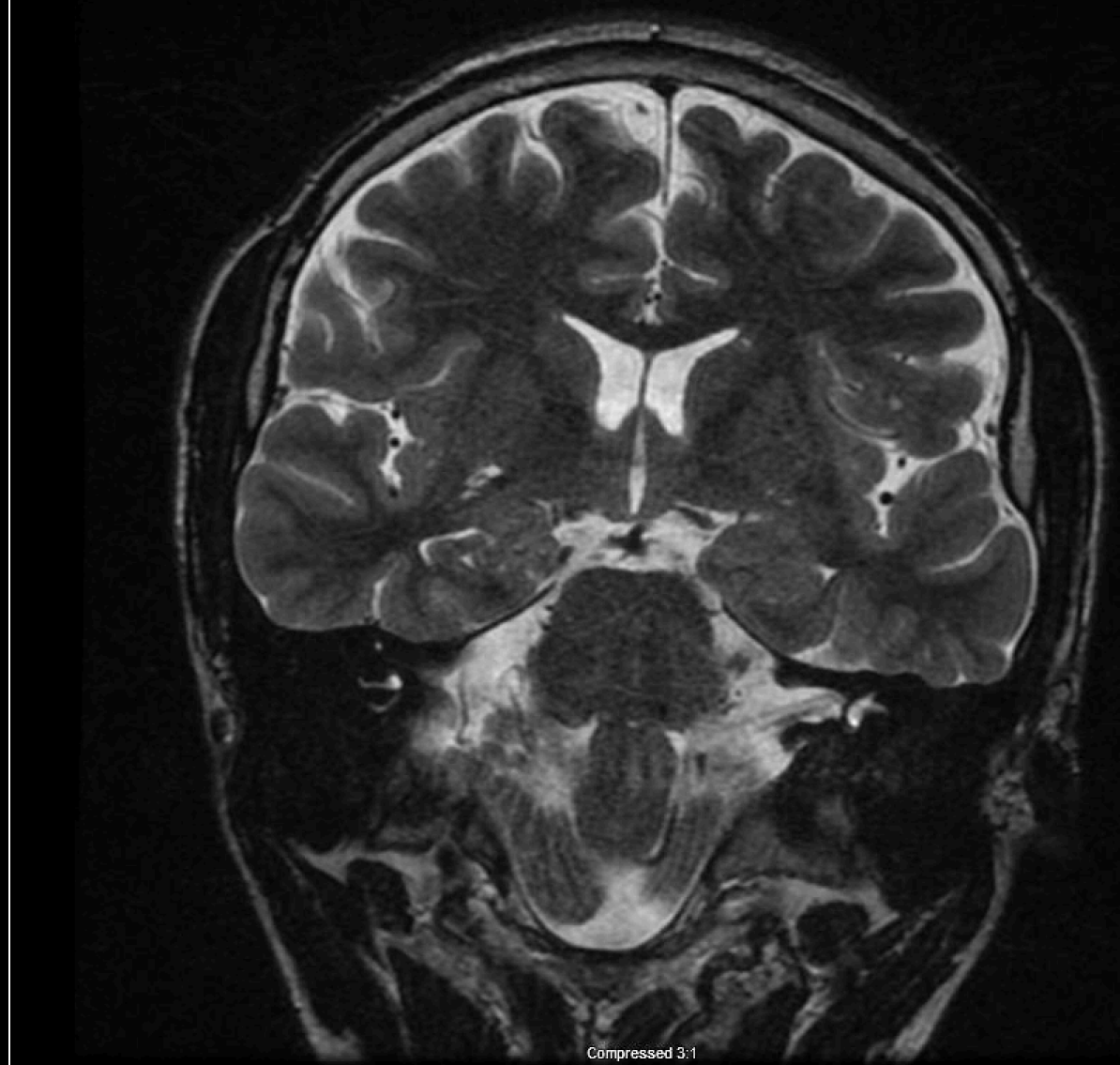
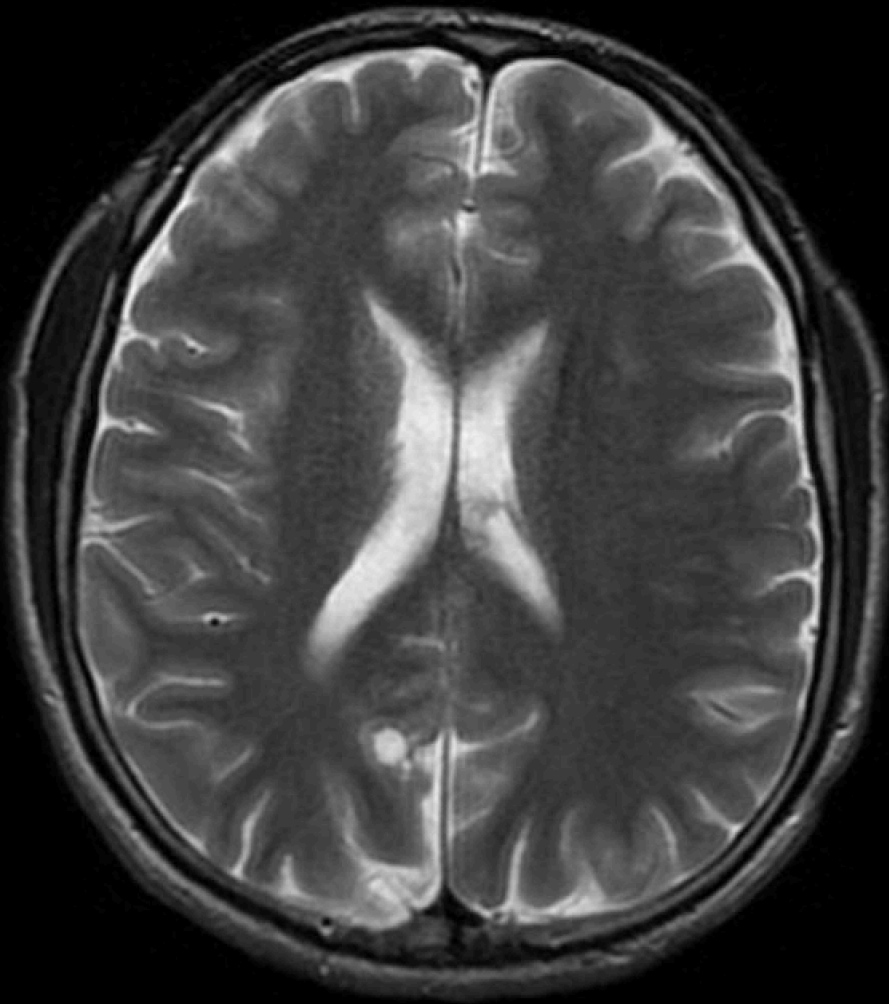
CT



2012



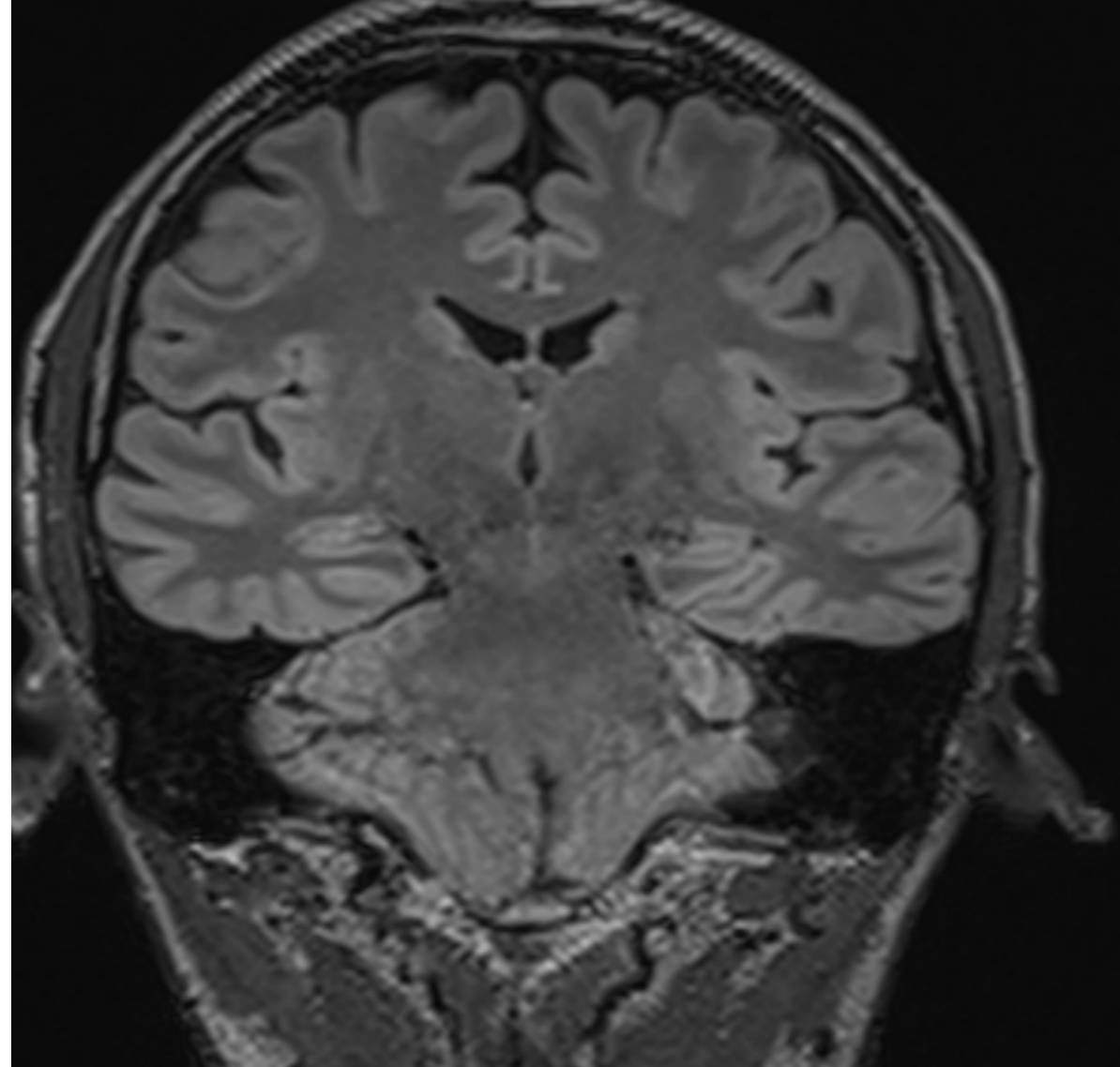
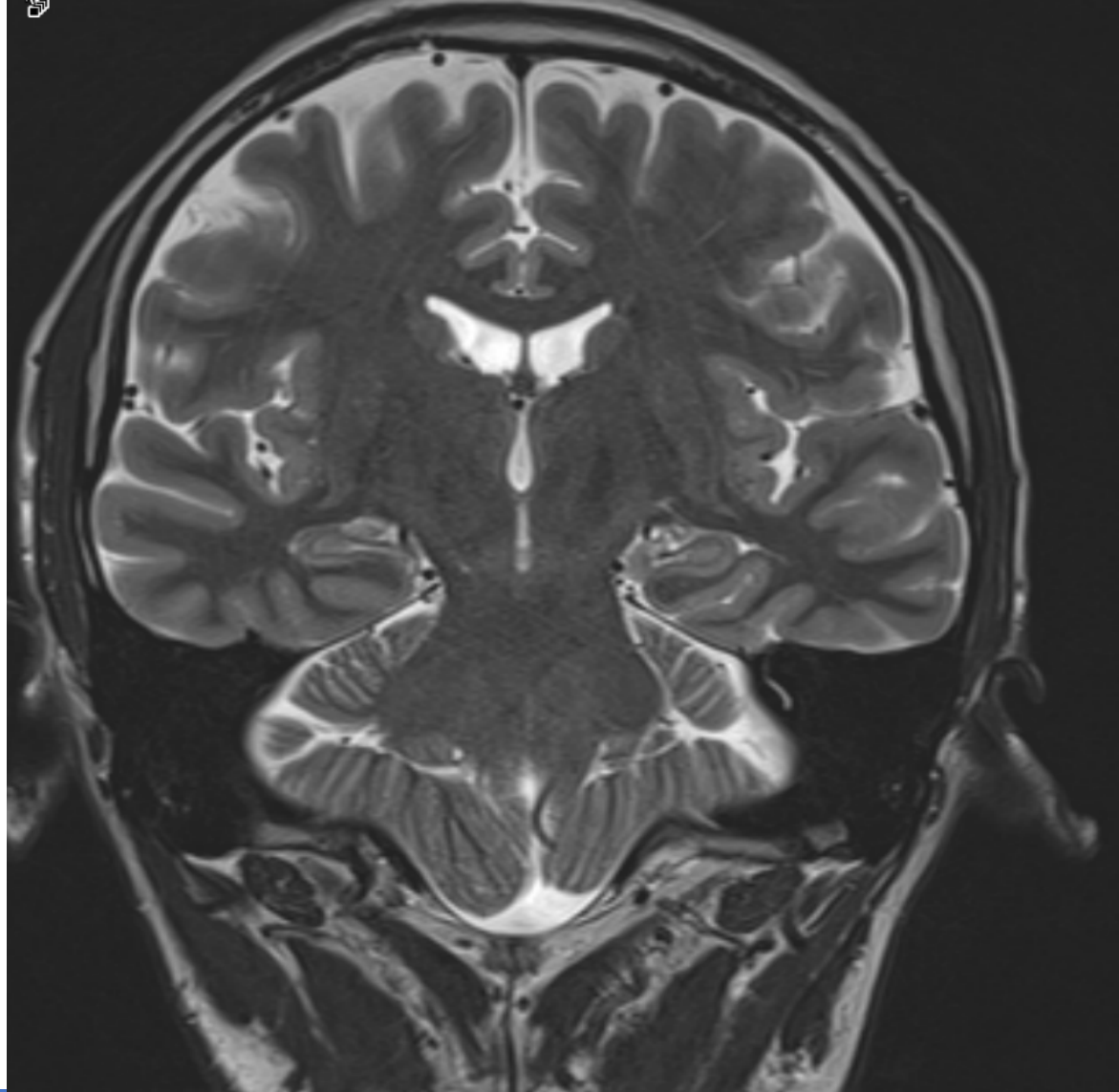
MRI



10/10/2015



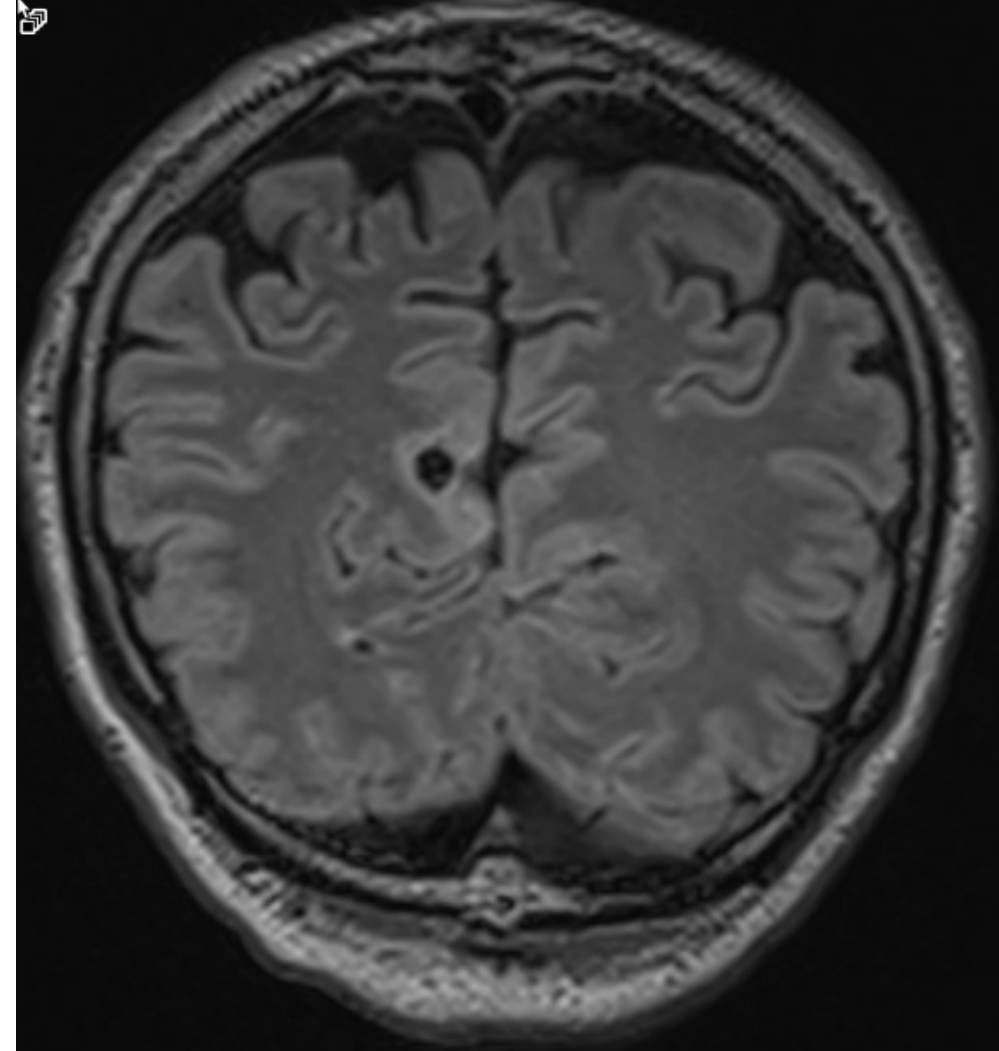
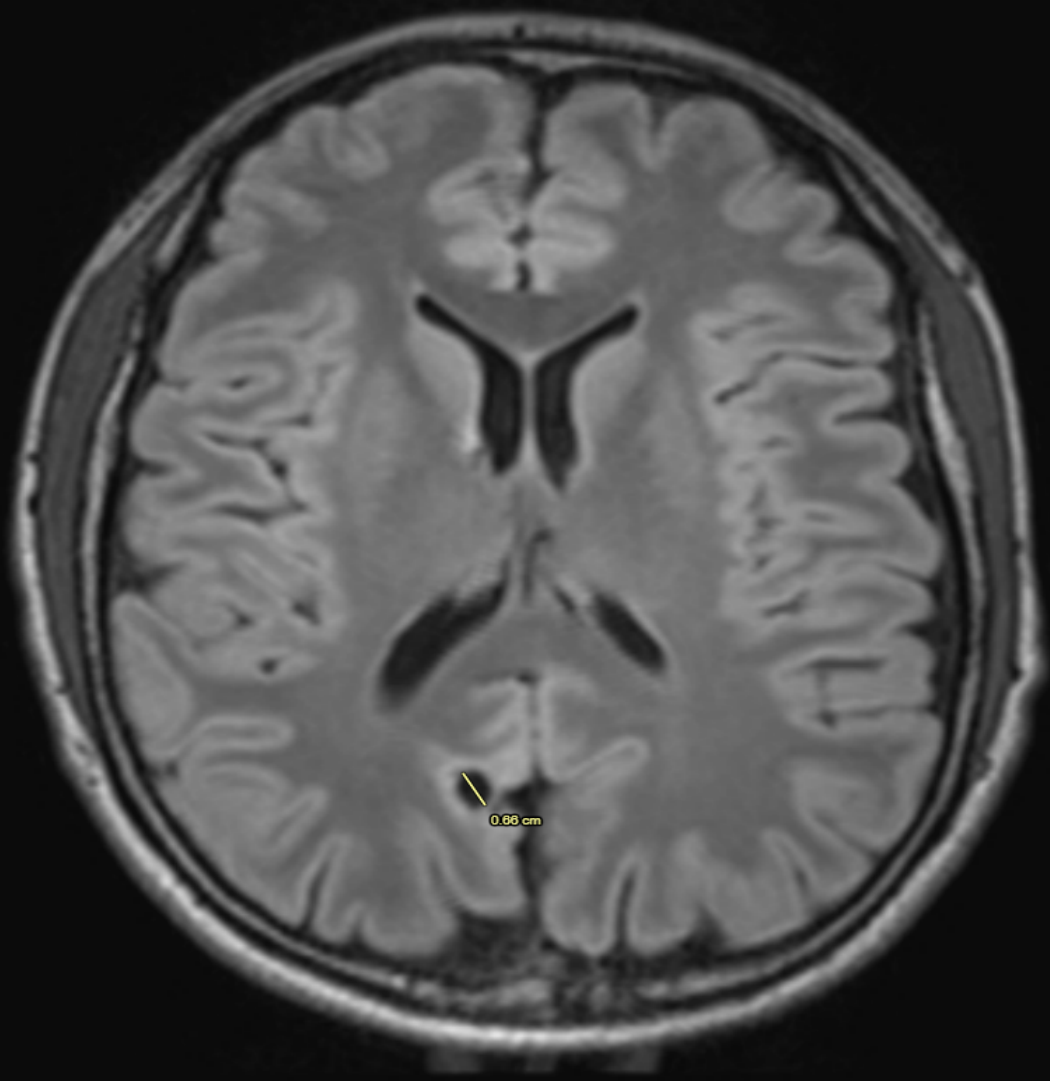
MRI



2018



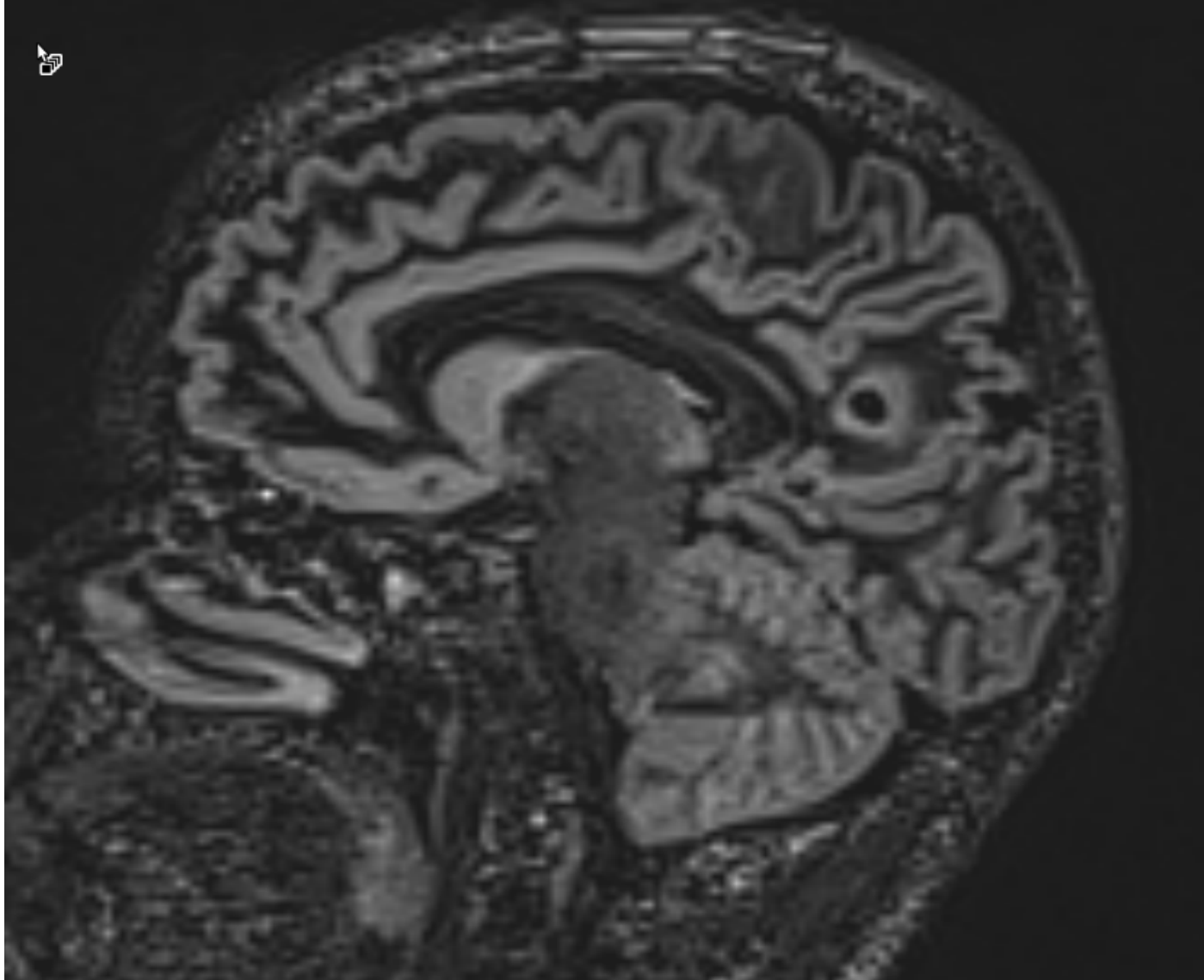
MRI



2018



MRI



2018



MRI

# MRI brain with & without contrast

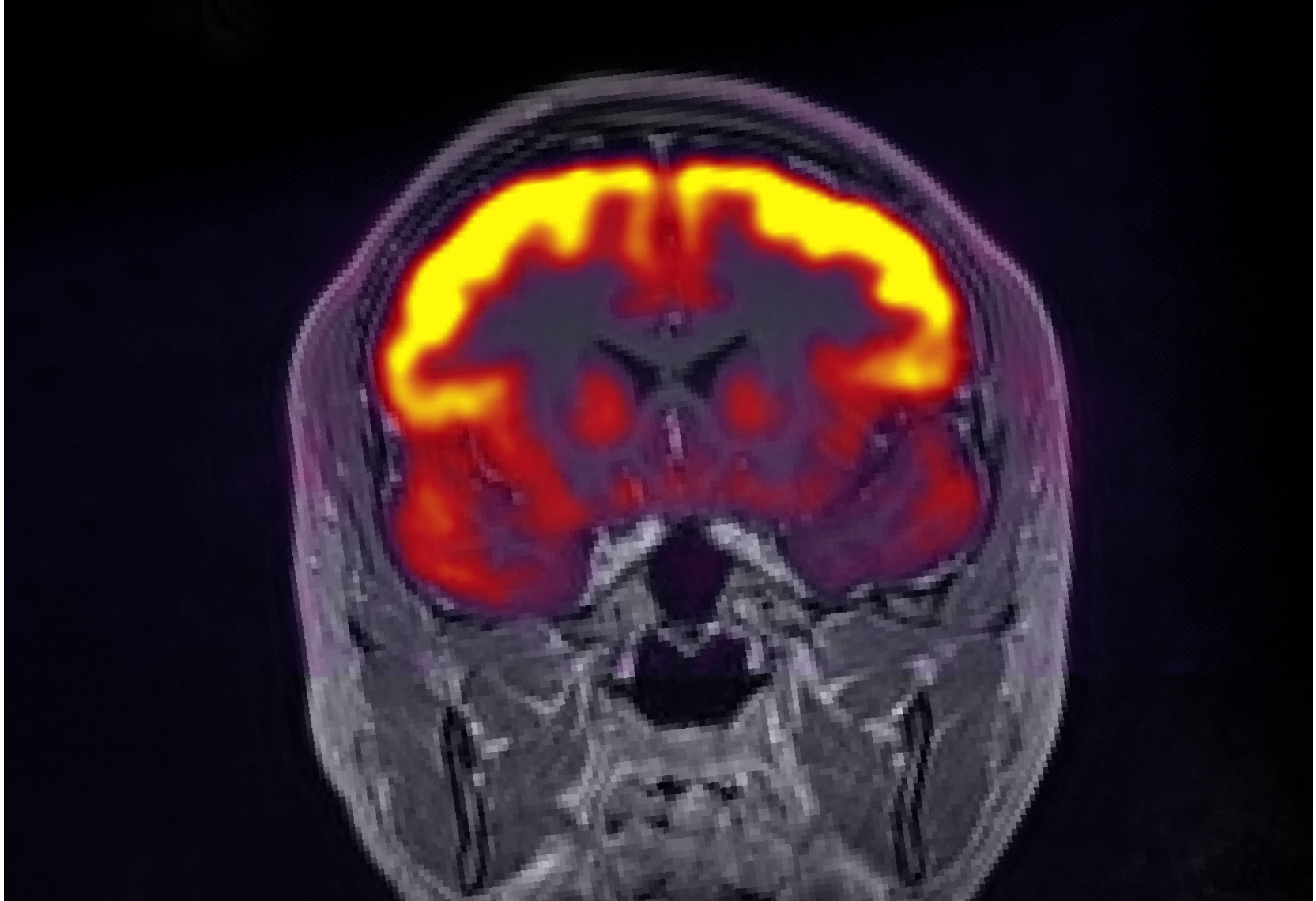
- 0.7 cm cystic cortical lesion in the right posterior parietal lobe (precuneus) with rim of calcification. Stable. Likely sequela of neurocysticercosis.
- No mesial temporal sclerosis

12/2018

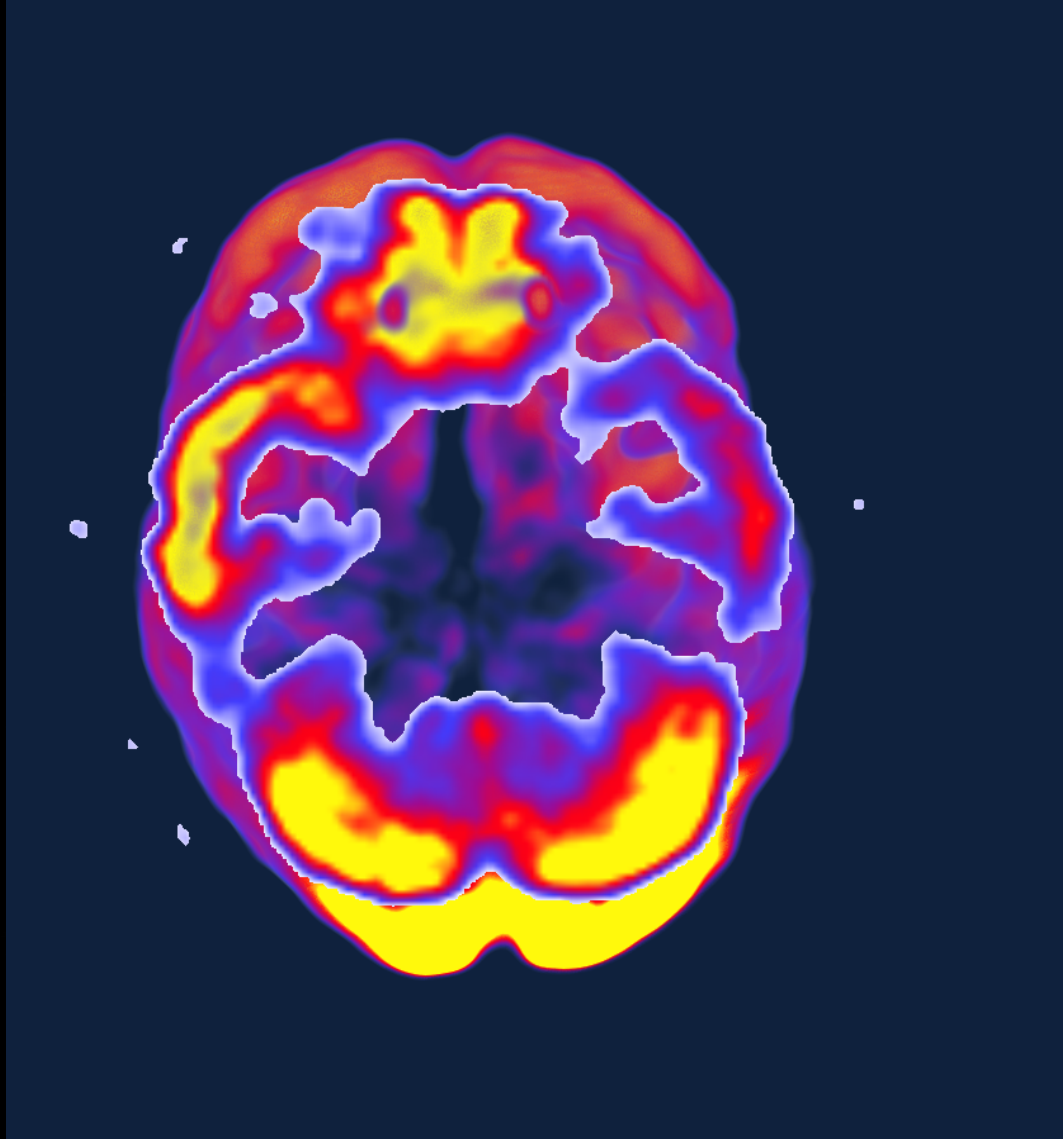
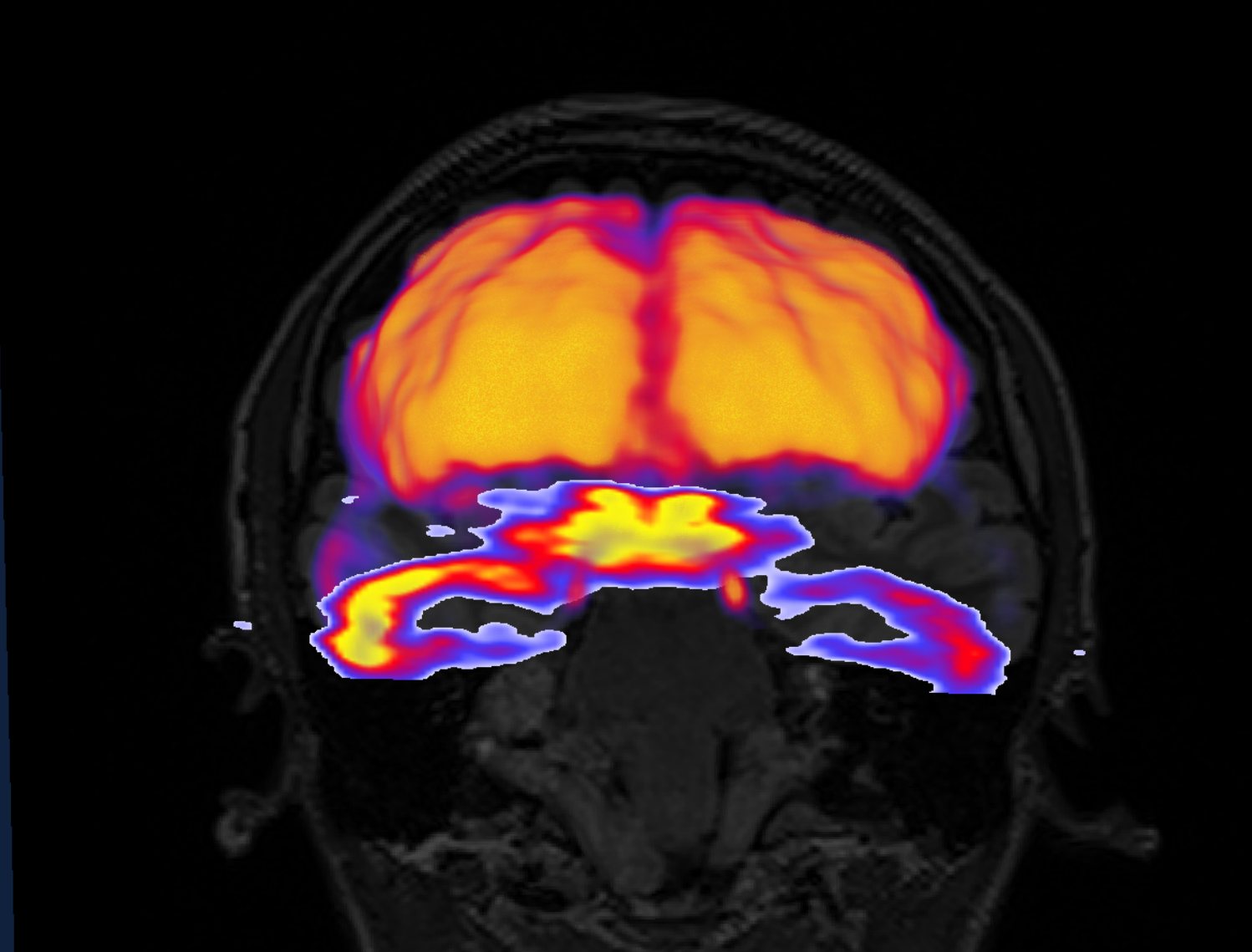


MRI





PET



PET

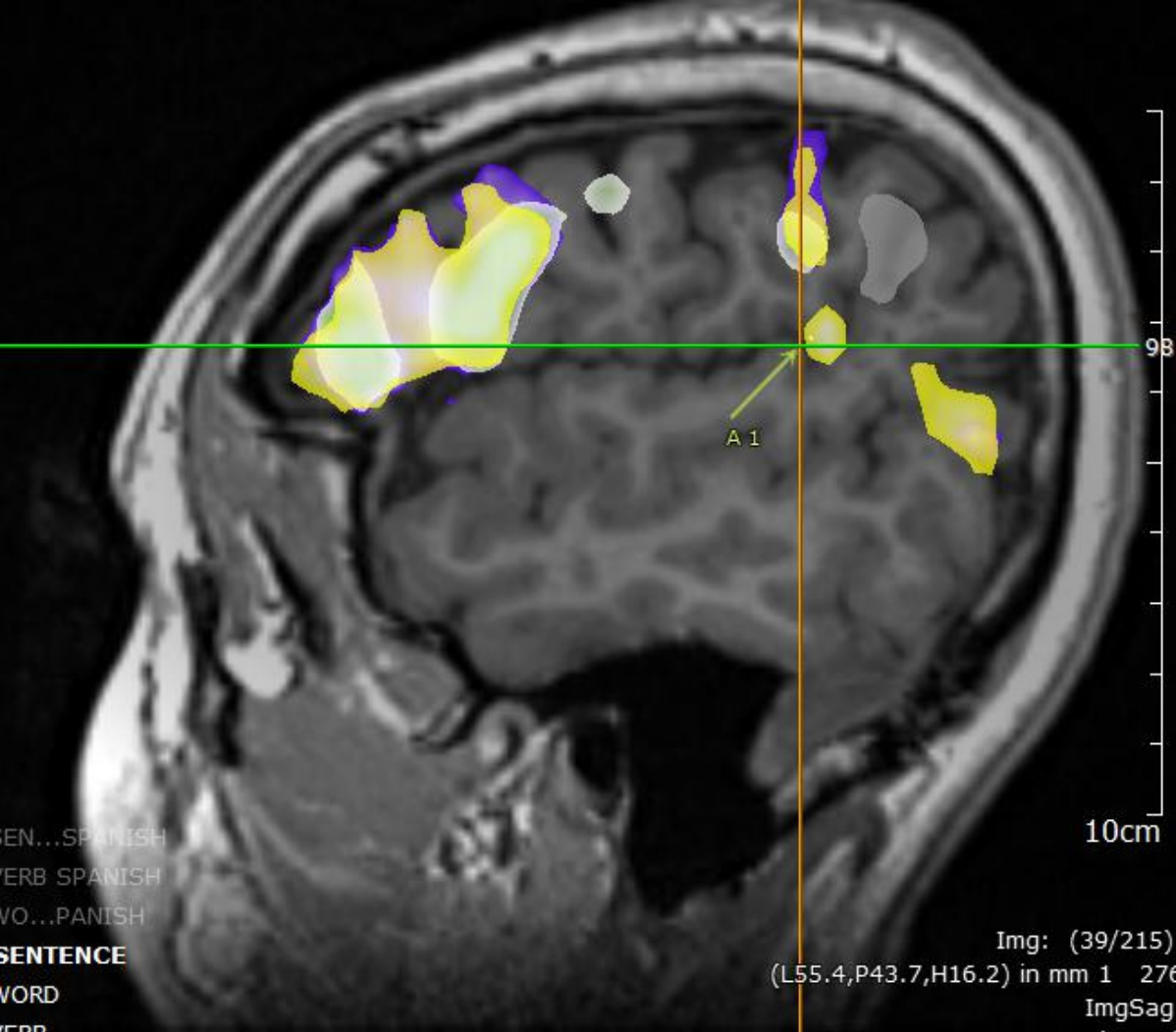
# PET report

- Decreased metabolic activity in the left anterior lateral and medial temporal horns
- Stable 0.7 cm peripherally calcified lesion in the right precuneus likely representing sequela of neurocysticercosis

2019

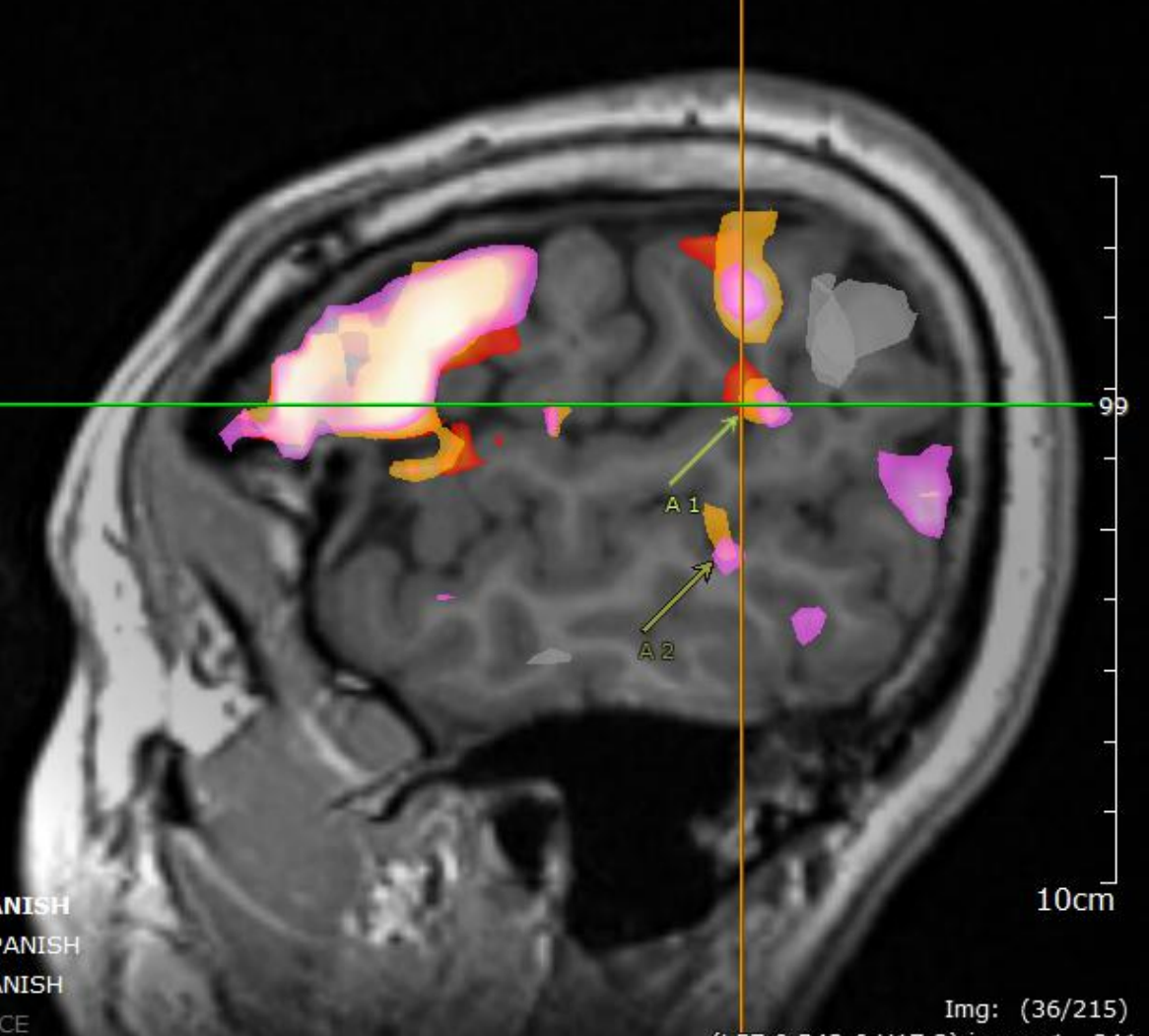


PET

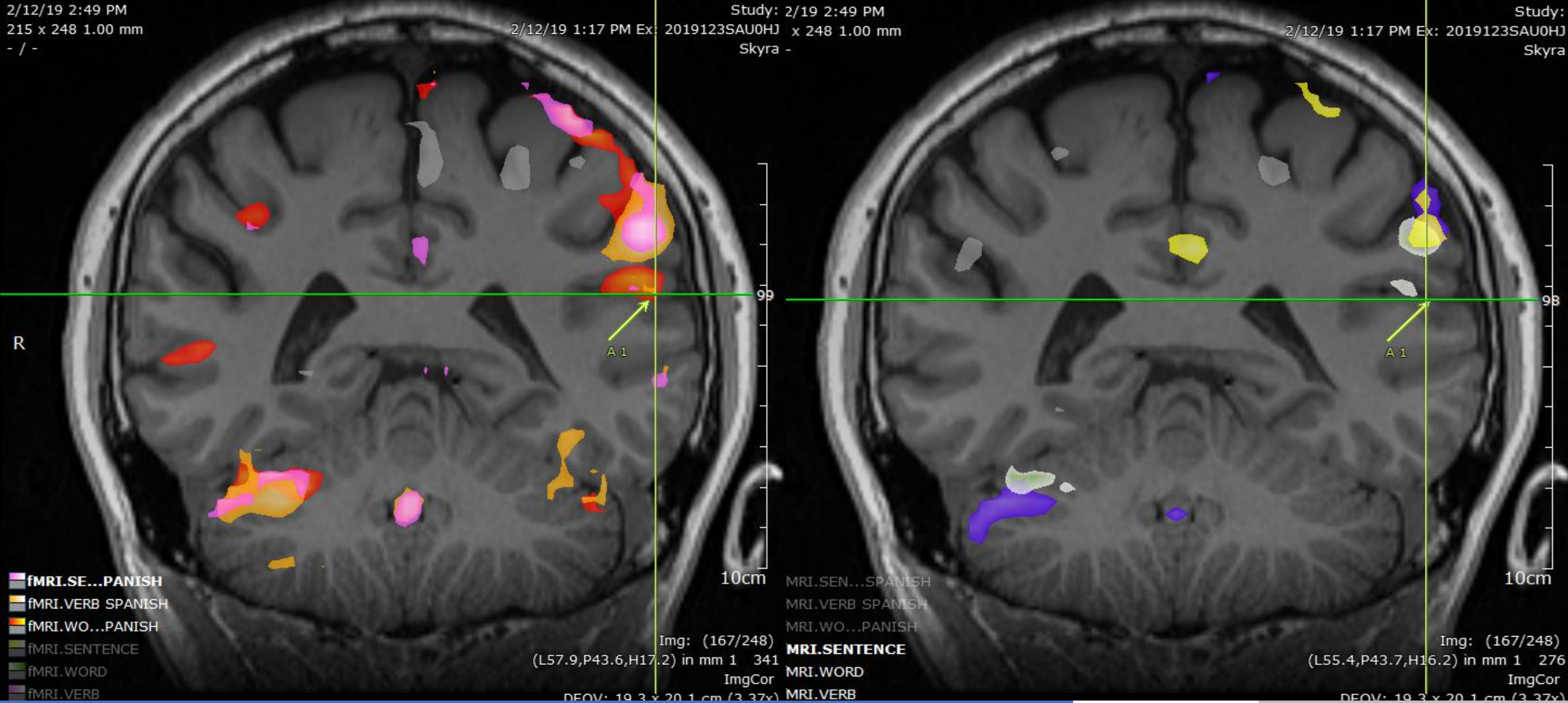


Img: (39/215)  
 (L55.4,P43.7,H16.2) in mm 1 276  
 ImgSag  
 DFOV: 19.3 x 20.1 cm (3.37x)  
 W: 1200 L: 600

■ fMRI.SE...PANISH  
 ■ fMRI.VERB SPANISH  
 ■ fMRI.WO...PANISH  
 ■ fMRI.SENTENCE  
 ■ fMRI.WORD  
 ■ fMRI.VERB



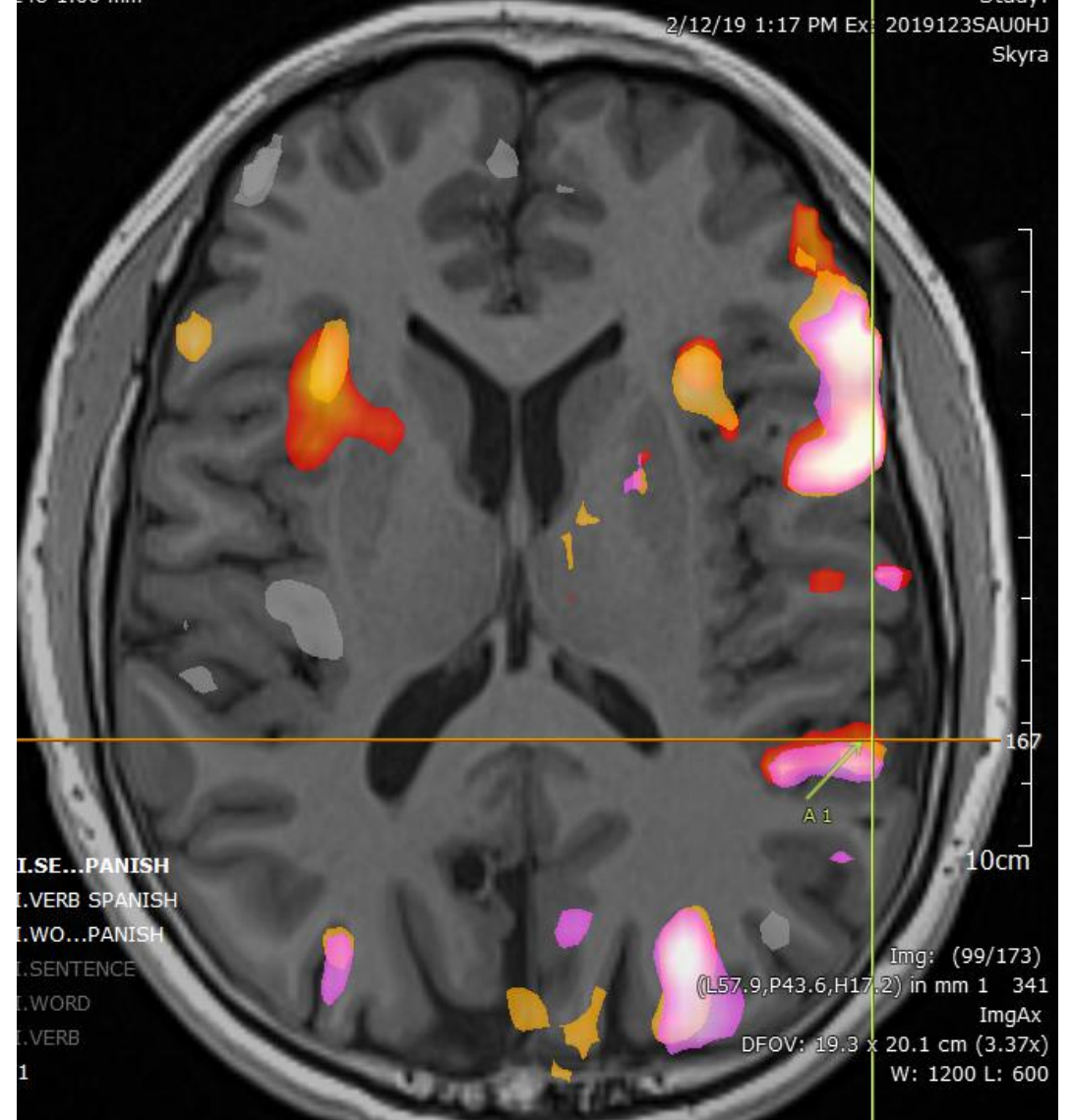
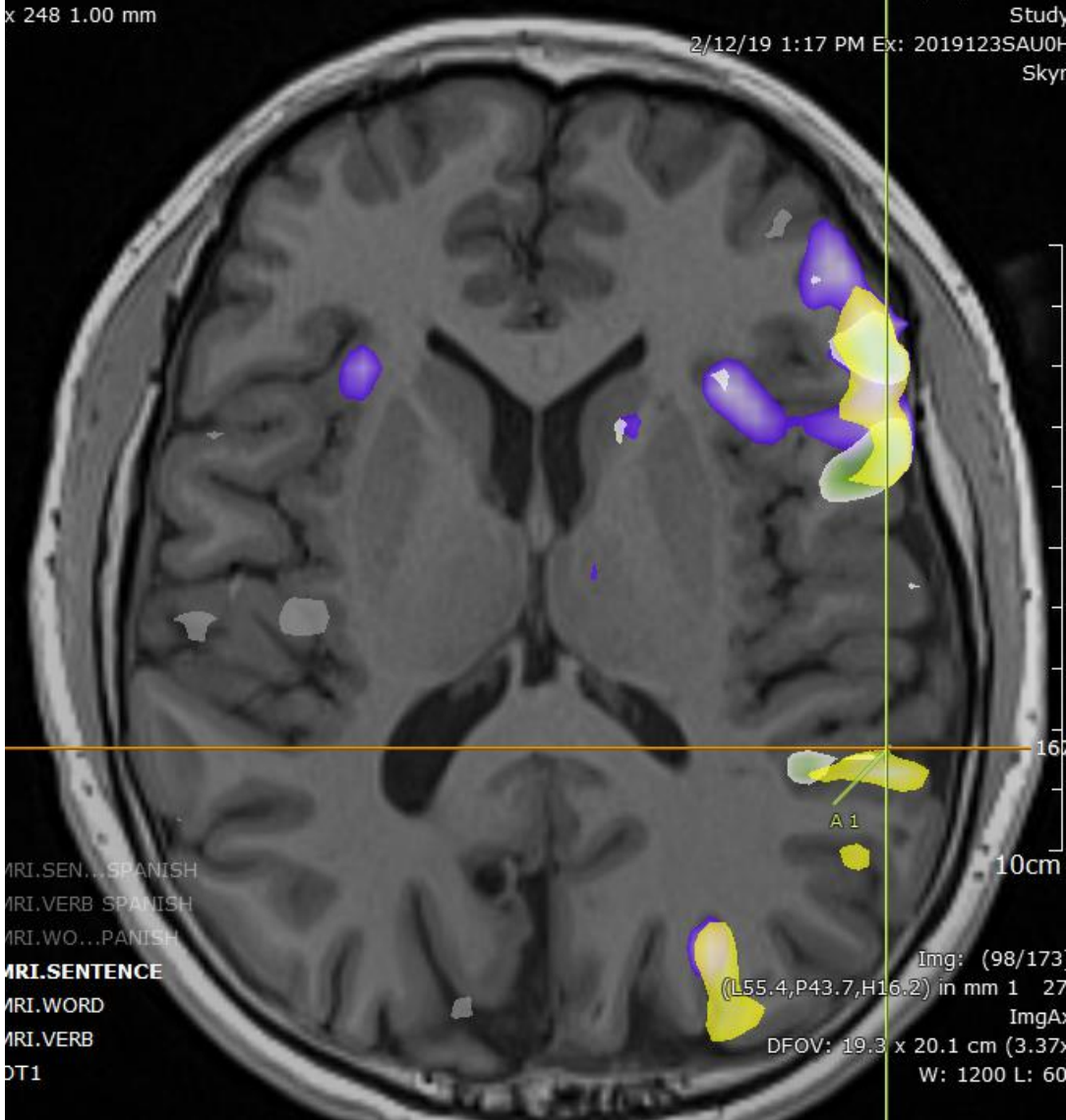
Img: (36/215)  
 (L57.9,P43.6,H17.2) in mm 1 341  
 ImgSag  
 DFOV: 19.3 x 20.1 cm (3.37x)



2019



fMRI



2019

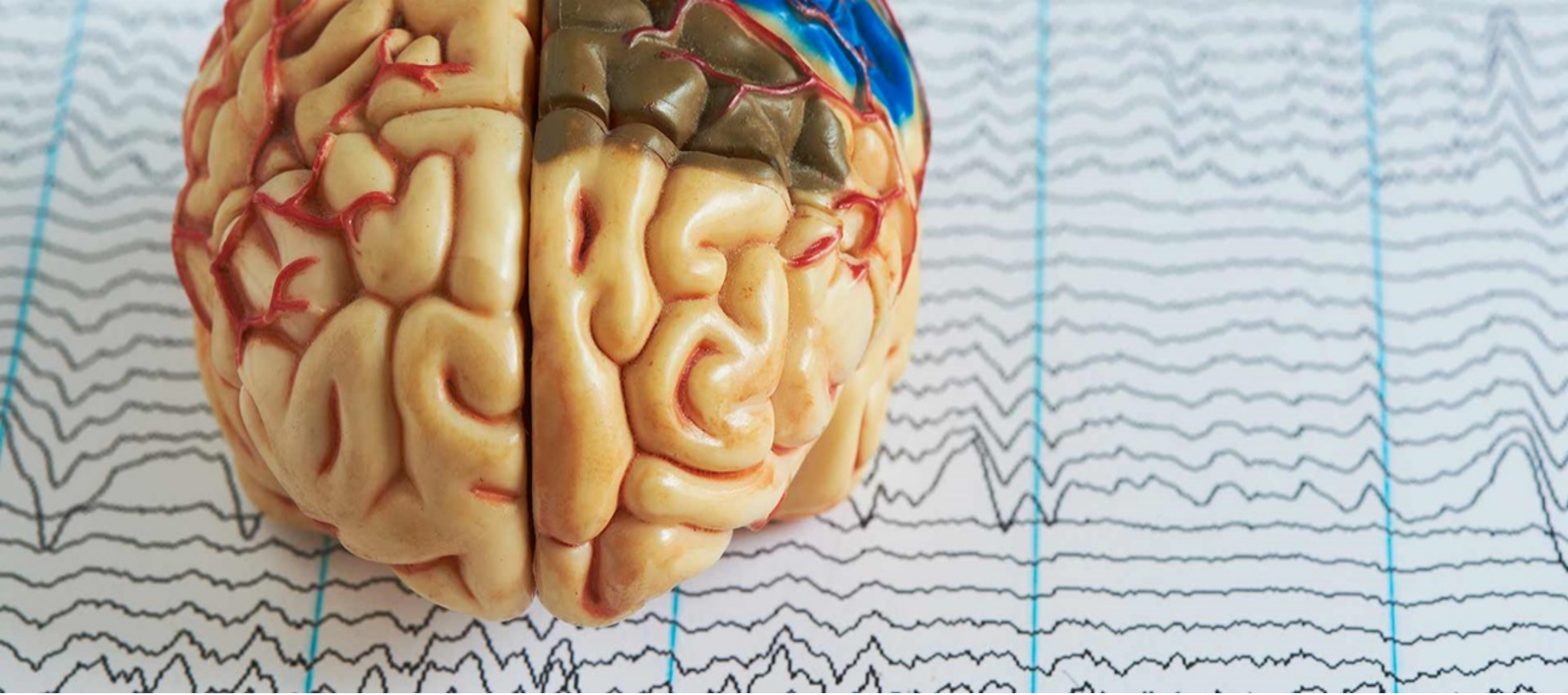


fMRI

# fMRI report

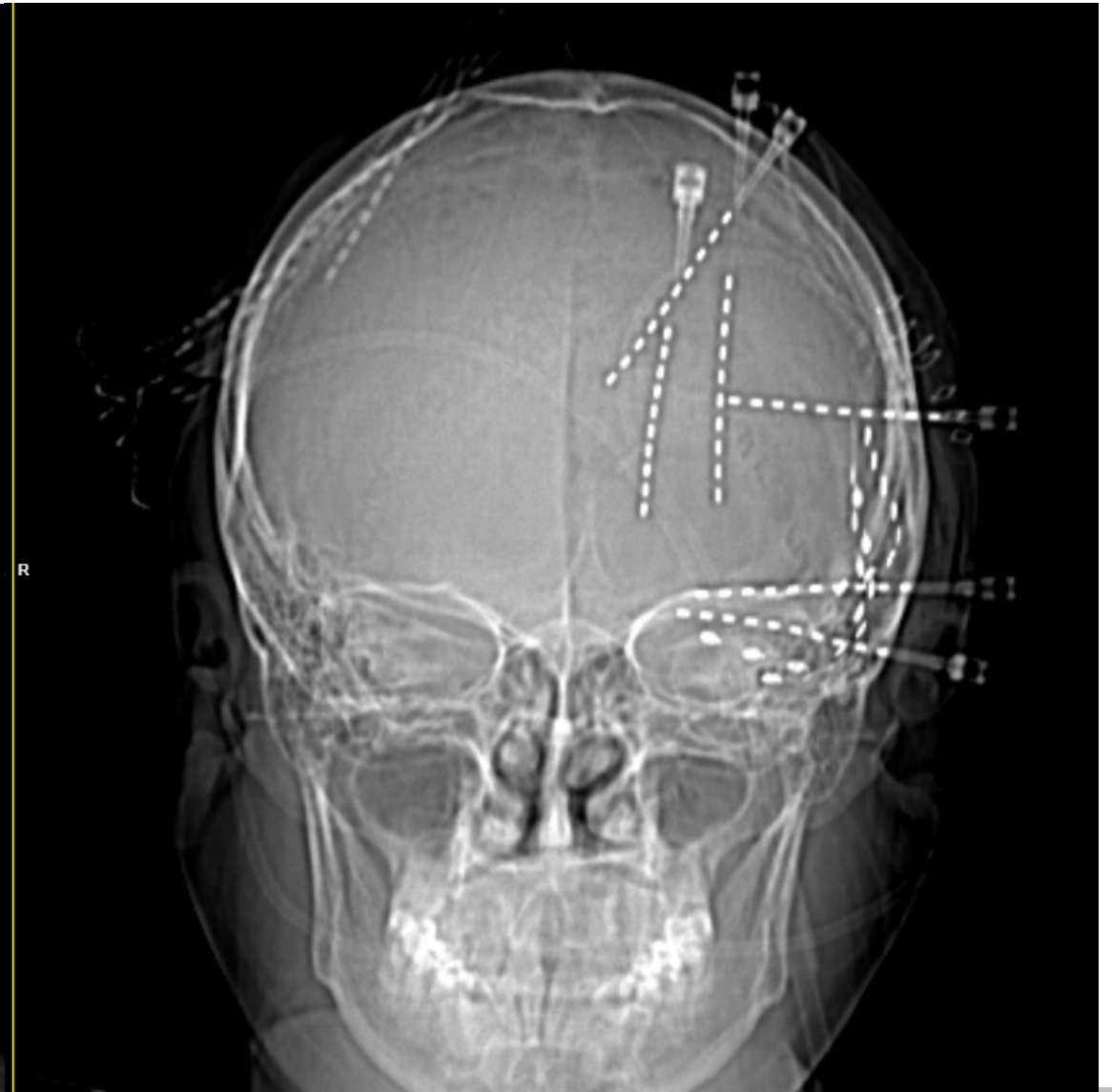
- Left dominant for English
- For Spanish, word generation is present in B/L Broca's and right Wernicke's (right mid/posterior aspect of middle temporal sulcus)
- For Spanish, verb generation and sentence completion in left Wernicke's (left mid/posterior aspect of the left middle temporal sulcus and sylvian fissure)





SEEG





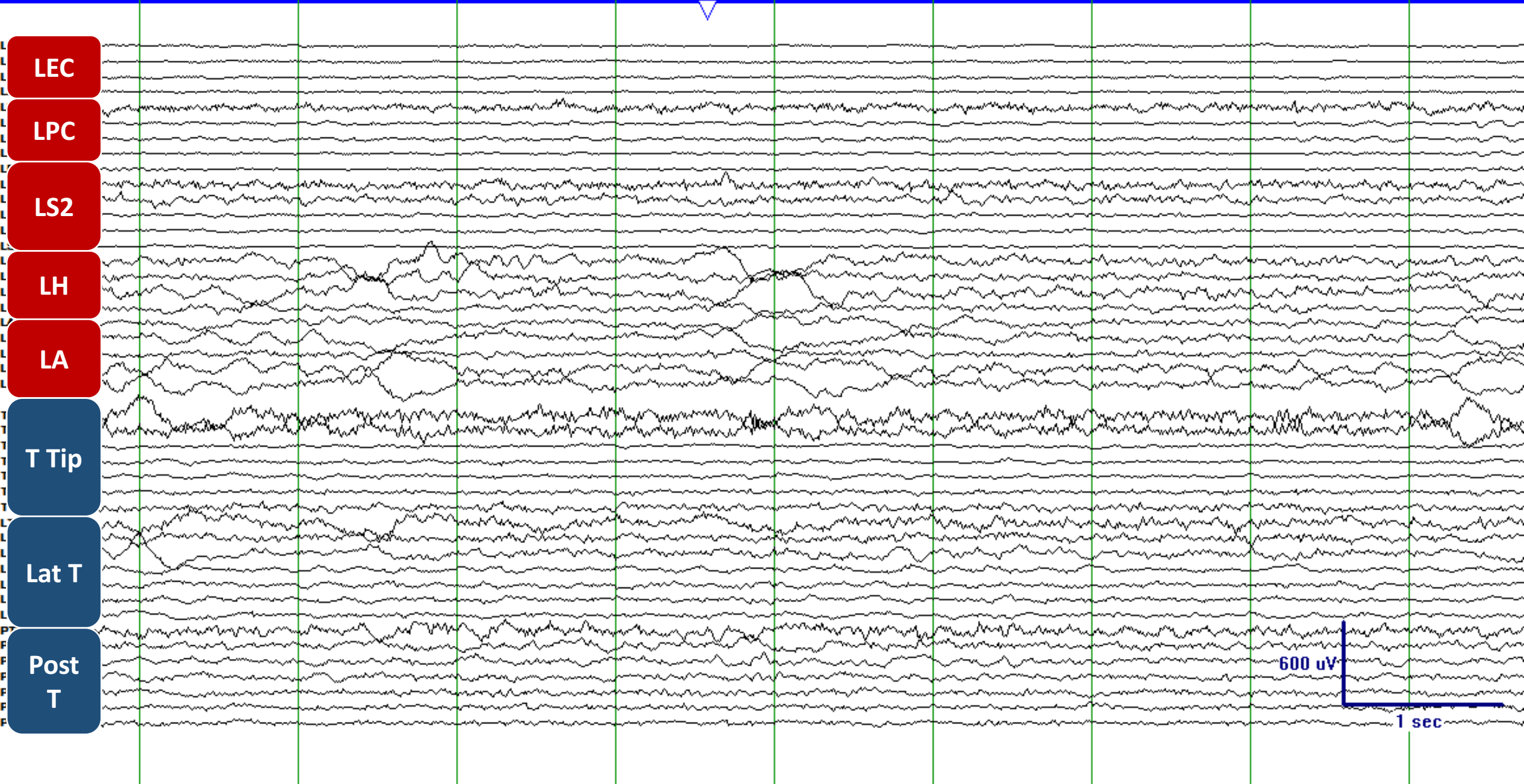
**LI** (posterior central sulcus for posterior insula, posterior to central sulcus), **S2**; **L PIC**;  
**LAH**; **LPH** (orthogonal); **LPC**; **LA** (orthogonal); 3 **strips** for neocortical evaluation:  
Temporal tip , posterior and lateral temporal area



SEEG

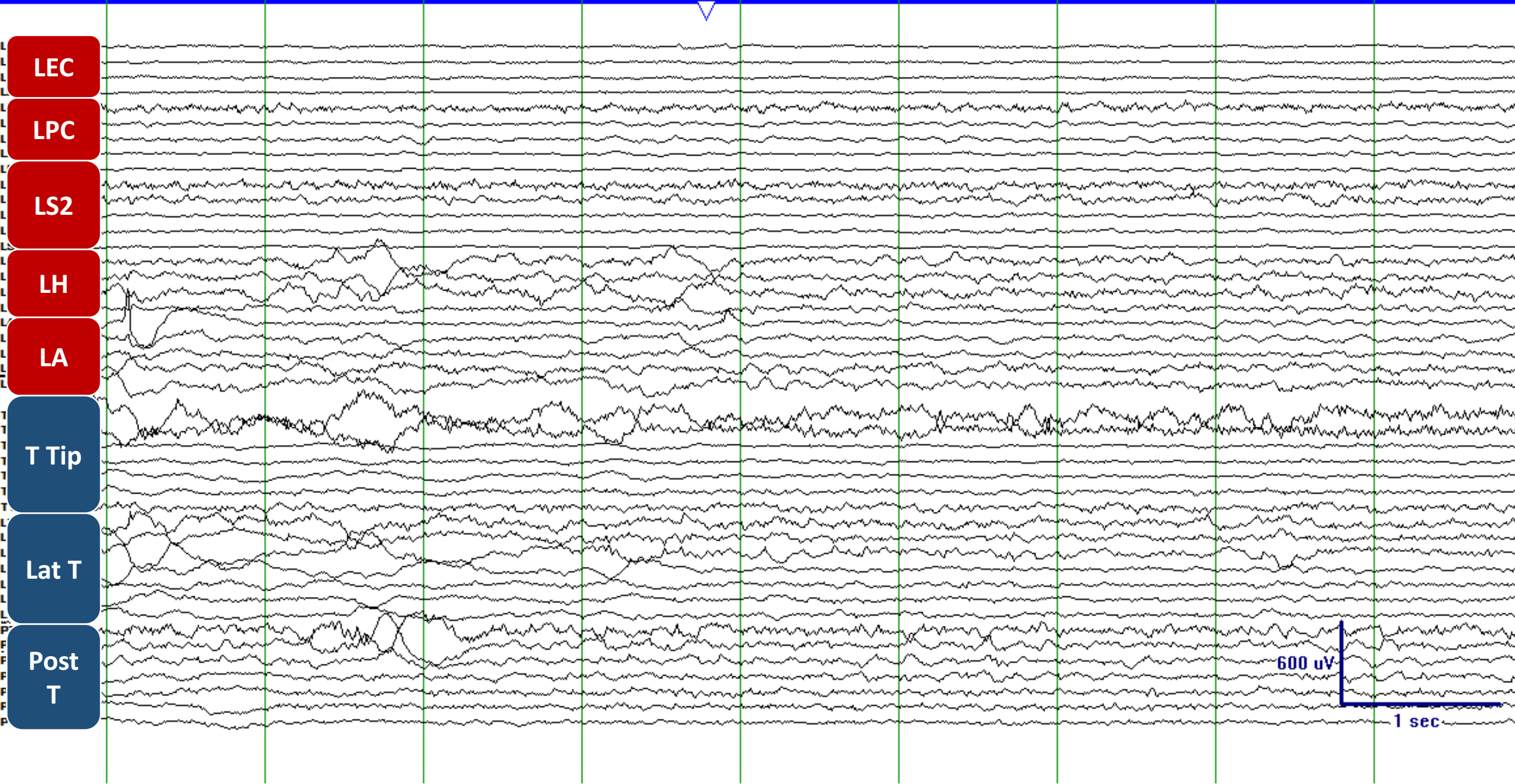
# Invasive Video-EEG

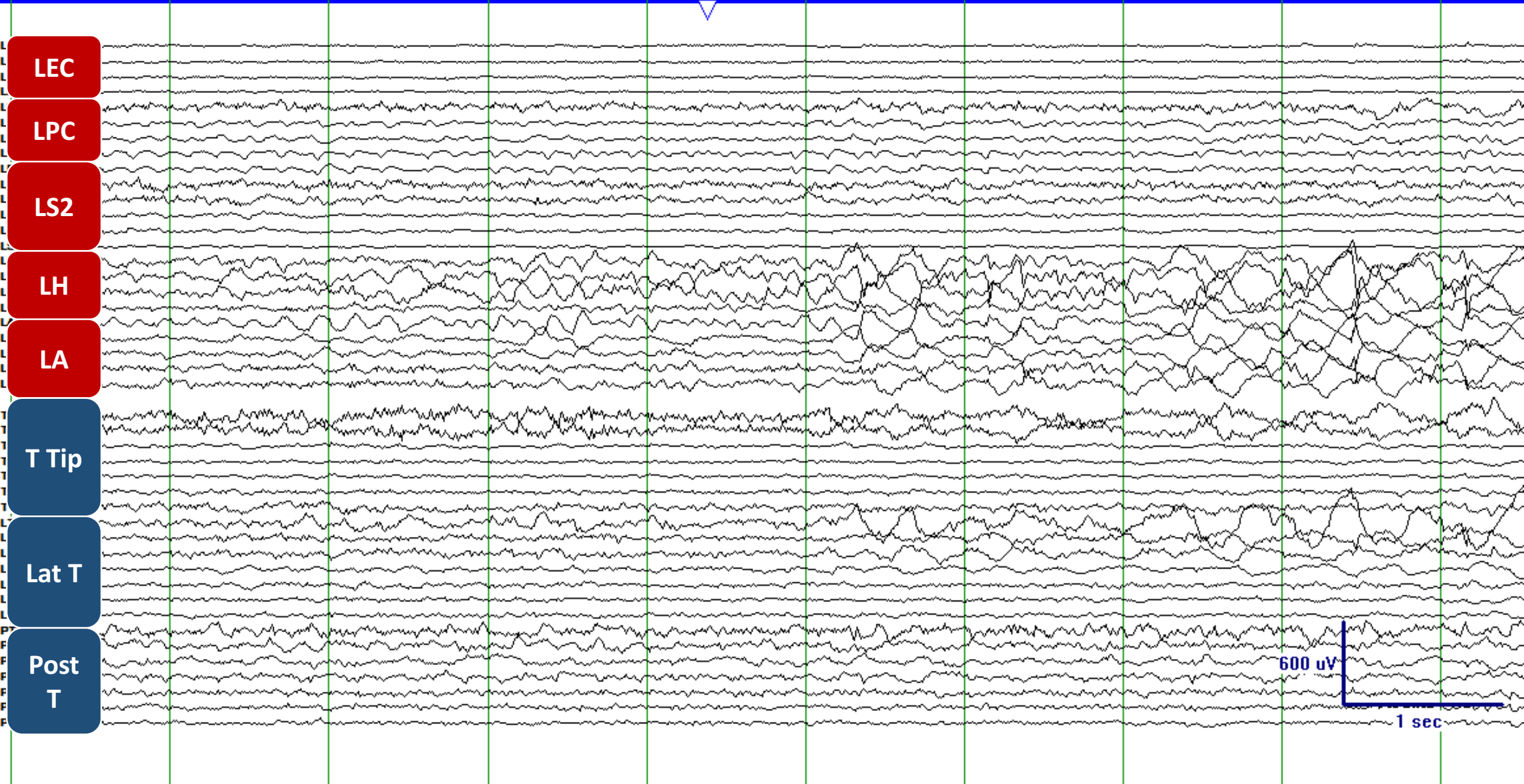


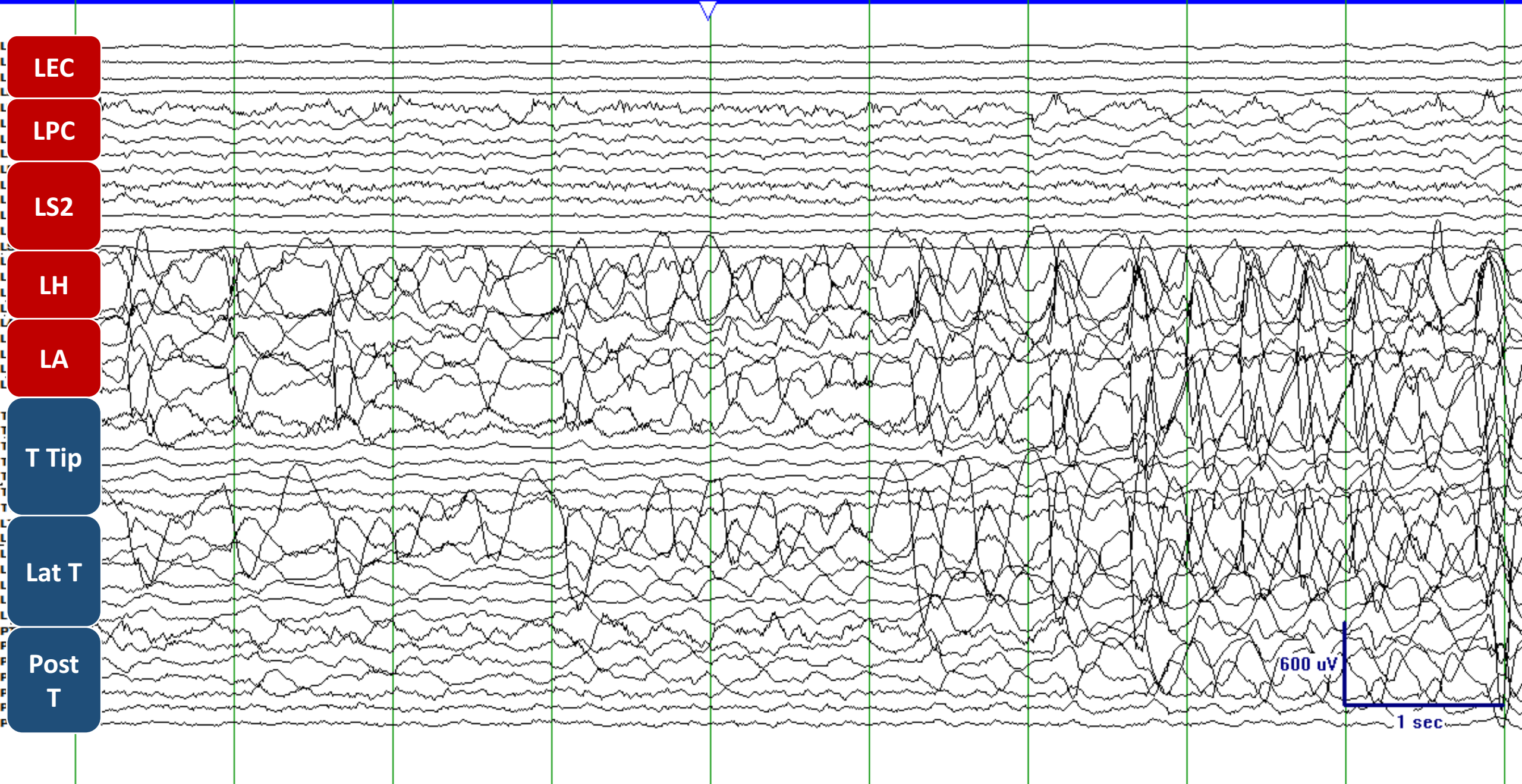


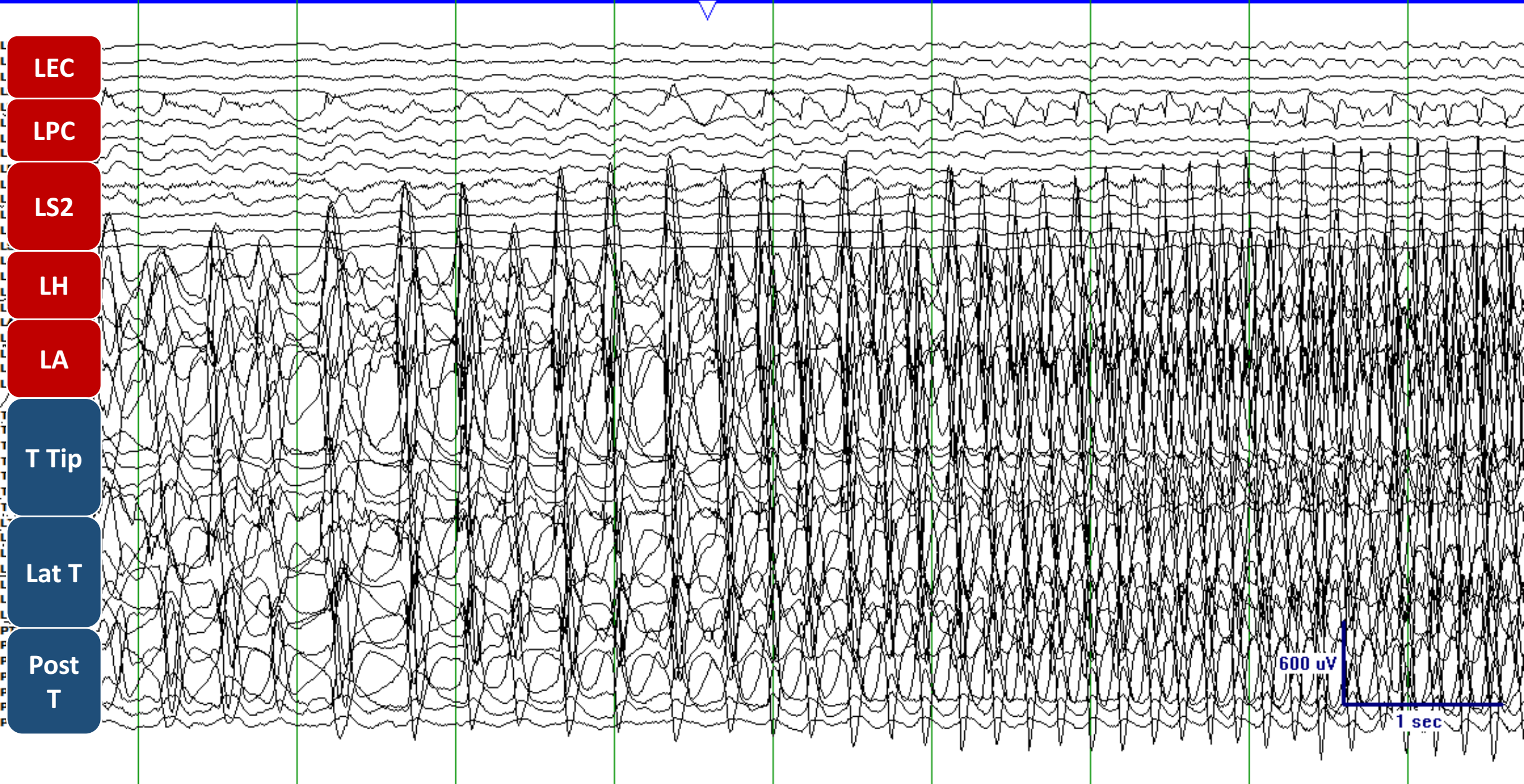


Seizure Onset

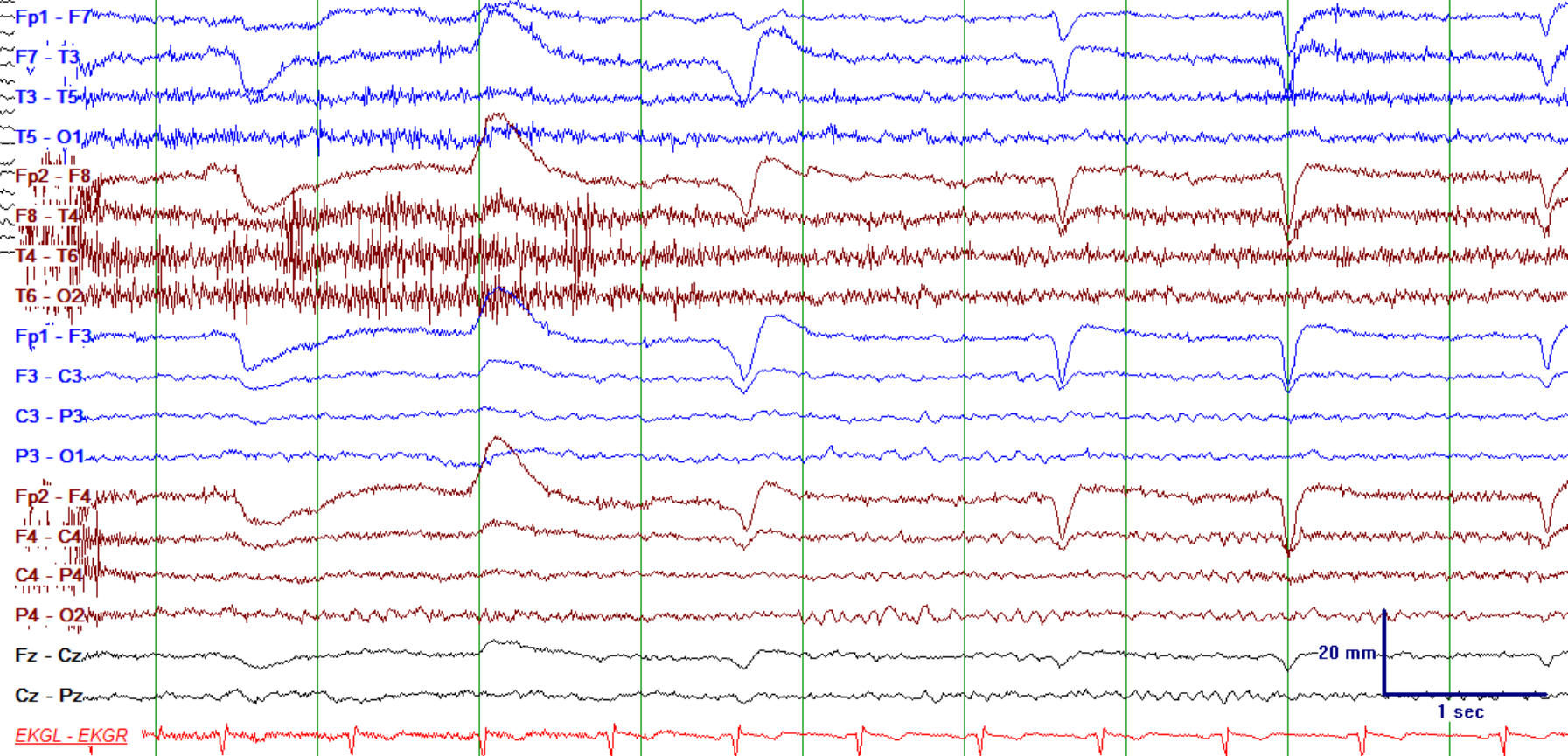
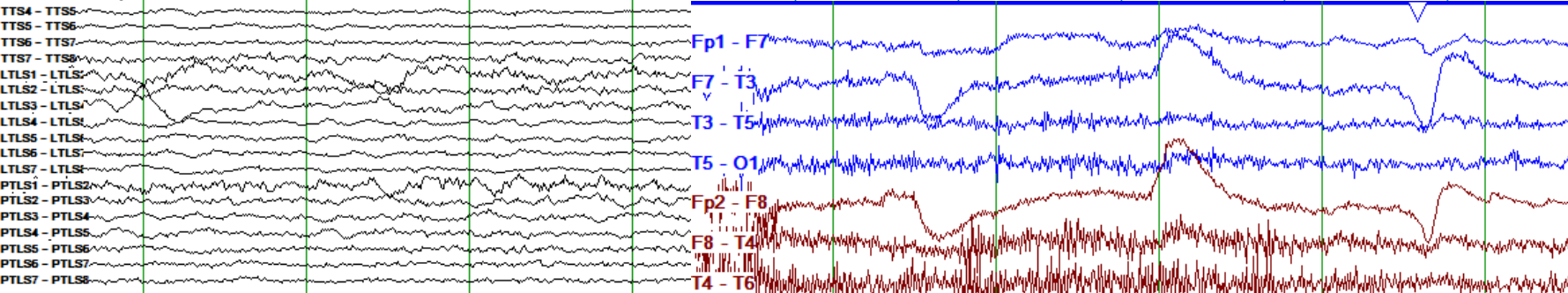
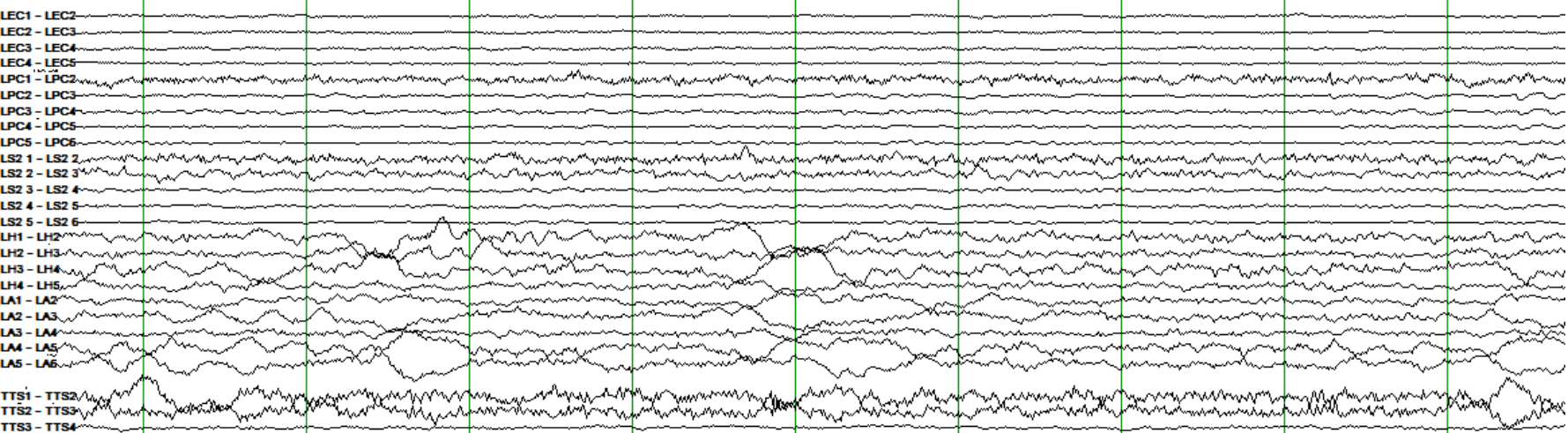






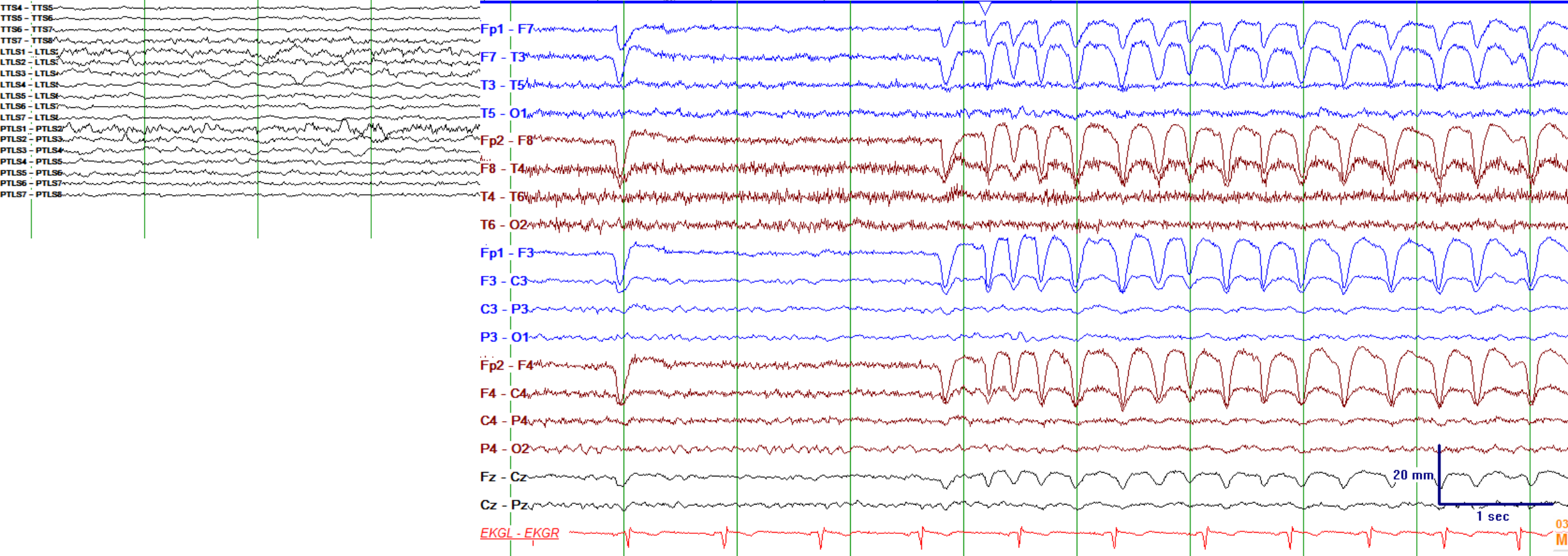
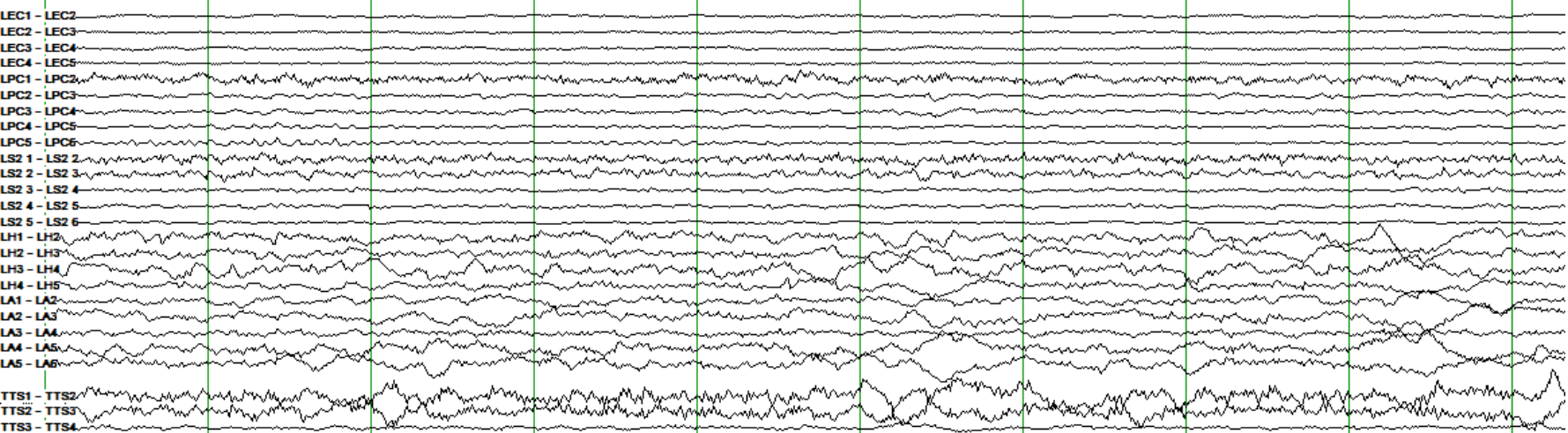


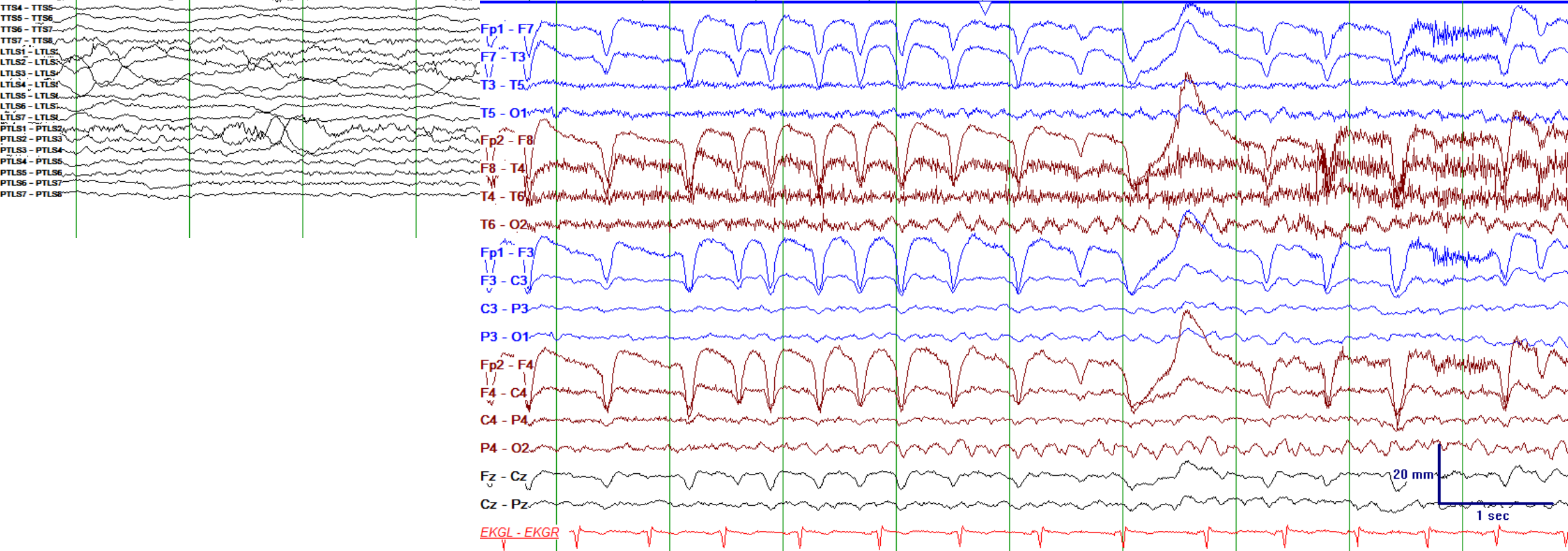
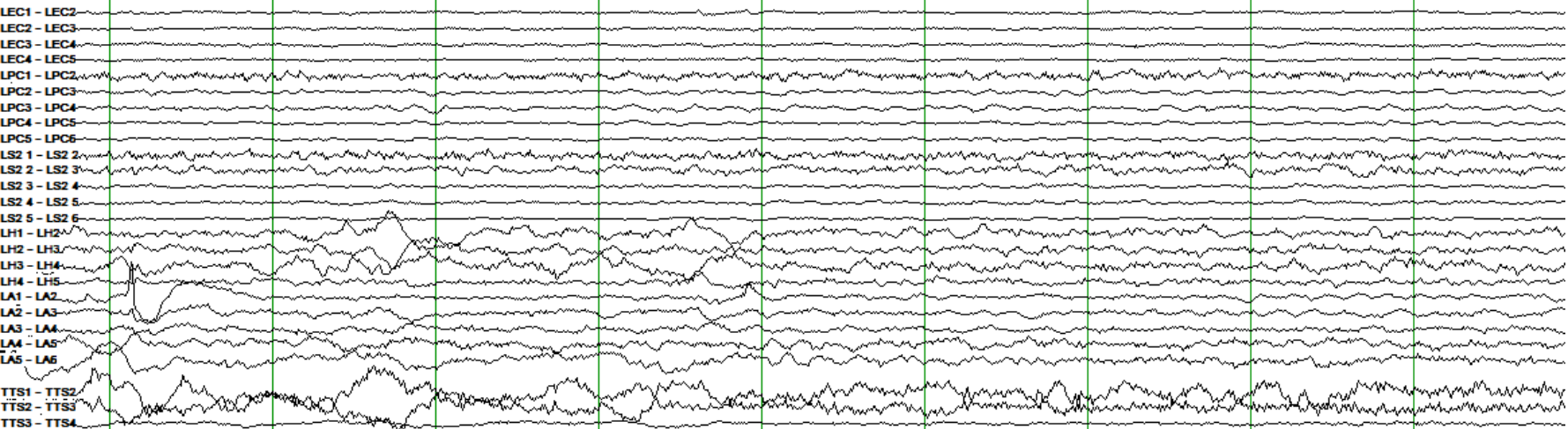


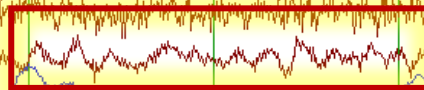
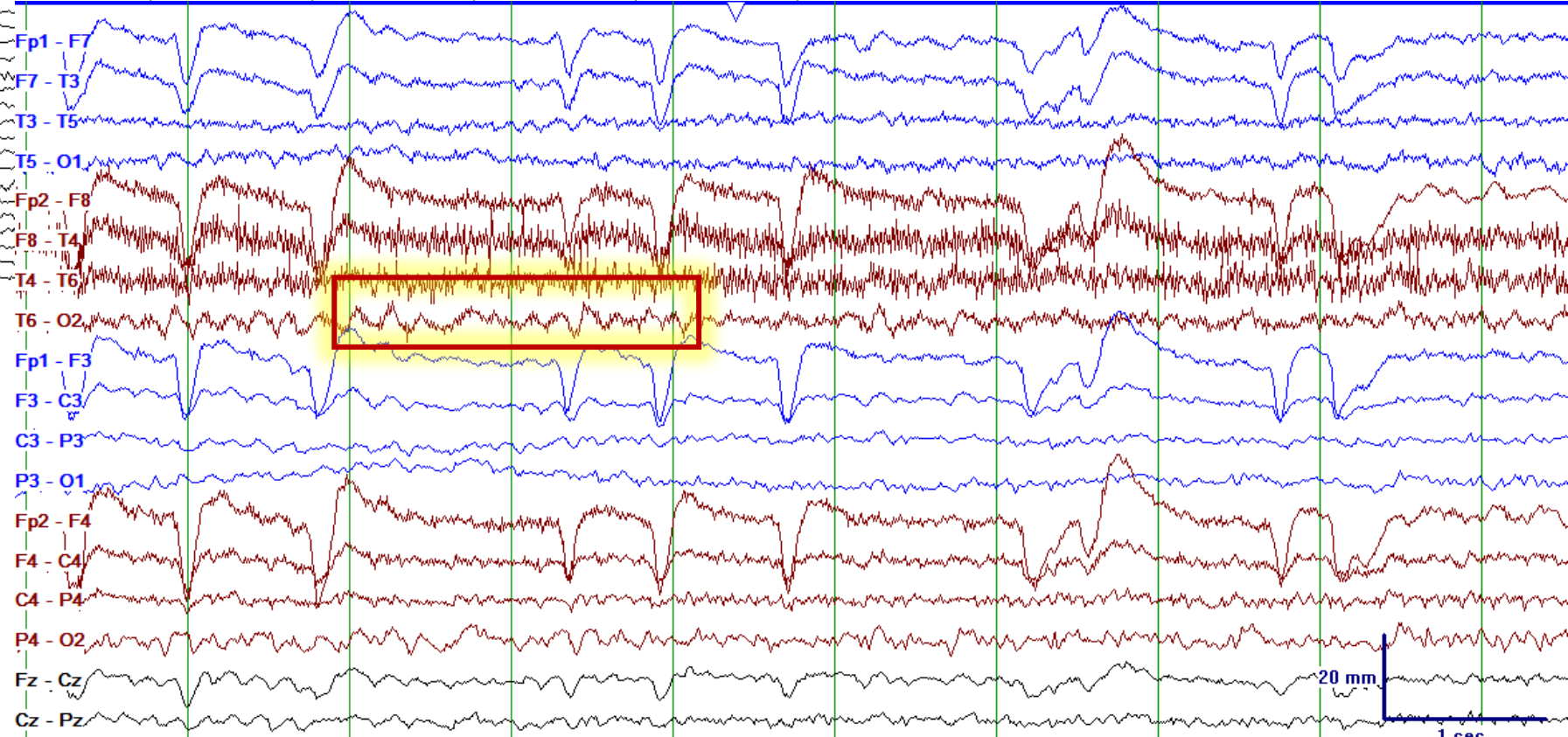
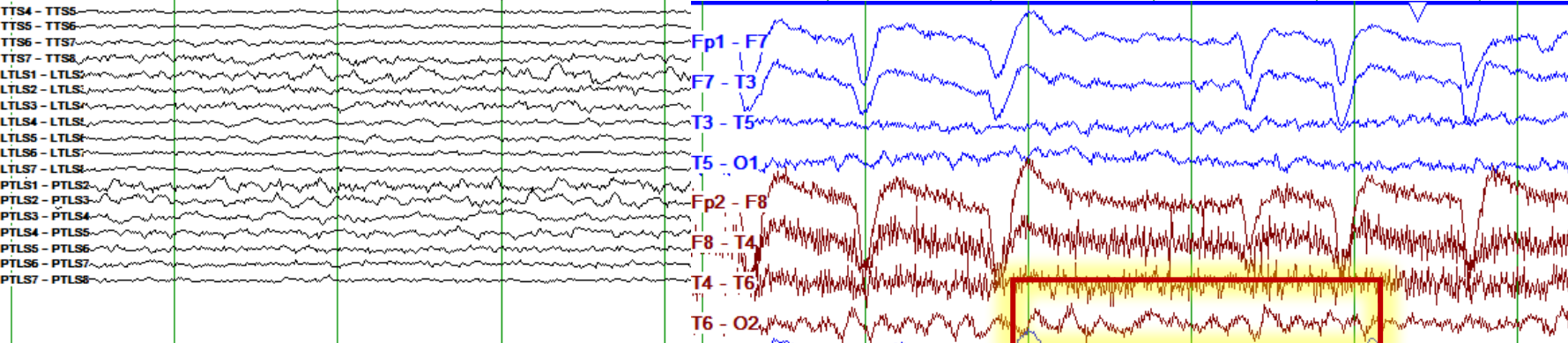
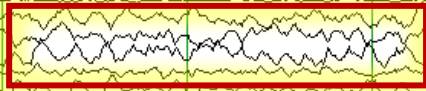
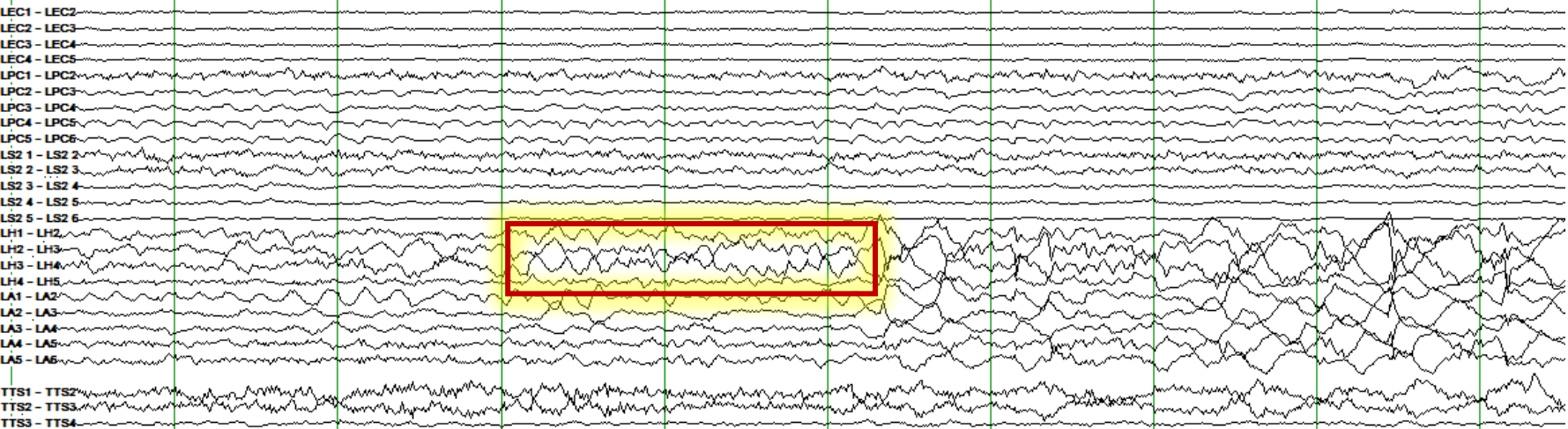


20 mm

1 sec



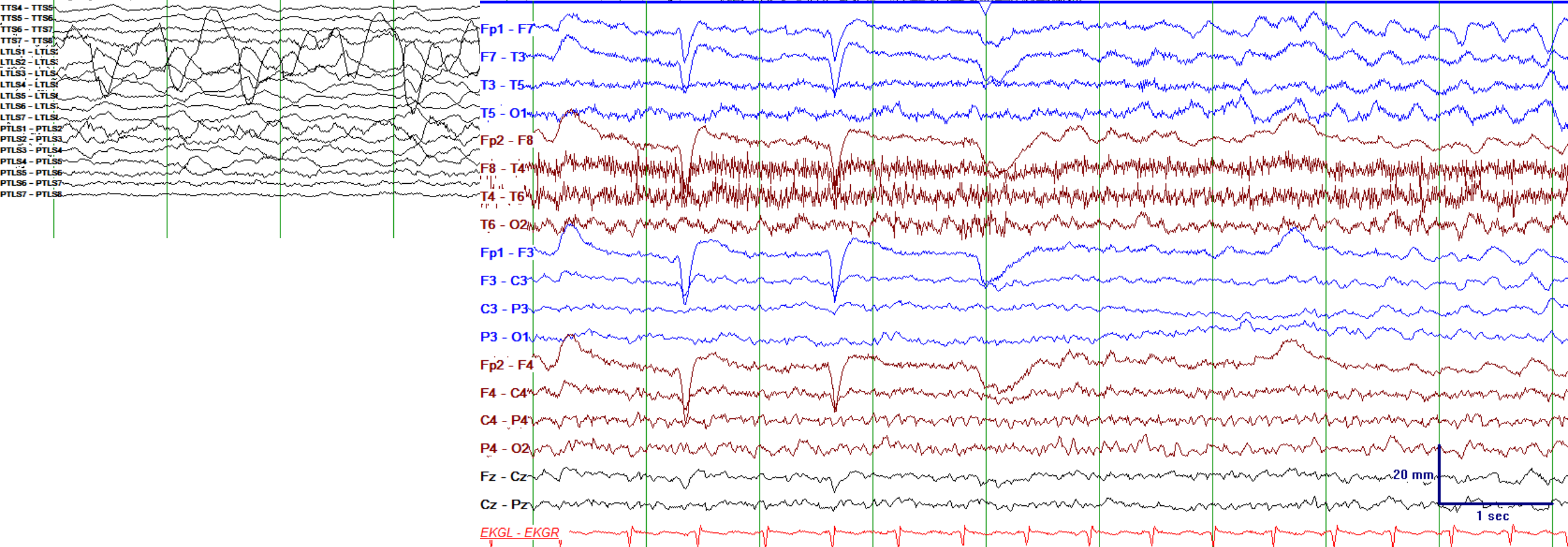
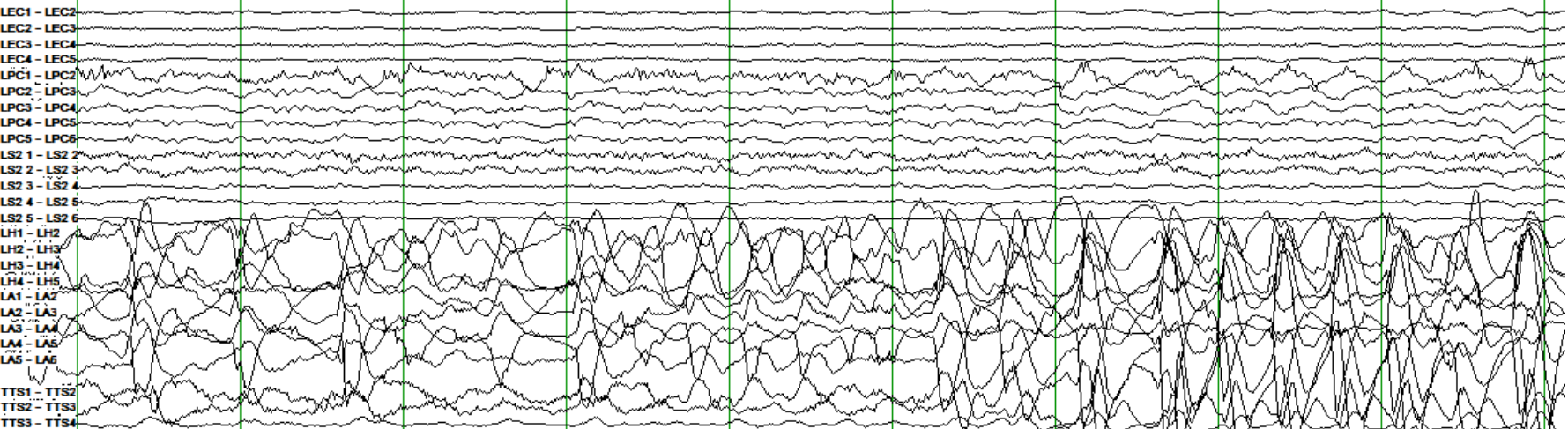


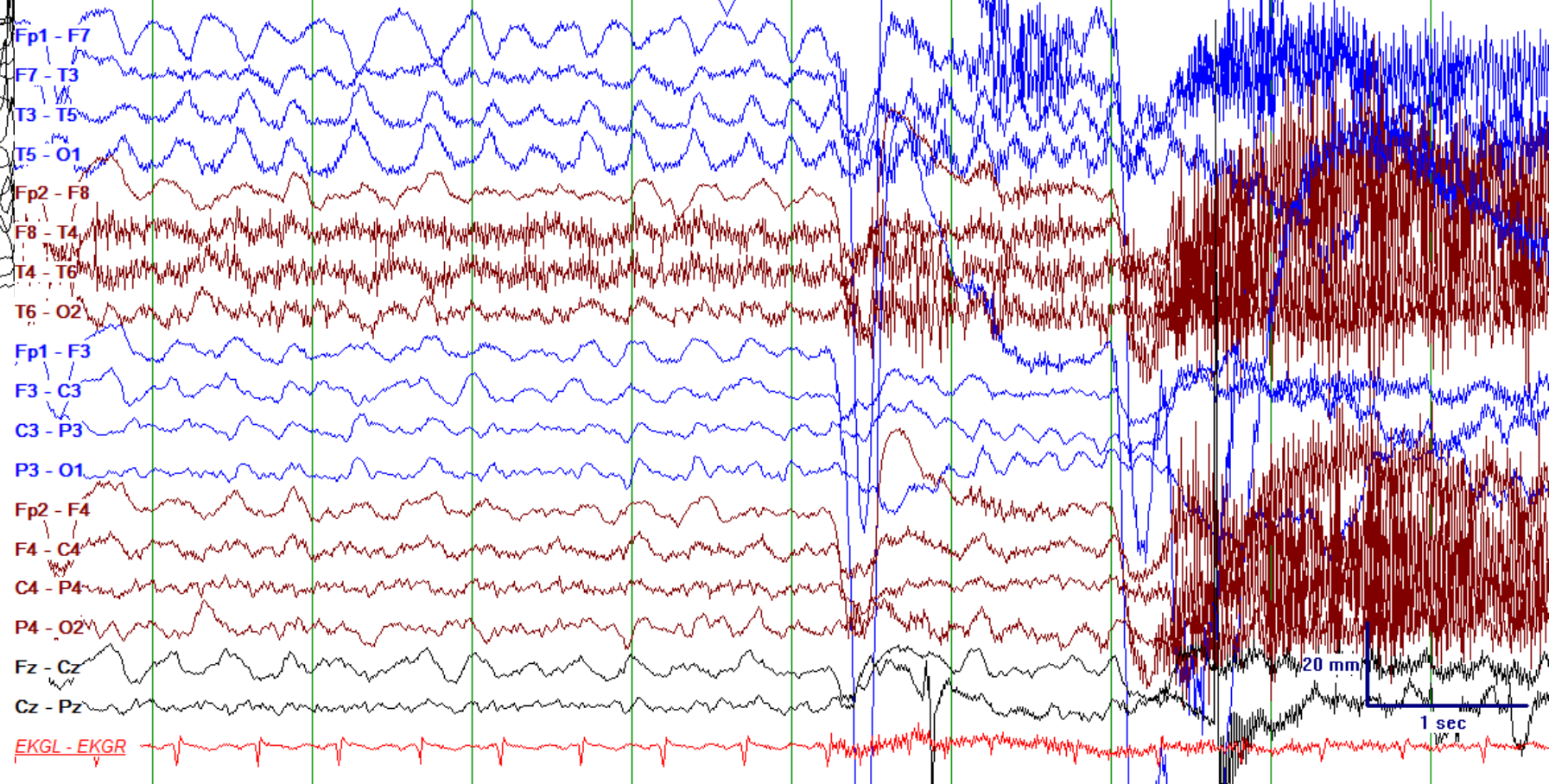
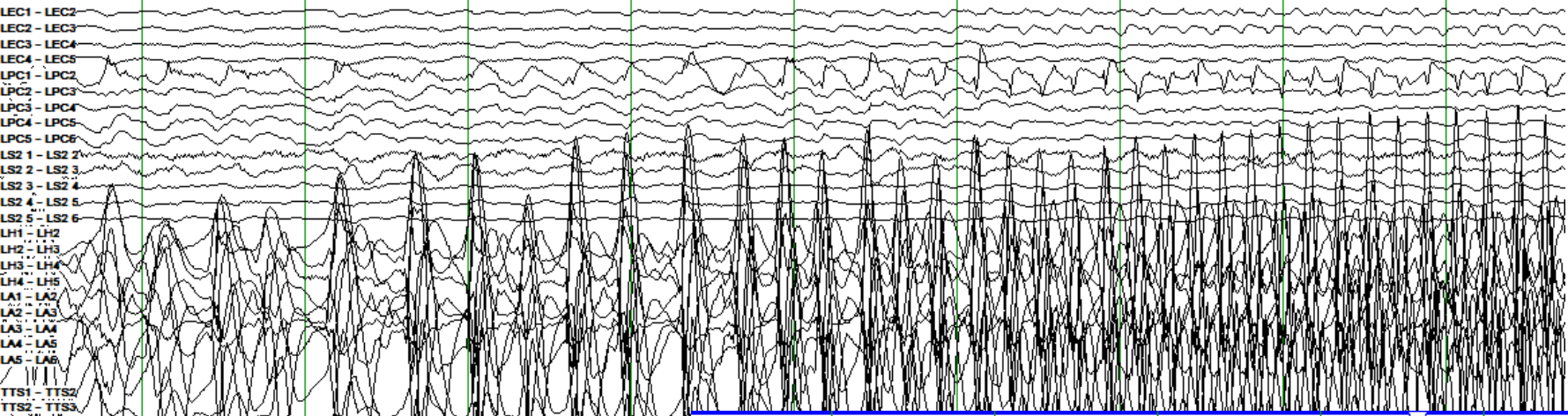


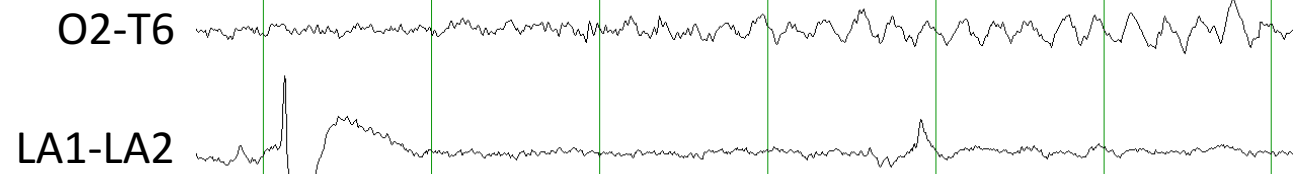
EKGL - EKGR

20 mm

1 sec

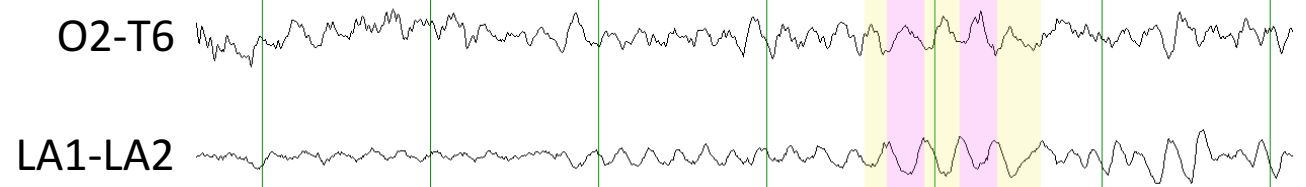
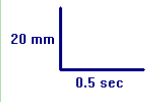






03/31/2019 07:16:00  
MD EYEBLINK ARTIFACT ON SCALP

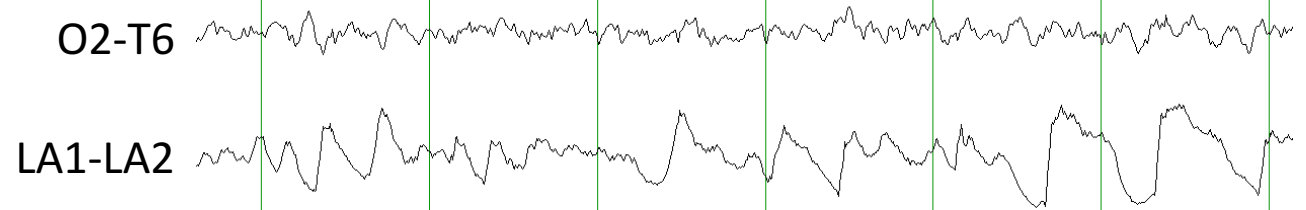
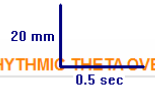
03/31/2019 07:16:03  
[ ] SZ



03/31/2019 07:16:08  
MD LH7 ARTIFACT

03/31/2019 07:16:09 03/31/2019 07:16:10  
MD 5 HZ PBR-L MD ICTAL ONSET: RHYTHMIC

03/31/2019 07:16:12  
THETA OVER LA AND MD IMPORTANT: COMPARE LA1-2 TO

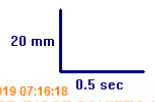


T6-O2

03/31/2019 07:16:15  
MD BUILDUP INTO DELTA LH, LA, LTLS1

03/31/2019 07:16:18  
MD PBR DISORGANIZES ON THE L, PERSISTS ON THE R

03/31/2019 07:16:19  
MD EVOLUT



# Interictal

- Frequent Spikes: left hippocampus, amygdala, lateral temporal tip
- Less frequent: posterior temporal lobe strip
- Frequent runs of temporal tip spikes at times synchronously with left hippocampus and amygdala

# Ictal

- Three focal seizures are noted on scalp with 5-6 Hz possible right posterior quadrant rhythmic activity preceding SEEG onset in L T tip by 6 to 20 seconds later

Summary

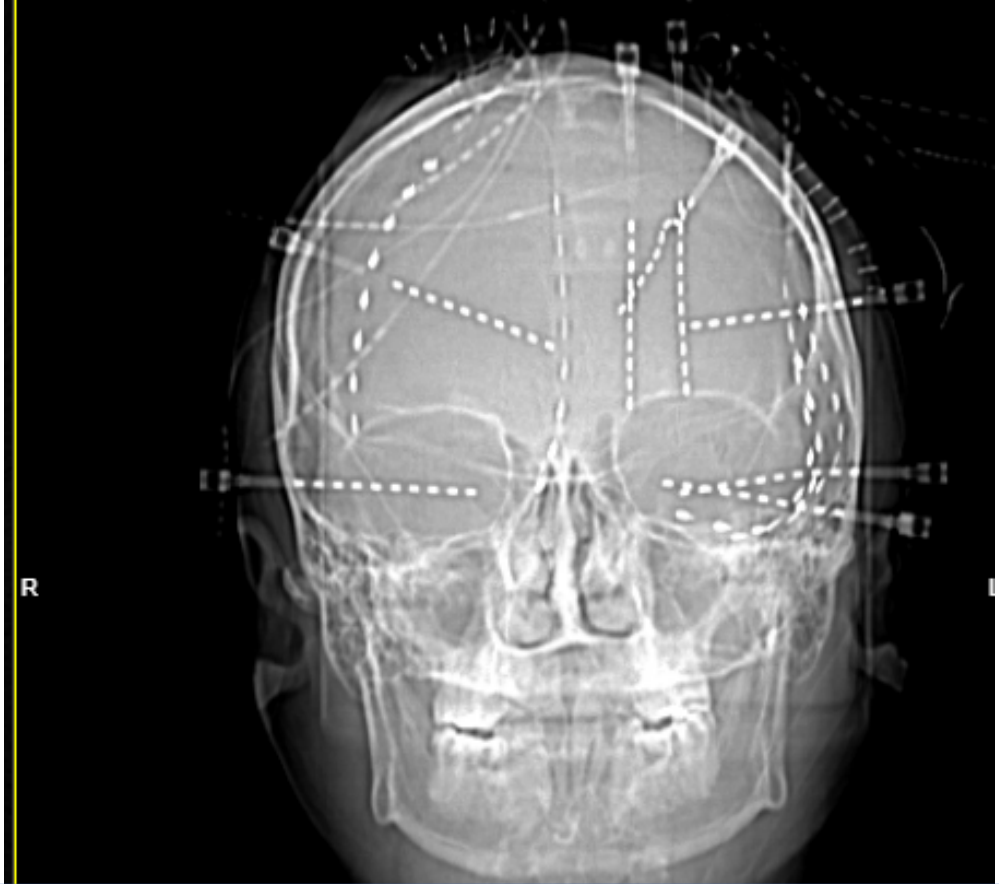


SEEG



# Discussion

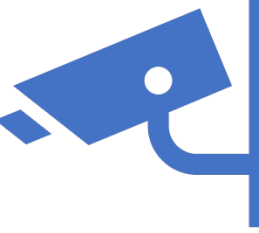




- Right parieto-occipital lesion (ROL), right hippocampus (RH) electrodes
- Right medial parietal lobe (RMS), right lateral parietal strip (RLS)

Additional right-side electrodes placement

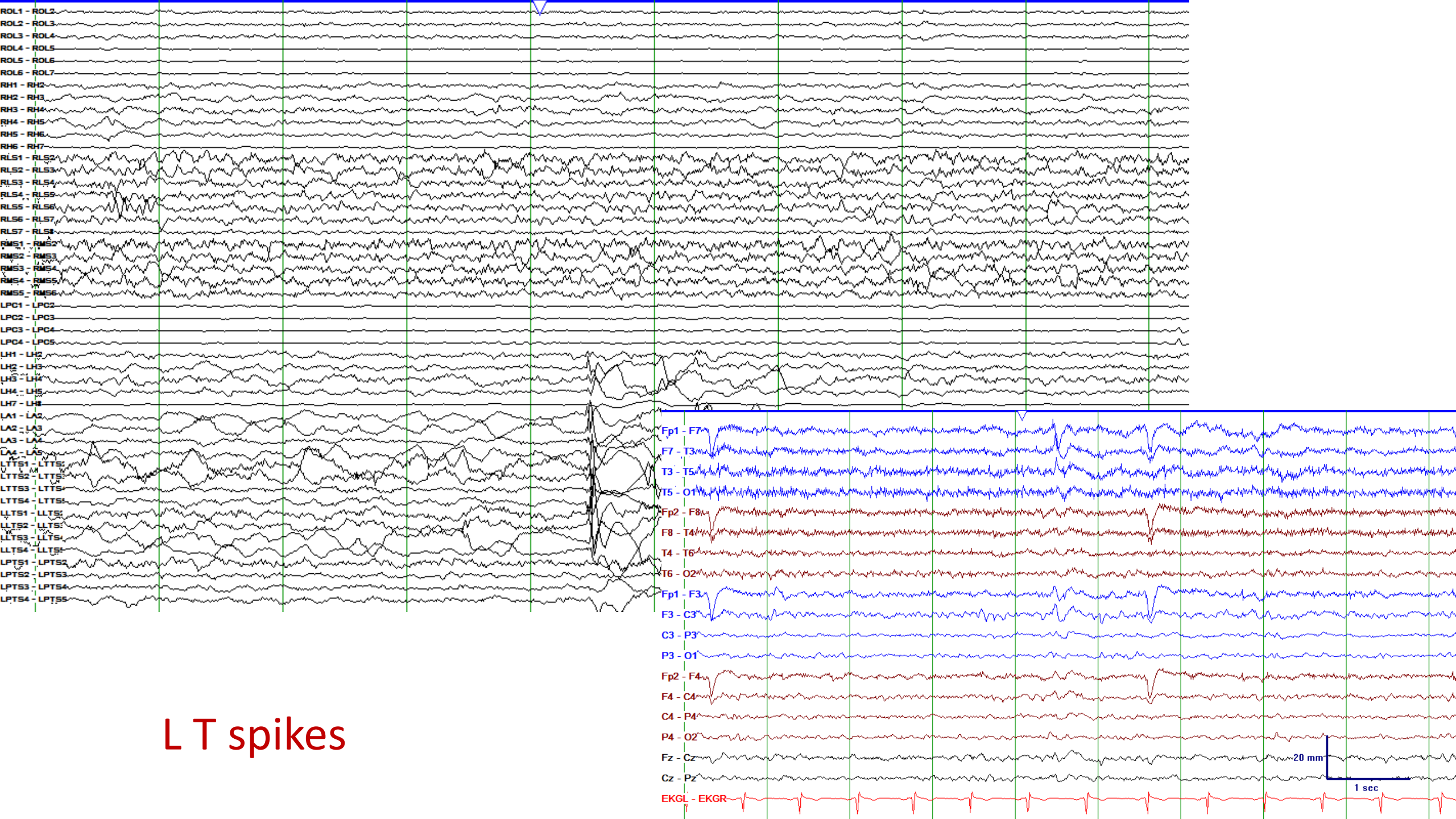




# Video EEG



Interictal Epileptiform Discharges

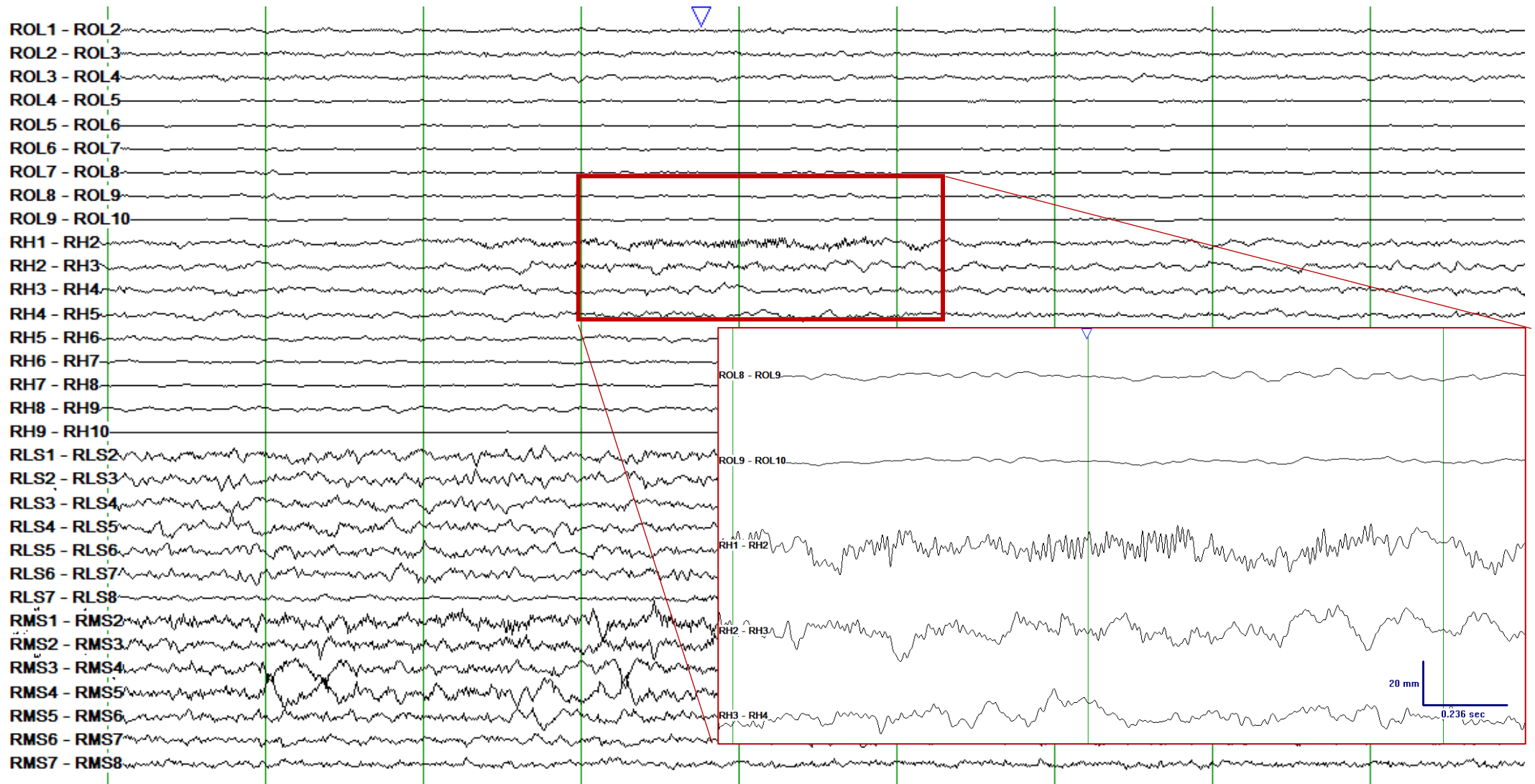


L T spikes

# RLS Spikes



# RH HFO

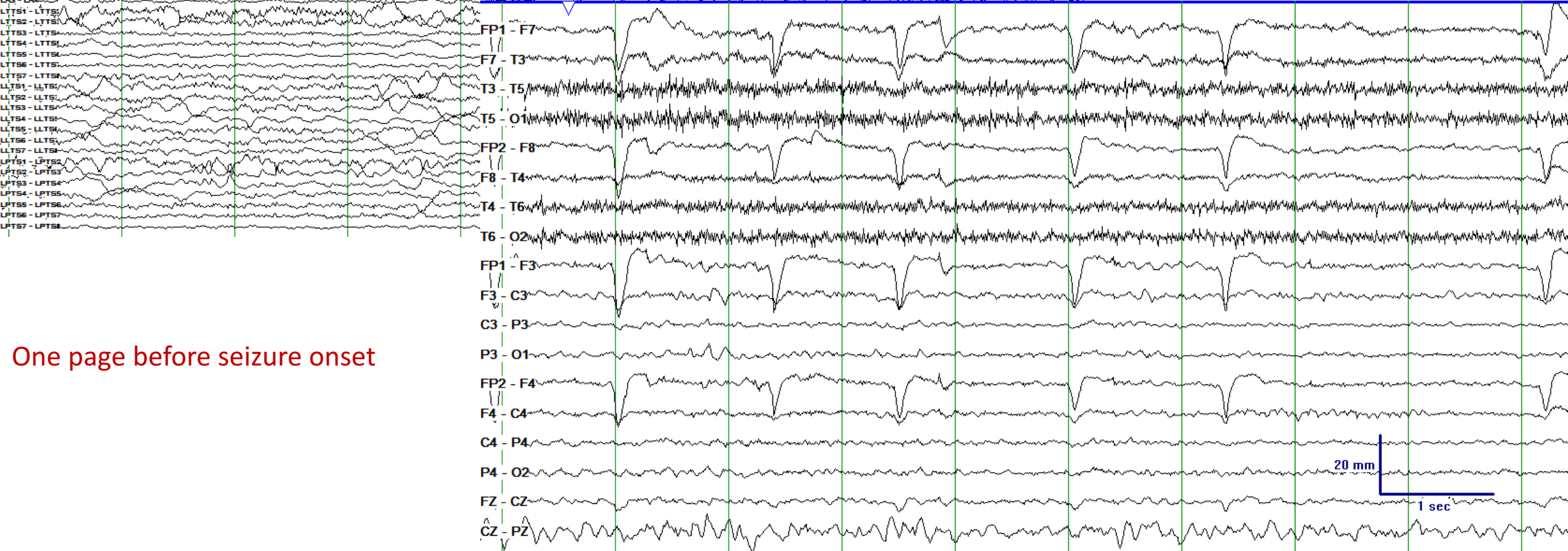




Video EEG

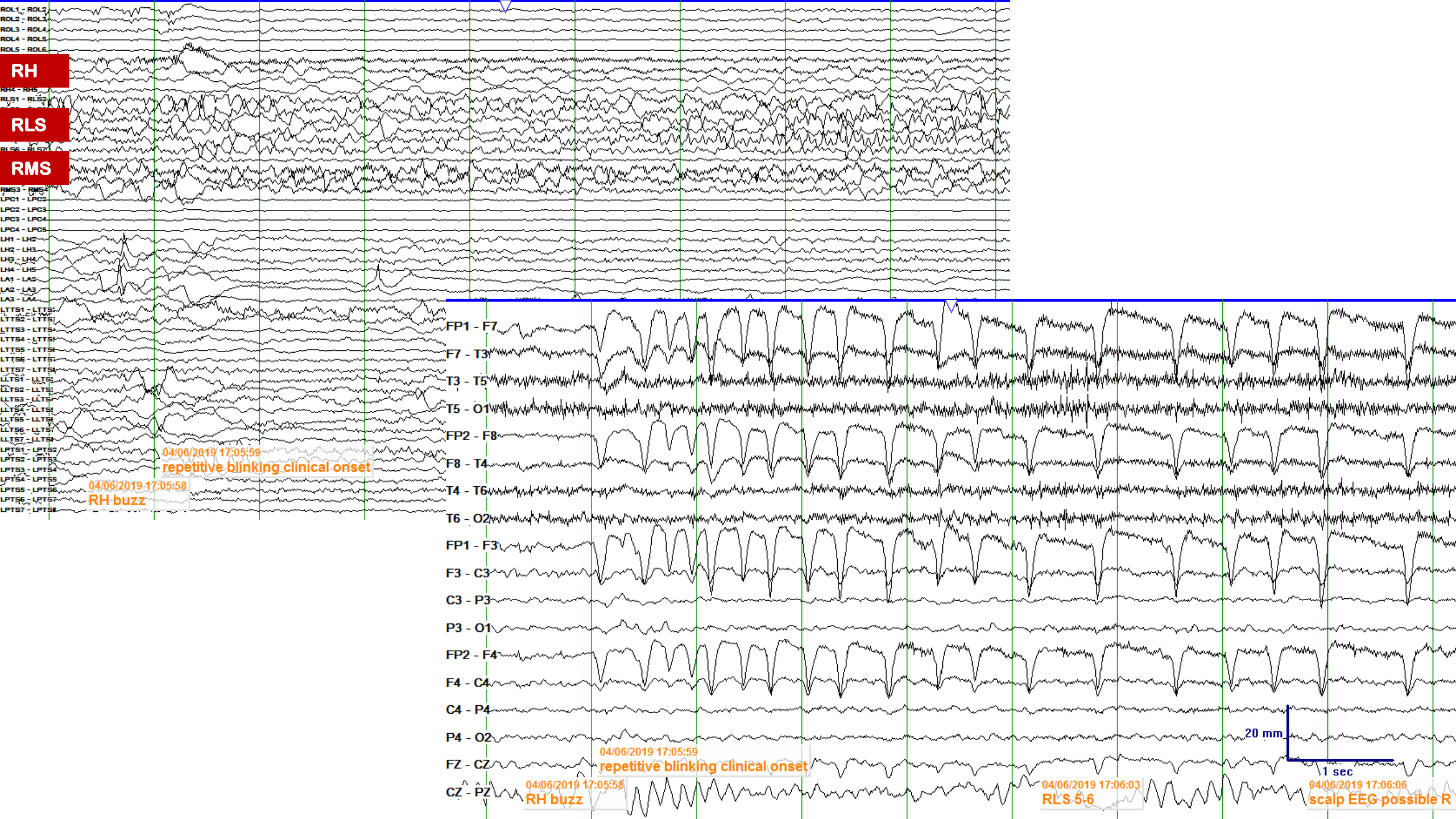


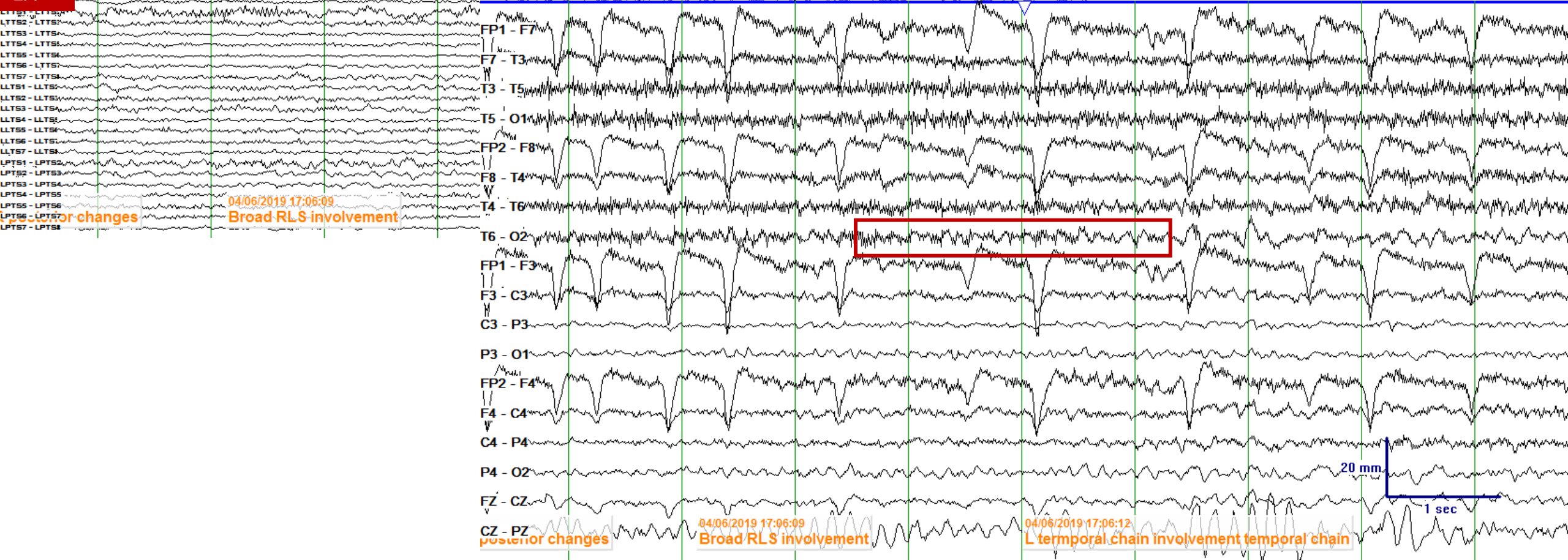
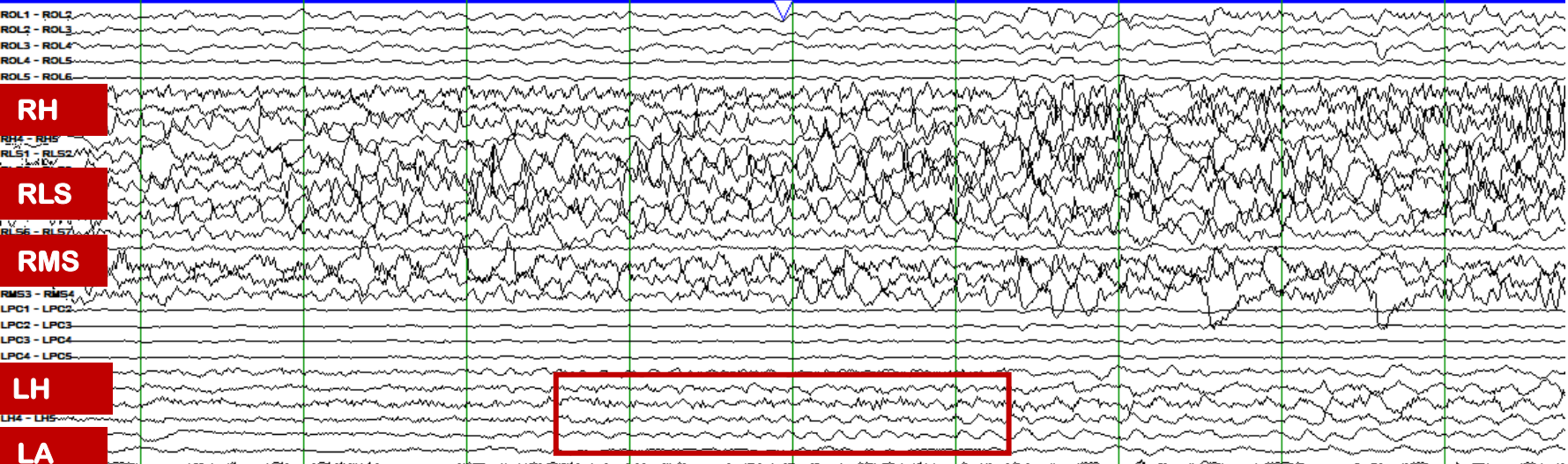
Seizures

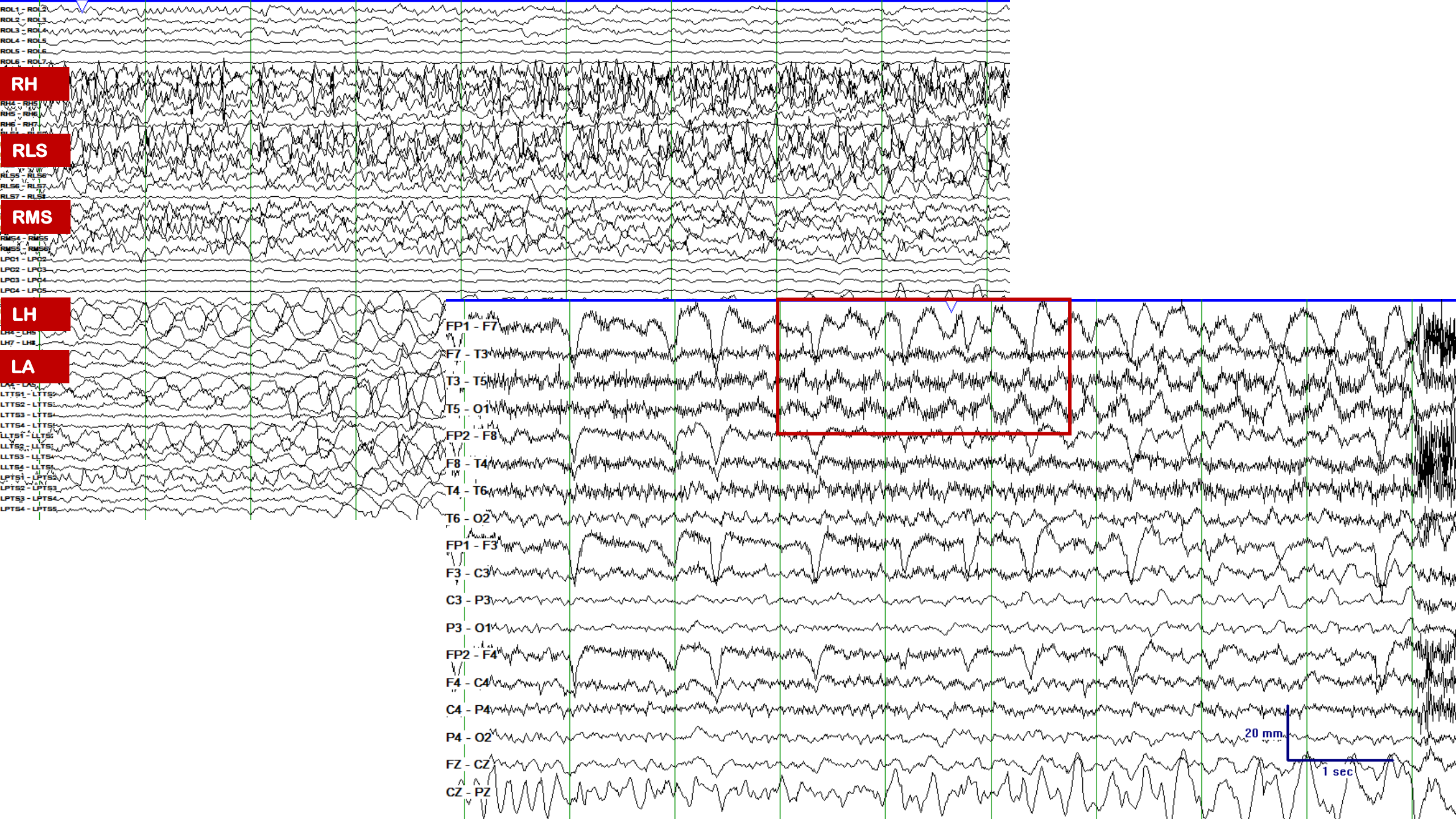


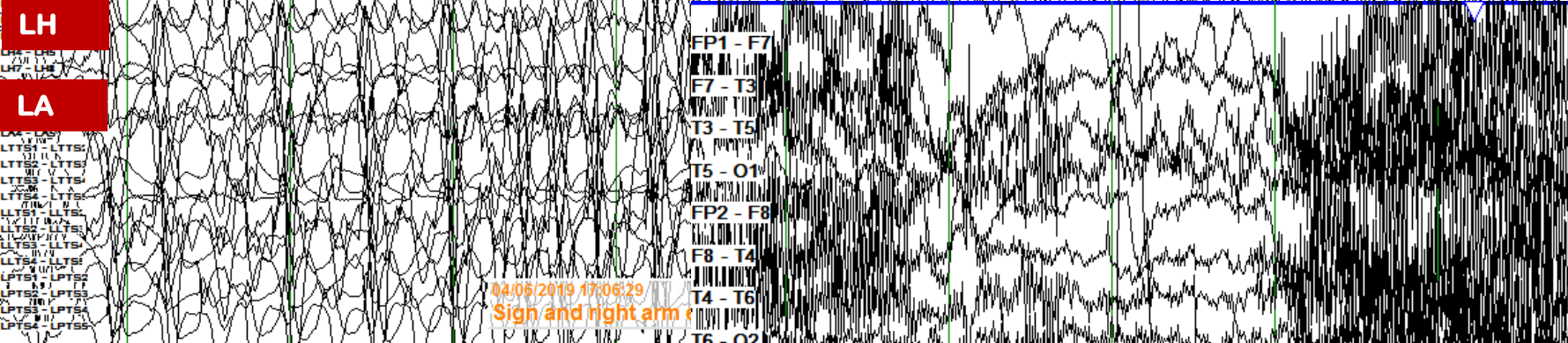
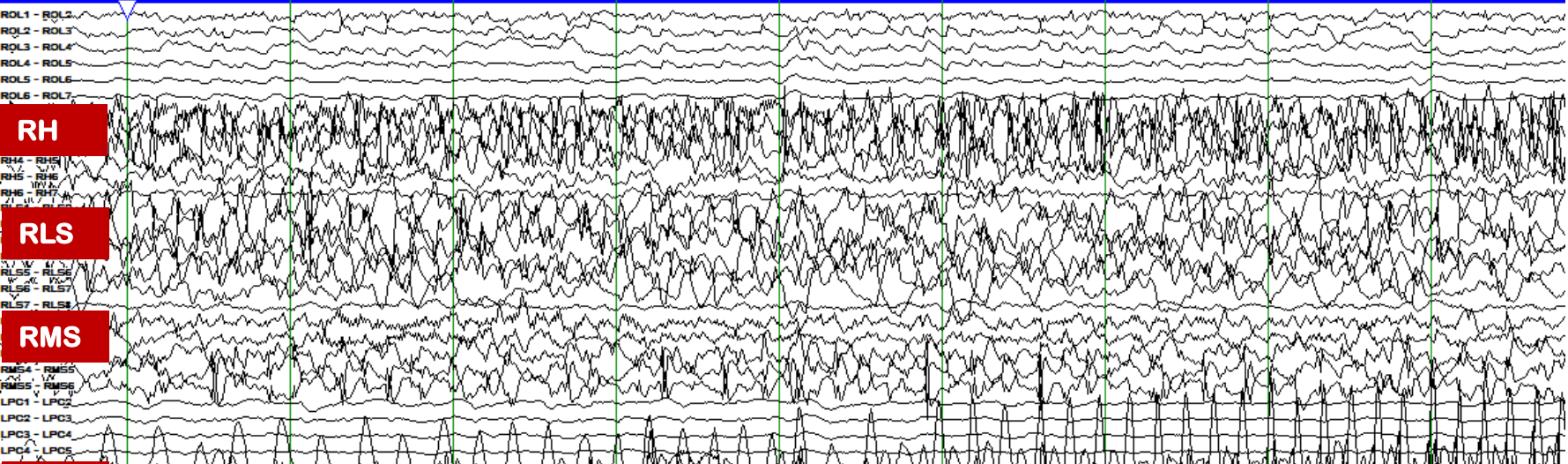
One page before seizure onset



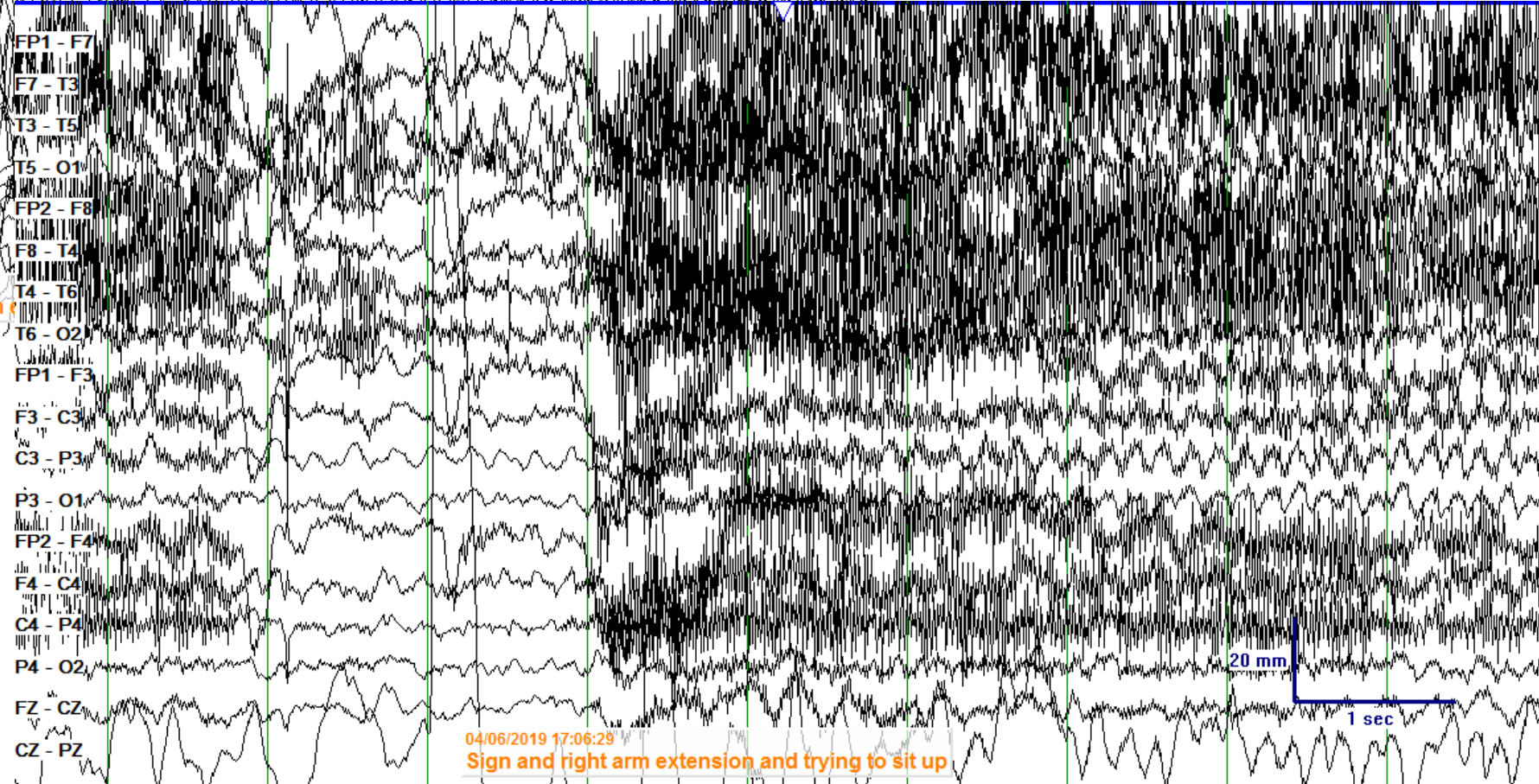






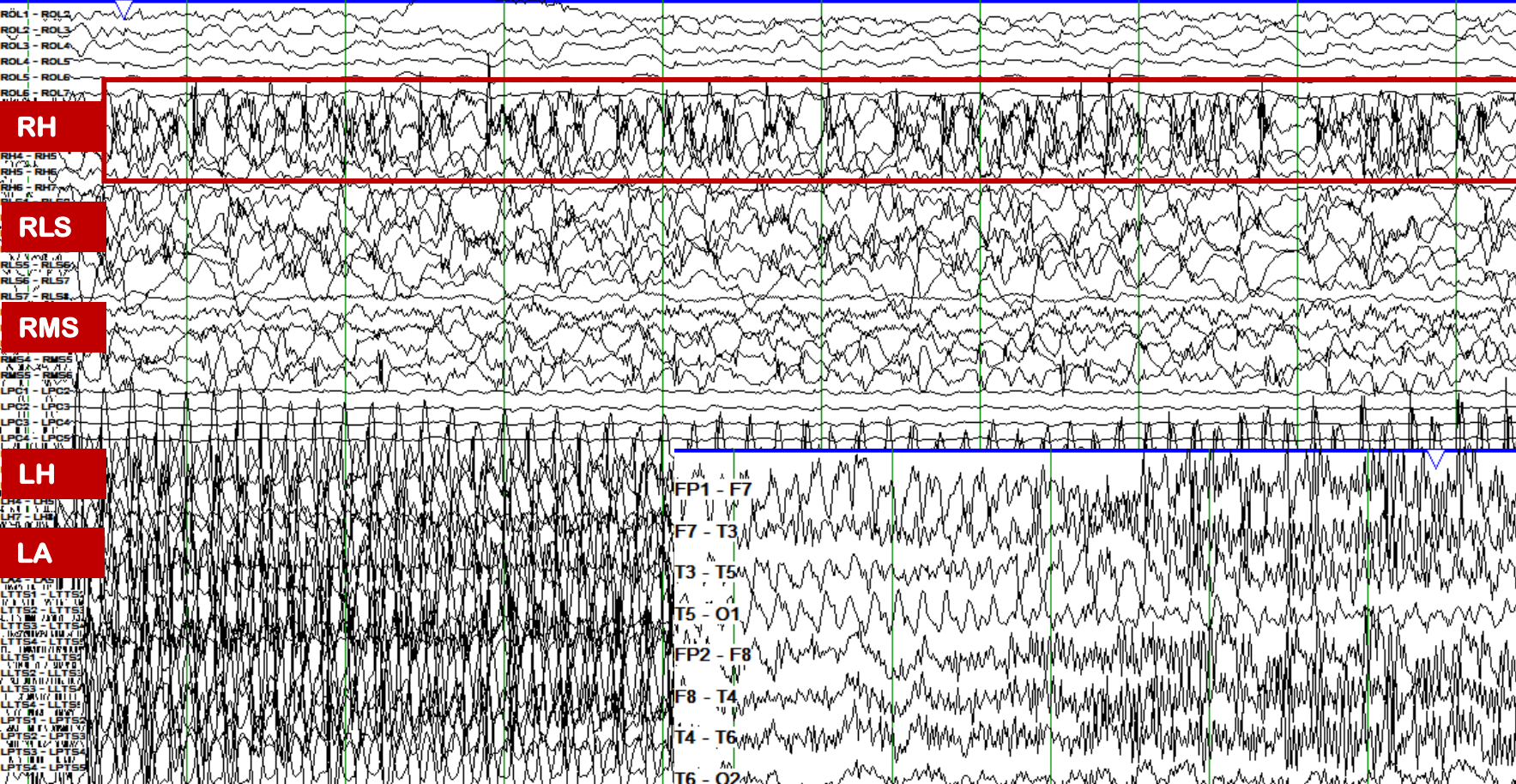


04/06/2019 17:06:29  
Sign and right arm e

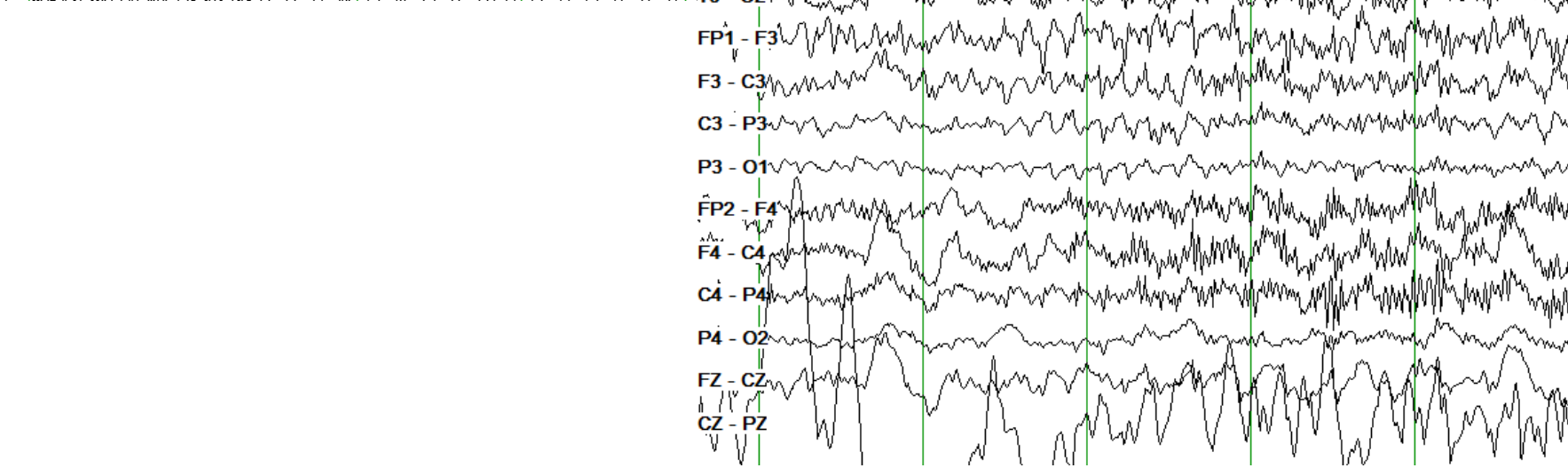


04/06/2019 17:06:29  
Sign and right arm extension and trying to sit up

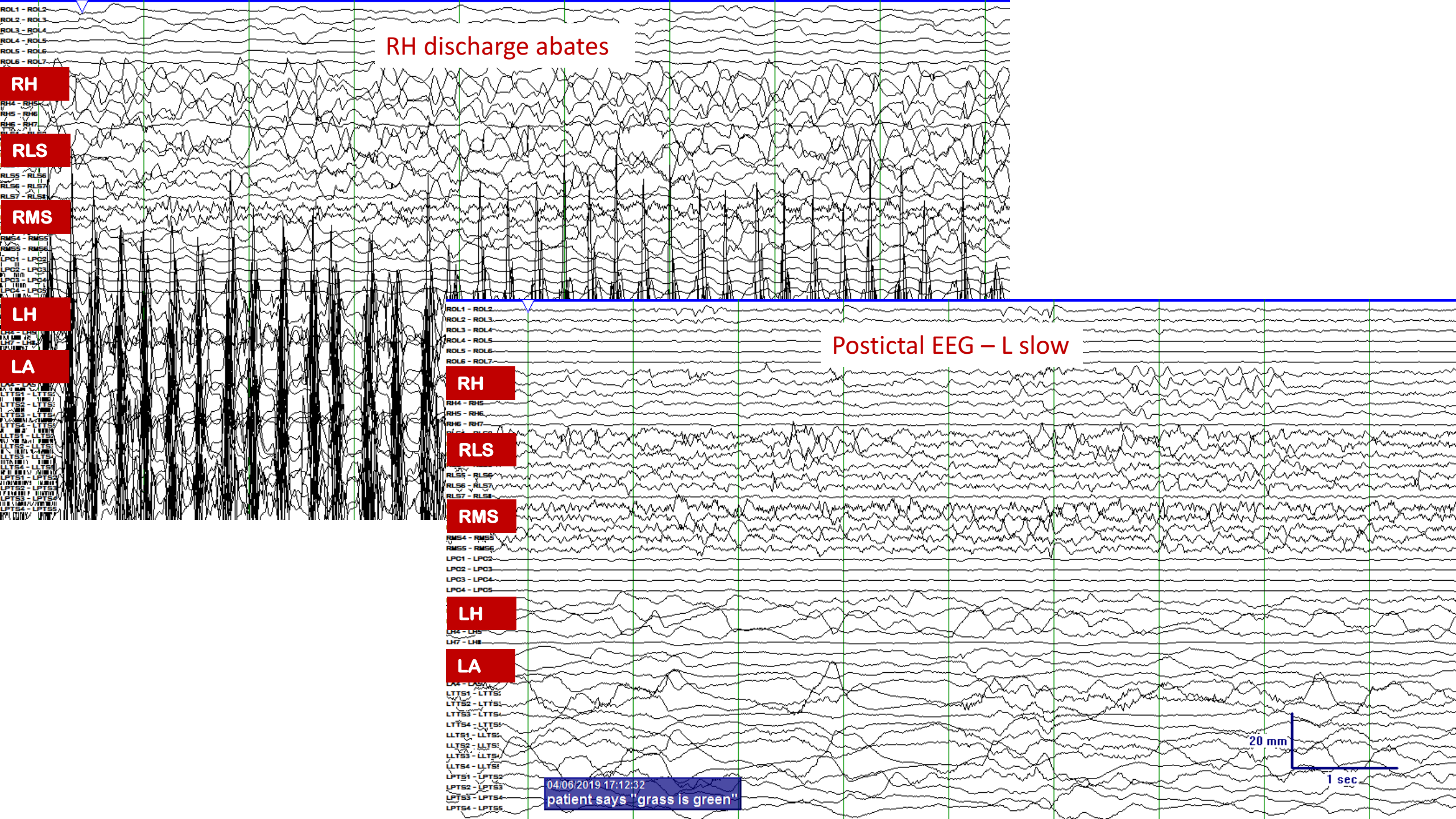
20 mm  
1 sec



No scalp EEG correlate



20 mm  
1 sec



RH discharge abates

Postictal EEG - L slow

04/06/2019 17:12:32  
patient says "grass is green"

20 mm  
1 sec

RH

RLS

RMS

LH

LA

RH

RLS

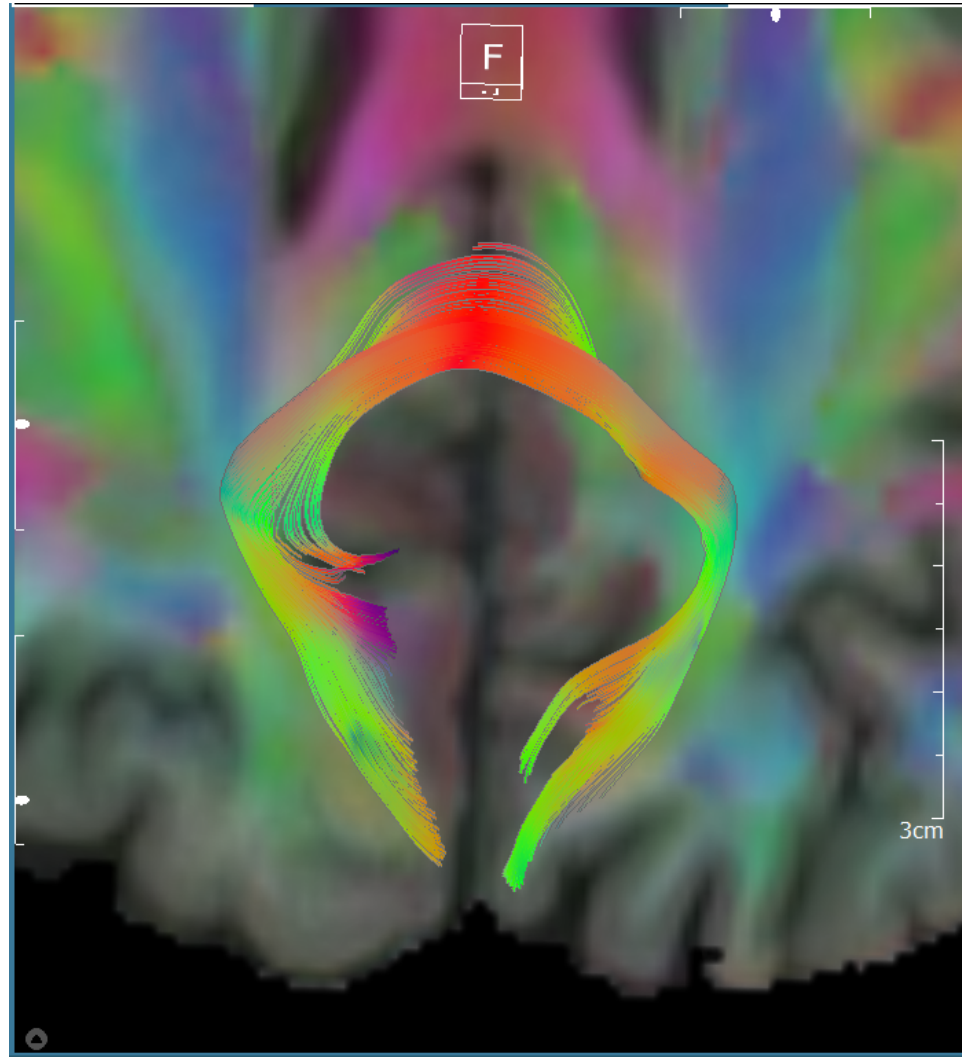
RMS

LH

LA

ROL1 - ROL2  
ROL2 - ROL3  
ROL3 - ROL4  
ROL4 - ROL5  
ROL5 - ROL6  
ROL6 - ROL7  
RH4 - RH5  
RH5 - RH6  
RH6 - RH7  
RLS5 - RLS6  
RLS6 - RLS7  
RLS7 - RLS8  
RMS4 - RMS5  
RMS5 - RMS6  
LPC1 - LPC2  
LPC2 - LPC3  
LPC3 - LPC4  
LPC4 - LPC5  
LH4 - LH5  
LH5 - LH6  
LH6 - LH7  
LA1 - LA2  
LTS1 - LTS2  
LTS2 - LTS3  
LTS3 - LTS4  
LTS4 - LTS5  
LTS1 - LTS2  
LTS2 - LTS3  
LTS3 - LTS4  
LTS4 - LTS5  
LTS1 - LTS2  
LTS2 - LTS3  
LTS3 - LTS4  
LTS4 - LTS5  
LTS1 - LTS2  
LTS2 - LTS3  
LTS3 - LTS4  
LTS4 - LTS5

ROL1 - ROL2  
ROL2 - ROL3  
ROL3 - ROL4  
ROL4 - ROL5  
ROL5 - ROL6  
ROL6 - ROL7  
RH4 - RH5  
RH5 - RH6  
RH6 - RH7  
RLS5 - RLS6  
RLS6 - RLS7  
RLS7 - RLS8  
RMS4 - RMS5  
RMS5 - RMS6  
LPC1 - LPC2  
LPC2 - LPC3  
LPC3 - LPC4  
LPC4 - LPC5  
LH4 - LH5  
LH5 - LH6  
LH6 - LH7  
LA1 - LA2  
LTS1 - LTS2  
LTS2 - LTS3  
LTS3 - LTS4  
LTS4 - LTS5  
LTS1 - LTS2  
LTS2 - LTS3  
LTS3 - LTS4  
LTS4 - LTS5  
LTS1 - LTS2  
LTS2 - LTS3  
LTS3 - LTS4  
LTS4 - LTS5



Abnormal peri-lesional tracts of the right tracing from the corpus callosum with the splenium as ROI

# Surgical Procedures



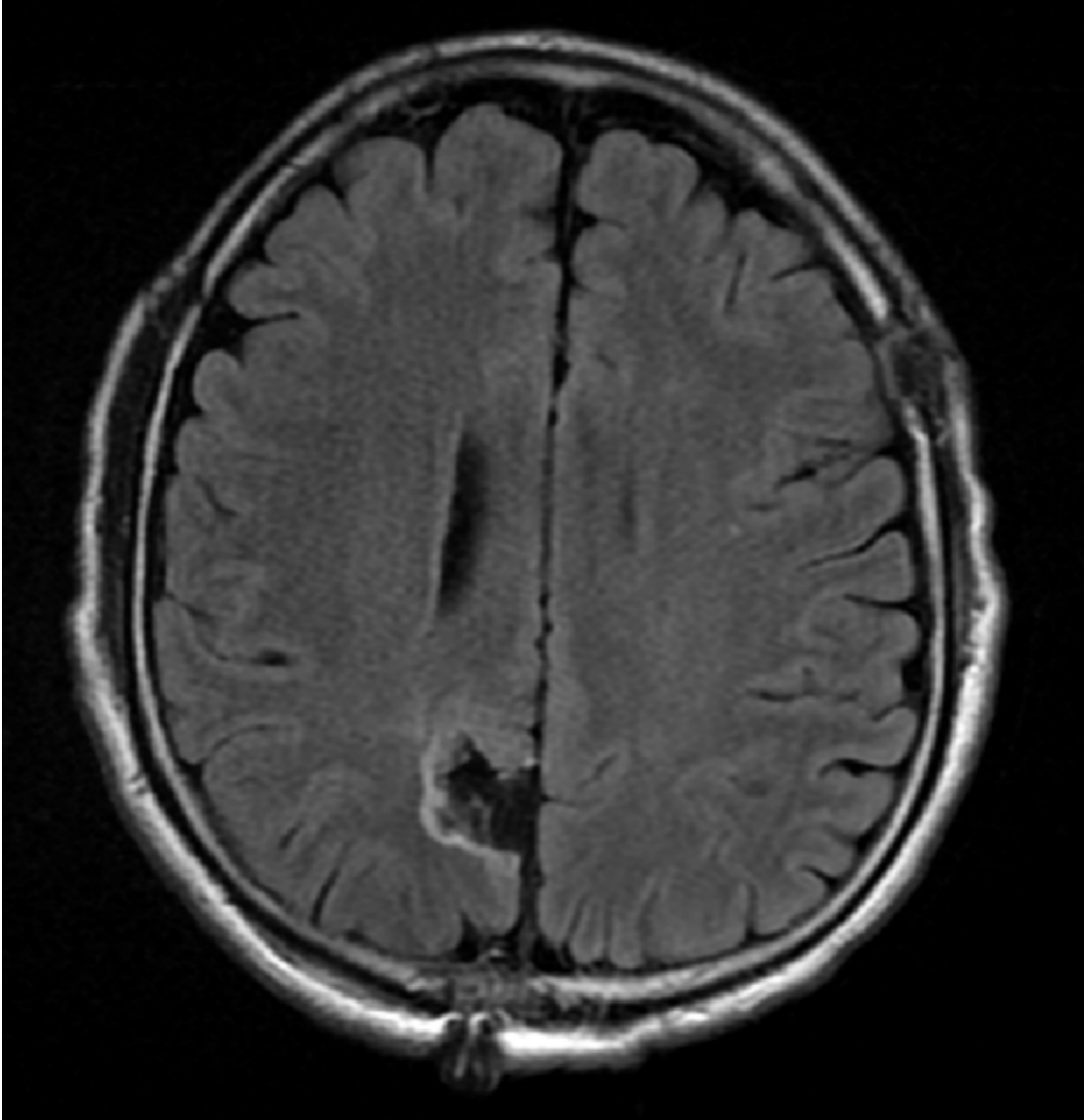


➤ Right parietooccipital craniotomy for removal of cysticercosis lesion and surrounding parenchyma.

5/08/2019



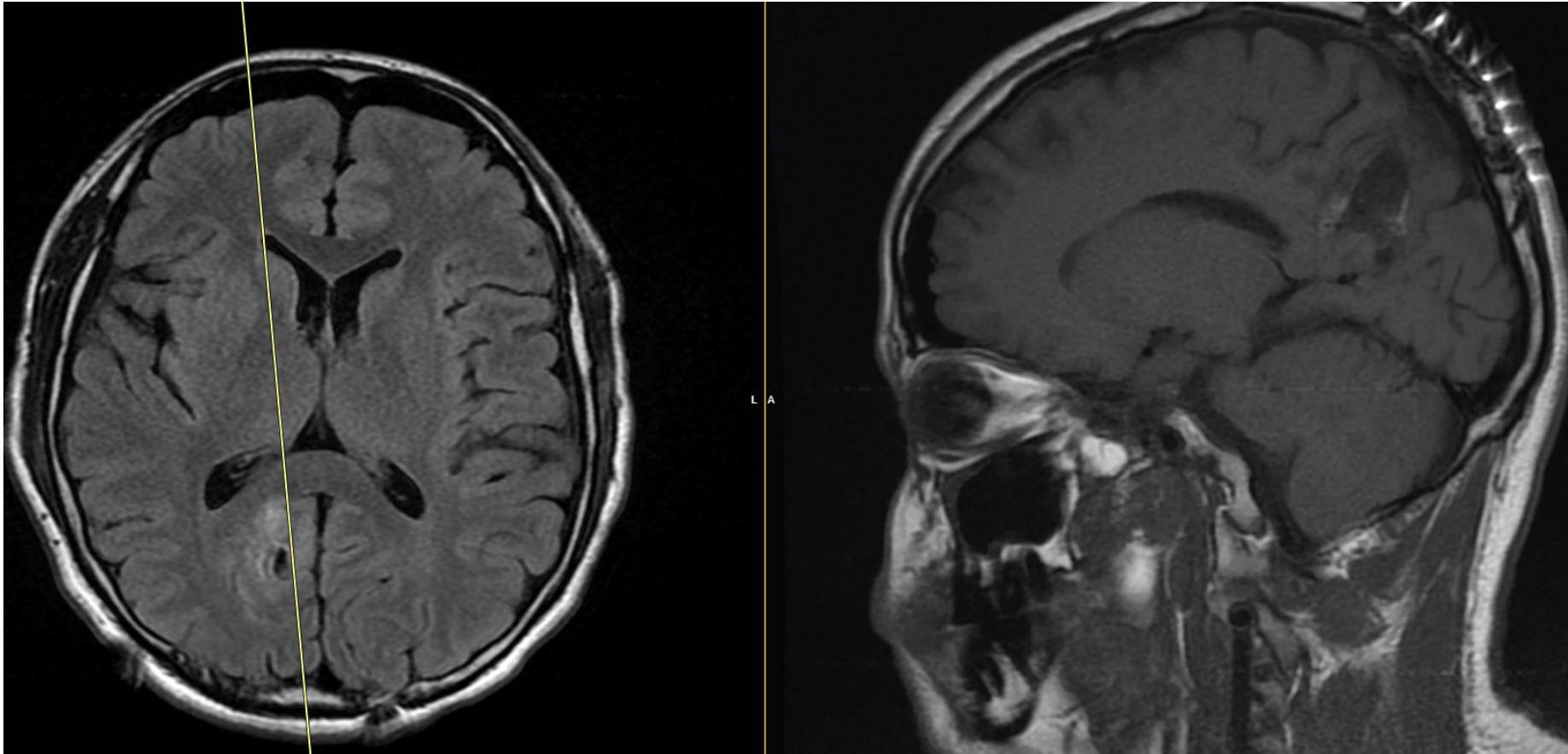
Surgery



Post resection



Surgery



Post resection



Surgery

Outcome



- The patient has been seizure-free for 3 years postoperatively.
- At one year postop, two of three medications were tapered and discontinued.



outcome