2023 GW Epilepsy Board Review & Best Practices

ICTAL EEG PATTERNS IN STATUS EPILEPTICUS

GWU Board Review Course
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Overview

- Status epilepticus (SE) definitions
- EEG features in SE
  - Convulsive SE
  - Nonconvulsive SE
- Ictal-interictal patterns in “boundary syndromes”
  - Severe neonatal epileptic encephalopathy
  - Infantile spasms
  - Lennox-gastaut syndrome
  - EE-SWAS

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Status epilepticus (SE) definitions

- Continuous seizure for ≥ 30 minutes
- Recurrent seizures for > 30 minutes without return to baseline mental status
- Recurrent seizures for ≥50% of an EEG epoch

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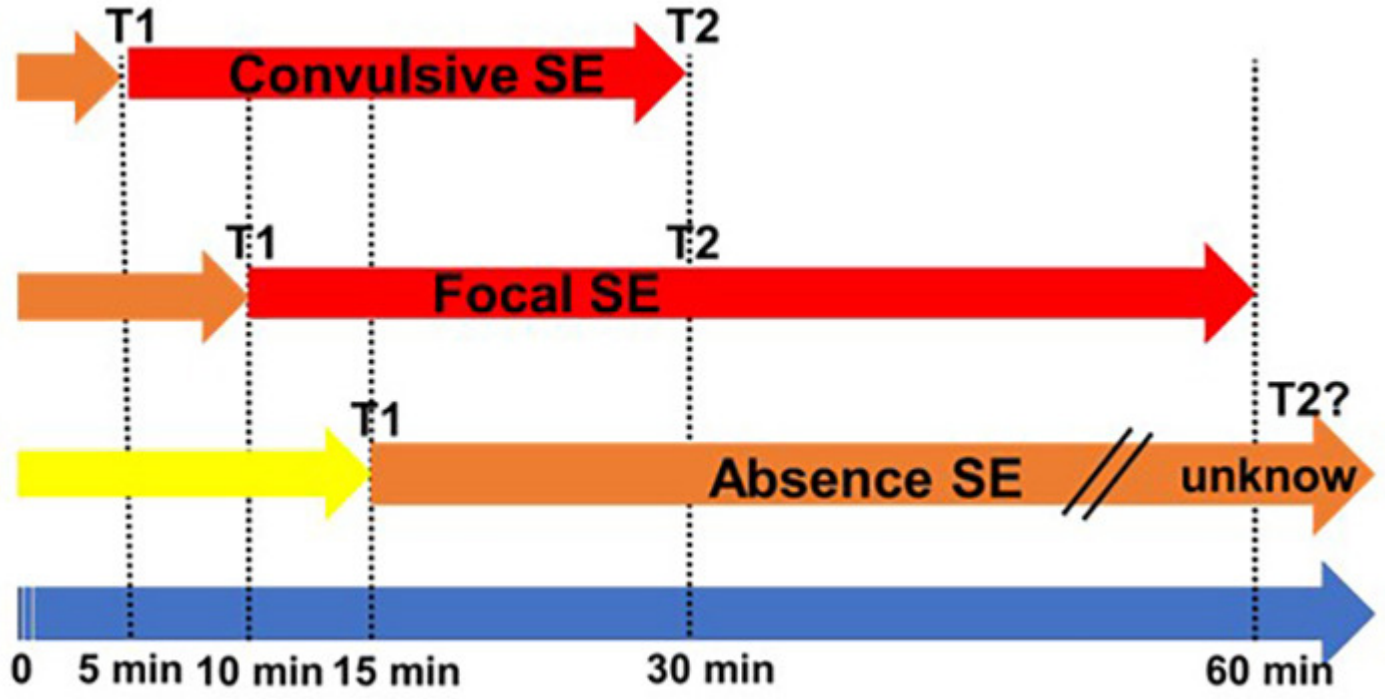
SE- Operational definition and classification



Pinto et al 2022, adapted from Trinka et al 2015

Table 2. Axis I: Classification of status epilepticus (SE)

(A) With prominent motor symptoms
A.1 Convulsive SE (CSE, synonym: tonic–clonic SE)
- A.1.a. Generalized convulsive
- A.1.b. Focal onset evolving into bilateral convulsive SE
- A.1.c. Unknown whether focal or generalized

A.2 Myoclonic SE (prominent epileptic myoclonic jerks)
- A.2.a. With coma
- A.2.b. Without coma

A.3 Focal motor
- A.3.a. Repeated focal motor seizures (Jacksonian)
- A.3.b. Epilepsia partialis continua (EPC)
- A.3.c. Adversive status
- A.3.d. Oculoclonic status
- A.3.e. Ictal paresis (i.e., focal inhibitory SE)

A.4 Tonic status

A.5 Hyperkinetic SE

(B) Without prominent motor symptoms (i.e., nonconvulsive SE, NCSE)

B.1 NCSE with coma (including so-called "subtle" SE)

B.2 NCSE without coma
- B.2.a. Generalized
  - B.2.a.a Typical absence status
  - B.2.a.b Atypical absence status
  - B.2.a.c Myoclonic absence status
- B.2.b. Focal
  - B.2.b.a Without impairment of consciousness (aura continua, with autonomic, sensory, visual, olfactory, gustatory, emotional/psychic/experiential, or auditory symptoms)
  - B.2.b.b Aphasic status
  - B.2.b.c With impaired consciousness
- B.2.c Unknown whether focal or generalized
  - B.2.c.a Autonomic SE

Trinka et al 2015

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Convulsive SE

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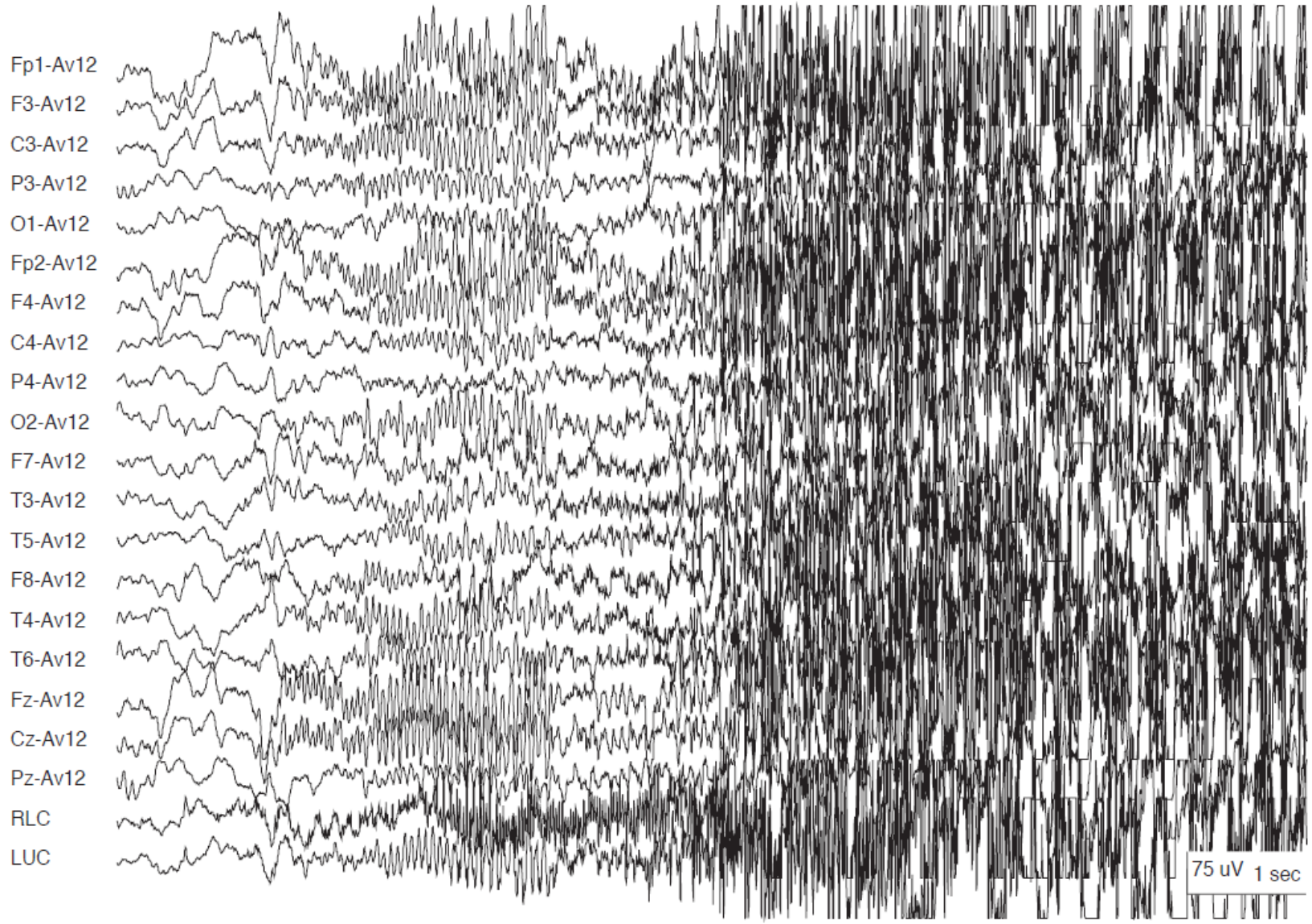
Generalized Convulsive SE (GCSE)



Onset is bilateral symmetric with widespread attenuation/fast activity in the initial tonic phase

Niedermeyer's EEG, 6th edition

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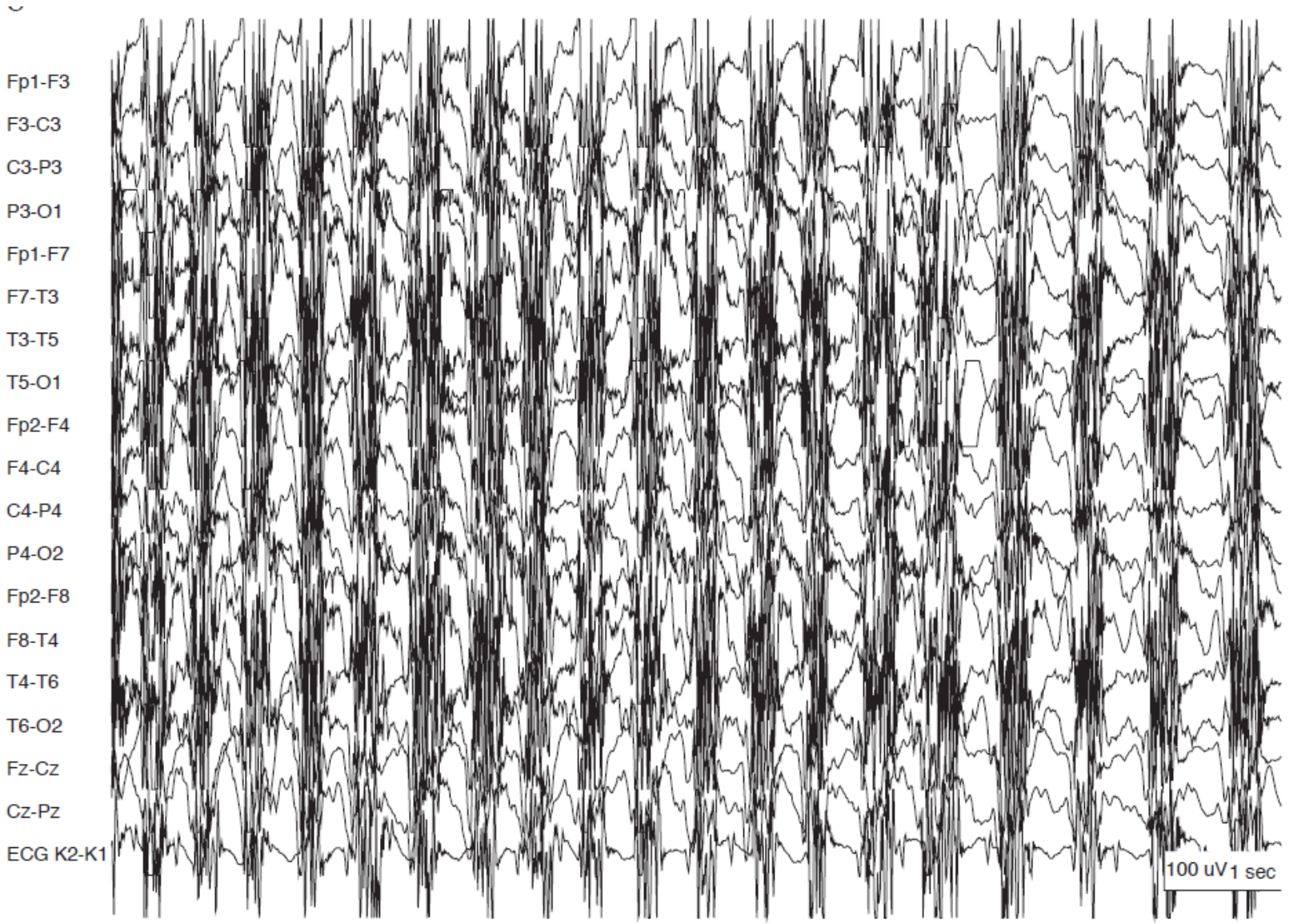
GCSE



Progresses to rhythmic spike activity during clonic phase often obscured by significant muscle artifact

Niedermeyer's EEG, 6th edition

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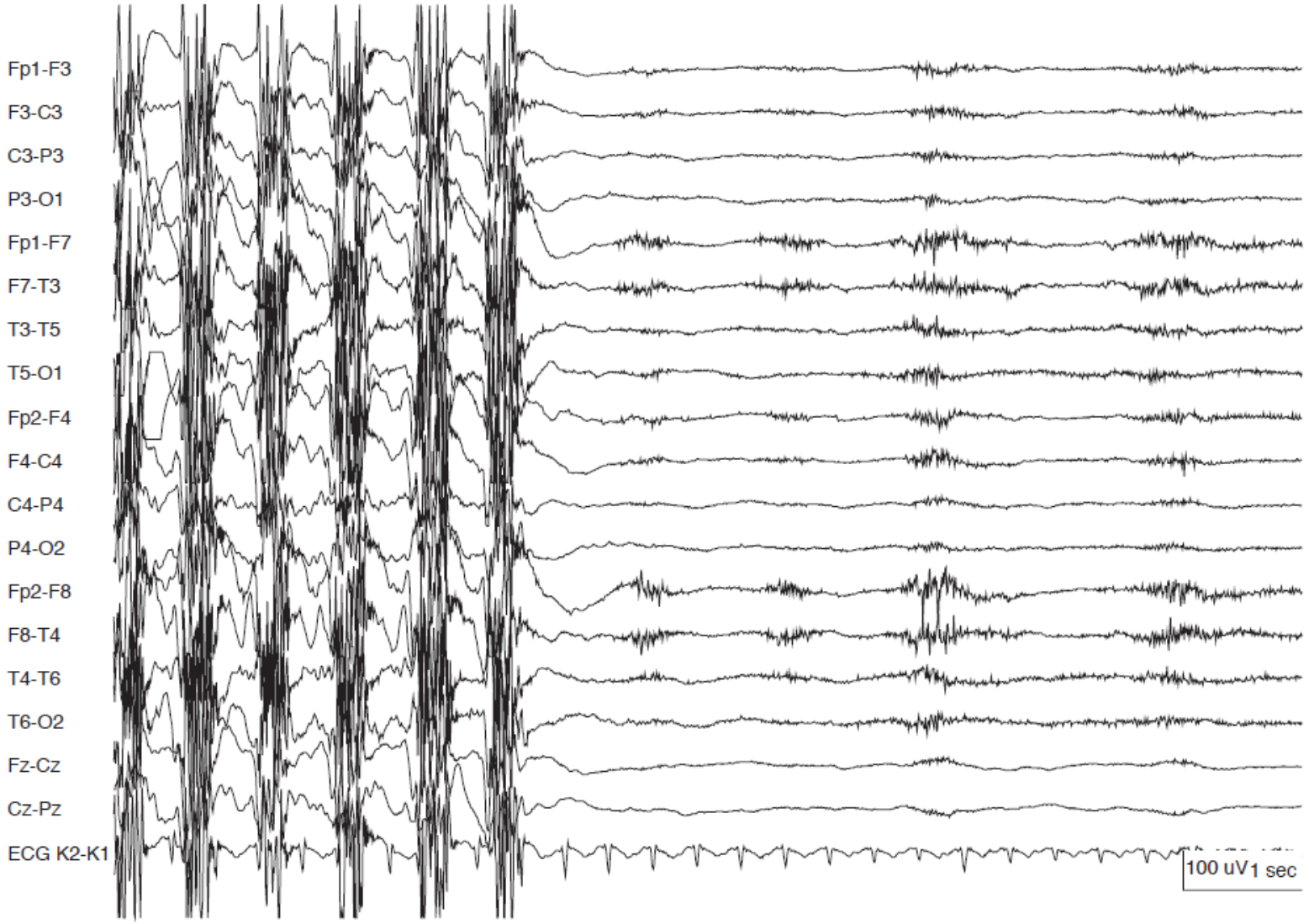
Convulsive SE



End of seizure marked by diffuse slowing or suppression before gradual return of baseline background

Niedermeyer's EEG, 6th edition

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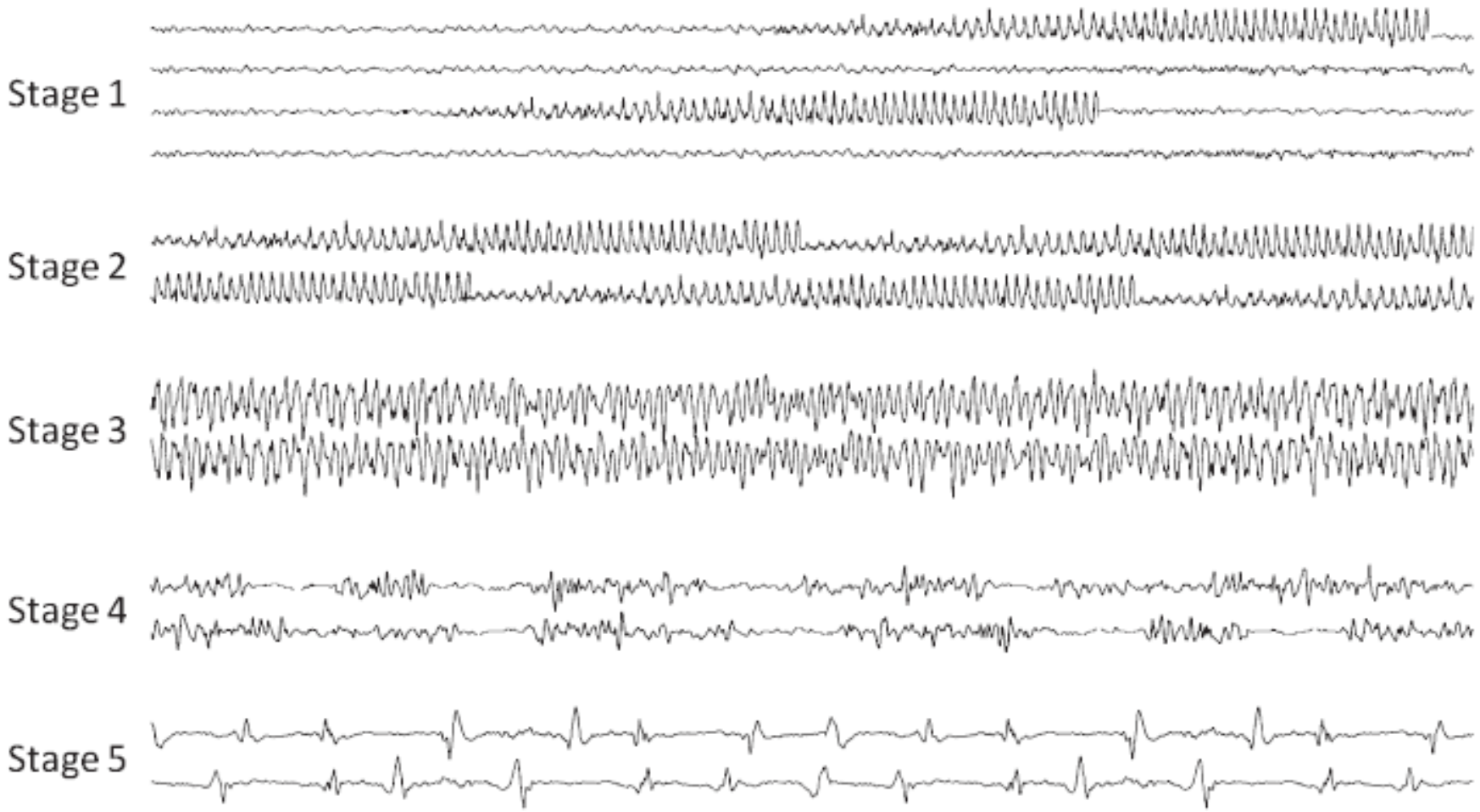
Sequential pattern of SE



Niedermeyer's EEG, 6th edition
Trieman et al, 1990

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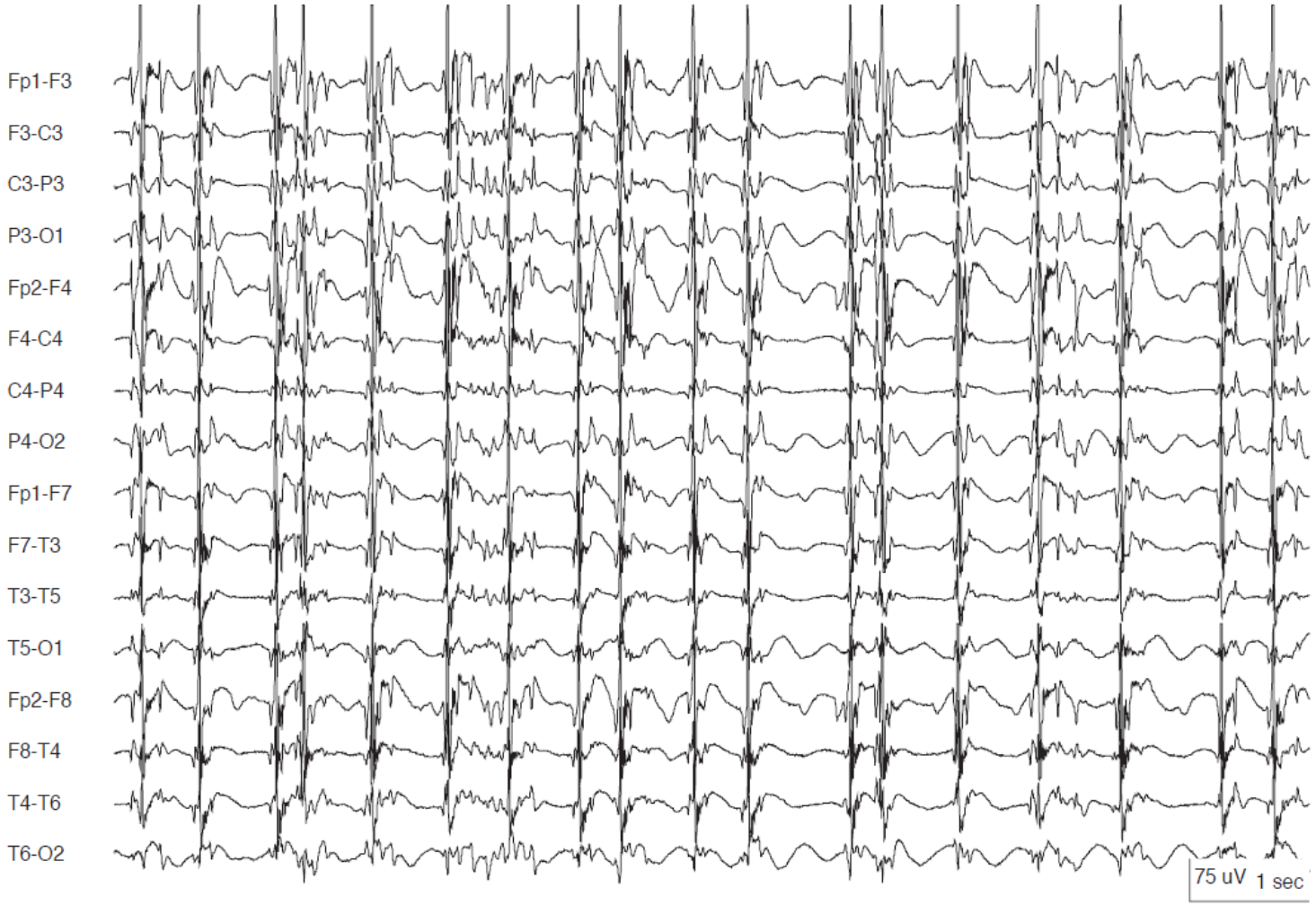
Myoclonic SE

- Etiologies:
  - JME
  - Severe myoclonic epilepsy of infancy
  - Exacerbation in PGE after use of OXC
  - Lennox-gastaut, Myoclonic-astatic, Myoclonic absence epilepsies
  - Anoxic brain injury



Spike wave discharges time locked with jerk

Niedermeyer's EEG, 6th edition

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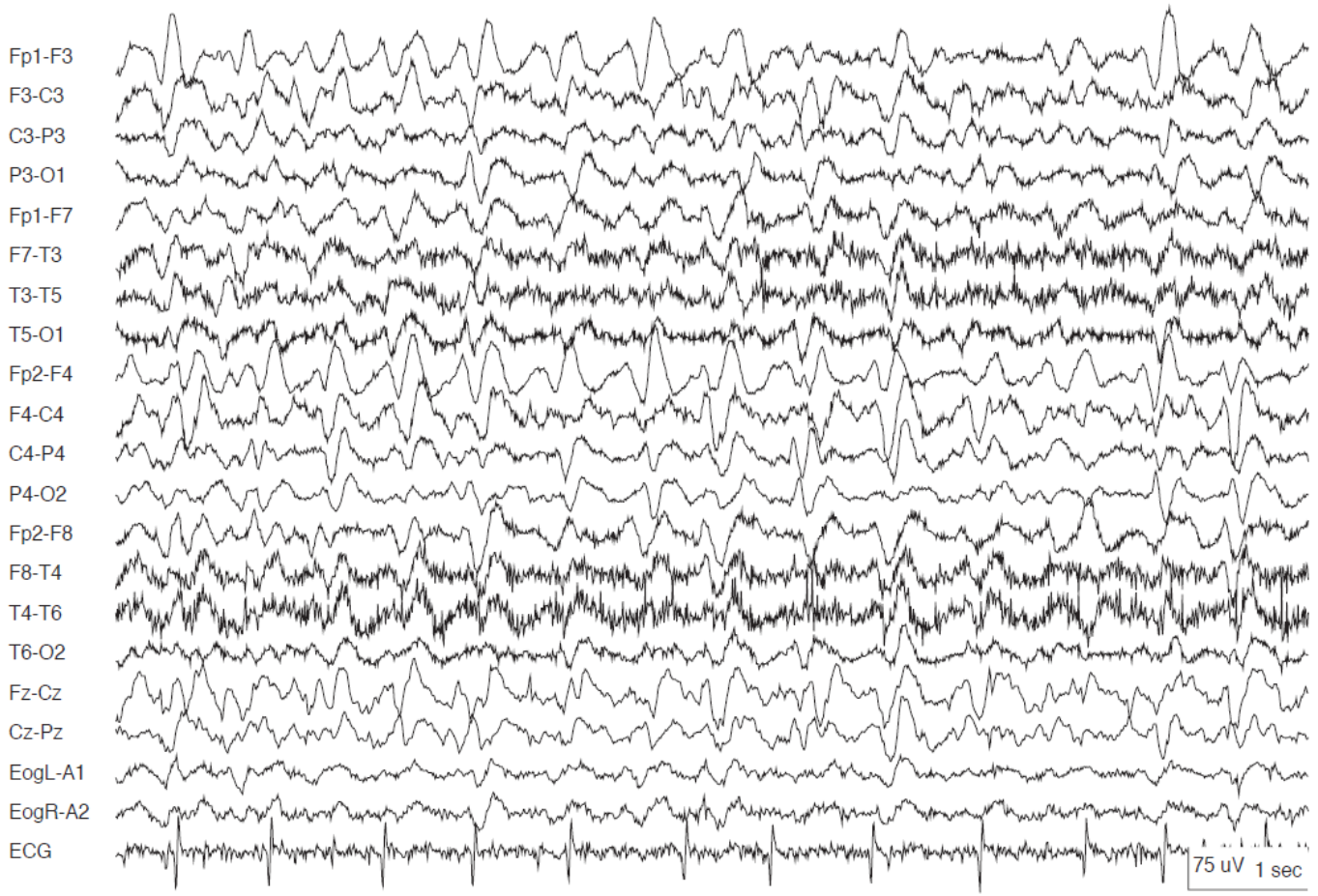
Vs Status Myoclonus

- Not epileptic in origin- background slow, jerks without associated spike-wave on EEG



Niedermeyer's EEG, 6th edition

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Epilepsia partialis continua

- Focal motor SE with prolonged clonic muscular twitching on one side of body at regular intervals
- Can last hours, days, weeks
- Etiology:
  - Children: Rasmussen's encephalitis, Mitochondrial d/o (POLG)
  - Adults: stroke, vascular lesion, tumor, infection

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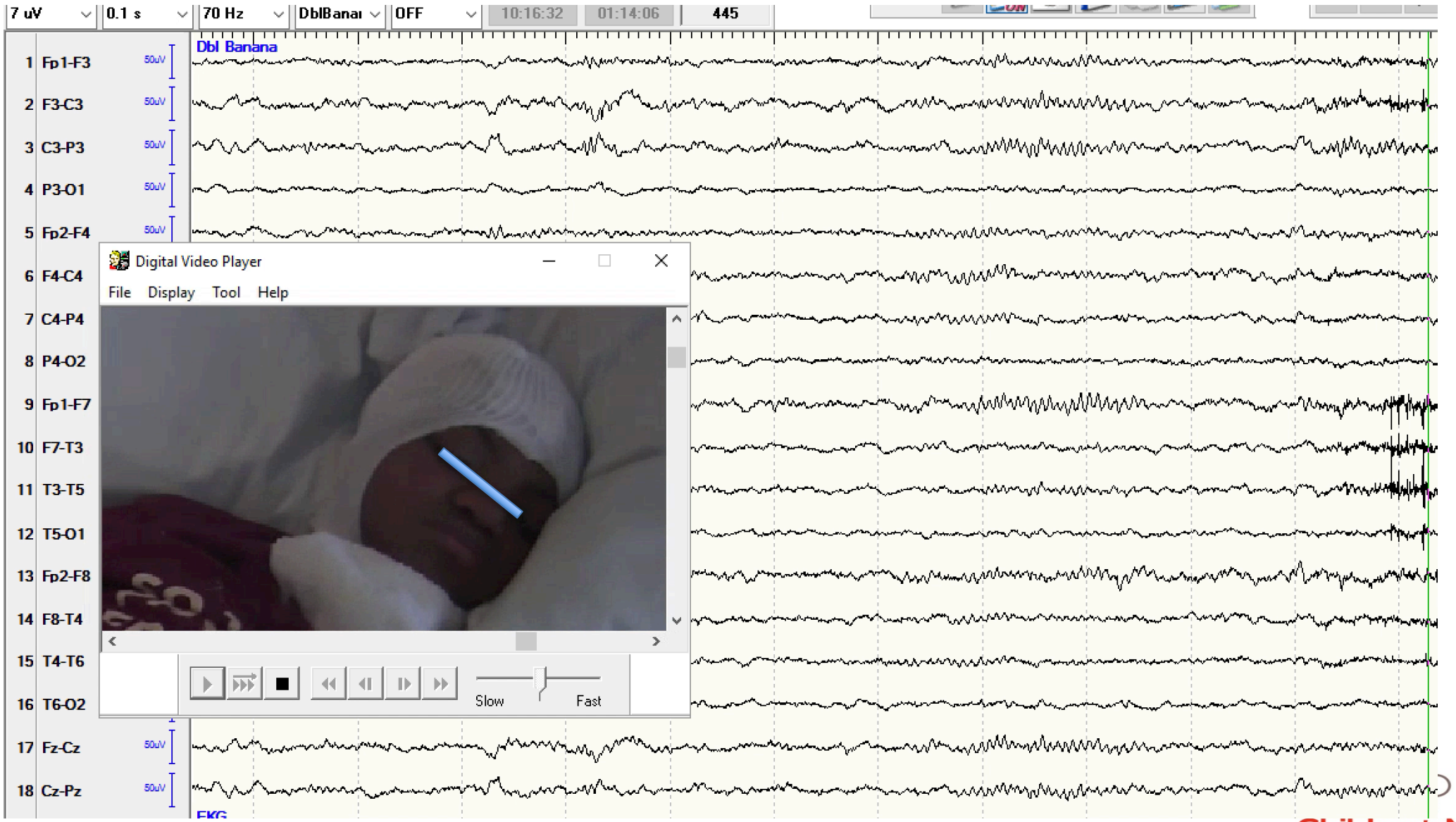
Epilepsia partialis continua



Nonconvulsive SE

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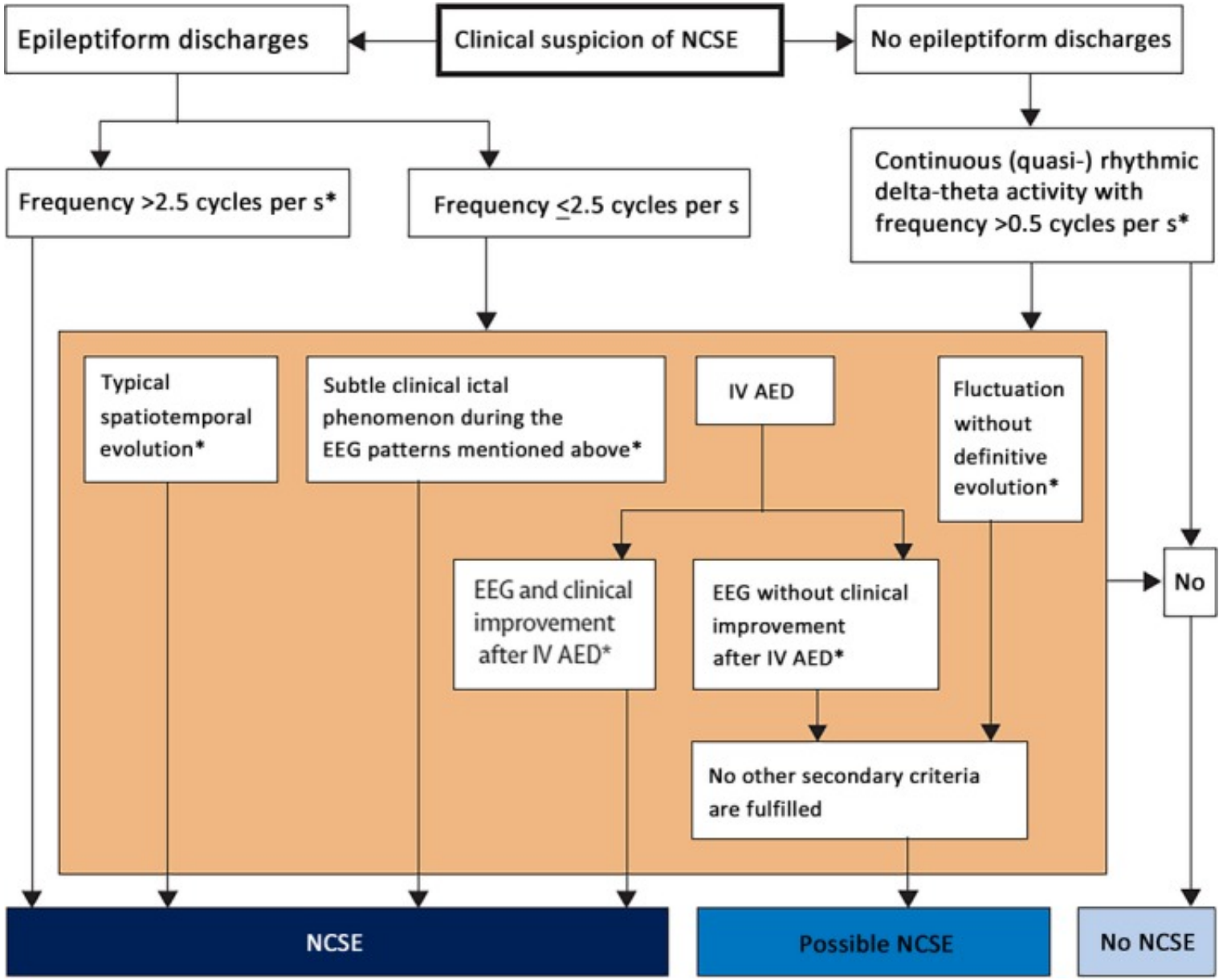
Salzburg Criteria



Leitinger et al, 2016

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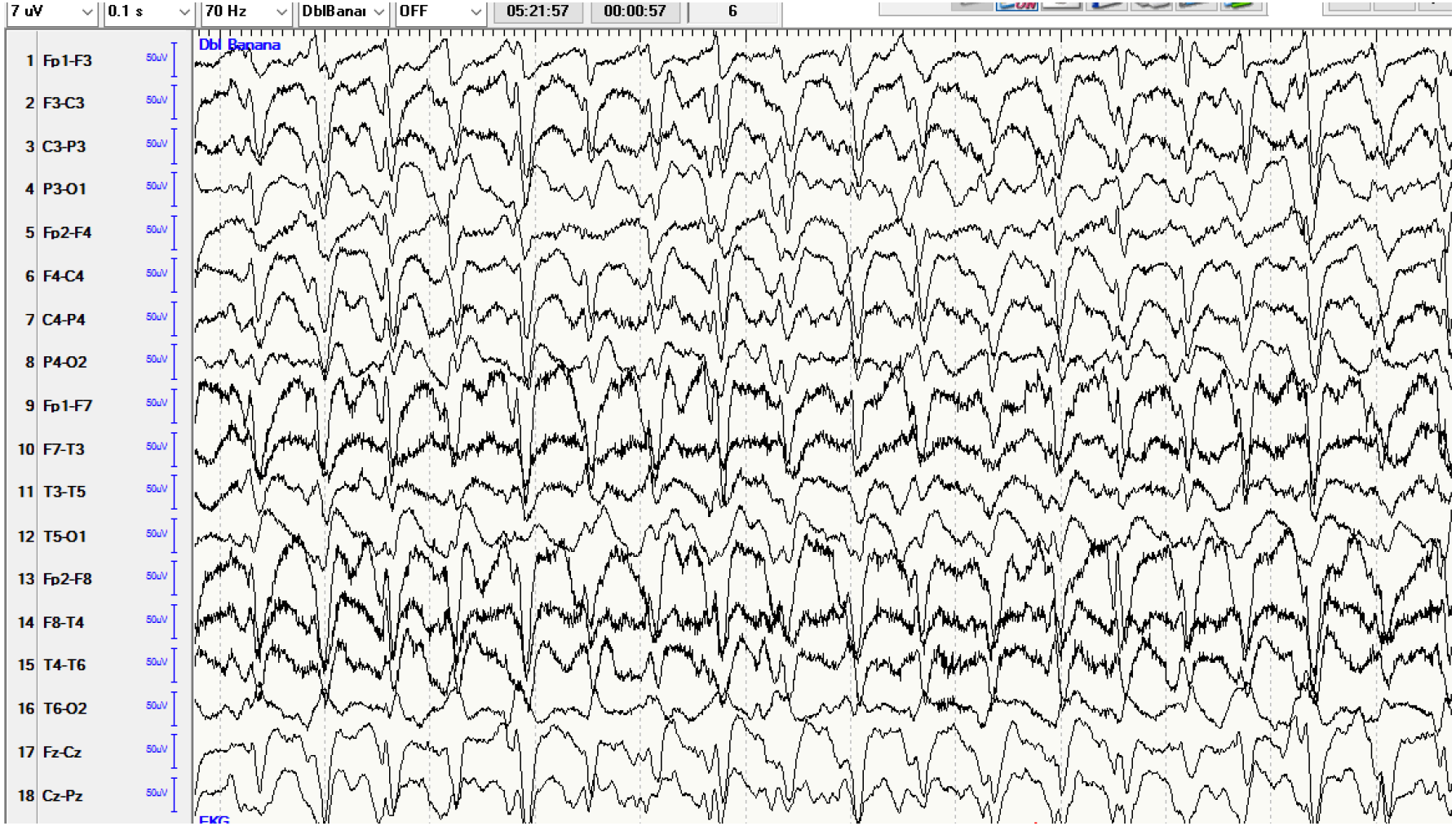
NCSE?



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History is key

- Presenting after seizures/status and not yet fully recovered?
- Clinical change from baseline- AMS, cognitive/behavioral changes, subtle motor signs
- Underlying history with risk of NCSE?
- Change from baseline EEG?

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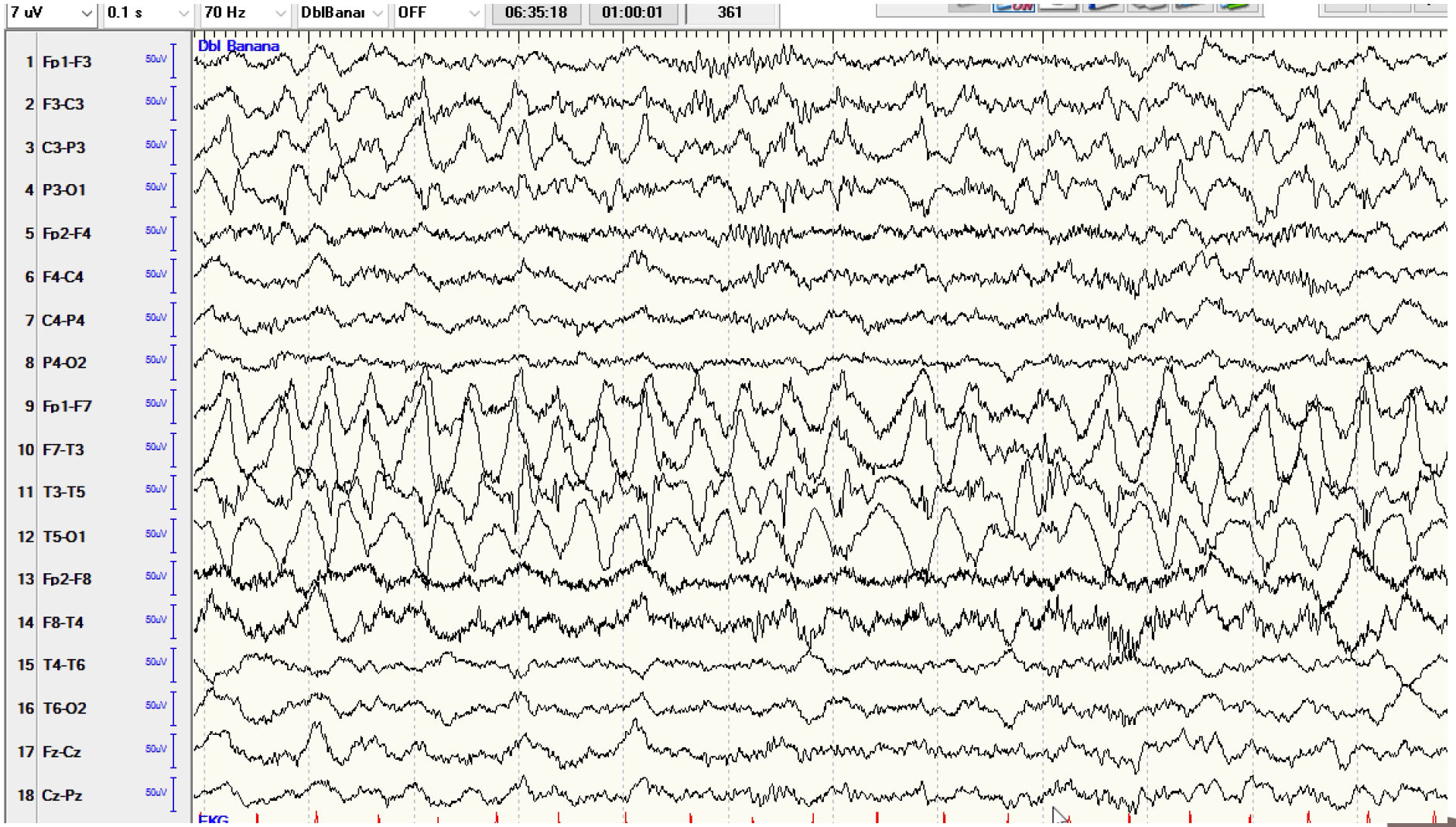
NCSE?



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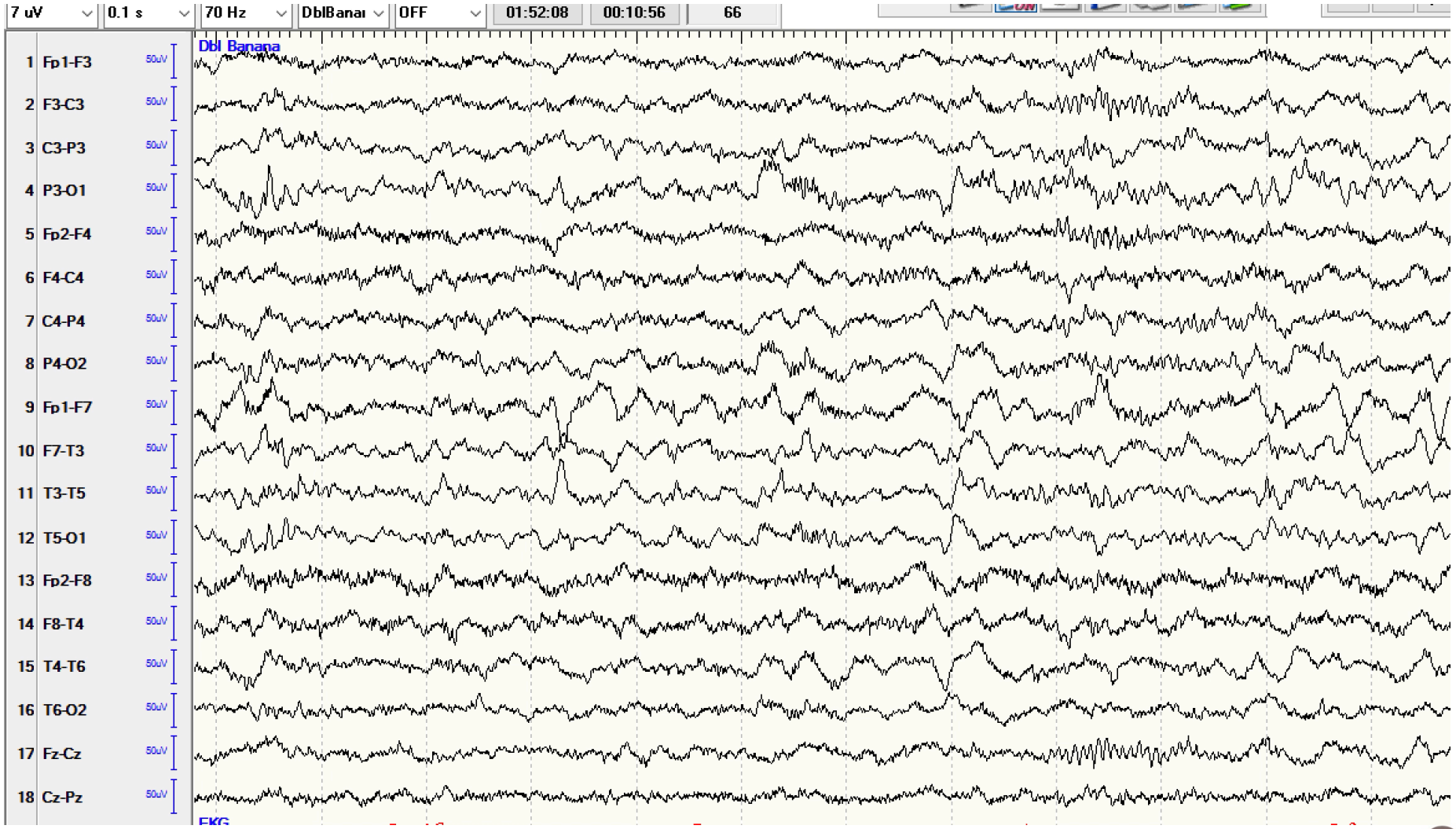
After Ativan trial:



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Absence SE

- Occurs in patients with absence epilepsy or other idiopathic generalized epilepsies
- Triggers: sleep deprivation, alcohol, illness, metabolic abnormalities, medications (TCAs, Benzos, phenytoin/carbamazepine)
- Can start abruptly with seizures in rapid succession or single prolonged episode with continued impaired consciousness

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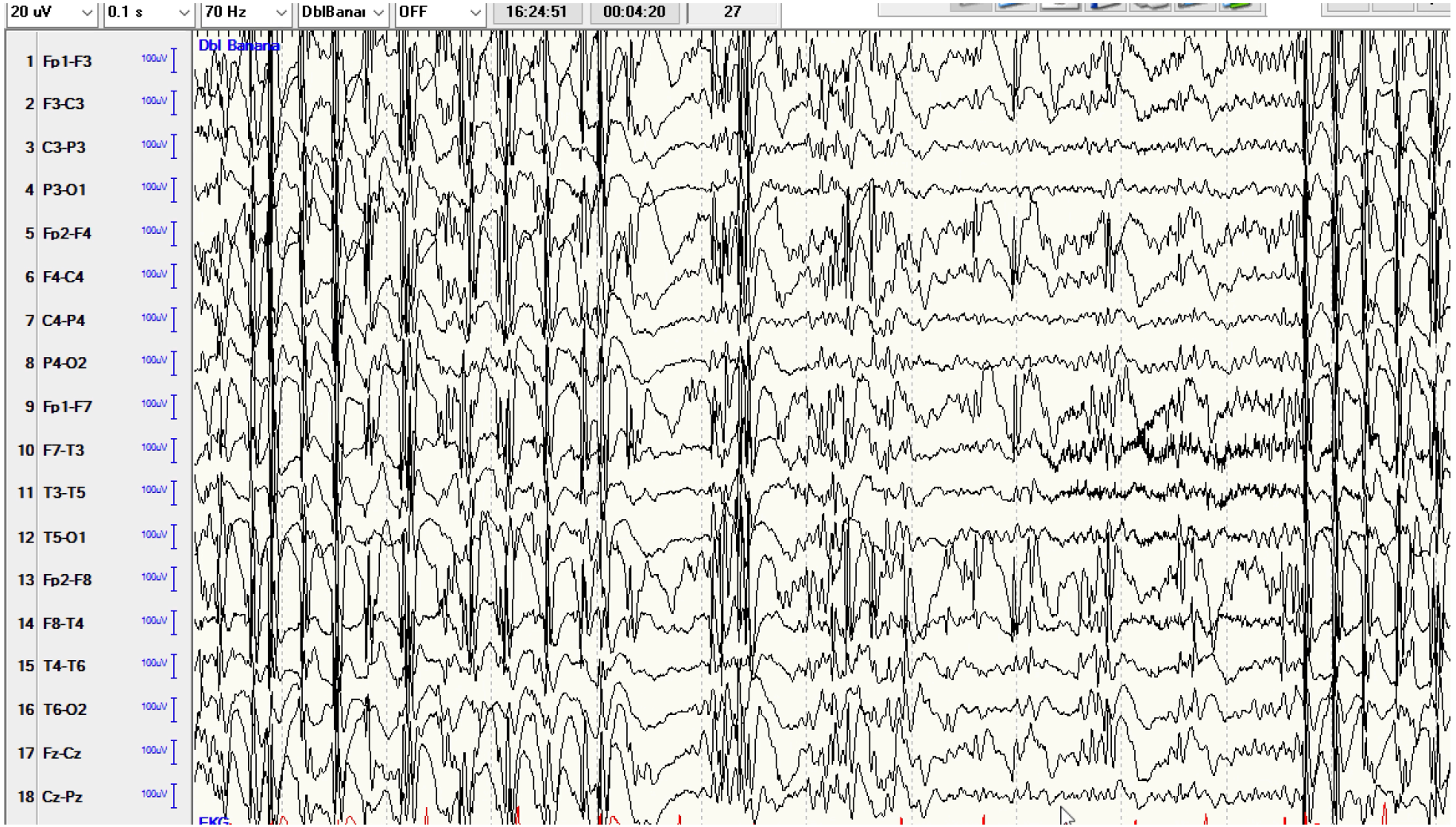
Absence SE



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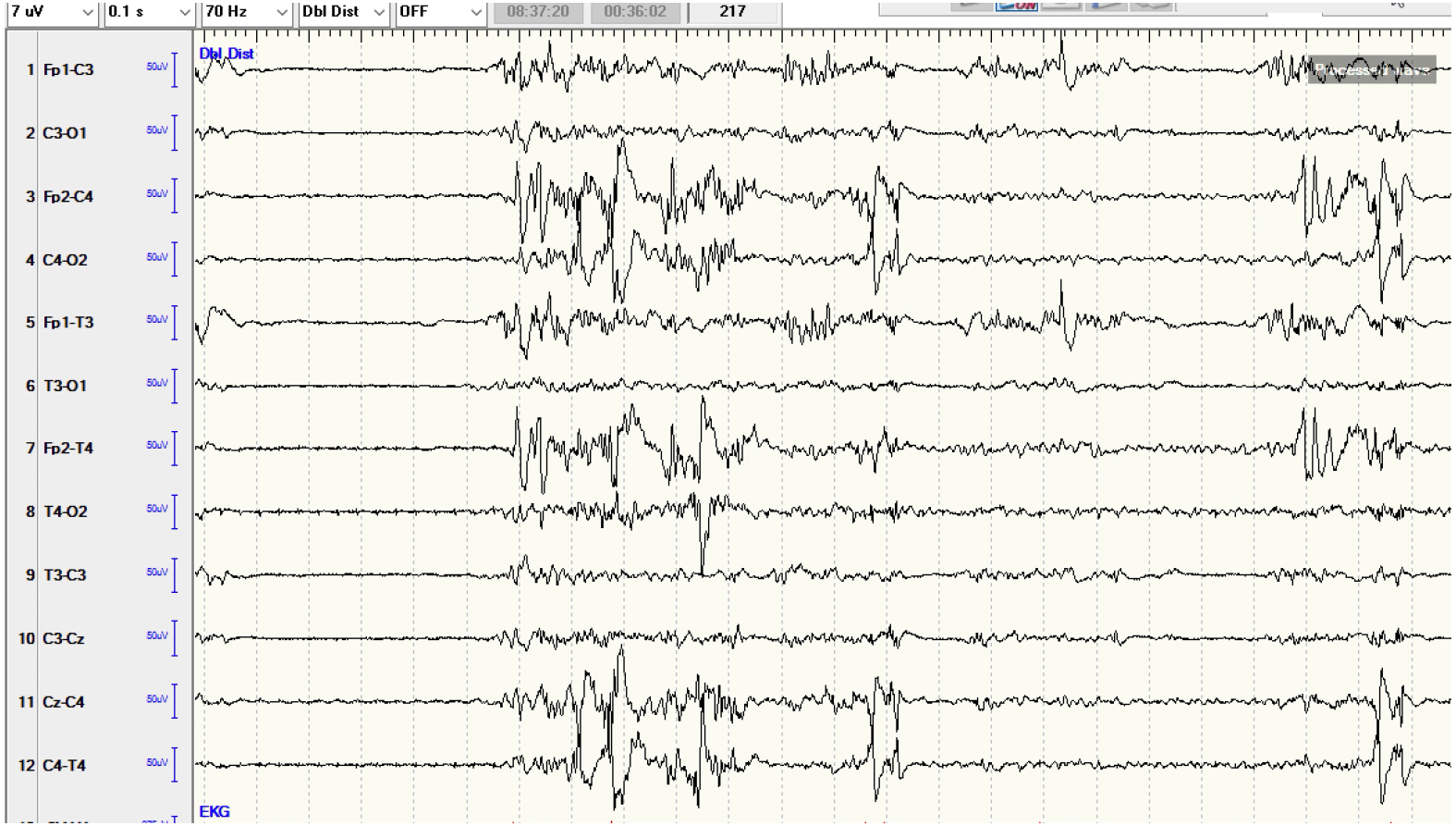
Focal nonconvulsive SE

Neonates

- Electroclinical dissociation with seizure medications
  - Ongoing clinically silent seizures in up to 58% of neonates



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“Boundary” syndromes: NCSE in epileptic encephalopathies

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Features concerning for NCSE

- Change in baseline:
  - Clinical symptoms
  - Seizure frequency/duration
  - EEG background
- Improvement after select medications for that syndrome

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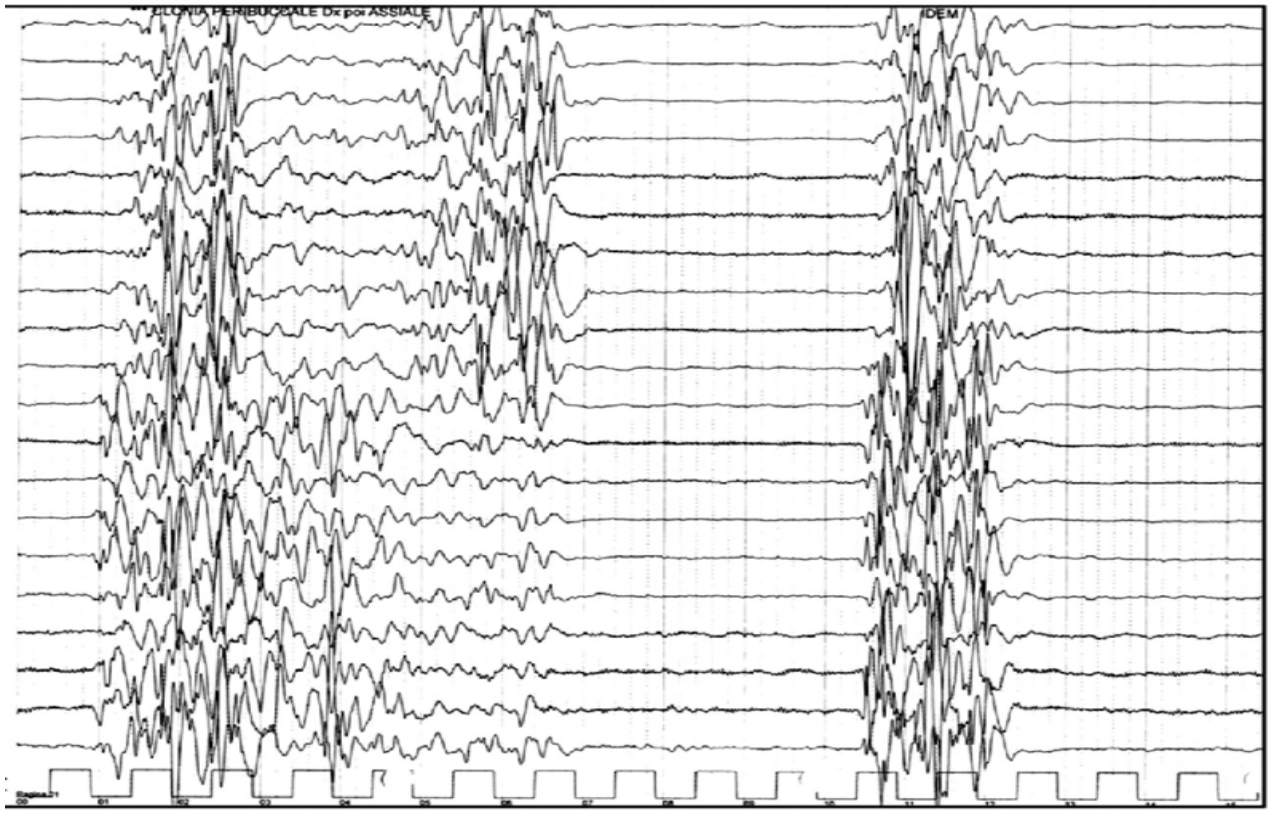
Early infantile epileptic encephalopathy- EIEE/EME



- Initial Tx: Phb, fpht, lvt, tpm, pyridoxine/P5P
- If continue to be refractory and no significant improvement in background with high suspicion for metabolic/genetic syndrome, then no need to be aggressive with treatment escalation (i.e. drips)
- Medication adjustments made based on significant increase from baseline, frequent associated apneas

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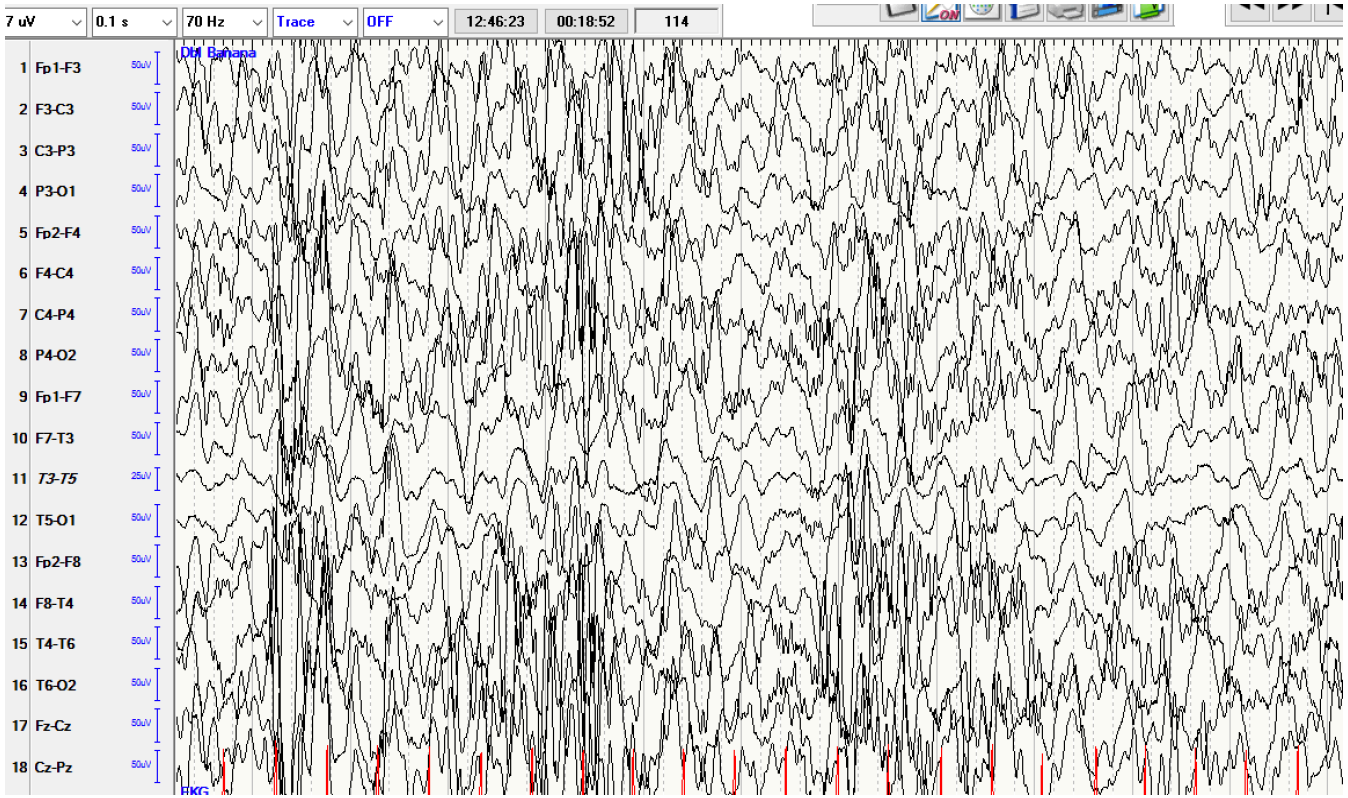
Infantile Spasms



- Initial Tx: ACTH/prednisolone, vigabatrin
- If refractory to above:
  - Structural etiology: surgery
  - Genetic: various medication trials, do not recommend aggressive escalation

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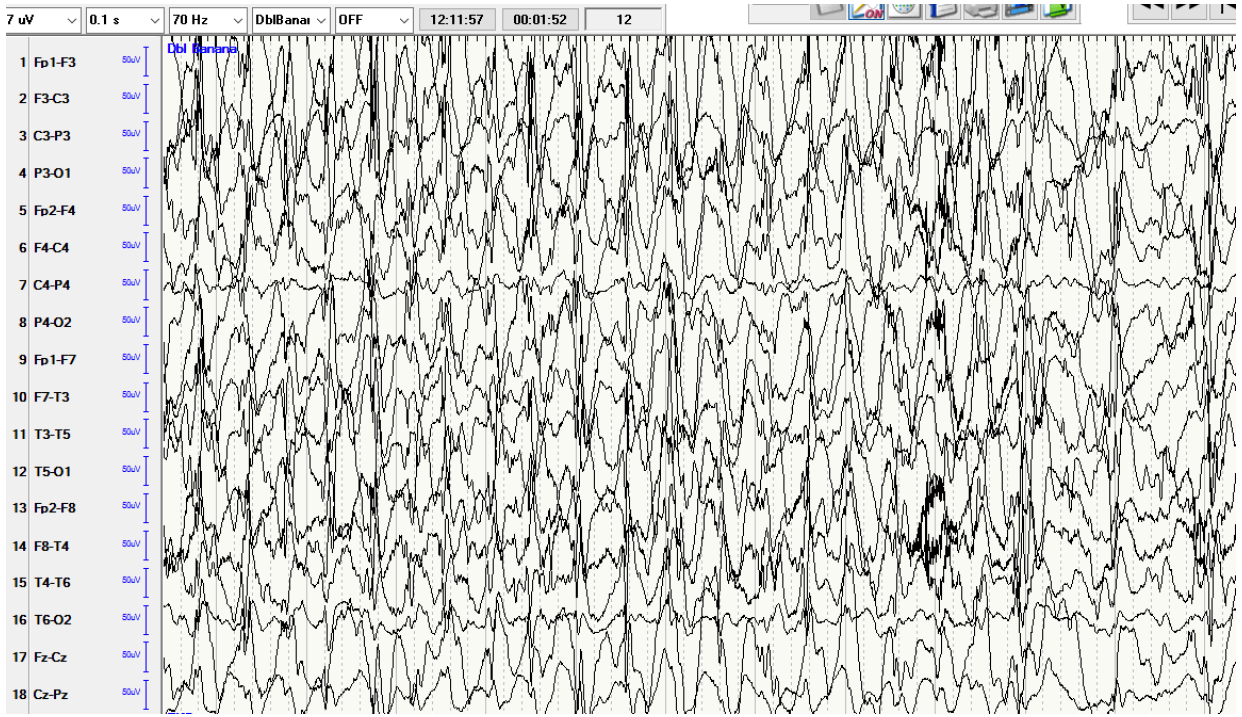
Lennox-Gastaut Syndrome



- Initial Tx: LGS cocktail
- Can present in convulsive SE: myoclonic, tonic, GTC
  - Can trial benzo, fPHT, LVT, VPA, LCM loads to break status
  - Will still likely have some breakthrough seizures
- NCSE: atypical absence
  - Significant clinical change from baseline
  - EEG with near continuous slow spike waves worse from baseline
  - Trial VPA, ETX

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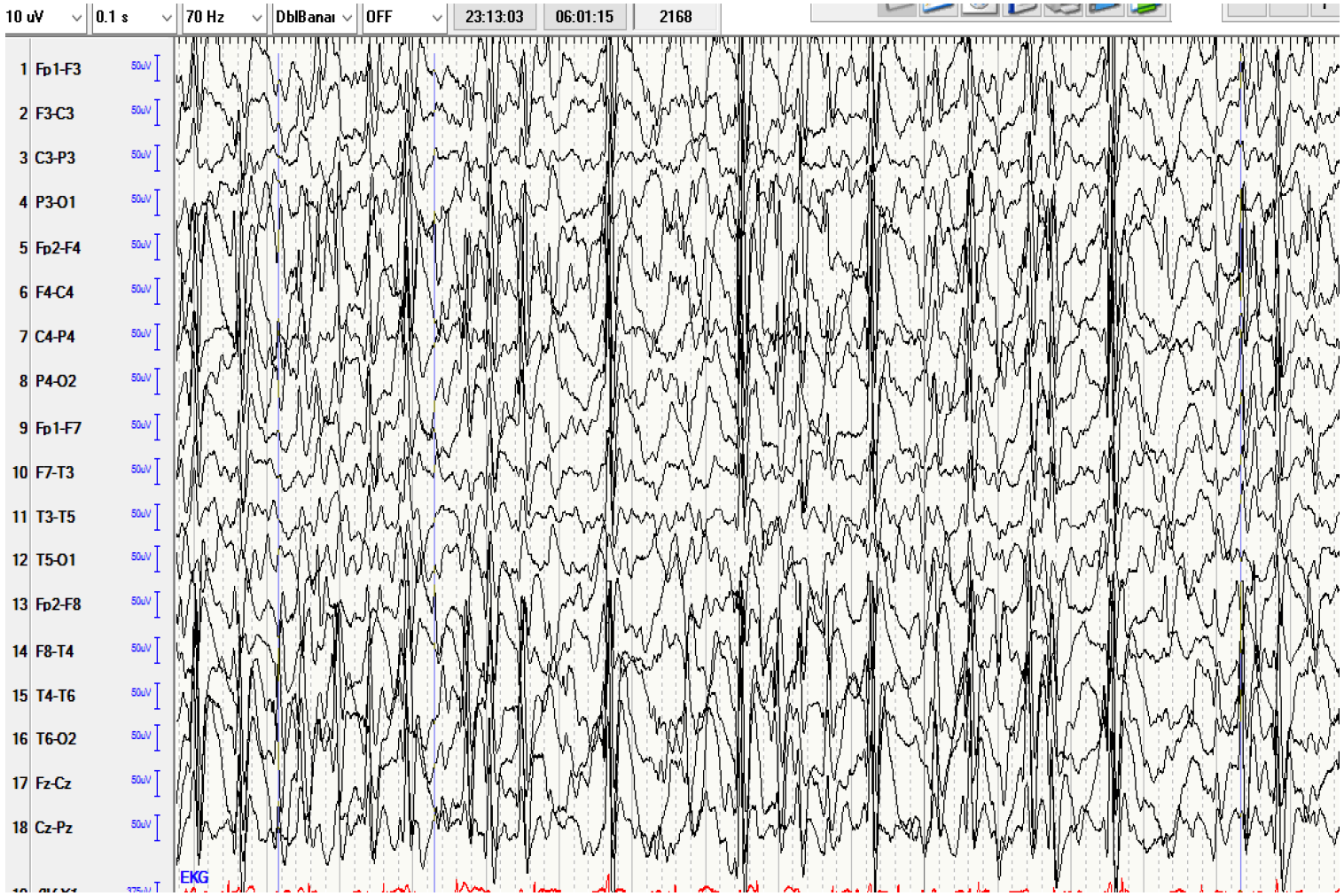
EE-SWAS: Landau-Kleffner



- In context of language regression, treatment is more aggressive:
  - Steroids
  - High dose valium
  - ASMs: VPA, ETX, CLB, LVT

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Questions

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Which of the following is not a commonly recognized definition of status epilepticus?

A. Continuous seizure for ≥ 30 minutes
B. Cluster of 3 seizures in 1 hour with return to baseline
C. Recurrent seizures for > 30 minutes without return to baseline mental status
D. Recurrent seizures for ≥50% of an EEG epoch

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Which of the following patterns marks the late stage 5 of status epilepticus?

A. Seizures merge gradually with waxing/waning quality
B. Seizures become discontinuous with periods of voltage attenuation
C. Individual seizures followed by background slowing/attenuation
D. Generalized periodic discharges or polyspikes with frequency of 0.5-4Hz that arise from a flat background
E. Seizures become continuous

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A 6 month previously healthy baby girl presents with new, persistent focal motor twitching of her face for the past 24hours in setting of a viral illness. MRI shows DWI changes in the basal ganglia. Which medication would be contraindicated in the treatment of these symptoms?

A. Phenytoin
B. Phenobarbital
C. Valproate
D. Levetiracetam
E. Lorazepam

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A 22yo previously healthy M presents with AMS, found to have a mass in his left temporal lobe on HCT. Which of the following EEG features would be concerning for nonconvulsive status epilepticus?

A. Continuous rhythmic 3-4Hz spike wave discharges in the left temporal region
B. Fluctuating rhythmic delta <0.5 Hz in the left temporal region
C. Frequent 1-2Hz high amplitude spike waves in the left temporal region without clear evolution
D. Paroxysmal fast activity in the left temporal region

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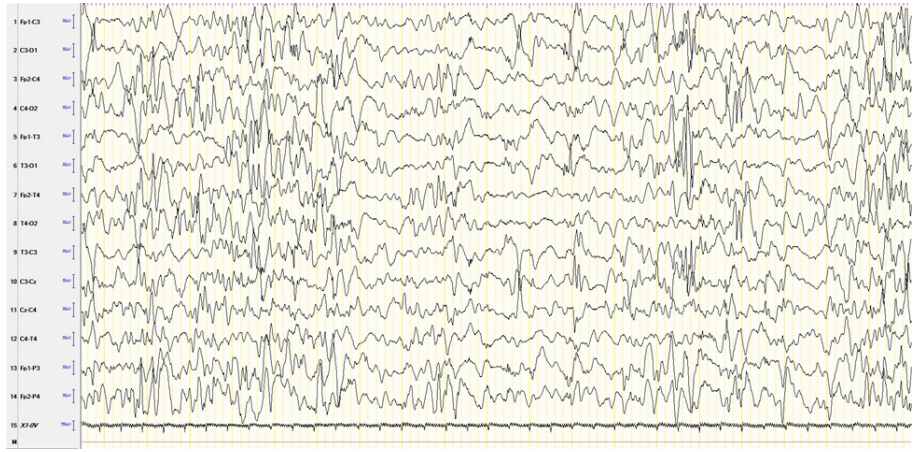
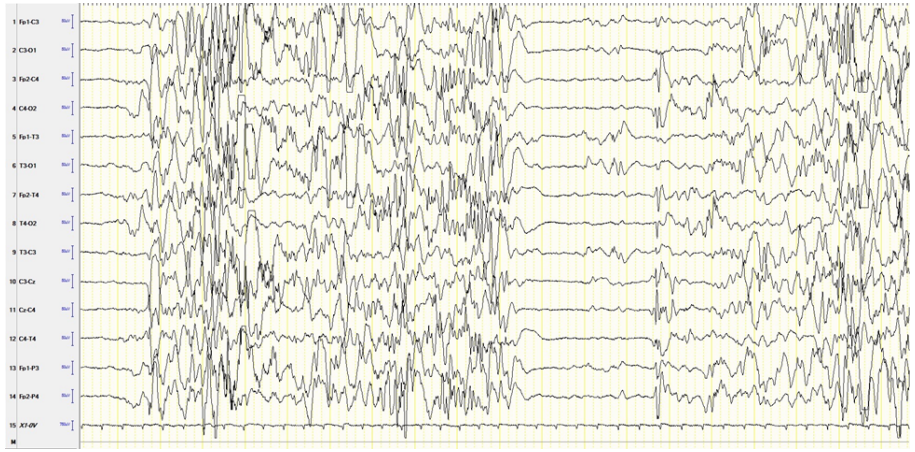
A 2 day old newborn presents in status epileptics with numerous episodes of apnea and tonic stiffening. The EEG awake and sleep background are below:





Which of the following medications would be most appropriate to trial in this patient?

A. Phenobarbital
B. Midazolam drip
C. Ketamine drip
D. Topiramate
E. A and D

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