

MAHIDOL
UNIVERSITY
Wisdom of the Land

Interictal & Ictal Patterns in Generalized Seizures

Chaiyos Khongkhatithum, MD

Neurology Division

Department of Pediatrics



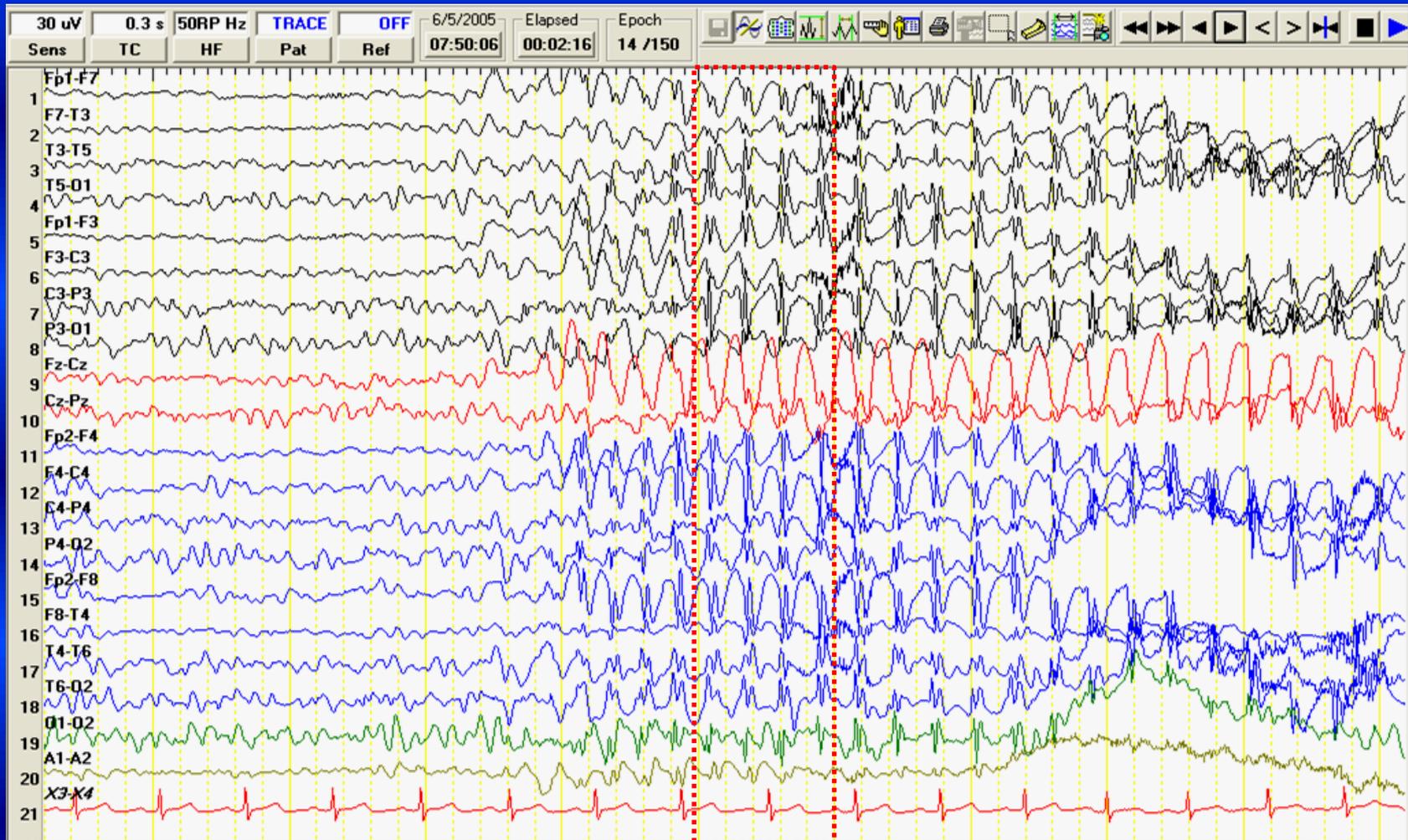
ภาควิชากุมารเวชศาสตร์ คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี

Outline

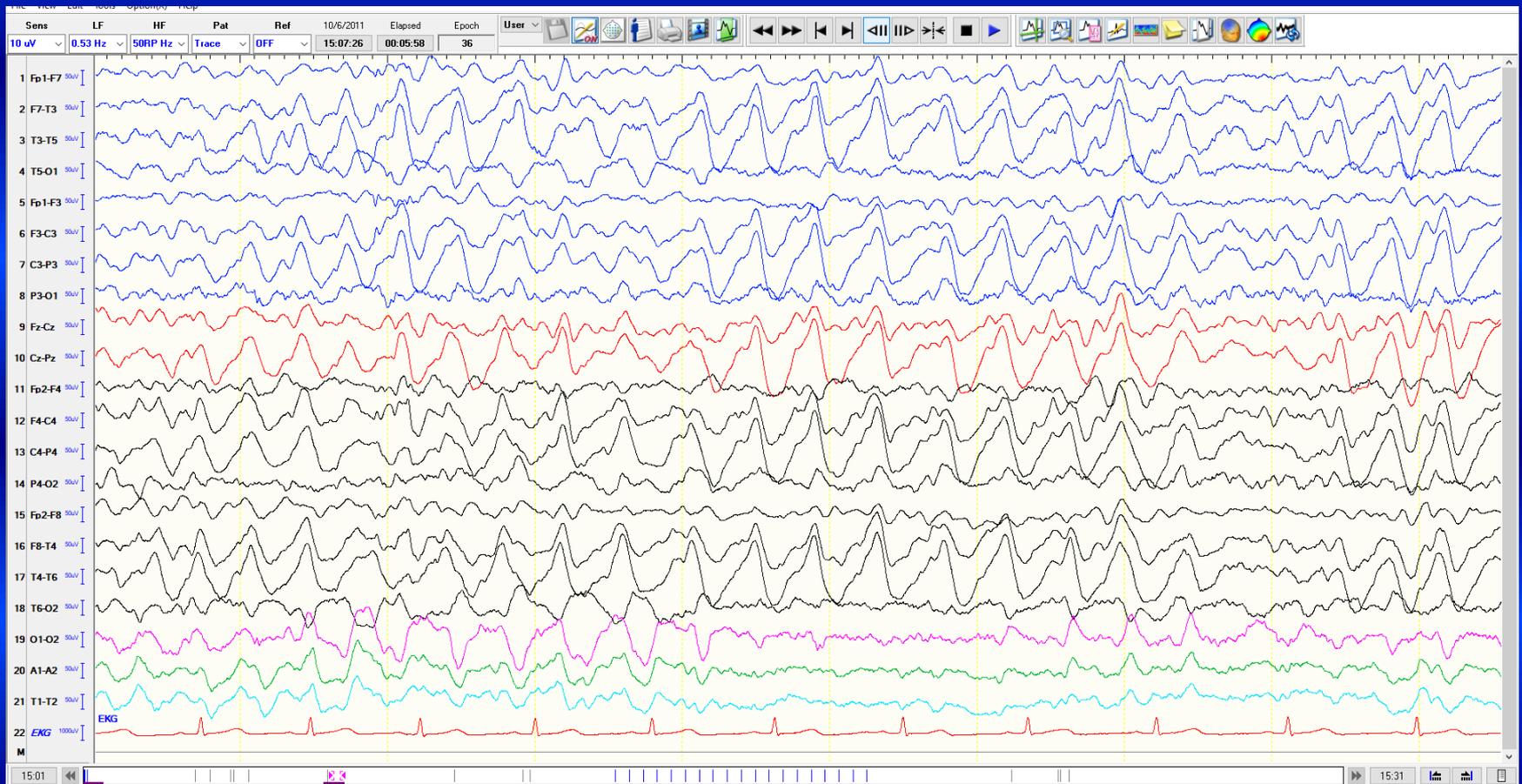
- **Interictal** generalized epileptiform activity.
 - Generalized spike-and-slow wave complexes
 - Intermittent rhythmic slow activity e.g. OIRDA
 - Paroxysmal fast activity
 - Hypsarrhythmia
- **Ictal** EEG pattern in generalized seizures
 - Motor e.g. GTC, Tonic
 - Non-motor e.g. Absence

Interictal EEG

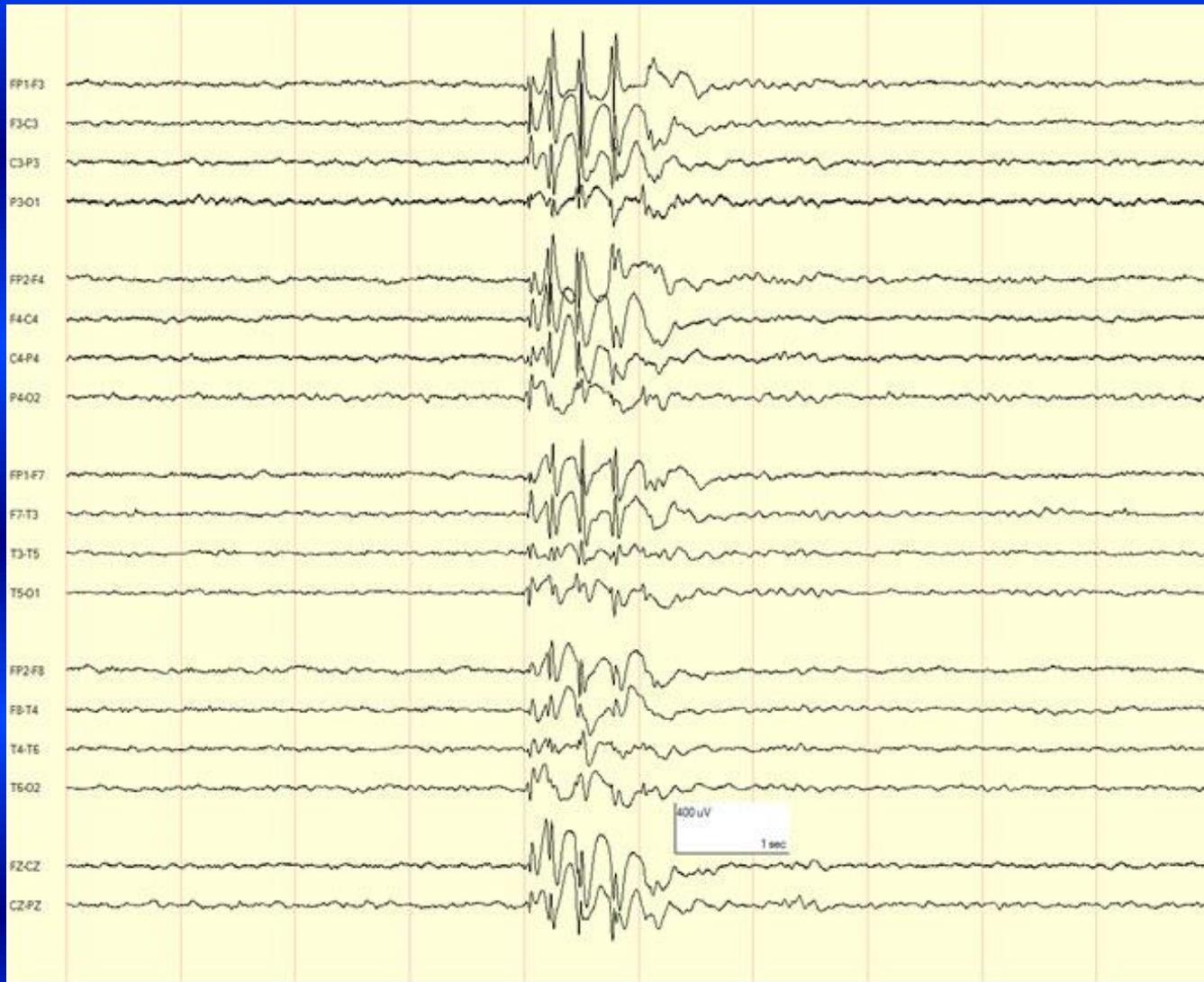
3 Hz-Generalized Spike-and-wave Complexes



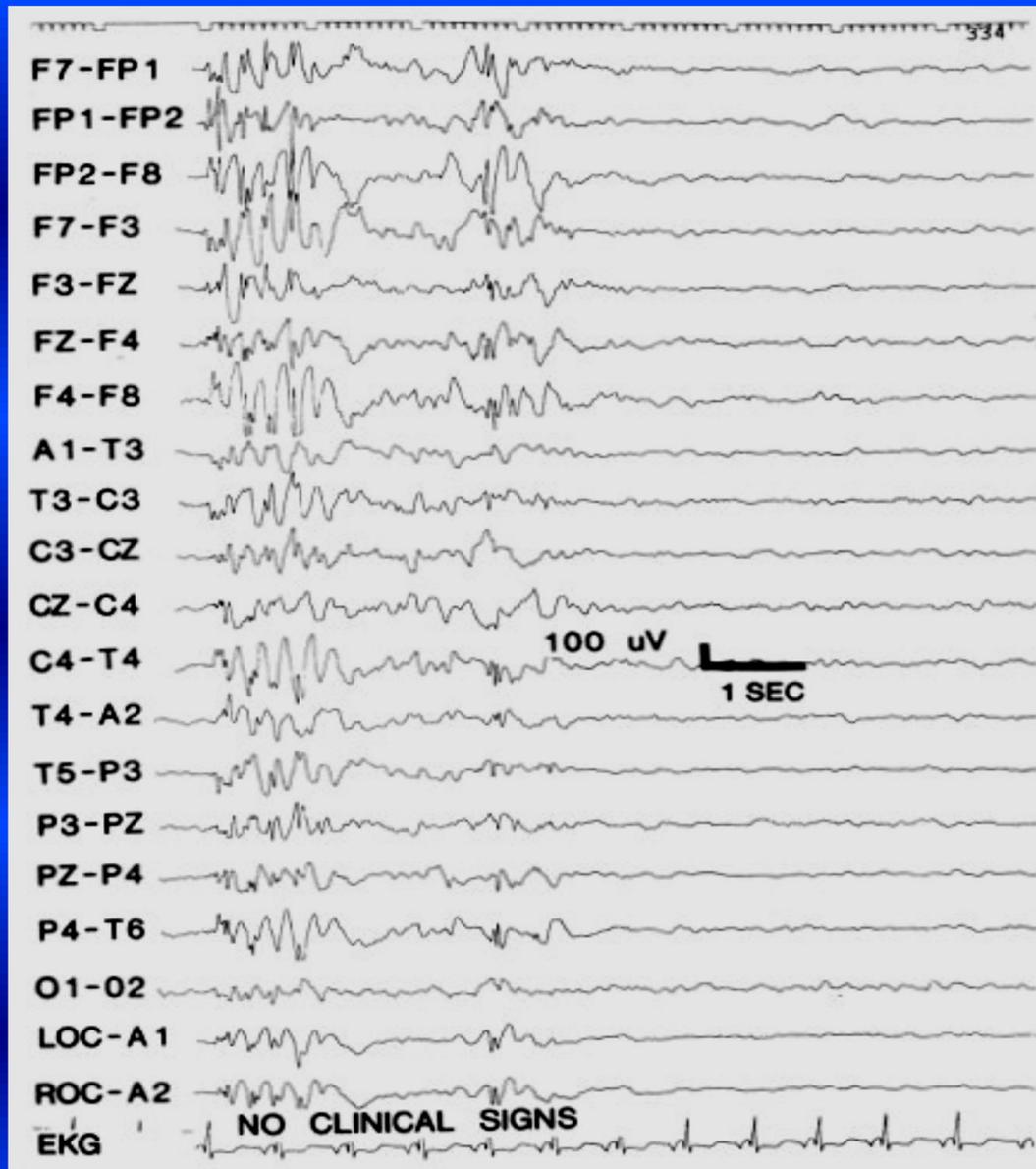
Occipital Intermittent Rhythmic Delta Activity (OIRDA)



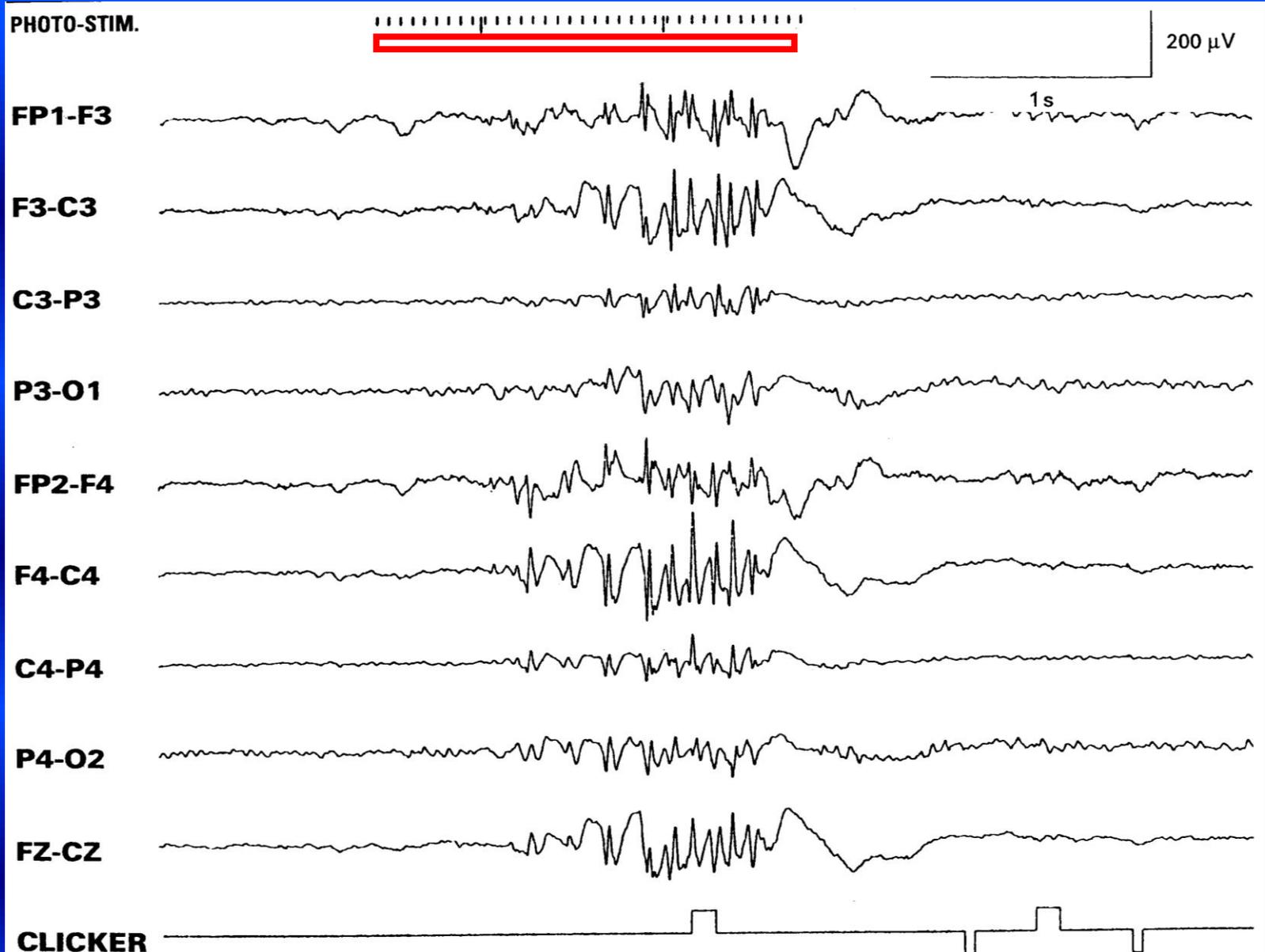
3-6Hz Generalized Spike-and-wave



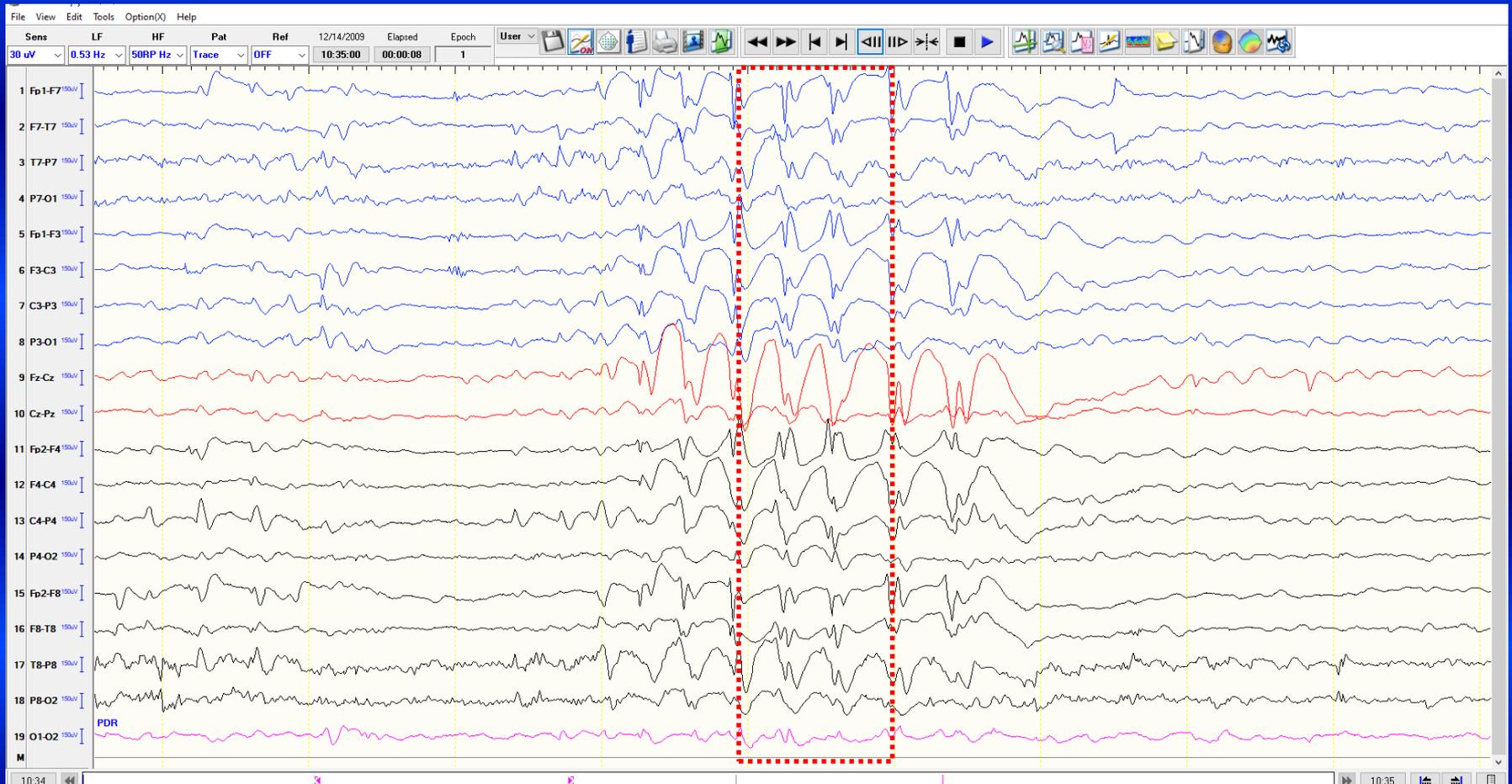
Polyspike-and slow wave discharges



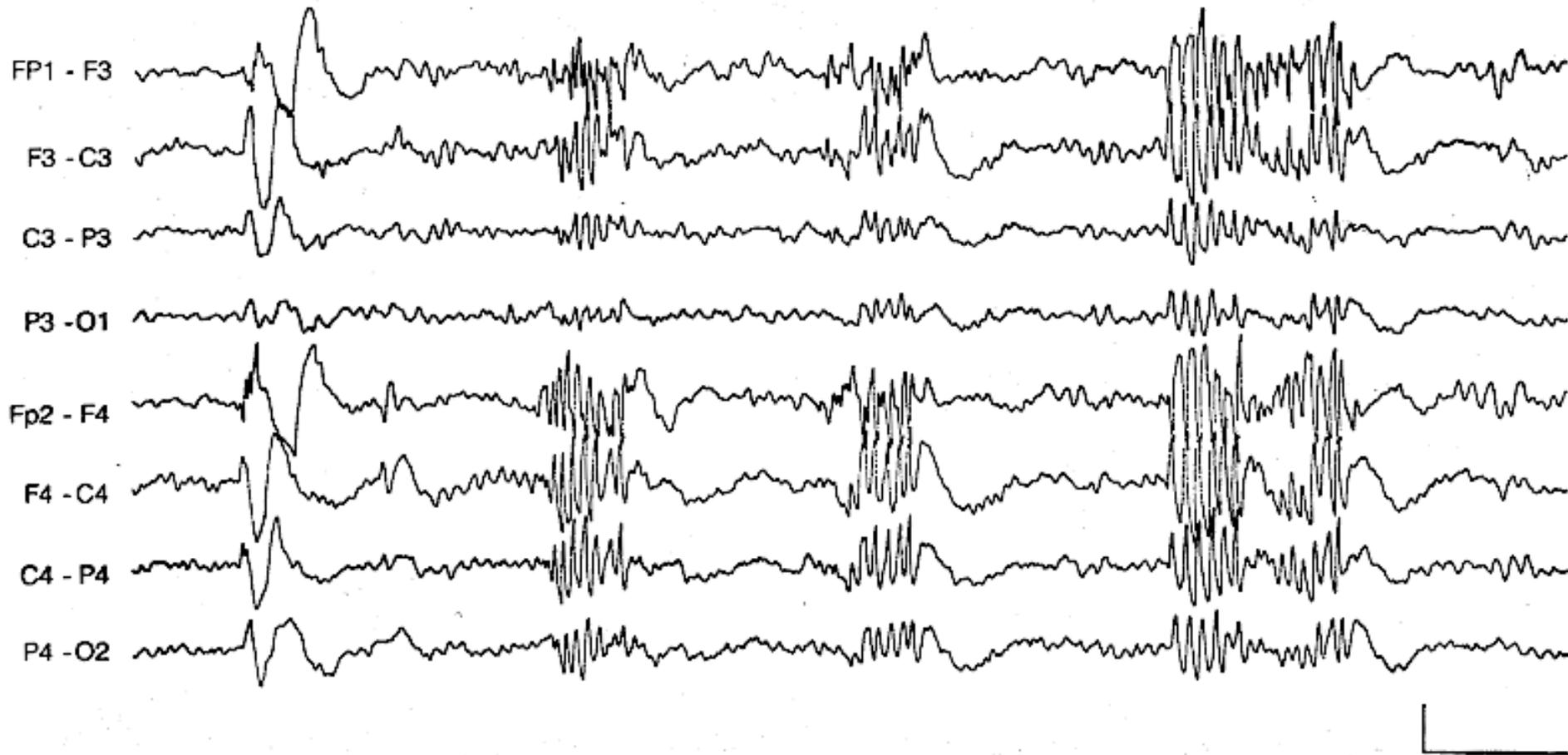
15-Hz photic stimulation triggered generalized repetitive spikes



Slow (<2.5 Hz) spike-and slow wave discharges

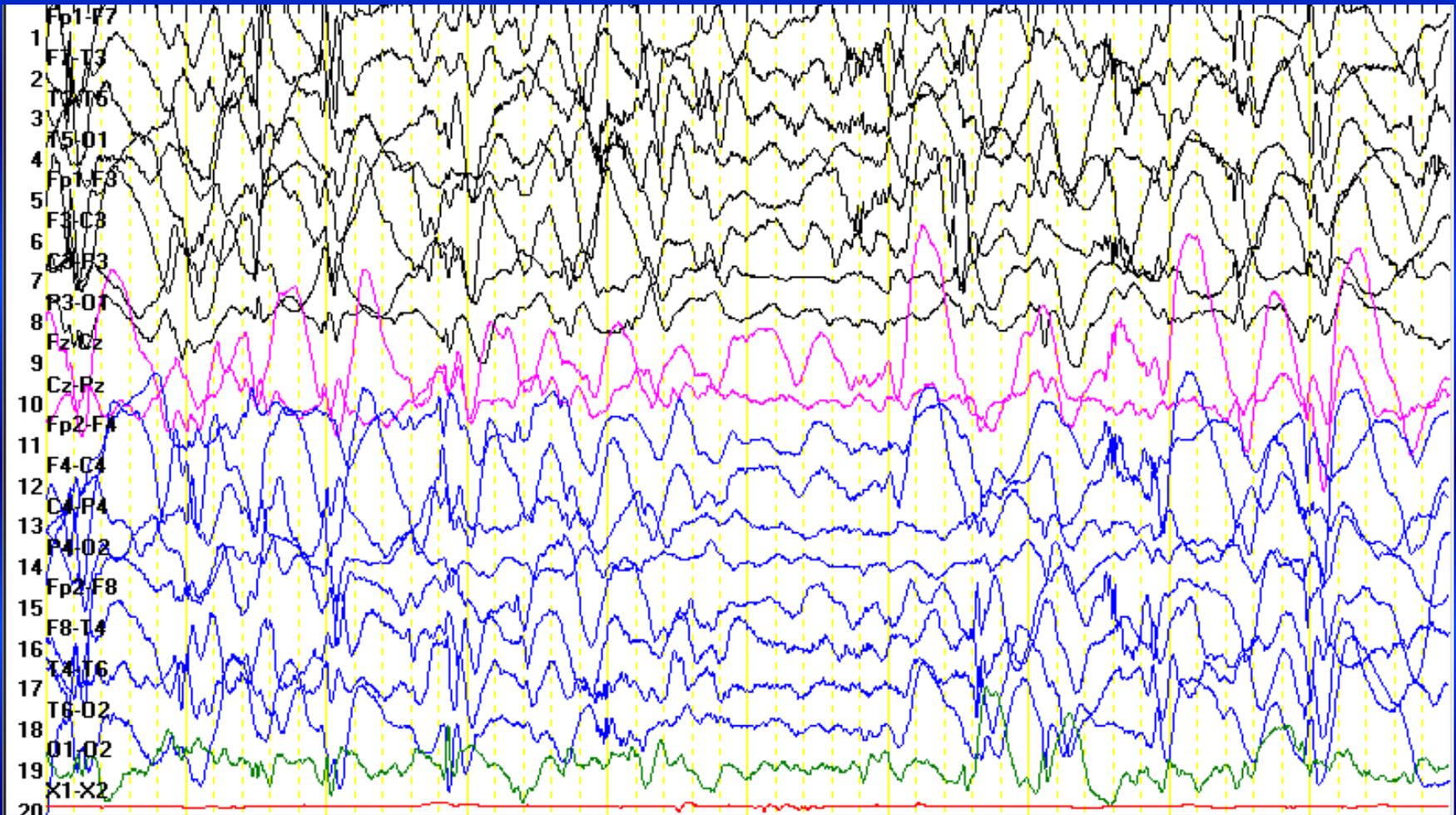


Bursts of bisynchronous spikes at 10-25 Hz

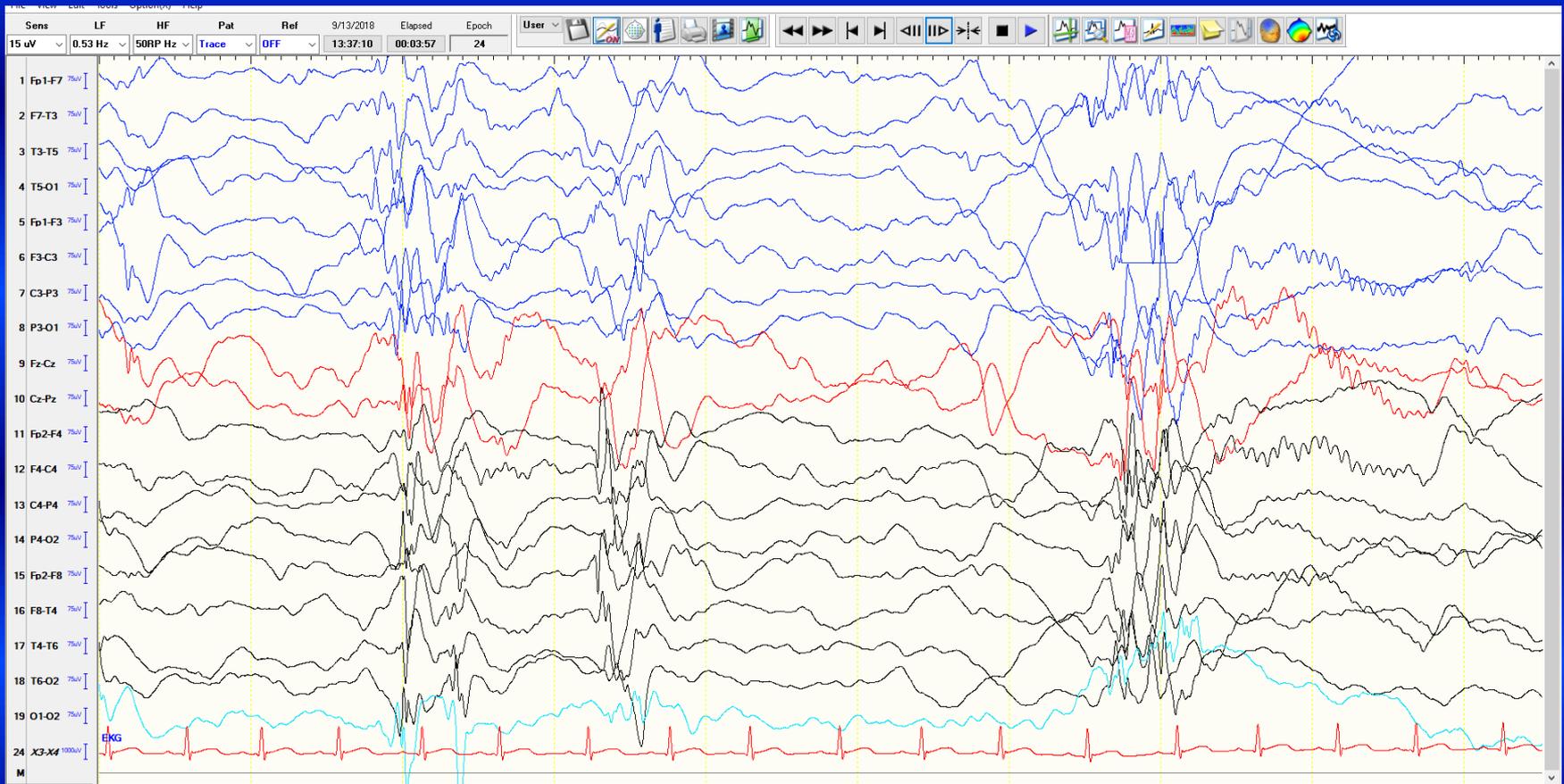


- Associated with primary generalized epilepsy
- Older children, adolescents with tonic and/or atonic attacks

Hypsarrhythmia



Burst-Suppression liked Pattern in Sleep



Ictal EEG

EEG Pattern in Generalized Seizures

- Generalized seizures consist of bilaterally synchronous sequential spike-waves, spikes, or rhythmic waves.
- Higher frequency phenomena (fast rhythmic waves, polyspikes) usually appear earlier in the seizure than lower frequency ones (spike-waves, rhythmic delta)
- Usually an abrupt non-focal onset and offset.

Motor Seizure

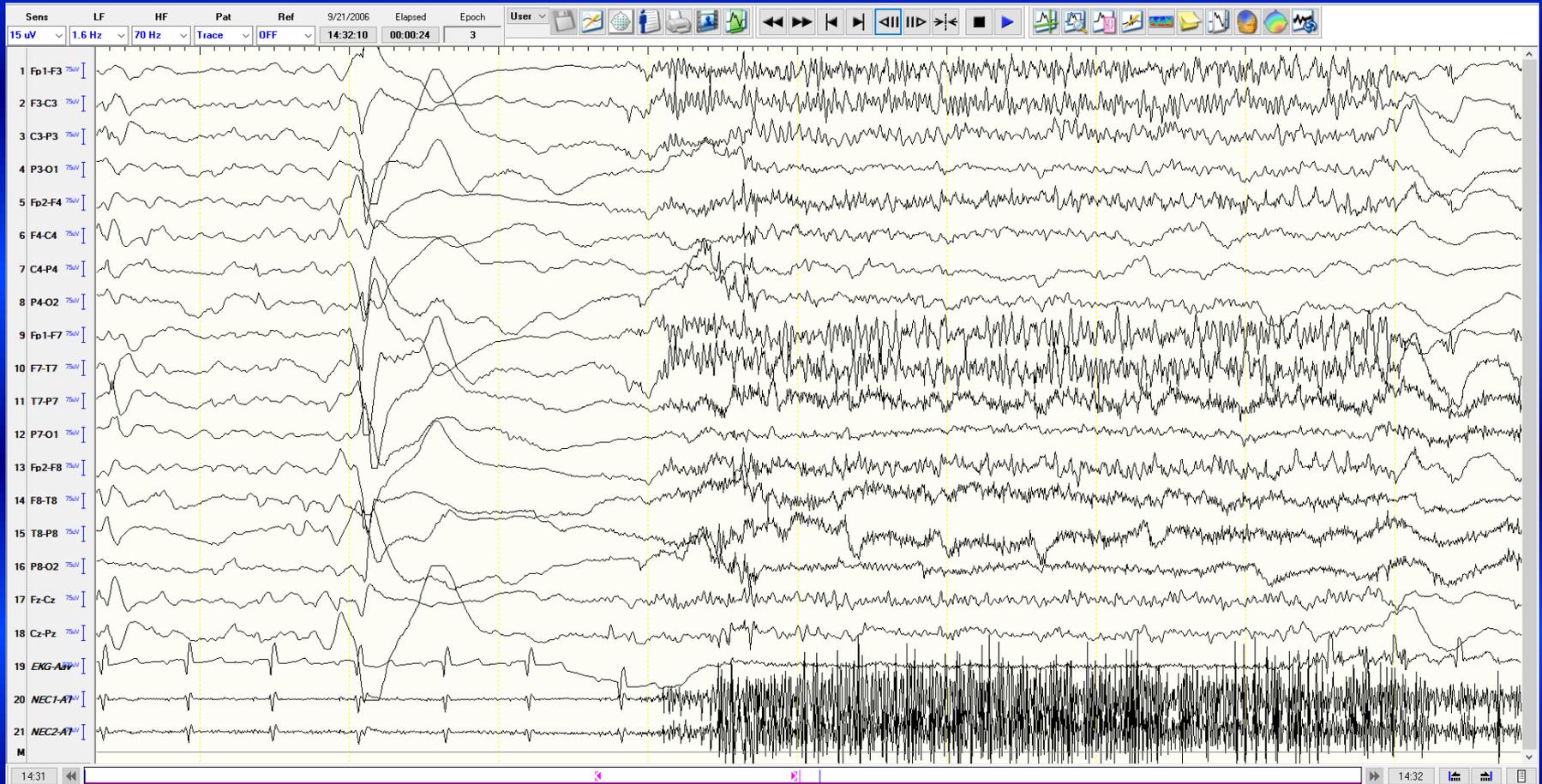
Tonic-Clonic Seizure

- Ictal EEG is often obscured by artifact.
- Generalized **fast rhythmic spikes** are seen in the **tonic** stage.
- Bursts of **spikes and slow waves** are synchronous with **clonic** jerks.
- Postictal period of irregular slow activity.
- Individual seizure onsets can appear localized, the location and lateralization are not consistent from one seizure to another.

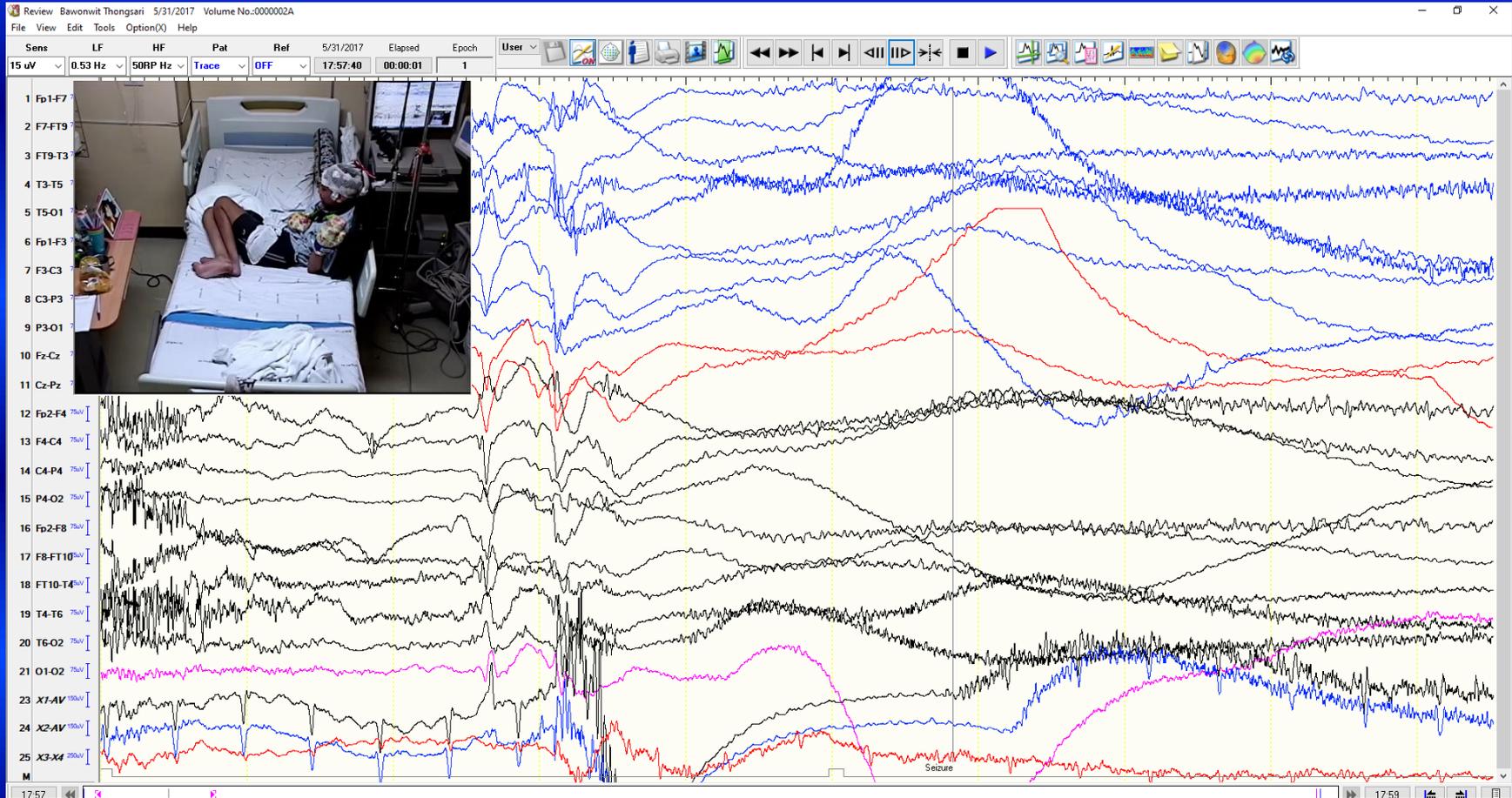
Tonic Seizure

- Diffuse or generalized accelerating low amplitude paroxysmal fast activity, which is often bilateral and predominates in the anterior and vertex regions.

Lennox Gastaut Syndrome– Tonic seizure Paroxysmal Fast Activity-PFA



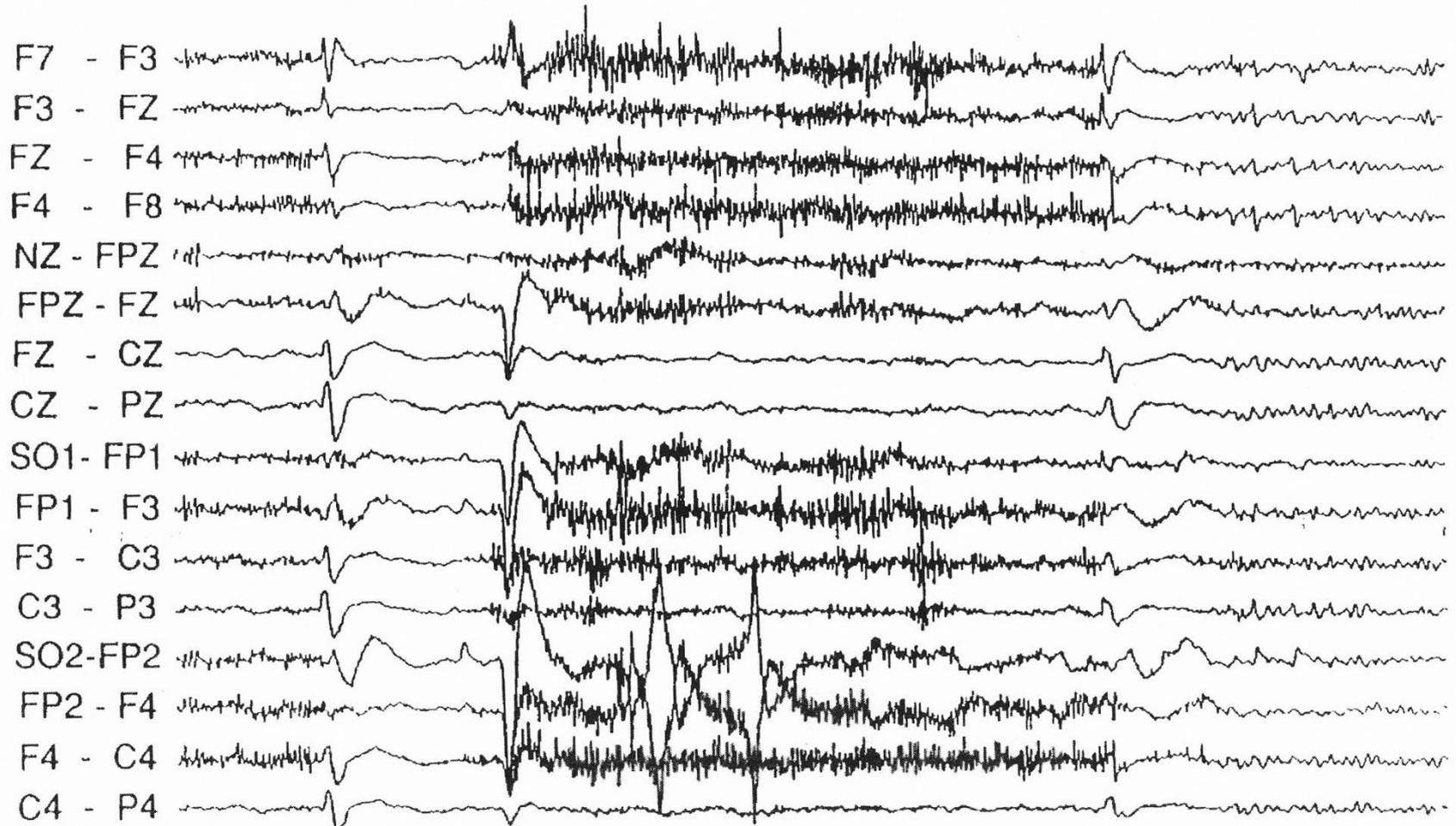
Tonic sz & Ictal EEG



Atonic Seizure

- Generalized spike-and-wave is typical, with **atonia** at the time of the **slow wave**.
- If intermittent photic stimulation triggers seizures
→ consider myoclonic-atonic seizures

Lennox Gastaut Syndrome– Atonic seizure

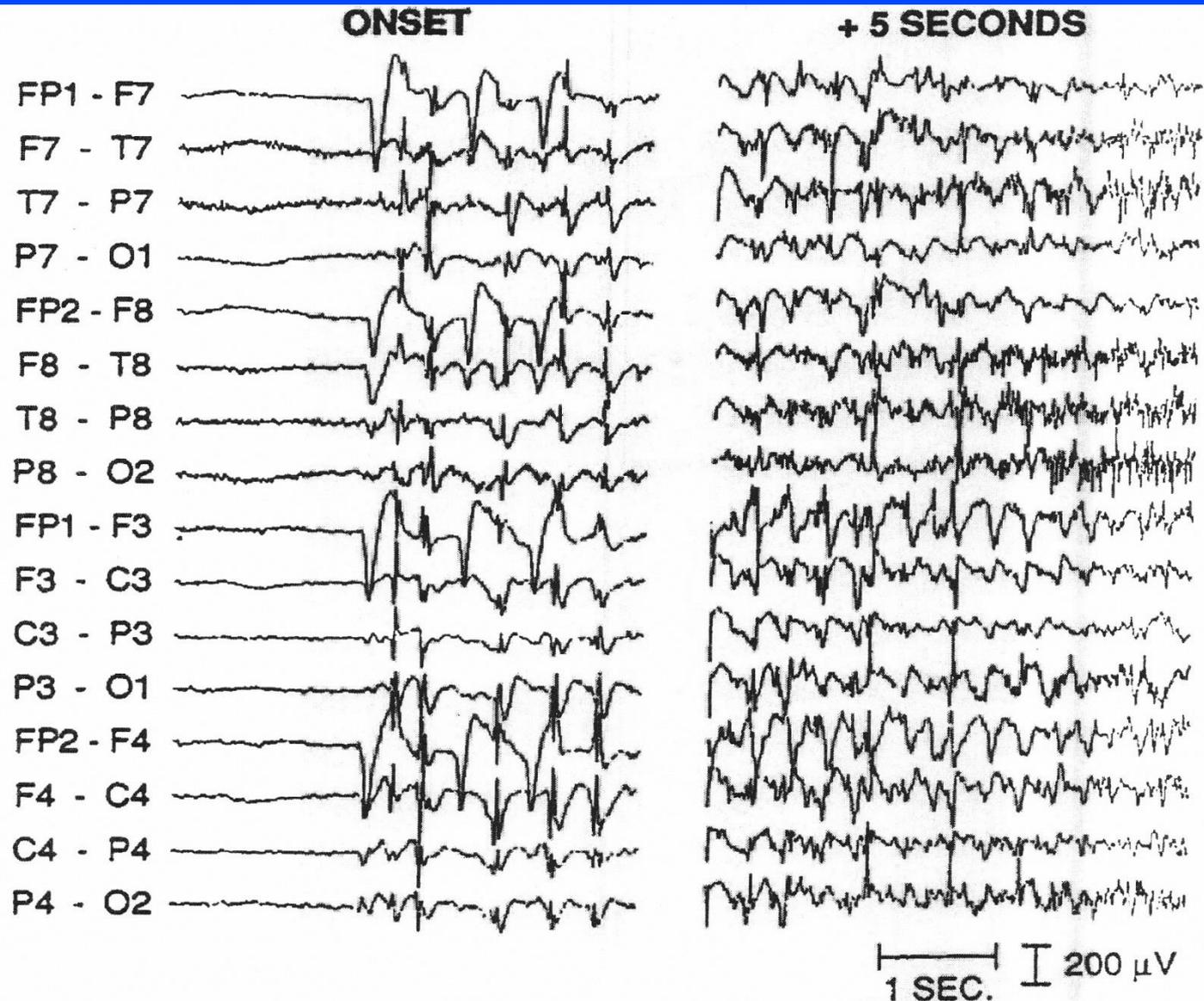


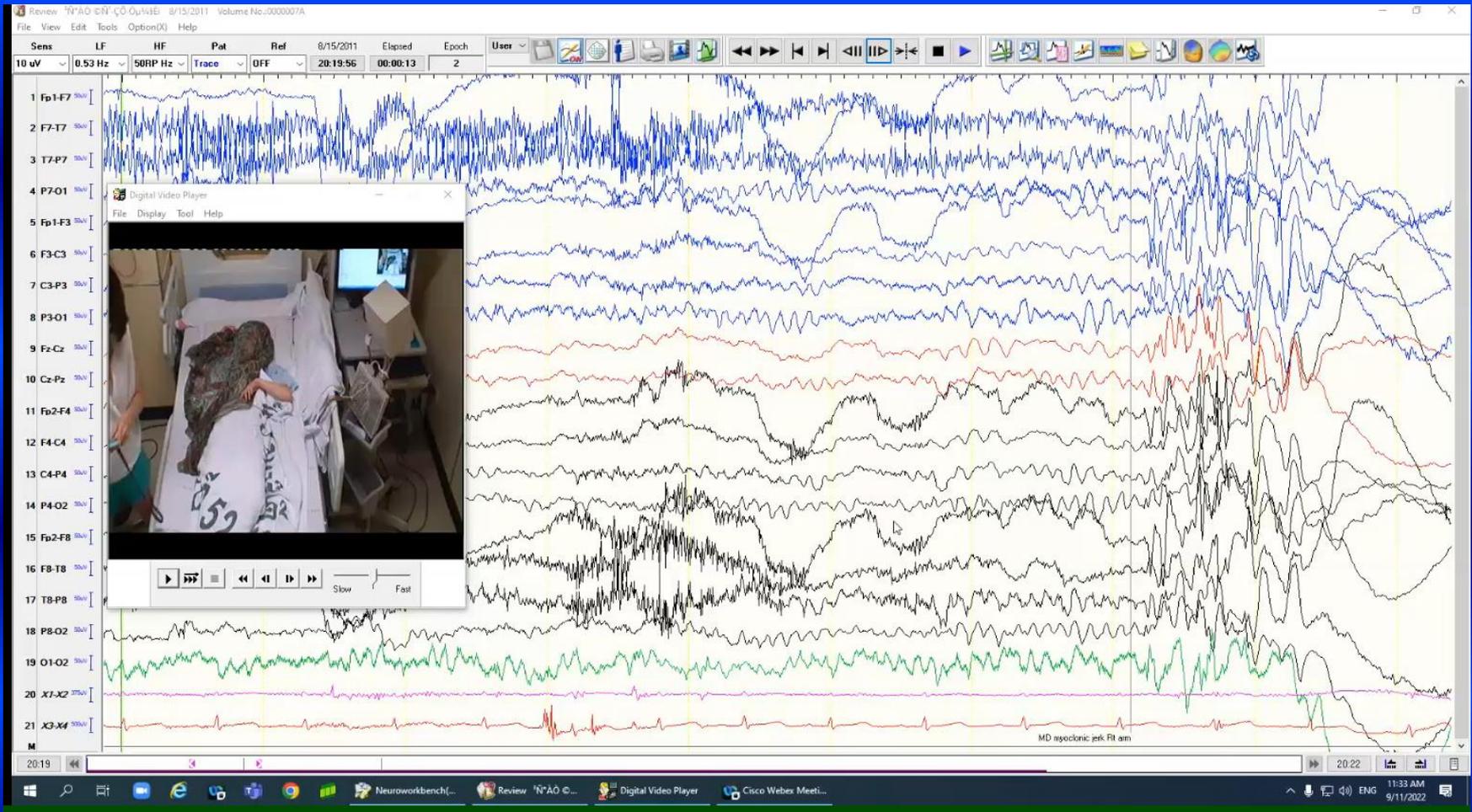
↑ 1 SEC. 100 μ V

Myoclonic Seizure

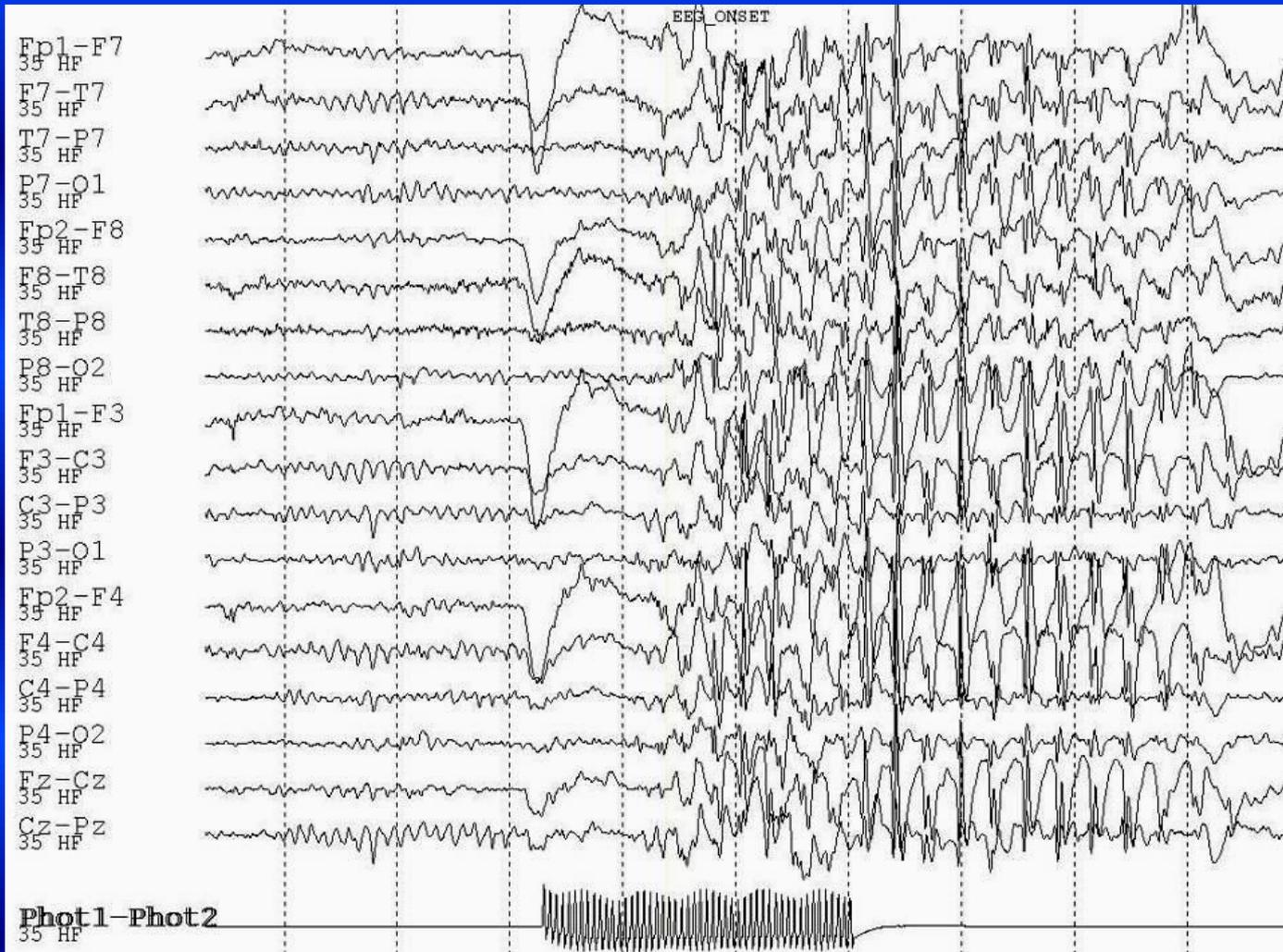
- Myoclonic jerk correlates with a generalized spike-and-wave or polyspike-and-wave.

JME – Cluster of Myoclonic Jerks





Photoparoxysmal Response

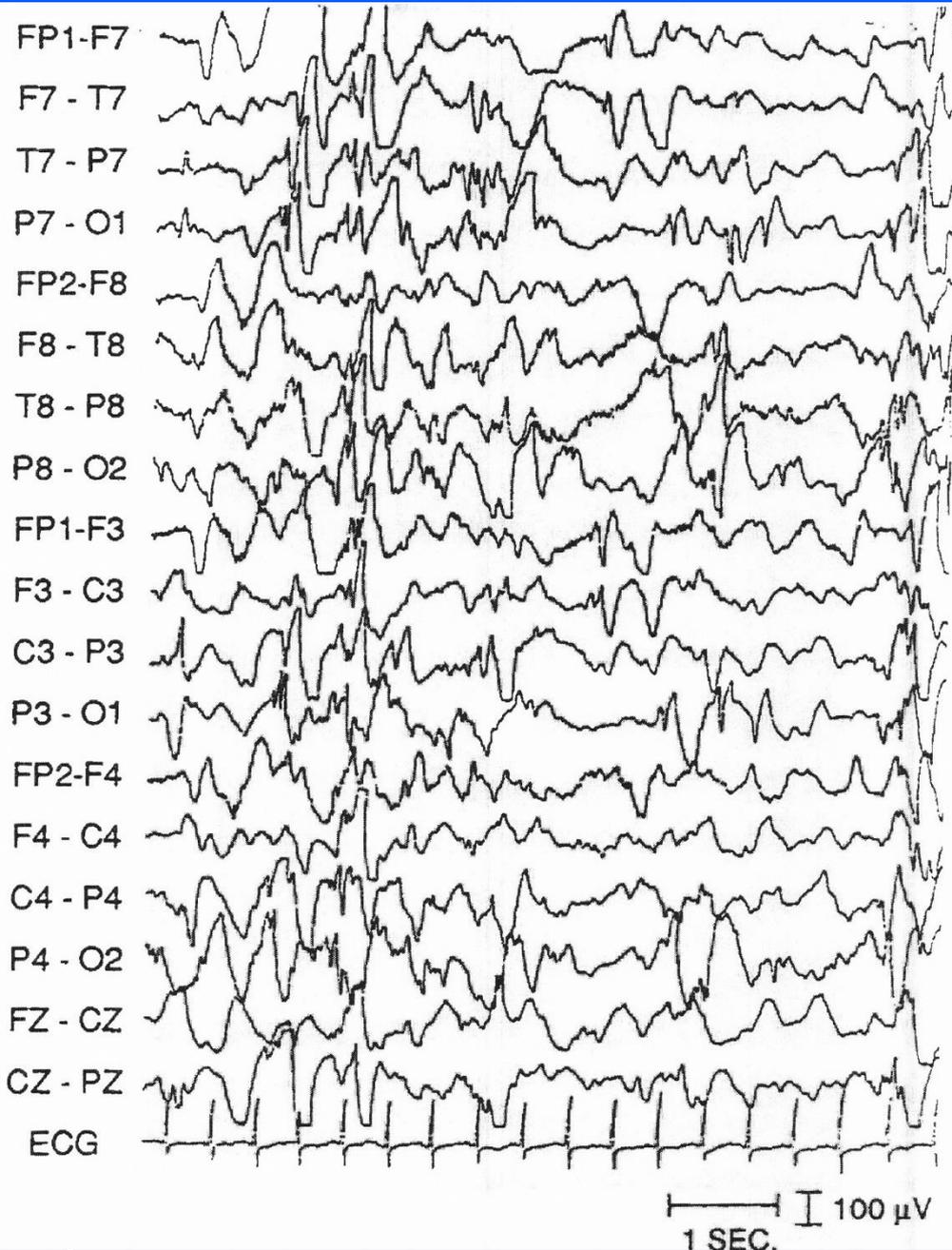


Myoclonic Atonic Seizure

- Myoclonic component is associated with a generalized spike or polyspike.
- Atonic component is associated with the aftergoing high voltage slow wave.

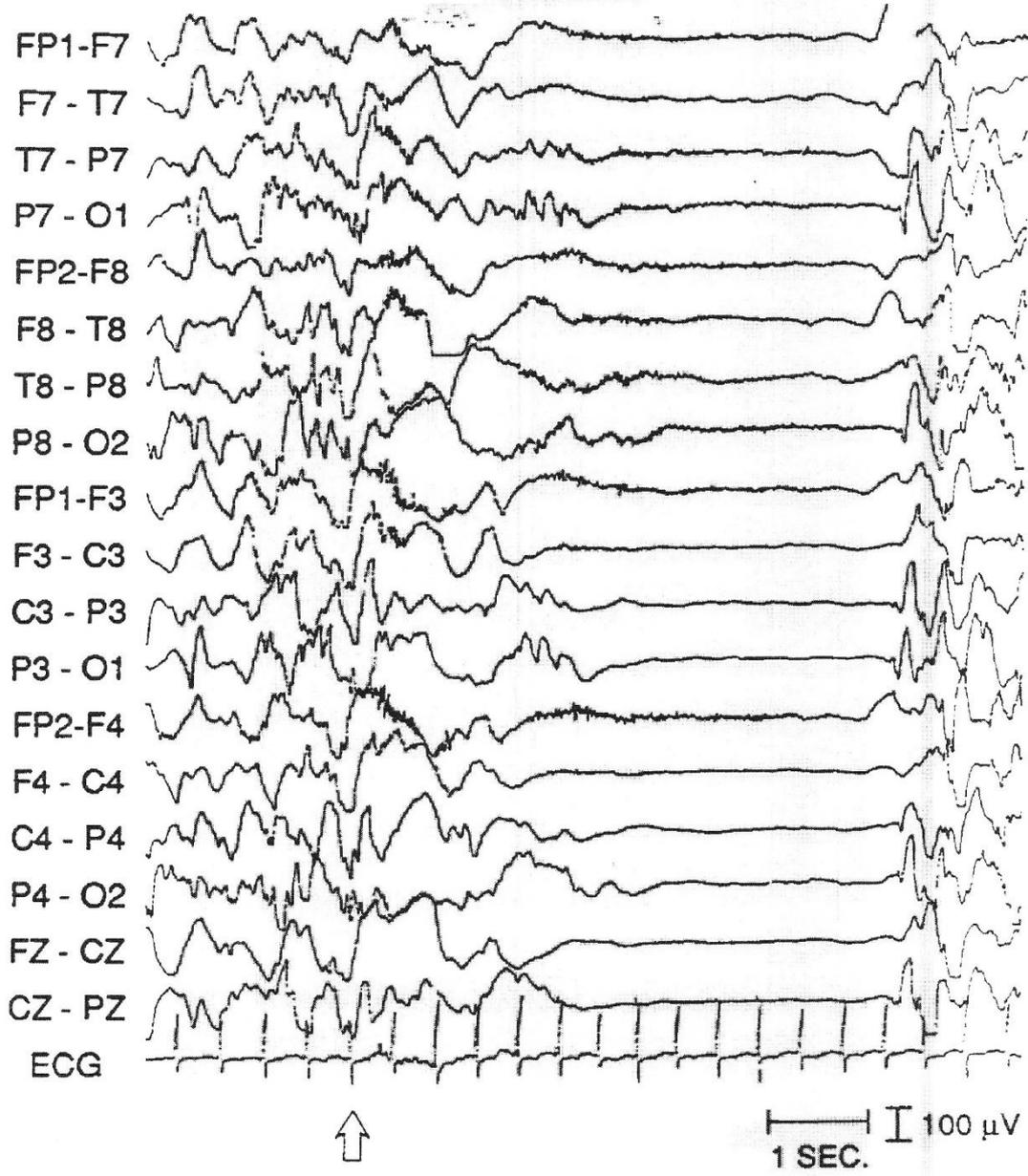
Epileptic Spasms

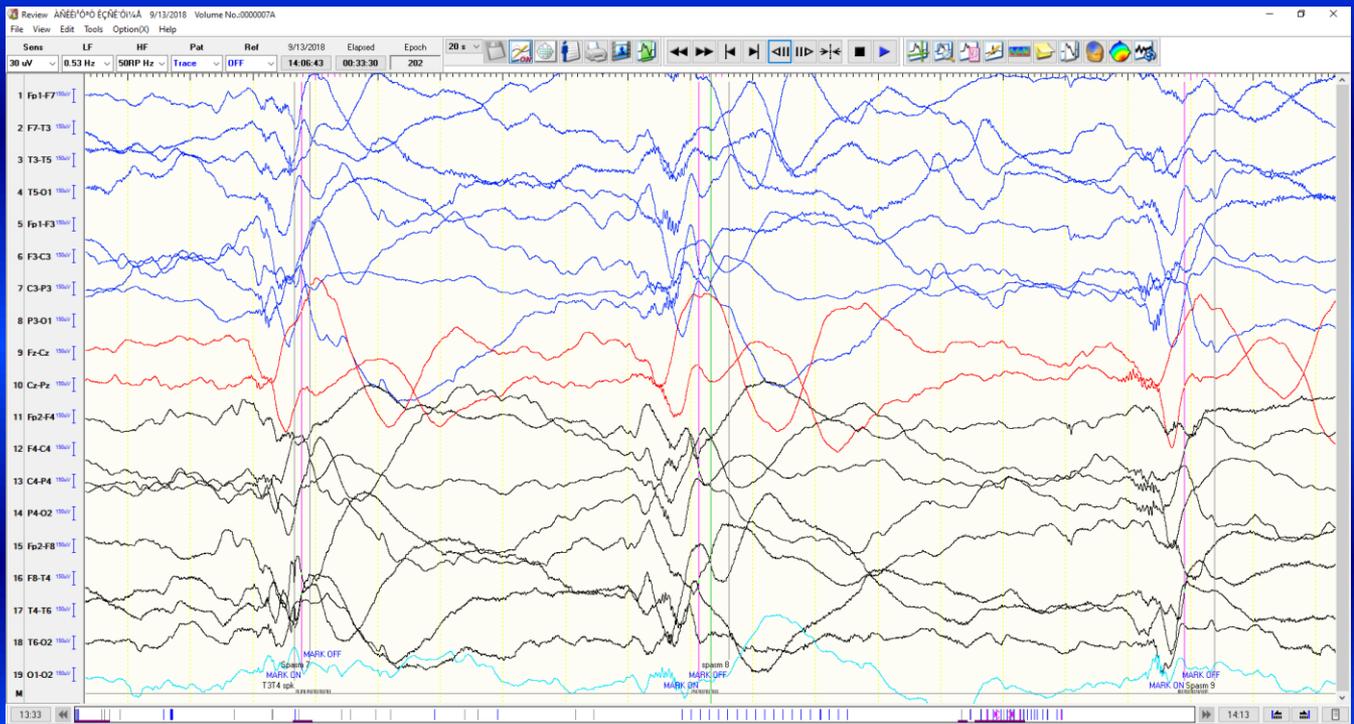
- Epileptic **spasms** are most commonly accompanied by a high voltage triphasic sharp or **slow wave followed by low amplitude fast activity** and voltage attenuation.
- Generalized or focally
- This EEG pattern may be seen in sleep with or without clinical seizures.



Infantile Spasms- Hypsarrhythmia (Interictal)

Infantile Spasms-Ictal



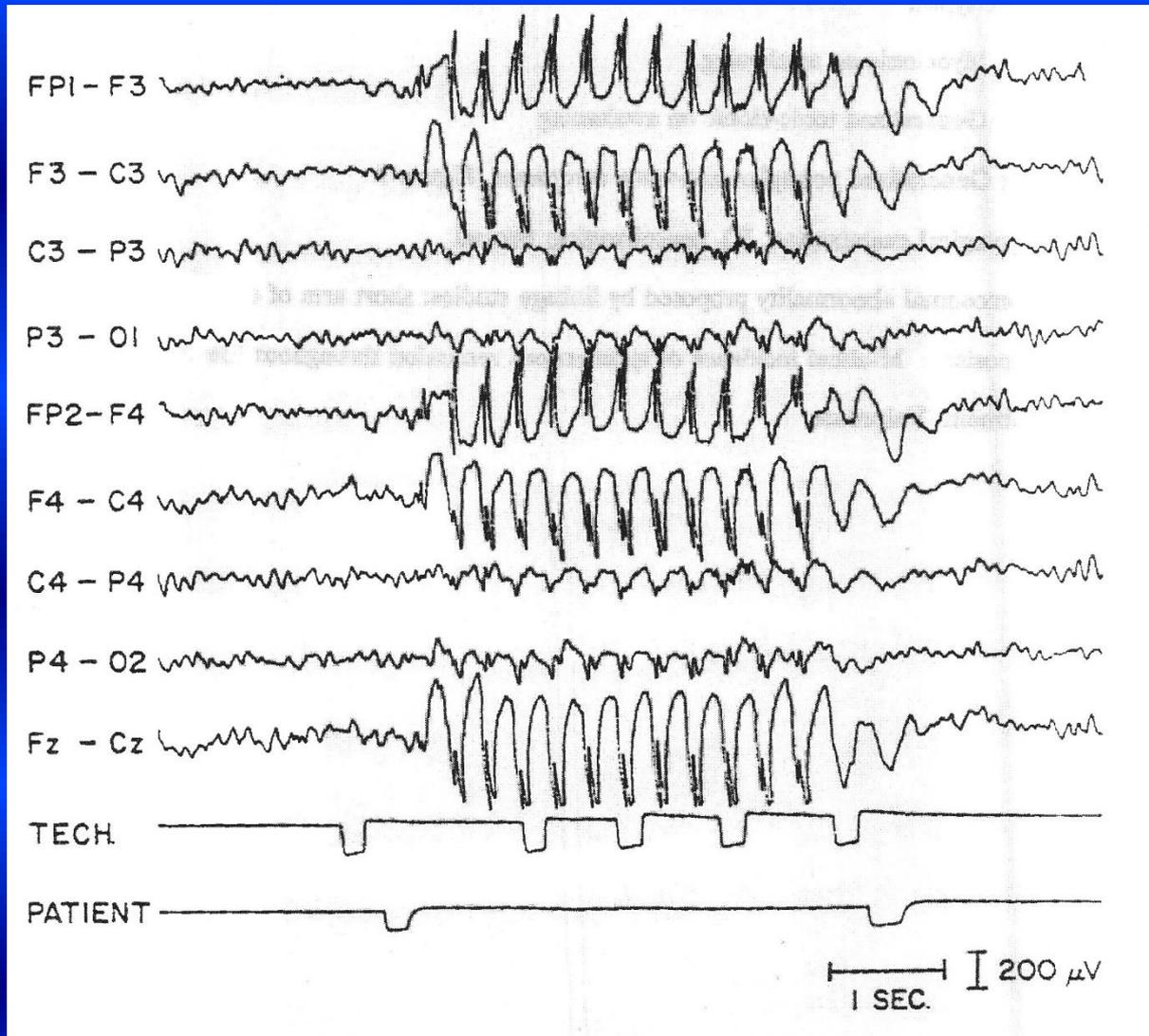


Non-Motor Seizure

Absence Seizure

- Regular 3 Hz generalized spike-and-wave occurs with typical absence seizures in childhood absence epilepsy.
- In absence seizures beginning in adolescence, faster irregular 3.5-6 Hz generalized spike-and-wave and polyspike-and-wave occurs.

Absence Seizure During Hyperventilation

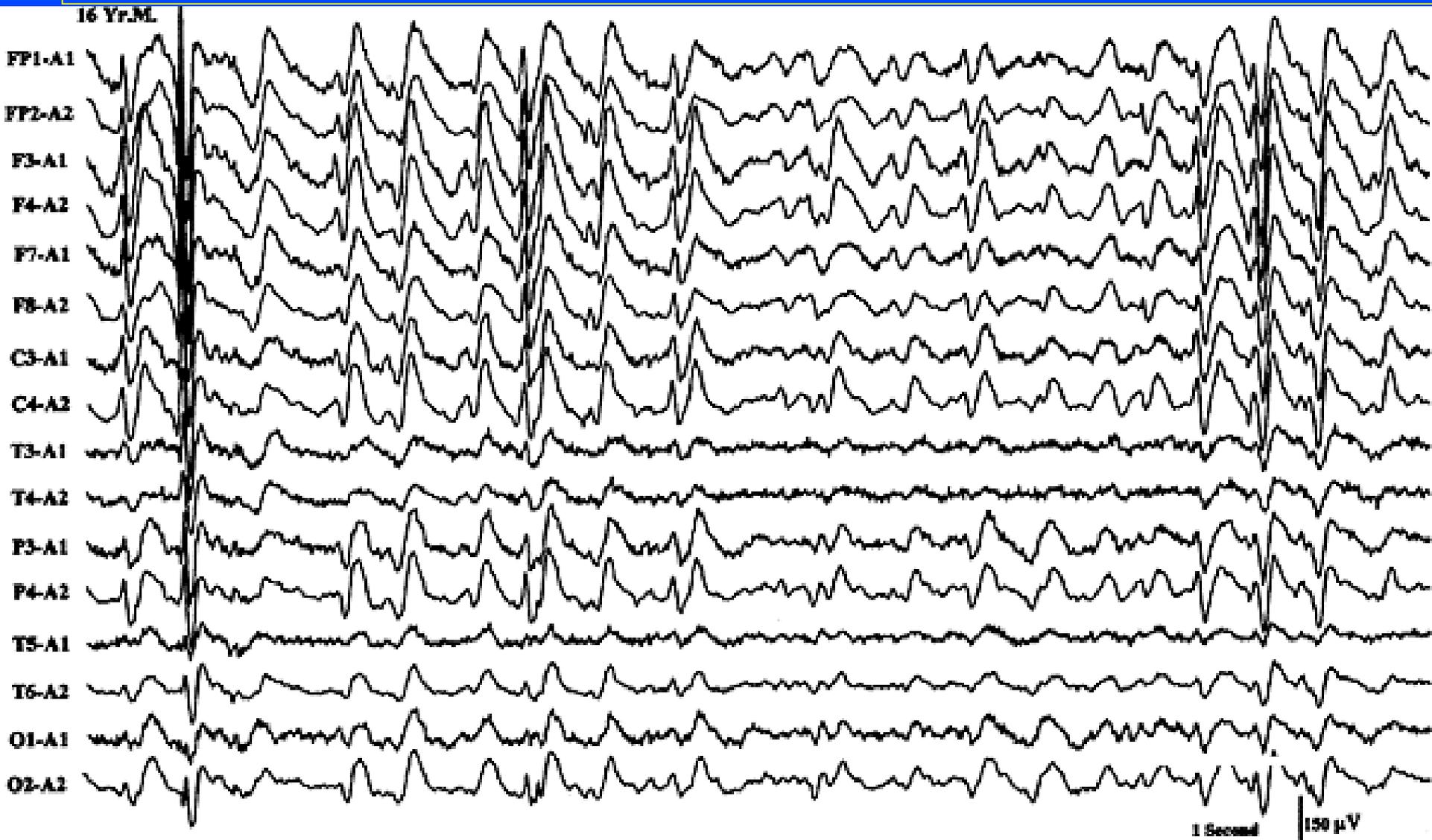




Atypical Absence Seizure

- Slow (<2.5 Hz) generalized spike-and-wave discharges accompany atypical absences.
- May be facilitated by hyperventilation, however hyperventilation may be difficult to achieve in children with intellectual impairment.

EEG of a 16-year-old child with intellectual disability and tonic seizures (Slow SWC)



Myoclonic Absence Seizure

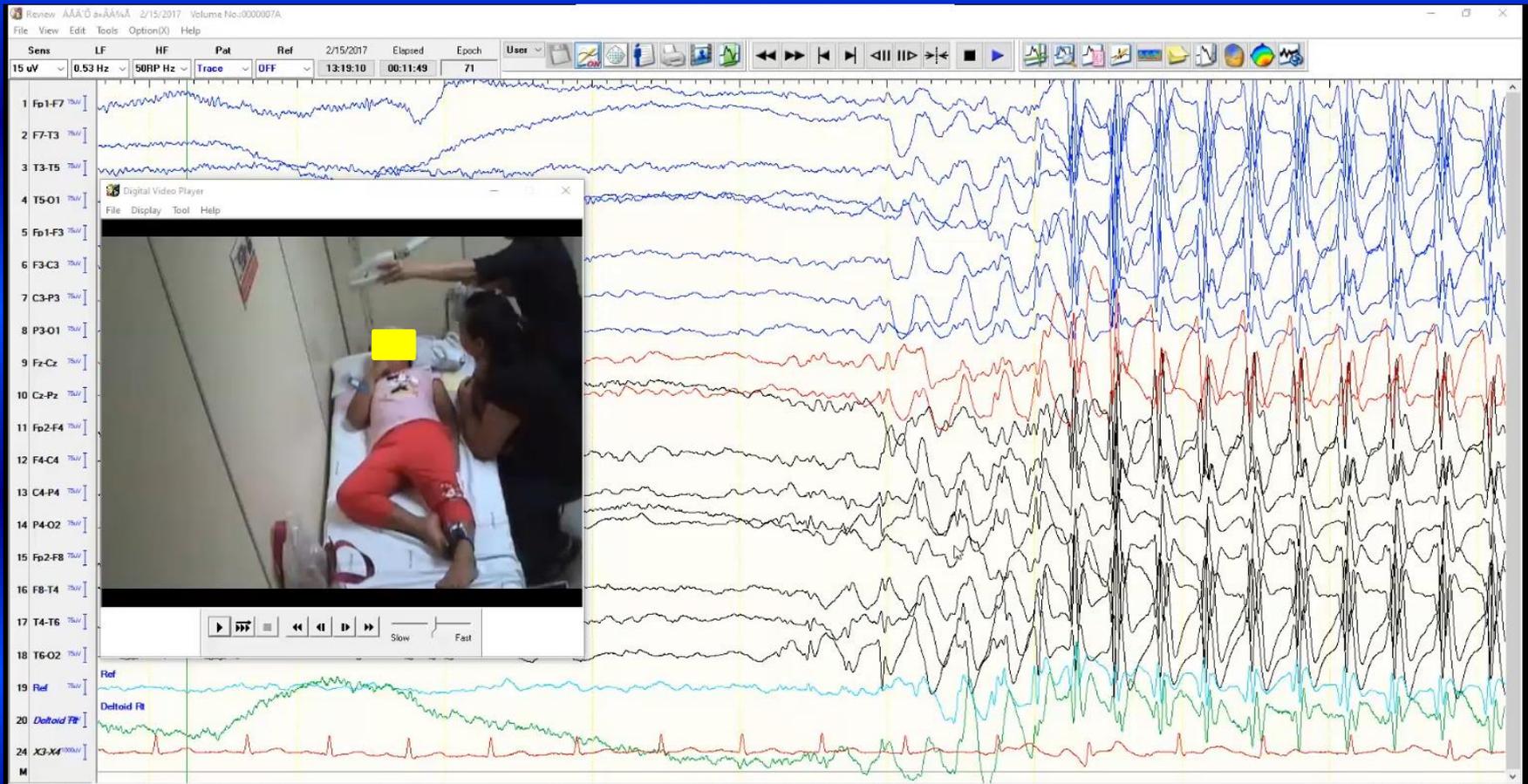
- Regular 3-Hz generalized spike-and-wave.
- EMG recordings from the upper arm show a constant relationship between the bilateral myoclonic jerks and spike-and-waves.

Myoclonic Absence Seizure

Absence with Eyelid Myoclonia

- High amplitude generalized spike-and-wave and polyspike-and-wave at a frequency of 3-6Hz, triggered by eye closure and intermittent photic stimulation.

Absence with Eyelid Myoclonia



Q & A

<https://www.epilepsydiagnosis.org/index.html>