



# Interictal & Ictal Patterns in Generalized Seizures

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### 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



#### **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

![](_page_9_Figure_1.jpeg)

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

# Hypsarrhythmia

![](_page_10_Figure_1.jpeg)

### **Burst-Suppression liked Pattern in Sleep**

![](_page_11_Figure_1.jpeg)

![](_page_12_Picture_0.jpeg)

### **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 ( spikewaves, 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

![](_page_17_Picture_1.jpeg)

# **Tonic sz & Ictal EEG**

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# **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

![](_page_20_Figure_1.jpeg)

1 /1 SEC. Ι 100 μV

### **Myoclonic Seizure**

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

#### JME – Cluster of Myoclonic Jerks

![](_page_22_Figure_1.jpeg)

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![](_page_23_Figure_0.jpeg)

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#### Photoparoxysmal Response

![](_page_24_Figure_1.jpeg)

# **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.

FP1-F7 **F7** T7 - P7 P7 - 01 FP2-F8 F8 - T8 T8 - P8 P8 - 02 FP1-F3 F3 - C3 C3 - P3 P3 - 01 FP2-F4 **F4** C4 - P4 P4 - O2 FZ - CZ CZ - PZ -ECG T 100 μV 1 SEC

#### Infantile Spasms-Hypsarrhythmia (Interictal)

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#### Infantile Spasms-Ictal

![](_page_29_Figure_0.jpeg)

# **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-andwave and polyspike-and-wave occurs.

#### **Absence Seizure During Hyperventilation**

![](_page_32_Figure_1.jpeg)

![](_page_33_Figure_0.jpeg)

## **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)

![](_page_35_Figure_1.jpeg)

## **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**

![](_page_39_Figure_1.jpeg)

![](_page_40_Picture_0.jpeg)

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