Seizures and Epilepsy: Typical and Atypical

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\[\text{(Epileptic) Seizure}\]

- "Transient dysfunction of all or part of the brain due to excessive discharge of a group of neurons, causing sudden and transient symptoms of a motor, sensory, autonomic or psychic nature."

- Provoked Seizure: A seizure triggered by an immediate precipitant, such as fever, acute head trauma, CNS infection, hypoglycemia, syncope, etc.

- Unprovoked Seizure: A seizure without an immediate precipitant, i.e. fever, acute head trauma, syncope, etc.

Epileptic Seizures Classification

- **Partial** (local, localized)
  - Simple – no change in consciousness
  - Complex – alteration of consciousness
  - Secondarily generalized – loss of consciousness

\[\text{Faculty Disclosure Information}\]

A. I do not have any current financial relationships with the manufactures of any commercial product and/or provider of commercial services discussed in this CME activity:

B. I do intend to discuss an unapproved / investigative use of a commercial product / device in my presentation.
Epileptic Seizures
Classification

- **Generalized**
  - Absence
  - Tonic-clonic
  - Clonic

- **Generalized**
  - Tonic
  - Atonic (drop attacks)
  - Myoclonic
    - Infantile Spasms

Epilepsy

- Epilepsy is a **clinical syndrome** that is defined by **recurrent** clinical seizures based on historical information provided by the patient and/or his family.
- The diagnosis of epilepsy is not made nor excluded on the findings of an EEG
- Seizure ≠ Epilepsy
Seizures / Epilepsy

- A single unprovoked seizure is NOT epilepsy
- One or more provoked seizures is NOT epilepsy
- Epilepsy - “recurrent unprovoked seizures”

A normal EEG does not exclude the diagnosis of epilepsy

- In known cases of epilepsy, abnormalities are present only in 50 - 60% of routine first EEGs, 75 - 85% of second studies and 92% in further studies
- EEG abnormalities decrease with age in persons with epilepsy
- Several studies have demonstrated that anticonvulsant medications do not “normalize” the EEG (exception is absence epilepsy)

The EEG is definitely useful in certain situations

- EEG is most useful in the characterization and classification of seizures, and therefore can be helpful in guiding therapy
  - ie. Partial onset, absence, generalized
- This is especially true if a seizure can be recorded (ictal recording)

Epileptic Syndromes

Classification

- Seizure Type/s
- Age
- Neurodevelopment
- Family History
- EEG
- Imaging

Etiology

Therapy

Prognosis
### Pediatric Epileptic Syndromes

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<thead>
<tr>
<th>Generalized Syndromes</th>
<th>Localization Related Syndromes</th>
<th>Special Syndromes</th>
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### Febrile Seizures

- **Age**: 3 mo - 6 yrs
- **Devel Hx**: Normal
- **Sz type**: Tonic-clonic, occas focal or status
- **Etiology**: 3-5% of all children, often FHx
- **Evaluation**: r/o CNS infection, ? EEG
- **EEG**: Normal
- **Treatment**: Usually not needed
- **Prognosis**: Excellent - Normal

### Pediatric Epileptic Syndromes

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### Febrile Seizures

- **Age**: 4-12 years at onset
- **Devel Hx**: Normal
- **Sz type**: Absence (staring spells)
- **Etiology**: Genetic - complex
- **Evaluation**: EEG
- **EEG**: 3 cps generalized spike-wave
- **Rx**: Ethosuximide, Valproate, Lamictal
- **Prognosis**: Good
**Infantile Spasms**

**West’s Syndrome**

- **Age**: 1 mo-3 yrs
- **Devel Hx**: Abnormal (secondary)  
  Normal (idiopathic)
- **Sz Type**: Clustered massive myoclonus
- **Etiology**: Idiopathic (genetic)  
  Symptomatic: HIE, Genetic, IEM, Malformation,  
  Tuberous sclerosis, Infection (ToRCH)
- **Evaluation**: EEG, MRI, Metabolic/Genetic, LP ?
- **EEG**: Grossly abnl - hypsarrhythmia typical
- **Rx**: ACTH vs Pred, Vigabatrin, BZP, keto diet…
- **Prognosis**: Poor, severely handicapped - 90 +%

**Lennox-Gastaut Syndrome**

- **Age**: 2-10 years
- **Devel Hx**: Abnormal (secondary)  
  Normal (idiopathic)
- **Sz types**: Mixed: tonic, atonic, atypical absence,  
  myoclonic, tonic-clonic
- **Etiology**: Idiopathic (genetic)  
  Symptomatic: HIE, Genetic, IEM, Malformation,  
  Tuberous sclerosis, Infection
- **Evaluation**: EEG, MRI, Metabolic/Genetic
- **EEG**: Generalized spike and polyspike-wave
- **Rx**: VPA, BZP, ZNG, TPM, FBM, CLB, VNS
- **Prognosis**: Poor, all are mentally disabled
Pediatric Epilectic Syndromes

- **Generalized Syndromes**
  - Petit Mal Epilepsy / Childhood Absence
  - Infantile Spasms (West’s Syndrome)
  - Lennox-Gastaut Syndrome
  - Juvenile Myoclonic Epilepsy (JME)

- **Localization Related Syndromes**
  - Benign Rolandic (Focal) Epilepsy
  - Benign Occipital Epilepsy

- **Special Syndromes**
  - Febrile Seizures

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**Benign Rolandic Epilepsy**

- **Age**: 3-13 years at onset
- **Devel Hx**: Normal
- **Sz type**: PM focal Sz may generalize
- **Etiology**: Genetic often with FHx
- **Evaluation**: EEG, MRI to r/o pathology
- **EEG**: Centrotemporal spikes (Rolandic)
- **Rx**: Keppra, OXC, CBZ
- **Prognosis**: Excellent, resolves in adolescence
Goals of Antiepileptic Treatment

- Control seizures (minimize frequency)
- Minimize side-effects of AEDs
- Monotherapy when possible
- Balancing Act:

Seizure Control

Compliance Side-effects

Epilepsy
Therapeutic Selection

AEDs
Resective Surgery
Ketogenic Diet
VNS

A wealth of anticonvulsants®

- phenobarbital
- ethosuximide
- carbamazepine
- valproate
- phenytoin
- lamotrigine
gabapentin
felbamate

*clonazepam
topiramate
tiagabine
*zonisamide
*levetiracetam
*rifampin
gabapentin
evagabrant
*felbamate
*carbamazepine
*valproate
*phenobarbital
*phenytoin
ethosuximide

1900 1920 1940 1960 1980 2000

Available in the US

Factors in choosing an AED

- The seizures
  - Type, frequency, severity
- The AEDs
  - Side-effects, titration schedule, drug interactions, dosing forms, cost
- The patient
  - Co-morbidities, other drugs, prescription plan
Worth Remembering

- First seizures almost never need treatment with daily AEDs
- Some cases of epilepsy do not need treatment with daily AEDs (i.e., Benign Rolandic)
- With or without AED treatment, the goal is “a life unaffected by seizures”
- Choose an AED based on the seizures, the patient and the drugs best suited

Antiepileptic Drug (AED) Regimens
Success Rates

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<td>Seizure free with 1st drug</td>
<td>36%</td>
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<tr>
<td>Seizure free with 2nd drug</td>
<td>4%</td>
</tr>
<tr>
<td>Seizure free with 3rd or multiple drugs</td>
<td>47%</td>
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<tr>
<td>Not seizure free</td>
<td>13%</td>
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Previously Untreated Epilepsy Patients (N=470)


Epilepsy
Therapeutic Selection

- AEDs
- Ketogenic Diet
- Resective Surgery
- VNS