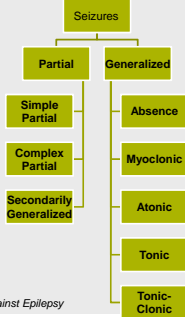

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CNA certification lecture
Seizure Disorders
January 30 2013

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ILAE Classification of Seizures



```
graph TD; Seizures --> Partial; Seizures --> Generalized; Partial --> SimplePartial[Simple Partial]; Partial --> ComplexPartial[Complex Partial]; Partial --> SecondarilyGeneralized[Secondarily Generalized]; Generalized --> Absence; Generalized --> Myoclonic; Generalized --> Atonic; Generalized --> Tonic; Generalized --> TonicClonic[Tonic-Clonic];
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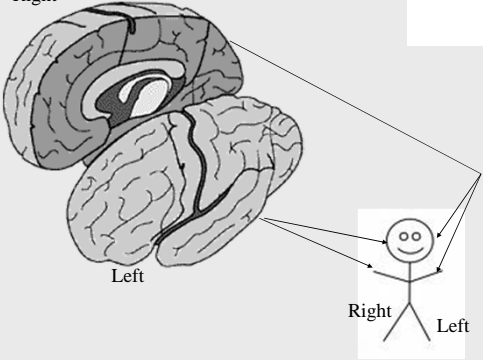
ILAE – International League Against Epilepsy

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With permission from www.aesnet.org

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Right



Left

Right Left

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Partial seizures

- Duration: 5–10 seconds
- Memory is preserved
- Auras ARE seizures
- Note: Prodrome is the feeling prior to seizure
- Somatosensory, motor, autonomic or psychic symptoms
- Todd's paresis may be present
- Often minimal or no post-ictal period

```

graph TD
    Seizures --> SIMPLE_PARTIAL[SIMPLE PARTIAL]
    Seizures --> Generalized
    
```

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Complex partial seizures

- Duration: 30 seconds to 2 minutes
- ****IMPAIRED CONSCIOUSNESS****
- Automatism
- Autonomic phenomena
- Eye, head deviation
- Contralateral movements (motor, dystonic)
- May have brief post-ictal period
- Headaches common
- Todd's paresis; expressive aphasia
- TIP: State a favorite thing during the seizure and ask after what you said

```

graph TD
    Seizures --> COMPLEX_PARTIAL[COMPLEX PARTIAL]
    Seizures --> Generalized
    
```

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Secondarily Generalized Seizures

- Begins focally, with or without focal neurological symptoms
- Variable symmetry, intensity, and duration of tonic (stiffening) and clonic (jerking) phases
- Typical duration 1-3 minutes
- Postictal confusion, somnolence, with or without transient focal deficit

```

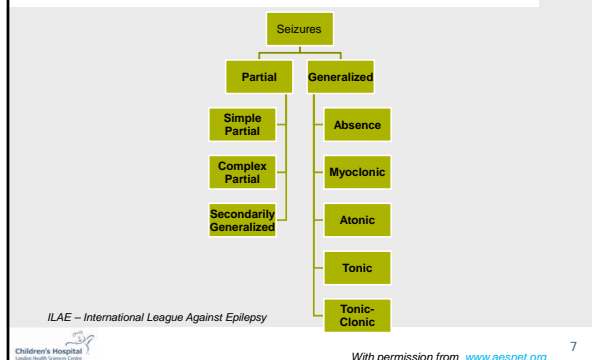
graph TD
    Seizures --> Partial
    Seizures --> Generalized
    Partial --> Secondarily_Generalized[Secondarily Generalized]
    
```

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ILAE Classification of Seizures



Typical Absence Seizures

- Brief staring spells ("petit mal") with impairment of awareness
- 3-20 seconds
- Sudden onset and sudden resolution
- Often provoked by hyperventilation
- Onset typically between 4 and 14 years of age
- Often resolve by 18 years of age
- Normal development and intelligence
- EEG: Generalized 3 Hz spike-wave discharges

```

    graph TD
      Seizures --> Partial
      Seizures --> Generalized
      Generalized --> Absence
  
```

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Myoclonic Seizures

Epileptic Myoclonus

- Brief, shock-like jerk of a muscle or group of muscles
- Differentiate from benign, nonepileptic myoclonus (e.g., while falling asleep)
- EEG: Generalized 4-6 Hz polyspike-wave discharges

```

    graph TD
      Seizures --> Partial
      Seizures --> Generalized
      Generalized --> Myoclonic
  
```

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Atonic Seizures

- Sudden loss of postural tone
 - Severe – may fall
 - Milder – head nod, jaw drop
- “Drop attacks”
- Usually impaired consciousness
- Duration: usually seconds

```
graph TD; Seizures --> Generalized; Generalized --> Atonic;
```

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Generalized seizures

- Onset without warning
- Loss of consciousness
- Often begins with tonic phase
- Proceeds to clonic phase – rhythmic bilateral contraction
- Massive autonomic outpouring – tachycardia, hypertension, hypersalivation, pupillary dilation
- Duration: 30 seconds– 2 minutes
- Post-ictal – minutes to hours

```
graph TD; Seizures --> Generalized; Generalized --> Tonic; Generalized --> Tonic/Clonic;
```

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Nonepileptic

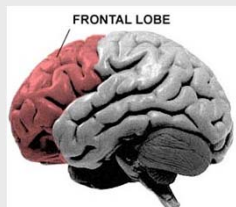
- Reflex anoxic seizures
- Febrile seizures
- TIA – may appear as CPS
- Psychogenic seizures (pseudosz)
- Key * HISTORY
 - Eyes closed; Length of time; Emotional trigger; Unusual motor movements; Unusual non guttural vocalizations; May have incontinence
- No EEG correlate
- Diagnosis of exclusion

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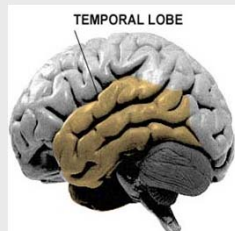
Frontal Lobe Symptoms

- **MOTOR** movements
- Turning away of eyes
- Aphasia
- Head, body turning



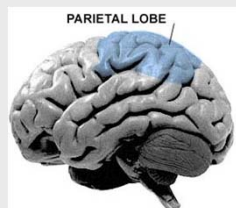
Temporal Lobe Symptoms

- Gastric phenomena
- Fear, panic
- Autonomic phenomena
- Oroalimentary and gestural automatism
- Dystonia
- Aphasia
- Auditory hallucinations (buzzing, person's voice)



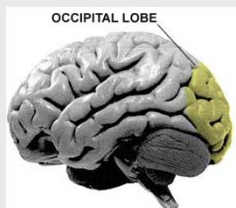
Parietal Lobe Symptoms

- **SENSORY**
- Vertigo
- Contralateral hemi-neglect
- Eyes may turn away or toward side of seizure



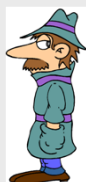
Occipital Lobe Symptoms

- Simple geometric shapes
- Flashes of light (contralateral visual field)
- Hallucinations (flashing lights)



Deciphering Seizures

- **HiSTORY**
 - Seizure progression?
- **Localization**
 - Where?
- **Classification**
 - Focal? General?



Case Study #1



▪ Trevor is a 13 year old male who was recently noted at school to be staring unresponsively with his head and eyes turned to the right. He was making some swallowing motions . At first his teacher thought he was goofing off because he kept grabbing at his shirt repeatedly with his left hand. Then she noticed his right hand was turned inward and very stiff. His pupils were very dilated and he was unresponsive. The total event lasted about 60 seconds. Afterwards Trevor seemed fine but complained of a headache for a ½ hour and recalls feeling “funny” and his “stomach bothering” him before the seizure started.

Case Study # 2



- Brenda is an 48 year old female underwent gross total resection of a large brain tumor. Six hours post op she suddenly grunted, became stiff with arms and legs outstretched, eyes open and rolled back, and her jaw was clenched. She then developed tonic and quickly clonic movements. She had drooling and mild cyanosis. The entire seizure lasted 2 minutes. Afterward she slept deeply for 3 hours.

Deciphering Seizures

▪ HiSTORY

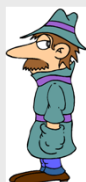
- Seizure progression?

▪ Localization

- Where?

▪ Classification

- Focal? General?



Antiepileptic Drug Principles

- Seizure type/ Epilepsy syndrome
- Treatment Strategies (Pharmacodynamics)
- Pharmacokinetic profile (ADME)
- Efficacy (ability to suppress seizures)
- Ease of Use
- Adverse effects
- Cost
- Interactions/other medical conditions

AED Management Principles

- Specific seizure type/epilepsy syndrome
- Monotherapy – Best if achievable
- Balance between No Seizures and No (minimal) side effects
- Treatment based on effect on quality of life
- Mechanism of action goal is to make cell membrane less excitable
- Side effects, drug interactions, administration issues, protein binding

Generic/Trade Names

Broad-Spectrum Agents

Valproate – Depakene, Epival
 Lamotrigine - Lamictal
 Topiramate - Topamax
 Levetiracetam - Keppra
 Clonazepam – Rivotril
 Clobazam - Frisium

Absence

Ethosuximide – Zarontin
 VPA; LAM

Narrower Spectrum Agents

Partial onset seizures

Phenytoin - Dilantin
 Carbamazepine - Tegretol
 Oxcarbazepine - Trileptal
 Gabapentin - Neurontin
 Primidone – Mysoline
 Phenobarbital - same

Epileptic Spasms

ACTH –Cosyntropin (Synacthen Depot)
 Vigabatrin (Sabril)

Other anti-seizure meds

- Lacosamide (Vimpat)
- Rufinamide (Banzil)
- Felbamate*
- Zonisamide*
- Stiripentol*
- Pregabalin

SEIZURE FIRST AID

CALM.....SAFE.....TIME

- ROLL ON SIDE
- DO NOT INSERT ANYTHING IN MOUTH

- DETAILS OF SEIZURE PROGRESSION



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RECORD THE SEIZURE EXACTLY

- Remember to record the time and how the seizure progressed on the Seizure Record/Clinical Notes. The more detail you can provide, the better.



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RESPONDING TO A SEIZURE LASTING LONGER THAN 5 MINS

- Give initial rescue med at five minutes
 - Remember it takes 5-7 mins to work if NOT IV
- Call 911 or a Code (facility specific)
- ABCs
- Administer O2
- Monitor Vital signs, O2 Sat
- Establish IV Access (2 lines)
- Blood work as directed - bld glucose, AED level*, gas
- Monitor for respiratory depression, hypotension, arrhythmias
- Early treatment associated with the best outcome



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Rescue meds



- Ensure order on chart for rescue med
- Usual drugs of choice:
 - Lorazepam (buccal/rectal)– 0.1 mg/kg – max 4 mg
 - Midazolam (buccal) – 0.5 mg/kg – max 10 mg
or intranasal – 0.2 mg/kg – max 5 mg/nostril
 - Diazepam (rectal) – 0.5mg/kg/dose – max 20 mg/dose
- IV– not necessary unless prolonged seizure → Status Epilepticus
- Note: Benzodiazepines affect GABA receptors which decrease neuronal excitability



(Friedman, 2011)

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MANAGEMENT OF STATUS EPILEPTICUS

FIRST LINE (Benzos)

- Lorazepam IV (0.05– 0.1 MG/KG) Max 4 mg
- Assess 1–5 minutes – may repeat.
- Administer at a rate of 2 MG/MIN
 - Longer acting
 - Safe to administer IV
 - Lower risk of C–R depression
- If SZ continues an additional dose is given 5–10 mins after first dose
- May give up to a cumulative dose of 8–10 mg over 20 mins



(Friedman, 2011; Micromedex 2013)

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MGMT OF SE (cont'd)

- DIAZEPAM 0.1 mg/kg IV or MIDAZOLAM 0.05 mg/kg IV may be substituted if lorazepam not available.
- If IV access is not available, midazolam 10mg IM for patients with a body weight >40kg and 5mg IM for patients with a body weight of 13 to 40kg is an alternative



<http://www.uptodate.com>

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Management of SE (cont'd)...

2ND LINE: Begins 10 mins after last IV dose

- **Phenytoin (Dilantin)**
 - 15-20 mg/kg or max loading dose 1.5 – 2 gm
 - Maximum rate, children: 50 mg/min or 1 – 3 mg/kg/min, whichever is less
 - Adult rate: 50 mg/min
 - To avoid hypotension, bradycardia and irritation to blood vessels
 - NO IM injection
 - Only give with NS or flush before and after with NS



(Friedman, 2011)

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Management of SE (contd)

- **Fosphenytoin (Cerebyx)**
 - Rapidly converted to phenytoin
 - The dose, concentration in solutions, and infusion rates for fosphenytoin are expressed as phenytoin sodium equivalents (PE);
 - Fosphenytoin should always be prescribed and dispensed in phenytoin sodium equivalents (PE).
 - Loading dose, 15 to 20 mg phenytoin sodium equivalents (PE)/kg IV at a rate of 100 to 150 mg PE/min
 - Follow with maintenance doses of fosphenytoin or phenytoin
 - Compatible with NS and D5W



(<http://www.thomsonhc.com/micromedex2/librarian/...2013>)

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Management of SE (contd)

- **Phenobarbital**
 - 15 – 20 mg/kg (neonates and children) or max loading dose 1 Gram
 - Give undiluted or further dilute with an equal volume of NS or D5W
 - Do not exceed a rate of 1 mg/kg/minute or 30 mg/minute
 - Rapid injection rate may cause serious respiratory depression
 - Intubation/ventilation



(Friedman, 2011)

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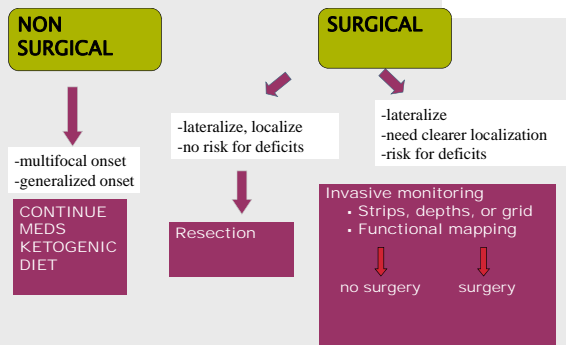
Management of SE (contd)

3rd LINE: IV infusion

- ICU – infusion – Midazolam or Pentobarbital
- Continuous EEG monitoring to keep in burst suppression

(Friedman, 2011)

Clinical Care Map



Management

- Treat underlying condition
- Education** (Sz and AED)
 - Avoid precipitating factors (alcohol, drug, fatigue)
 - Take medication regularly
 - Keep sz diary
 - Know medications
 - Know AED action and side effects
 - Know drug interactions

Management

- Counsel regarding living with uncertainty in illness/impact on quality of life
- Driving issues
- Women's issues – OC, co-morbidities
- Teen issues
- Use cell phones (meds/reminders)
- Medic alert bracelet
- Seizure first aid response – family/caregivers
- Websites
- Epilepsy Support Centers
- Keep appointments



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