

Anti-Epileptic Drugs for Seizure Disorders



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Session Summary

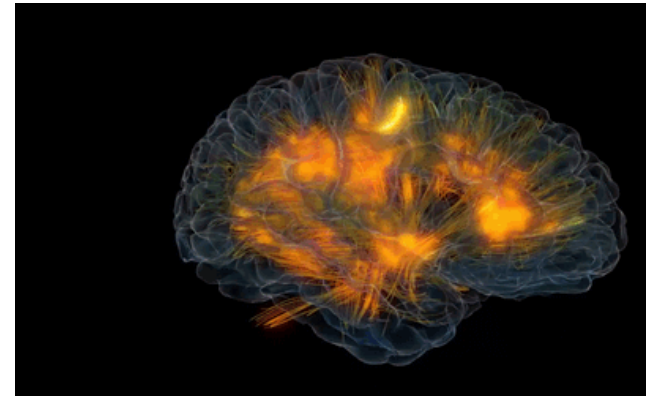
- **What you should already know:**
 - General presentation of a seizure
 - Common causes of seizures
- **What we will discuss today:**
 - Classifications of seizure types
 - Different anti-epileptic drugs (AEDs) available and their mechanism of action
 - Status epilepticus and management of seizure emergencies
- **What you should be able to do:**
 - Recognize an ineffective AED regimen
 - Identify an adverse reaction of an AED that may interfere with physical therapy
 - Understand the value of optimized seizure management on quality of life

Epilepsy

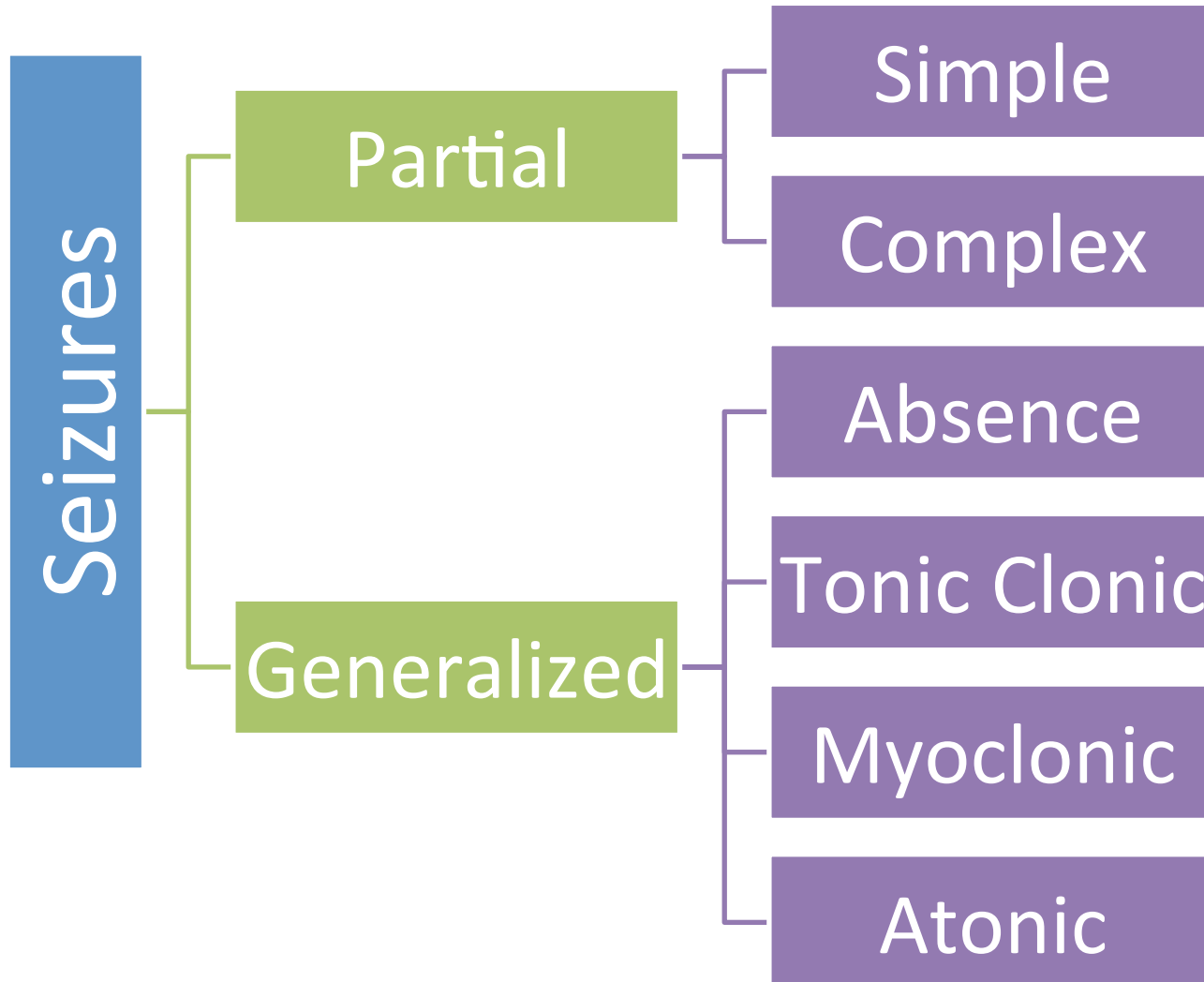
- Chronic syndrome involving **recurrent** seizures
- 1% of the world has epilepsy
 - 80% have control of seizures

Etiology:

- Tumor, trauma, stroke
- Metabolic disorder, hypoglycemia, poisoning, alcohol withdrawal, drug-induced
- Genetic/congenital



Types of Seizures



Types of Seizures

Simple (Partial)

- Consciousness preserved
- Jerking, psychological symptoms (altered senses)

Complex (Partial)

- Impaired consciousness
- Psychological symptoms

Absence

- Impaired consciousness, loss of tone
- Urinary incontinence

Tonic Clonic

- Tonic: <1 min loss of consciousness and muscle rigidity
- Clonic: 2 min jerking, biting, urinary/fecal incontinence

Myoclonic

- Consciousness preserved
- Single or multiple myoclonic jerks

Atonic

- Loss of muscle tone
- Limp collapsing

Goals of Treatment

1. Control and prevent seizures
2. Minimize adverse effects
 - a. Balance seizure control with drug side effects
3. Optimize quality of life
 - a. Create safe physical environment
 - b. Eliminate anxiety and develop mental confidence

Anti-Epileptic Drugs (AEDs)

- Mechanism of Action
 - **Potential** inhibitory effects of GABA
 - **Antagonizing** excitatory effects of glutamate and aspartate signaling
- Selection
 - **Seizure type** and AED indication
 - Adverse effect profile
 - Drug interaction potential (**CYP450 metabolism**)
- Efficacy
 - Inter-patient variability in response
 - Trial and error

AEDs by Generation

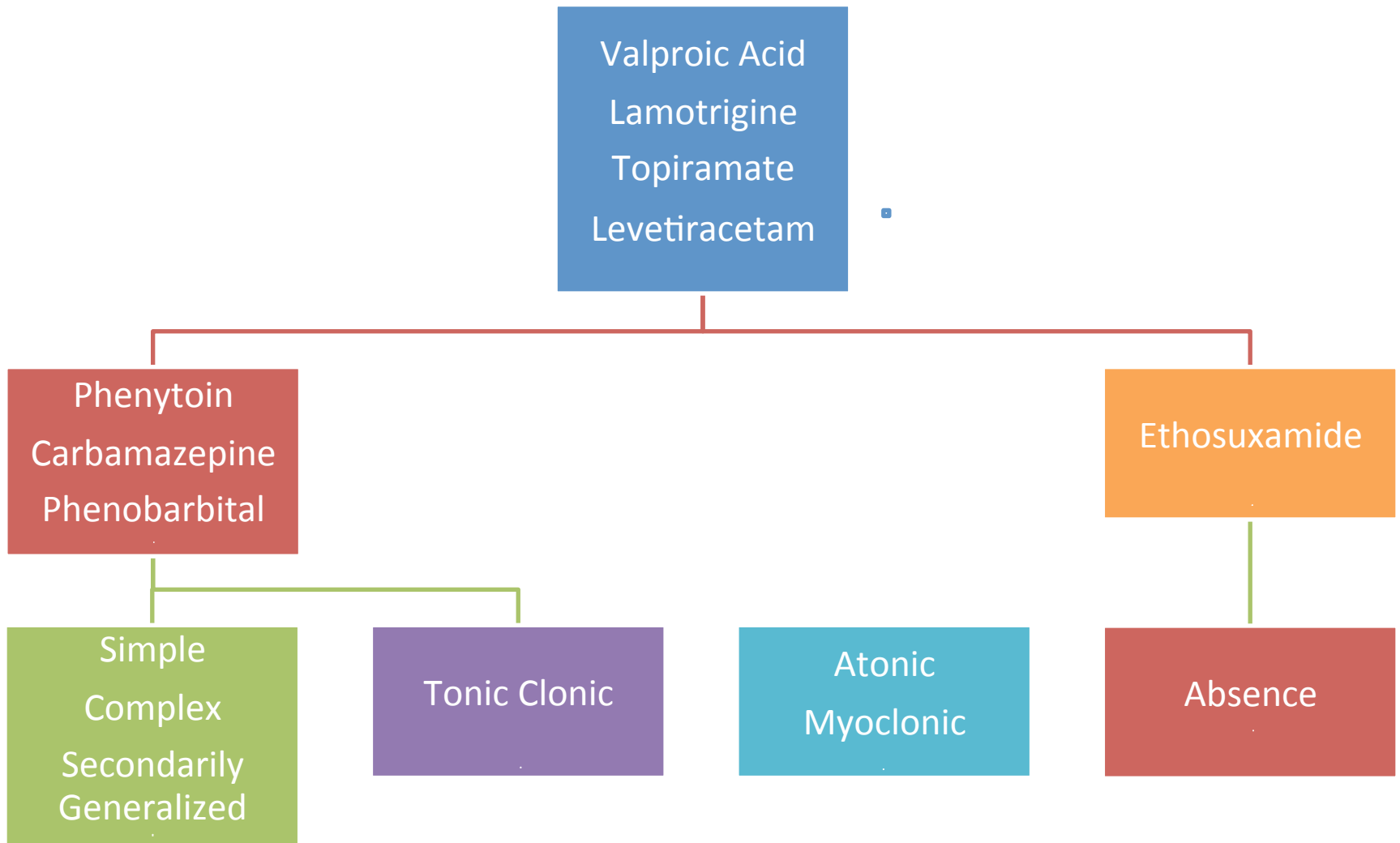
Classic (Older) AEDs

- Phenytoin (DILANTIN)
- Carbamazepine (TEGRETOL)
- Valproic Acid (DEPAKOTE)
- Phenobarbital

Modern (Newer) AEDs

- Lamotrigine (LAMICTAL)
- Levetiracetam (KEPPRA)
- Topiramate (TOPAMAX)
- Gabapentin (NEURONTIN)

AEDs by Indication



Phenytoin (DILANTIN)

Indications

- Complex seizures
- Tonic clonic seizures
- Prophylaxis post surgery

Adverse Events

- **Ataxia/asthenia**
- **Coordination**
- **Diplopia/nystagmus**
- **Confusion**
- Peripheral neuropathy
- Gingival hyperplasia

Drug Interactions

- CYP enzyme inducer
- May increase or decrease concentration of other drugs

Carbamazepine (TEGRETOL)

Indications

- Complex seizures
- Tonic clonic seizures
- Mixed seizures
- Trigeminal neuralgia

Adverse Events

- **Dizziness**
- **Ataxia/asthenia**
- **Diplopia/nystagmus**
- Nausea
- Rash/Pruritis

Drug Interactions

- CYP enzyme inducer
- May increase or decrease concentration of other drugs

Valproic Acid (DEPAKOTE)

Indications

- Complex seizures
- Absence seizures
- Mixed seizures
- Bipolar disorder

Adverse Events

- **Asthenia**
- **Dizziness**
- **Diplopia/amblyopia**
- **Weight gain**
- **Backache**
- **Tremor**
- Abdominal pain
- N/V/D

Drug Interactions

- Cisplatin decreases [serum] of Valproic acid
- Warfarin – increased risk of bleeding
- Other drugs with narrow therapeutic windows

Lamotrigine (LAMICTAL)

Indications

- Partial seizures
- Tonic clonic seizures
- Bipolar disorder

Adverse Events

- **Diplopia**
- **Dizziness**
- **Ataxia/asthenia**
- **Coordination**
- **Tremor**
- **Vertigo**
- Somnolence
- Headache
- Rhinitis

Drug Interactions

- CYP substrate affected by inducers/inhibitors
- Efficacy affected by contraceptives/HIV drugs/antidepressants

Levetiracetam (KEPPRA)

Indications

- Partial seizures
- Tonic clonic seizures
- Myoclonic seizures

Adverse Events

- **Decreased bone density**
- **Asthenia**
- Fatigue
- Headache/irritability

Drug Interactions

- Minimal liver enzyme effects
- Orlistat may decrease anticonvulsant activity
- Ginkgo may decrease anticonvulsant activity

Gabapentin (NEURONTIN)

Indications

- Partial seizures
- Neuralgia/
neuropathies

Adverse Events

- **Weight gain**
- **Ataxia**
- Nystagmus
- Fatigue

Drug Interactions

- Minimal liver enzyme effects
- Orlistat may decrease anticonvulsant activity
- Ginkgo may decrease anticonvulsant activity

Epilepsy and Physical Therapists

- Understand seizure type diagnosis, triggers, and symptoms
- Be able to identify when a patient is having a seizure
- Recognize common and serious adverse effects of AEDs
 - Do they impact physical therapy sessions?
 - Are they acceptable for the patient
 - Are they serious/dangerous?

Impact of Physical Therapists

- Improving Quality of Life
 - Improving balance and physical strength (to counter adverse effects of AED)
 - Establishing patient-specific safe environment by determining patient-specific needs
 - Encouraging patients to perform physical activities
 - Addressing fear of seizures
 - Benefits of physical activity on reducing seizure frequency

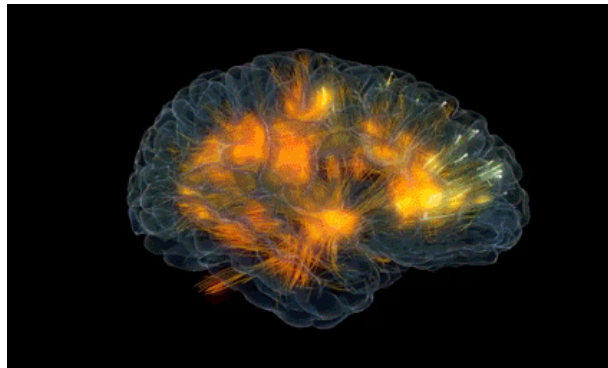
What to do if a patient has a seizure

- Clear area of dangerous objects
- Loosen objects around the neck/remove eyeglasses
- Find flat, soft place for patient to lie on
- Turn patient onto their side
- Do not restrain patient
- If seizure **duration > 5 minutes**, **injury** occurs, or patient becomes **unresponsive**: call 911

Status Epilepticus

- Defined as **continuous seizure lasting at least 5 minutes**

OR



- Two or more discrete seizures between which there is **incomplete recovery of consciousness**
- **Life threatening** emergency

Status Epilepticus

- Treatment
 - ABCs (airway/breathing/circulation)
 - Benzodiazepines (IV lorazepam)
 - IV AED (fosphenytoin)
 - Anesthesia
- Goals
 - Abort seizure
 - Ensure patient safety

What questions do you have?



References

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First Aid for Seizures. Centers for Disease Control and Prevention. Atlanta, GA. Available at: http://www.cdc.gov/epilepsy/basics/first_aid.htm. Accessed March 04, 2016.

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Acknowledgements

- Gary Fong, PharmD

Supplemental Slide

- Videos of Seizure Types
 - [Partial Seizures \(Simple\)](#)
 - [Partial Seizures \(Complex\)](#)
 - [Tonic-clonic Seizures \(Generalized\)](#)
 - [Absence Seizures \(Generalized\)](#)
 - [Myoclonic Seizures](#)
 - [Atonic Seizures](#)