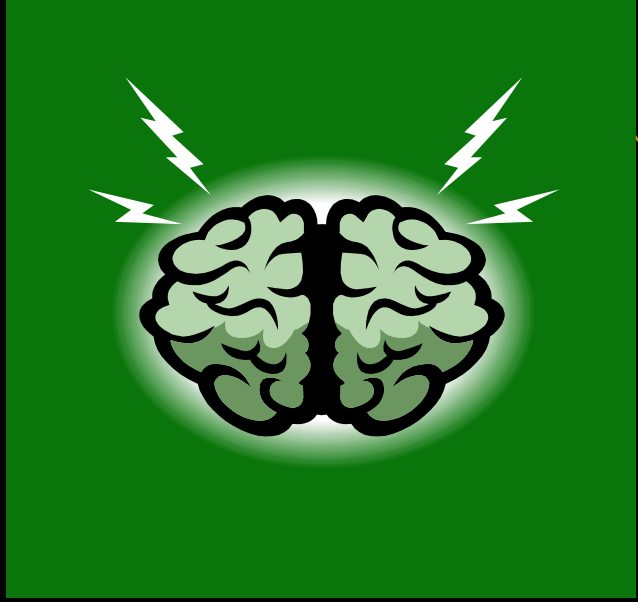
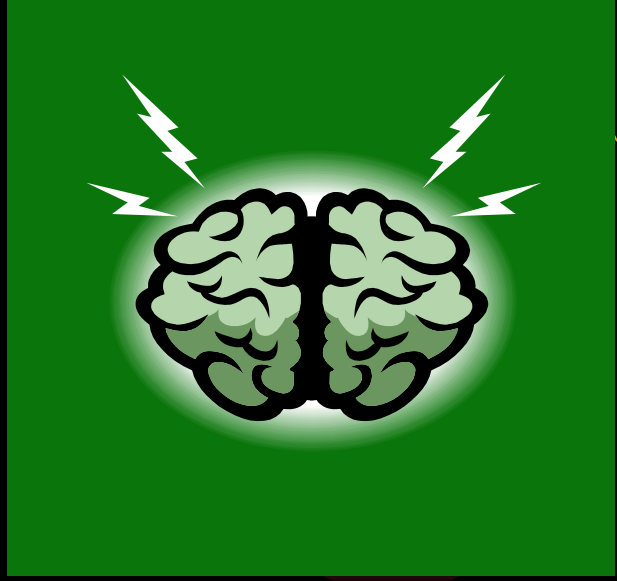
Chronic Neurologic Disorders



- Seizure/Epilepsy
- Multiple Sclerosis
- Parkinson’s Disease
- Amyotrophic Lateral Sclerosis



Seizure/Epilepsy

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Seizure

- Transient, uncontrolled electrical discharge of neurons in brain, interrupting normal function
- May accompany other disorders or occur spontaneously without apparent cause

Seizure

- **Metabolic disturbances associated with seizures include**
  - Acidosis
  - Electrolyte imbalances
  - Hypoglycemia
  - Hypoxia
  - Alcohol or barbiturate withdrawal
  - Dehydration or water intoxication

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Seizure

- **Extracranial disorders associated with seizures**
  - Hypertension
  - Heart, lung, liver, kidney disease
  - Systemic lupus erythematosus
  - Diabetes mellitus
  - Septicemia

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Seizure Disorders

- Many possible causes
- Most common causes vary by age
- Genetic link
- Idiopathic

Epilepsy

- Disease with continuing predisposition to seizures with consequences
  - Neurobiologic
  - Psychologic
  - Social
    - Affects 2.2 million Americans

Epilepsy

- 4th most common neurologic disorder
  - Higher in young children and older adults
  - More common in African Americans and socially disadvantaged populations
  - More common in males
  - Detected by EEG

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Epilepsy Pathophysiology

- Group of abnormal neurons
- Spontaneous firing
- Where seizure originates
- Pattern of spread/extent of involvement
- Scar tissue (gliosis)
- Locating seizure focus is critical for successful surgical intervention

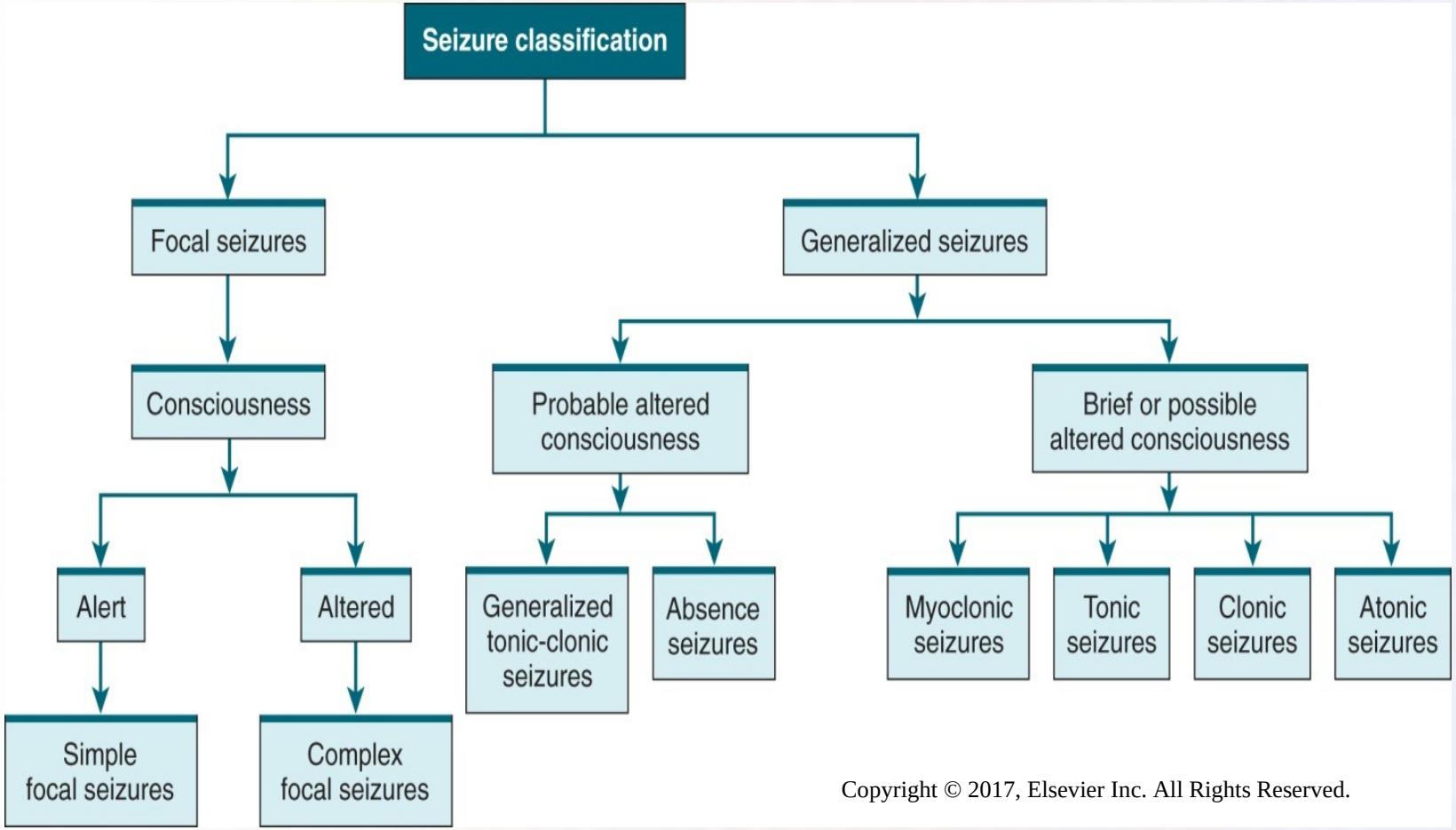
Clinical Manifestations

- **Seizures**
- **Determined by site of electrical disturbance**
- **Two major classes**
  - Generalized
  - Focal

Classification of Seizures

- **Focal Seizures**
  - Simple
  - Complex
- **Generalized Seizures**
  - Tonic-Clonic
  - Absence
  - Myoclonic
  - Atonic
  - Tonic
  - Clonic

Seizure Classification



Clinical Manifestations

- **Seizures**
- *May progress through several phases*
  - Prodromal phase
  - Aural phase
  - Ictal phase
  - Postictal phase

Generalized Seizures

- **Tonic-clonic seizures**
  - Characterized by loss of consciousness and falling
  - Body stiffens (tonic) with subsequent jerking of extremities (clonic)
  - Cyanosis, excessive salivation, tongue or cheek biting, and incontinence may occur

Generalized Seizures

- **Tonic-clonic seizures**
  - *Postictal phase for tonic-clonic characterized by muscle soreness, fatigue*
    - Patient may sleep for hours
    - May not feel normal for hours to days
    - No memory of seizure

Generalized Seizures

- **Typical absence seizures**
  - Usually occurs only in children and rarely beyond adolescence
  - Can be precipitated by flashing lights and hyperventilation
  - Typical symptom is staring spell “daydreaming”
  - EEG demonstrates pattern unique to this type of seizure

Generalized Seizures

- **Atypical absence seizures**
  - Characterized by staring spell with other manifestations
    - Eye blinking, chewing
    - Jerking movements of the lips
    - Lasts more than 10 seconds
    - can continue into adulthood

Generalized Seizures

- **Myoclonic Seizure**
  - Characterized by sudden, excessive jerk or twitch of body and extremities
  - Can be forceful enough to cause fall
  - Brief, few seconds
  - May occur in clusters

Generalized Seizures

- **Atonic seizure**
  - Involves tonic episode or paroxysmal loss of muscle tone
  - Begins suddenly and person falls
  - Typically last less than 15 seconds
  - Person usually remains conscious
    - Can resume normal activity immediately
  - Great risk for head injury

Generalized Seizures

- **Tonic seizures**
  - Involve sudden onset of maintained increased tone in the extensor muscles
  - Often occur in sleep
  - Affect both sides of body
  - Usually last less than 20 seconds
  - Consciousness is usually preserved

Generalized Seizures

- **Clonic seizures**
  - Begin with loss of consciousness and sudden loss of muscle tone
  - Followed by rhythmic limb jerking that may or may not be symmetric
  - Relatively rare

Focal Seizures

- **Focal Seizures**
  - Also called partial or partial focal seizures
    - Begin in specific region of cortex in one hemisphere of brain
    - Produce manifestations based on function of area of brain involved
  - Divided according to clinical expression
    - Simple focal seizures
    - Complex focal seizures

Focal Seizures

- **Simple focal seizures**
  - Person remains conscious and alert
  - Experiences unusual feelings or sensations that can take many forms
    - Sudden and unexplainable feelings of joy, anger, sadness, or nausea
    - May hear, smell, taste, see, or feel things that are not real

Focal Seizures

- **Complex focal seizures**
  - Patients have loss of consciousness or alteration in awareness
  - Eyes remain open but cannot interact
    - May display strange behaviors
    - Automatisms – repetitive, purposeless actions
    - Do not remember an activity started before or continued during seizure

Focal Seizures

- **Psychogenic seizures**
  - Can be misdiagnosed as epilepsy
  - History of
    - Emotional or physical abuse
    - A specific traumatic event
  - Accurate diagnosis usually requires use of video-EEG monitoring

Complications of seizures

- **Status epilepticus (SE)**
  - State of continuous seizure activity or condition when seizures recur in rapid succession without return to consciousness between seizures
    - Any seizure lasting longer than 5 minutes
    - Neurologic emergency
    - Can occur with any type of seizure

Complications of seizures

- Status Epilepticus
  - Medical Emergency
  - Most frequent in infants and elderly
  - May result in permanent brain damage or death

Interprofessional Care

- Diagnostic assessment
  - History and Physical
  - Seizure History
- Diagnostic Studies
  - CBC, urinalysis, electrolytes, creatinine, fasting blood glucose
  - Lumbar puncture for CSF analysis
  - CT,MRI,MRA,MRS,PET
  - Electroencephalography (EEG)

Drugs for Seizure Disorders

Type of Seizure	***Drug***
Simple and complex partial	Carbamazepine, Fosphenytoin, phenytoin, Valproic acid, primidone, phenobarbital
Primary generalized tonic-clonic, absence, atonic	carbamazepine, phenytoin, phenobarbital, valproic acid levetiracetam

Goals of Treatment

- Reduce seizures to a level that allows the patient to live as normal a life as possible
- Balance the desire for complete seizure control with acceptable side effects

How do Antiepileptic Drugs (AED) Work?

- Suppress discharge of neurons within a seizure focus
- Suppress propagation of seizure activity from the focus to the other areas of the brain.

How do Antiepileptic Drugs (AED) Work?

- Mechanisms of Action
  - Suppression of sodium influx
  - Suppression of calcium influx
  - Promotion of potassium efflux
  - Blockade of receptors for glutamate
  - Potentiation of gamma-aminobutyric acid (GABA)

Monitoring Plasma Drug Levels

- Serves as guide for dosage adjustment
- Monitors patient adherence
- Determines cause of lost seizure control
- Identify causes of toxicity

Promoting Patient Adherence

- Education about importance of adhering to prescribed regimen
- Monitoring plasma levels to encourage & evaluate adherence
- Deepening patient & family involvement by maintaining a seizure frequency chart

Classification of AEDs

Area of Comparison	Traditional AEDs	Newer AEDs
Efficacy	Well established	Equally good, less established
Clinical Experience	Extensive	Less Extensive
Therapeutic niche	Well established	Evolving
Tolerability	Less well tolerated	Better tolerated
Pharmacokinetics	Often complex	Less complex
Drug interactions	Extensive	limited
Safety in pregnancy	Less safe	safer
Cost	Less expensive	More expensive

Phenytoin (Dilantin)

- Most widely used traditional AED
  - Active against partial & generalized tonic-clonic seizures
- 1st to suppress seizures without depressing entire CNS
- MOA: causes selective inhibition of sodium channels

Phenytoin Adverse Effects

- Effects on the CNS
  - Nystagmus, sedation, ataxia, diplopia, cognitive impairment
- Gingival Hyperplasia
  - Severe cases: surgical removal of gum tissue
- Dermatologic effects
  - Morbilliform (measles-like) Rash
- Effects in Pregnancy
  - teratogen
- Cardiovascular Effects
  - Cardiac dysrhythmias & hypotension

Phenytoin Drug Interactions

- Decreases effects of: oral contraceptives, warfarin, glucocorticoids
- Increases Dilantin levels: diazepam, isoniazid, cimetidine, alcohol, valproic acid
- Decreases Dilantin levels: carbamazepine, phenobarbital, alcohol
- Dosing highly individualized
- Administration: with food

OLD AEDs

- **Carbamazepine** (Tegretol)
  - MOA: same as phenytoin but minimal effects on cognitive function
  - Used for bipolar disorder & trigeminal neuralgia
  - adverse effects – bone marrow suppression

- **Valproic acid** (Depakene, Depakote)
  - 1st line drug for all partial & generalized seizures
  - used for bipolar disorder & migraine prevention
  - adverse effects – hepatotoxicity, pancreatitis

OLD AEDs

- **Phenobarbital**
  - One of the oldest AED, effective & inexpensive
  - belongs to the barbiturate family
  - Can cause physical dependence
  - ↓ effects of warfarin & birth control
  - adverse effects – drowsiness, interferes with metabolism of vitamin d & k
  - toxicity – nystagmus & ataxia

Newer AEDs

- **Oxcarbazepine** (Trileptal)
  - Derivative of carbamazepine
  - MOA: blockade of voltage-sensitive sodium channels
  - For management of partial seizures
  - Approved for children & adults
  - Adverse effects: dizziness, drowsiness; avoid driving & other hazardous activities

Newer AEDs

- **Lamotrigine** (lamictal)
  - broad spectrum of antiseizure activity
  - Bipolar disorder
  - MOA: blocks sodium & calcium channels
  - life-threatening rash
  - Risk for suicide

Newer AEDs

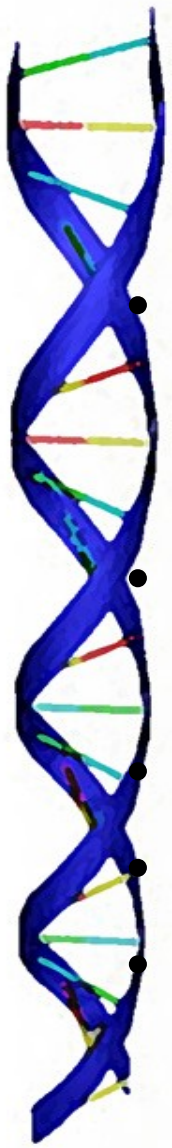
- **Gabapentin** (Neurontin)
  - Adjunct therapy for partial seizures
  - Off-label use: neuropathic pain, prophylaxis of migraine, fibromyalgia, & post menopausal hot flashes
  - Very well tolerated
  - Common side effects: somnolence, dizziness, ataxia, fatigue, Nystagmus, & peripheral edema

Newer AEDs

- **Pregabalin** (Lyrica)
  - useful for neuropathic pain, postherpetic neuralgia
  - is regulated under the Controlled Substances Act
  - Adjunct therapy for partial seizures
  - Can cause life threatening angioedema

Newer AEDs

- **Levetiracetam** (Keppra)
  - Does not interact with other AEDs
  - MOA: unknown
- **Topiramate** (Topamax)
  - Broad-spectrum antiseizure agent



Management of Acute Seizures & Status Epilepticus

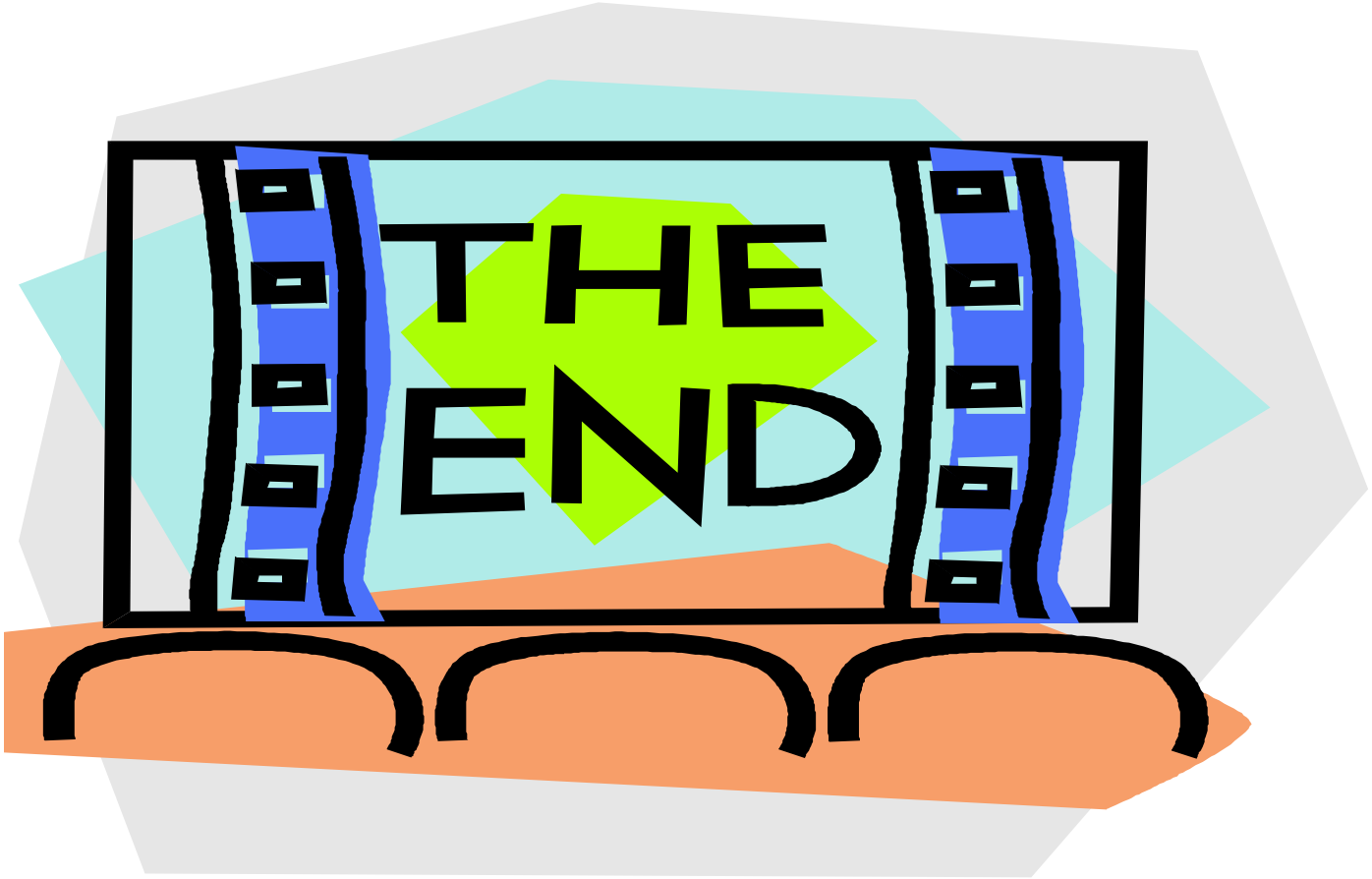
- **Lorazepam** (Ativan)
  - effects last up to 72 hours; 0.1mg/kg @ rate of 2 mg/min
- **Diazepam** (Valium)
  - short duration; 0.2mg/kg @ rate of 5 mg/kg
- **Phenytoin** (Dilantin)
- **Fosphenytoin** (Cerebyx) less irritating
- Magnesium Sulfate

Epilepsy: Therapeutic Considerations

- Surgical Treatment
  - Neurosurgery (best success rate)
  - Vagal Nerve Stimulation
- Diagnosis
  - Physical, neurologic, & laboratory evaluations along with thorough history
  - Electroencephalogram (EEG)

Nursing Management

- Free from injury during seizures
- Have optimal mental and physical functioning while taking AEDs
- Have satisfactory psychosocial functioning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