

EPILEPSY AND SEIZURE MANAGEMENT

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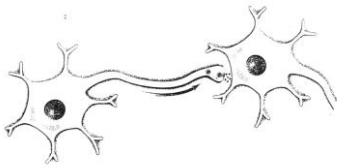
Objectives

- Define seizures
- Overview of seizure classification
- Discuss triggers
- Discuss Medications and SE
- Documentation & Monitoring

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Definitions

- **Seizures** are waves of abnormal electrical activity in the brain
- Can be observed as convulsions or brief periods of unconsciousness or altered behavior resulting from excessive and hyper-synchronized neuronal activity in the brain



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Definitions

- **Epilepsy**: two or more recurrent seizures unprovoked by systemic or acute neurologic insults
- Epilepsy is **not a specific disease**, but rather a **condition** arising from a variety of pathological insults involving the brain such as tumors

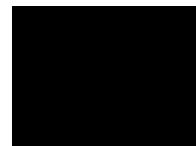
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EPILEPSY – who?

- All races, all ages, even animals
- The incidence of epilepsy in the general population is approximately 1 to 2%, but approximately 35 to 50% in persons with a developmental disability or autism
- The EEG in 40 % to 60 % of children with autism show epileptiform activity
- It's not hereditary (in most cases), but recently genetic frontal epilepsies have been identified

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Definitions cont...

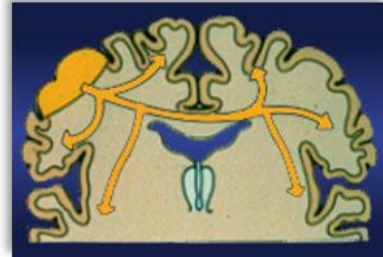


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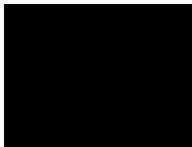
Classification of Seizures

- The International Classification of Epileptic Seizures is used by most neurologists to classify seizure types.
 - divides seizures into two basic groups based upon clinical and EEG data:
 - Partial** and **primary generalized**.
 - Based on origination of electrical activity

Classification: Partial Seizures



Classification Partial seizures



Classification

PARTIAL SEIZURES

- SIMPLE
- COMPLEX
- SECONDARY GENERALIZED

PRIMARY GENERALIZED

- ABSENCE
- MYOCLONIC
- ATONIC
- TONIC
- CLONIC
- TONIC-CLONIC

Classification Partial seizures

Partial Seizure

Simple Partial

Consciousness remains intact
-usually less than 2 min
-if head injury more often
- Possible symptoms include: Motor, Sensory, autonomic, Unusual sensations affecting either the vision, hearing, smell taste or touch
- Memory or emotional disturbances

Partial Seizure

Secondarily generalized

Always follow simple partial seizure
Symptoms that are initially associated with a preservation of consciousness that then evolves into a loss of consciousness and convulsions

Complex partial

Last b/w 30 seconds to 2 min
Afterward person may be tired or confused for up to 15 min may not return to "normal" for hours
Usually start in temporal or frontal lobe and disperse to other areas of brain
-(Impairment of awareness)
Automatisms such as lip smacking, chewing, fidgeting, walking and other repetitive, involuntary but coordinated movements

Classification Partial seizures

Partial seizure

- classified primarily on the basis of whether or not **consciousness is impaired** during the attack.
 - When **consciousness is fully maintained** the seizure is classified as
SIMPLE PARTIAL

Classification

Partial seizures

- **Complex Partial Seizures**
 - Impaired consciousness
 - may have a variety of repetitive semi-purposeful movements that are referred to as motor automatisms.

Classification

Partial seizures

Complex partial seizures

- can include oral-buccal movements (chewing, swallowing, sucking), complex motor phenomena including bicycling and kicking movements, flailing of the arms, and even running, jumping, and spinning.
- Complex partial seizures involve regions of both hemispheres, thus explaining the impaired consciousness and the more complex symptoms

Classification

Primary generalized

- **Generalized**
 - clinical changes indicate initial involvement of **both** hemispheres.
 - Consciousness may be impaired and this impairment may be the initial manifestation.
 - can be convulsive and non-convulsive (absence).

Classification

Primary generalized

Seizure Type	What to expect	Seizure Type	What to expect
Absence	<ul style="list-style-type: none"> -brief episode of staring -lasts 10-20 sec -loss of consciousness -can include muscle twitching -begin btw age 4-14yrs -likely alert immediately after episode 	Tonic	<ul style="list-style-type: none"> -muscle stiffening -usually less than 20sec -often occurs during sleep
Myoclonic	<ul style="list-style-type: none"> -brief shock-like jerks -last a few seconds 	Clonic	<ul style="list-style-type: none"> -rhythmic jerking of arms and legs -length varies -rare (primarily see tonic-clonic seizures)
Atonic	<ul style="list-style-type: none"> -'drop attacks' -last up to 15 seconds -person usually remains conscious -often begin in childhood -risk associated with sudden fall to ground and head injury 	Tonic Clonic	<ul style="list-style-type: none"> -often called "GRAND-MAL" -last 1-3 min -tonic first, muscles stiffen -loss of consciousness -rapid jerking mvs. -can lose bladder/bowel control -consciousness returns slowly

Status Epilepticus

Definition:

More than 30 minutes of continuous seizure activity **OR**

Two or more sequential seizures spanning this period without full recovery between seizures

Status Epilepticus

A medical emergency

Adverse consequences can include hypoxia, hypotension, acidosis and hyperthermia.....

Goal: stop seizures as soon as possible

Triggers

- Fatigue
- Exercise
- Low blood sugar
- Stress
- Infection
- alcohol
- Hyperventilation
- Hormonal changes
- Fear (being startled)
- Flashing lights

Triggers

- Sleep deprivation
- Antiepileptic medication reduction or inadequate AED treatment
- Fever
- Concussion and/or closed head injury
- Metabolic and Electrolyte Imbalance
- Stimulant/other proconvulsant intoxication
- Sedative or ethanol withdrawal
- **See lifestyle modifications sheet***

Sz - Treatment

- KETOGENIC DIET
- MEDICATION (AEDs)
- VAGUS NERVE STIMULATOR (implant)
- SURGERY (Craniotomy)

Treatment	Age	Indication	Efficacy	Side Effects
AEDs	Children Adults	Specific AEDs for specific seizure types	64% sz freedom (1)	Vary by AED, typically CNS- and endocrine-related
Ketogenic Diet	Primarily children	All seizure types	54% pts >50% sz reduction at 3 months (2)	Lipid disorders, ketoacidosis
Epilepsy Surgery	Children Adults	Pharmaco-resistant or localization-related epilepsy	70% in select patients sz freedom (3)	Cognitive effects, surgery-related risks
VNS Therapy	12 and older	Pharmaco-resistant epilepsy, partial seizures	43% of pts >50% sz reduction at 3 years (4)	Voice alteration, cough, pharyngitis, dyspnea

Common Medications

GENERIC NAME	BRAND NAME
Carbamazepine	Tegretol
Lorazepam	Ativan
Gabapentin	Neurontin
Clonazepam	Rivotril
Phenytoin	Dilantin
Diazepam	Valium
Valproic Acid	Dekapene
Topiramate	Topamax

Classic & Newer AEDS

Newer AEDs

Classic AEDs

- Phenobarbital (PB)
- Ethosuximide (Zarontin®)
- Clonazepam (Rivotril®) -> benzo
- Phenytoin (Dilantin®)

N/A in Canada yet:

- Tiagabine (Gabitril®)
- Zonisamide (Zonegran®)
- Rufinamide (Banzel®) (used for LGS)
- Lacosamide (Vimpat®)

- Primidone (Mysoline®) -> PB
- Clobazam (Frisium®) -> benzo
- Nitrazepam (Mogodon®) -> benzo
- Carbamazepine (Tegretol®) (**CBZ**)
- **Divalproex (DVA)/Valproate/Valproic Acid (Epival®/Depakene®) VPA >GI SE**
- Levetiracetam (Keppra®)
- Felbamate (Felbatol®) **D/C d/t liver probs**
- Vigabatrin (Sabril®) **Restricted d/t vision probs**
- Oxcarbazepine (Trileptal®) -> CBZ
- Gabapentin (Neurontin) -> gaba
- Lamotrigine (Lamictal®) -> no P450!
- Topiramate (Topamax®)
- Pregabalin (Lyrica®) -> gaba

Drug Levels



- Carbamazepine (CBZ)
17-54 $\mu\text{mol/L}$
4-12 mcg/ml
- Phenytoin (PHT)
40-80 $\mu\text{mol/L}$
10-20 mcg/ml
- Phenobarbital (PB)
65-150 $\mu\text{mol/L}$
20-40 mcg/ml
- Valproic acid (VPA)
350-800 $\mu\text{mol/L}$
50-115 mcg/ml

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Common Side Effects (SE)

Drug	Systemic SE	Neurotoxic SE
Carbamazepine	Nausea, vomiting, diarrhea, hyponatremia, rash, pruritus	Drowsiness, dizziness, blurred or double vision, lethargy, headache
Valproate	Weight gain, nausea, vomiting, hair loss, easy bruising	Tremor, dizziness
Topiramate	Weight loss, paresthesias	Fatigue, nervousness, difficulty concentrating, confusion, depression, anorexia, language problems, anxiety, mood problems, tremor

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Comparison of AEDs



- Please see Word document

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How does the doctor diagnose it?



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Diagnosis?



- *Observations from family, witnesses (detailed descriptions)
- Medical antecedents, obstetrical history & childhood development
- Physical & neurological exam
- Blood & urine tests
- Tests : EEG, CT scan, MRI, X-ray, PET scan, angiogram, SPECT
- Neurological evaluations, neuro-psychology, psychiatric evaluations, neuro-ophthalmology

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Documentation

Key aspects to document

- Activity before the seizure
- Activity during the seizure
 - Note sequence of events
 - Movements of body, eyes, head, arms,
 - Responsiveness during seizure

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Documentation

- Activity after seizure/behavior pattern
- Is there a pattern to seizure activity
- Are there triggers to seizure activity
- When does it happen, during favorite activities or only those which are disliked?

USEFUL TOOLS

- Scatterplot/calendar
- Observation sheets (epilepsy)
- ****see epilepsy.org sheets**
- VIDEO of the 'episodes'
- ****important to document all changes in medication, especially if there have been any recent changes**

Questions?



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