**Current Issues in Seizure Management**

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**Seizure types**

- **Tonic-Clonic**
- **Absence**
- **Atonic Seizures**
- **Myoclonic Seizures**
- **Epileptic Spasms**
- **Complex Partial Seizures**
- **Simple Partial Seizures**
- **Non-Epileptic Events**

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**Tonic-Clonic Seizures**

- Stiffening of arms and legs followed by rhythmic jerking
- Loss of consciousness
- Shallow breathing, foaming at the mouth
- Typically lasting 1-3 minutes followed by a post-ictal period
Absence Seizures

• Blank stare lasting few seconds
• Sometimes involving blinking, eye fluttering or chewing motions
• Most often noted by teachers or after a decline in grades

Atonic Seizures (Drops)

• Sudden collapse of head or whole body
• Lasting a few seconds
• May not have a post ictal period
• May need helmets to prevent head injuries
Myoclonic Seizures

• Sudden, brief, massive jerk involving all or part of the body
• Can happen in clusters
• May not have post ictal period

Epileptic Spasms

• Clusters of quick, sudden movements
• Start between 3 months and two years of age, but can occur at any age.
• In Sitting: Head will fall forward and the arms will flex forward.
• Lying Down: Knees will be drawn up with arms and head flexed forward as if reaching for support.

Complex partial seizures

• Random activity where the person is not aware of their surroundings.
• Nonsensical speech, automatisms (i.e. picking at clothes, lip smacking, chewing)
• Clumsy or disoriented movements
• Alteration in consciousness, confusion
Simple partial Seizures

- Jerking in one or more parts of the body
- Sensory distortions that may or may not be obvious by onlookers (i.e. visual distortions, tingling, smells, sounds)
- No altered or loss of consciousness

Non-Epileptic events

- Resembles epileptic seizure but has no EEG changes.
- Random movements of extremities that do not have a pattern (seizures do not go back and forth across the brain)
- B&D or psychologist referral
- Often triggered by stress- physical and/or emotional
Non-Epileptic events

- If they respond to painful stimulation, tickling or visual threat then it is likely not a seizure
- Can occur in 30% of children who have true epileptic seizures as well*

Non-epileptic

Epilepsy Syndromes

- TS-Tuberous Sclerosis
- Epileptic Spasms (Infantile Spasms)
- Ohtahara
- Lennox-Gastaut Syndrome
- Dravet Syndrome
- Doose Syndrome

These syndromes can have a variety of types of seizures that were previously discussed. These syndromes are often diagnosed with a particular EEG patterns or supporting physiological abnormalities or presentation.
Treatment goals for epilepsy

**Newly Diagnosed**
- AED Trial 1 Monotherapy
- AED Trial 2 Monotherapy or Polytherapy

**Intractable Epilepsy**
- Surgical Evaluation
- Epilepsy Surgery
- VNS Therapy
- AEDs (Polytherapy)
- Ketogenic Diet

**Treatment Goal**
- Seizure freedom
- Maximize quality of life
- Optimize long-term seizure control
- Minimize AED side effects
- Maximize adherence

**Medications**
- Based on type of seizures: known or suspected
- Always titrated up and weaned off slowly
- Can trigger seizures if abruptly stopped
- Most are dosed BID

**Broad-Spectrum - Generalized & Focal Epilepsies**
- Keppra (levetiracetam)
- Depakote (valproic acid - ≤ under 2 years old
- Lamictal (lamotrigine)
- Zonegran (Zonisamide)
- Topamax (Topiramate)
Focal epilepsies

- Vimpat (lacosamide)
- Trileptal (oxcarbamazepine)
- Fycompa (perampanel)

Other

- ADD ON THERAPY: Benzodiazepines - Clonazepam (Klonopin), Clorazepate (Tranxene), *Clobazam (Onfi)
- Sabril (vigabatrin): Epileptic Spasms
- Zarontin (ethosuximide): Absence Seizures

Rescue medications

- Single seizure lasting longer than 5 minutes
- Cluster of seizures lasting longer than 15-20 minutes
- Ativan (lorazepam)
- Diastat (diazepam rectal gel)
- Versed (midazolam)
Non-medication treatments

- Ketogenic diet
- Vagal nerve stimulator
- Epilepsy Surgery

Ketogenic Diet

Glucose (carbohydrate) and ketone bodies (fat) are the main sources of brain energy
- Glucose is the main energy source
- In absence (or decreased) glucose, ketones become the main source of brain energy.
- Ketone bodies-“neuroprotective”

Ketogenic Ratio

- The ketogenic ratio is the ratio of grams of fat to grams of protein and carbohydrates

- Ample protein and sufficient calories for growth
- Supplementation of vitamins and minerals
Fruits
- Kiwi
- Mango
- Nectarine
- Orange
- Papaya
- Peaches
- Pineapple
- Strawberries
- Tangerine
- Watermelon

Vegetables
- Radish
- Asparagus
- Beets
- Kohlrabi
- Beet greens
- Rhubarb
- Broccoli
- Mushroom
- Cabbage
- Sauerkraut
- Brussels sprouts
- Mustard greens
- Celery
- Summer squash
- Cabbage
- Okra
- Chives
- Swiss chard
- Carrots

Protein Choices
**Animal Protein**
- Eggs
- Chicken:
- Turkey:
- Pork:
- Lamb:
- Beef:
- Game Meat:

**Dairy**
Choose Full Fat Options
- Cream 36%, 40%
- Cream Cheese
- Sour Cream
- Yogurt
- Cottage Cheese
- Buttermilk
- Cheese
- Cheddar
- Mozzarella
- Provolone
- Parmesan
- Swiss
- Blue

**Seafood Protein**
- Bass
- Catfish
- Cod
- Halibut
- Mahi Mahi
- Salmon
- Tilapia
- Tuna
- Clams
- Crab
- Crawfish
- Lobster
- Shrimp
- Scallops
Incorporating Fat

- Whip into fruit
- Freeze
- Sauce/gravy
- Mix dash
- Soy sauce
- Ketchup
- Hot Sauce
- Pinch of herbs
- Pinch of spices
- Mix with fruit for topping

Kid-Friendly Favorites

- Pancakes
- Muffins
- Pizza
- Jalapeno Poppers
- Crab Rangoon
- Cheese Crackers (Goldfish)
- Cinnamon Cereal/Crackers
- S’mores

Epilepsy Surgery

- Focal epilepsy-partial seizures
- EMU study to capture 3-5 seizures
- Imaging and Functional tests:
  - MRI on 3 Tesla
  - fMRI (memory, language)
  - PET scan
  - Wada testing (memory, language)
  - Neuropsychological testing
Vagal Nerve Stimulator

- Delivers electrical current at set intervals
- Programmable
- Runs on battery
- Electrical pulses initiate “Action Potentials” which travel up the vagus nerve to the brain
- Action potentials are used by nerve fibers to conduct a signal (disrupt or abort seizure)
CBD oil
• First identified as possibly anticonvulsant in the 70s
• Cannabis plant has over 489 components- 70 are cannabinoids (ie. THC, CBD)
• CB1 receptors- On GABA and Glutaminergic neurons. Neuronal inhibition.
• 5HT1a receptor agonist
• Epidiolex (orphan drug approved to be used in clinical trials for Dravet and Lennox Gastaut)

CBD oil
• Parent report in children with Dravet syndrome, LGS, idiopathic epilepsy (n=19)
  – 11% (n=2) seizure free
  – 42% (n=8) reported >80% reduction in seizures
  – 32% (n=6) reported 25-60%
  – Increased alertness
  – No data on specific preparations

CBD oil
• Very little published research on the safety and effectiveness of hemp oil as an epilepsy treatment.
• No medical literature supporting the use of hemp oil as a treatment for seizures in children.
• We do not know how a child’s body metabolizes (handles) hemp oil
• We do not know how hemp oil interacts with other medications.
• We have no information on how to dose hemp oil.
• Not available in a standard preparation that provides consistent amounts of the active substances.
• We do not know how hemp oil affects the developing brain of children.