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Seizures and the Mysterious Co-morbidities between Autism, Childhood Trauma, and ADHD

Varleisha D. Gibbs, PhD, OTD, OTR/L

1

Learning Outcomes

- 1) Describe the various forms of seizures, signs, and the neurological connections
- 2) Identify the prevalence of both epileptic and non-epileptic seizures in the pediatric population
- 3) Recognize treatment implications for occupational therapists working with children who have, or are suspected to experience, seizures including reading EEG results, what to look for, and clinical presentations

2

CONTINUED

Introduction

- Prevalence
- Symptoms and Prognosis
- Impact to the field of Occupational Therapy

3

CONTINUED

Some possible signs of subclinical seizure activity include:

- Exhibiting behavior problems, such as aggression, self-injury, and severe tantrums
- Making little or no academic gains after doing well during childhood and pre-teen years
- Losing some behavioral and/or cognitive gains.

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What is a Seizure?

- An abnormal electrical discharge in the brain altering function or behavior
- Paroxysmal behavioral spell generally caused by an excessive disorderly discharge of cortical nerve cells
- It is the most common neurological condition in children, with a prevalence of more than 4%.
- Most seizures last for about 1 minute

Retrieved December 8, 2018 from: https://www.naec-epilepsy.org

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CONTINUED

Brain Storms...

- A seizure occurs when too many nerve cells in the brain “fire” too quickly causing an “electrical storm”
- The source of seizures is the brain.
- Neurons (brain cells) communicate with electrical signals.
- Seizures can change as the child ages.

Retrieved December 8, 2018 from https://www.epilpesy.va.gov/

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Epilepsy vs. Seizure Disorder

- Epilepsy, defined as two or more unprovoked seizures, occurs in 2-3% of the general population.
- Epileptic seizures range from clinically undetectable (“electrographic seizures”) to convulsions.
- Nonepileptic events (also called nonepilepsy seizures) are not caused by electrical activity in the brain.

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Seizure types: Signs and Symptoms

- Symptoms vary depending upon the part of the brain involved in the epileptic discharge.
- Psychogenic seizures or events are caused by subconscious thoughts, emotions, or "stress," not abnormal electrical activity in the brain.
- Doctors consider most of them psychological in nature, but not purposely produced. Usually the person is not aware that the spells are not "epileptic.”

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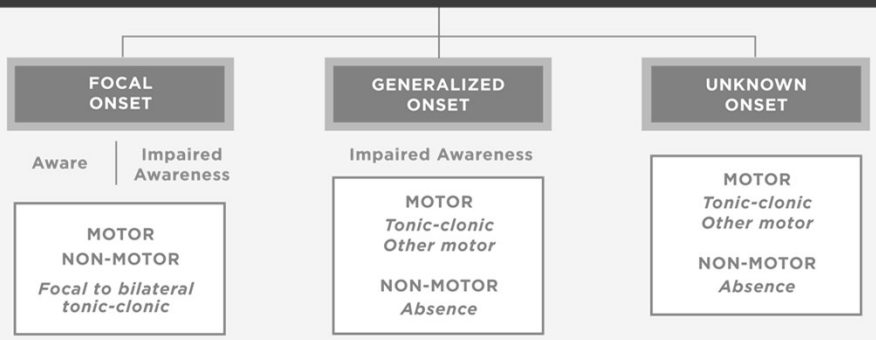
"NEW" CLASSIFICATION OF SEIZURE TYPES BASIC VERSION [1]

** from International League Against Epilepsy, 2017*



[1] Definitions, other seizure types and descriptors are listed in the accompanying paper & glossary of terms
[2] Due to inadequate information or inability to place in other categories

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Focal Awareness Seizure

- A seizure that starts in one area of the brain and the person remains alert and able to interact is called a focal onset aware seizure.
- Replaces previous terminology of simple partial seizure
- These seizures are brief, lasting seconds to less than 2 minutes.

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Focal Onset Impaired Awareness Seizures (complex partial seizures)

- A seizure that starts in one area or side of the brain and the person is not aware of their surroundings
- Replaces complex partial seizures
- Focal impaired awareness seizures typically last 1 to 2 minutes.
- These seizures may have an aura (or warning, which technically is itself a focal aware seizure).
- Signs include lip smacking, picking at clothes, fumbling), becoming unaware of surroundings, and wandering.

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Focal to Bilateral Tonic-clonic Seizures (secondarily generalized seizures)

- A seizure that starts in one area of the brain, then spreads to both sides of the brain.
- This term replaces secondarily generalized seizure.
- They usually last 1 to 3 minutes, but it may take a longer for a person to recover.
- A focal to bilateral tonic-clonic seizure lasting longer than 5 minutes is a medical emergency.

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Absence seizures

- Cause lapses in awareness, sometimes with staring.
- They are a type of generalized onset seizures, meaning they begin in both sides of the brain at the same time.
- Replaces former term; petit mal seizures.
- They begin and end abruptly, lasting only a few seconds.
- Absence seizures can be so brief they sometimes are mistaken for daydreaming and may not be detected for months.
- They are more common in children.

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Tonic-clonic Seizures

- Another word for this is a convulsion formally “grand mal.”
- A tonic-clonic seizure usually begins on both sides of the brain but can start in one side and spread to the whole brain.
- A person loses consciousness, muscles stiffen, and jerking movements are seen.
- These types of seizures usually last 1 to 3 minutes and take longer for a person to recover.
- A tonic-clonic seizure lasting more than 5 minutes is a medical emergency.

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Common Treatments

- Various treatment options to address symptoms such as, medications, dietary therapy, surgery, and devices.

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Connection to Autism

- Autism is more common in people with epilepsy Approx. 20%
- Epilepsy is more common in people with autism Approx. 25-40%
- Most cases of epilepsy in children with ASD present after 10 years of age (two peaks: infancy and puberty)
- More frequent in children with ASD than other children
- All seizure types have been reported. (Besag, 2018)

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Connection to ASD Continued

- Sudden loss of language skills or behavioral regression may be caused by epileptic disruption which may not always show up clinically.
- Electrical status epilepticus of sleep
- A number of studies have found abnormalities in corpus callosum connectivity associated with ASD.
- About 20% of corpus callosum abnormalities are caused by single or multiple gene mutations or by chromosomal abnormalities.

(Besag, 2018)

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Connection to Self-stimulatory behaviors?

- Dopamine connection
- Neurons that fire together wire together
- Too much?
- Coupling

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Connection to Connected Childhood Trauma

- Abusive Head Trauma
- Emotional Complex Trauma
- Damage to brain cells
- PTSD = Brain damage
- Elevate exposure to trauma = increased risk

(Myers, Perrine, Lancman, Fleming, & Lancman, 2013)

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CONTINUED

PNES

- PNES are a physical manifestation of a psychological disturbance and are a type of Somatoform Disorder called a conversion disorder.
- Up to 90% of patients with psychogenic nonepileptic seizures (PNESs) have history of childhood trauma (sexual and physical) abuse when compared to the general population.
- PNES are diagnosed in 20 to 30% of patients seen at epilepsy centers for intractable seizures.

(Myers, Perrine, Lancman, Fleming, & Lancman, 2013; www.epilepsy.com)

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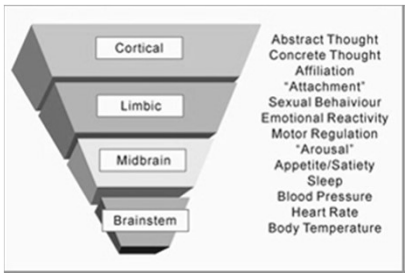

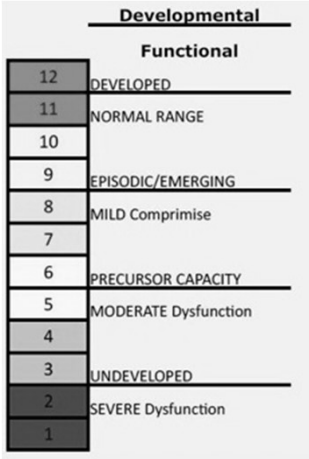

Damage to the brain?
Brain's survival mechanism?

(Perry, 2009)

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Connection to ADHD

- 30% children with Epilepsy have ADHD

(Besag, 2018)

- 1 in 5 adults with Epilepsy also have ADHD
- More than 18 percent had significant ADHD symptoms
- Compared to other epilepsy patients, those with ADHD symptoms were also nine times more likely to have depression, eight times more likely to have anxiety symptoms

(Ettinger et. al, 2015)

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Neural Dynamics

- "Neural oscillations are a fundamental mechanism that enables the synchronization of neural activity within and across brain regions and promotes the precise temporal coordination of neural processes underlying cognition, memory, perception, and behavior."
- From: The Neurobiology of Schizophrenia, 2016

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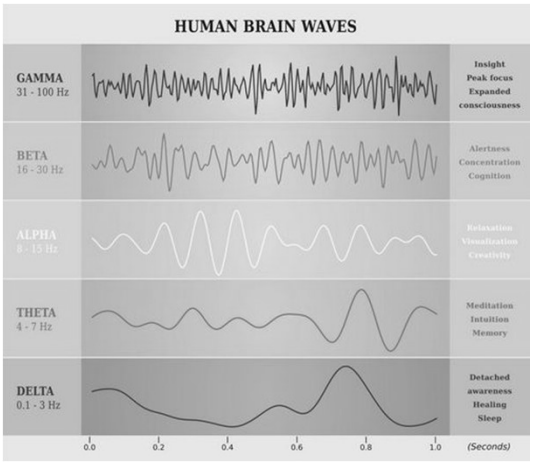
Neuronal Oscillations

- Lower Gamma waves; and Alpha waves correlated to things versus language
- Waves show a peak with attention to an object versus typically peaking with surprise
- Children with Autism respond to the familiar not novel objects or experiences
- Improve with treatment
- We conclude-> Learning must address the what is familiar first for implicit memory (attending) to occur!



UCLA CART "Autism 2013" Symposium, Feb. 1, 2013
Panel II: EEG in ASD: Can Brain Waves Help Us Predict Treatment Response and Outcomes?
Shafali Jeste, M.D.

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Research

- ASD lacked change in Alpha waves with visual distractors
- Atypical EEG oscillations=atypical arousal levels
- Excitatory/inhibitory imbalance.

Keehn, B., Westerfield, M., Müller, R. A., & Townsend, J. (2017). Autism, attention, and alpha oscillations: An electrophysiological study of attentional capture. Biological Psychiatry: Cognitive Neuroscience and Neuroimaging, 2(6), 528-536.

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Asynchrony = Dysfunction

- Poor Arousal
- Challenges with Attention
- Emotional Dysregulation
- Memory Difficulty

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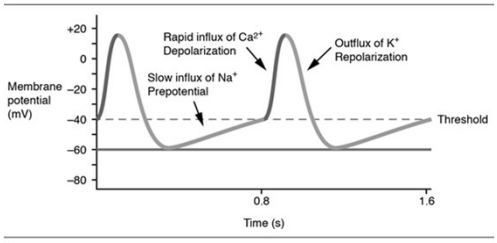
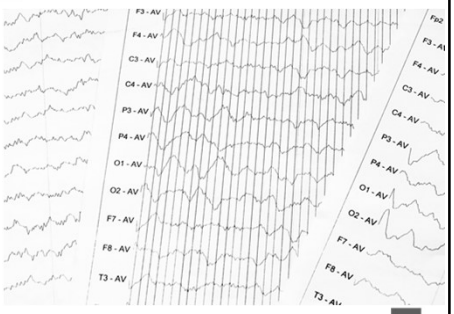
Synchronization versus Over Coupling





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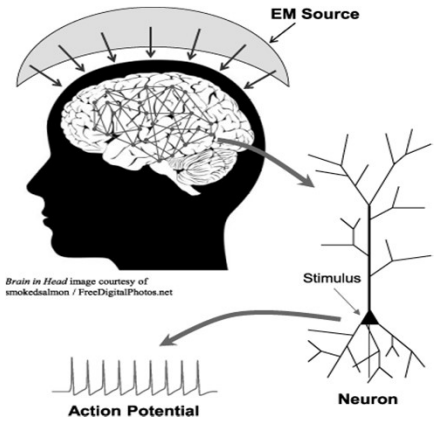
How?

Oscillations start outside of the brain!



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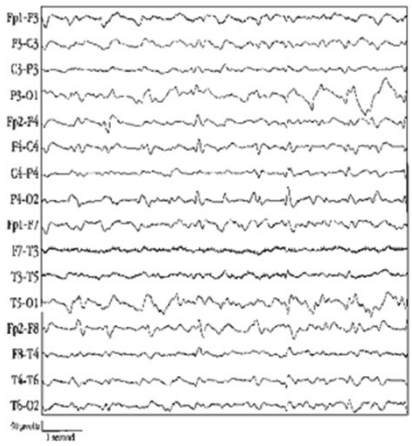
Brain waves and Electrical Signals

- F = frontal
- Fp = frontopolar
- T = temporal
- C = central
- P = parietal
- O = occipital
- A = auricular (ear electrode)



Retrieved December 8, 2018 from: https://www.epilepsy.com/learn/diagnosis/eeg/how-read-eeg

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Electrode Numbers

- T3, T4, P3, P4
- Even numbers identify electrode positions on the right side of the head
- Odd numbers refer to the left side
- "z" points to electrode sites in the midline of the head

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EEG Readings

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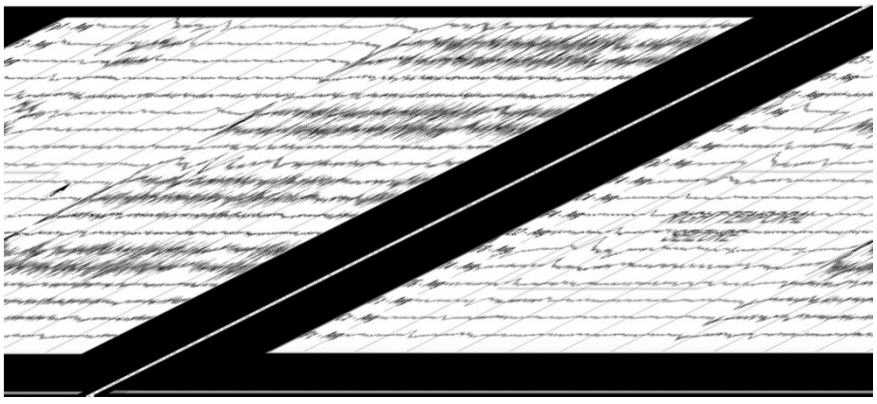
Video Example



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Connection to Intervention

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What to look for...

- Face
- Body
- Communication
- Altered mental status
- Change in behavior
- Triggers

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Selecting Tx. Interventions

- Interprofessional Collaboration
  - MD: Triggers
  - Reporting changes and reactions
- Appropriate sensory activities
  - Lighting
  - Smell

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Mind-Body Connection

- Movement can connect to brain oscillations
- Rocking can effect brain patterns
- Calming the body can occur with rhythmic breathing
- Brain oscillations affected by
- Enriched activities, oral motor activity, and novel stimulation

(Bayer, 2011)

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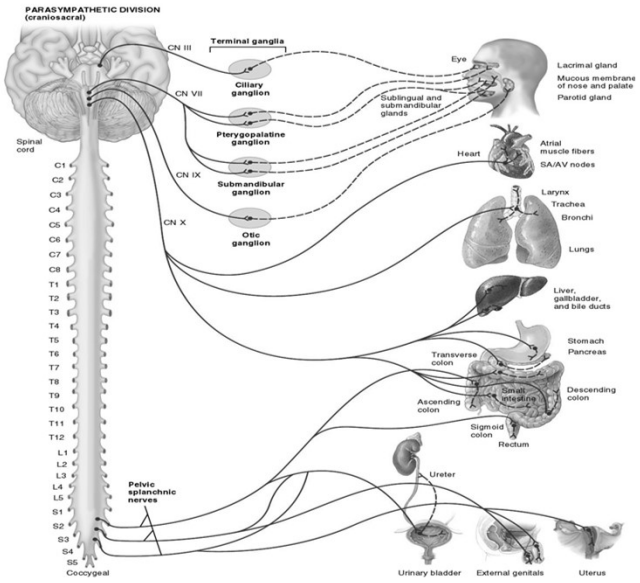
Vagus Nerve!



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Vagus Stimulation

- Inversion
- Prone Activities
- Valsava (resistive blowing activities)
- Cold temperature
- Sucking and Swallowing (use of water bottles)
- Facial and eyelid massage (connection to cranial nerves)

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Case Examples

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Rhythmic Activities

- Multi-sensory
- Whole Body
- Proprioceptive Feedback
- Vestibular

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Client Hx:
Likes to run around, jump,tense hands, fixates on objects, self-stimulatory behaviors, difficulty with gross motor play, self-help, and handwriting.

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Questions and Answers

info@drvgibbs.com

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