

SEIZURES: UPDATES



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I do NOT have any financial
relationships with any
commercial interest

Educational Objectives

- Learn Alternatives to Medication
- Understand the differential diagnosis of shaking
- Realize that an EEG is helpful when it's positive



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ORIGINAL ARTICLE

Early Identification of Refractory Epilepsy

Patrick Kwan, M.D., and Martin J. Brodie, M.D.

N Engl J Med 2000; 342:314-319 | [February 3, 2000](#) | DOI: 10.1056/NEJM200002033420503

N Engl J Med 2000; 342:314-319 | [February 3, 2000](#) | DOI: 10.1056/NEJM200002033420503

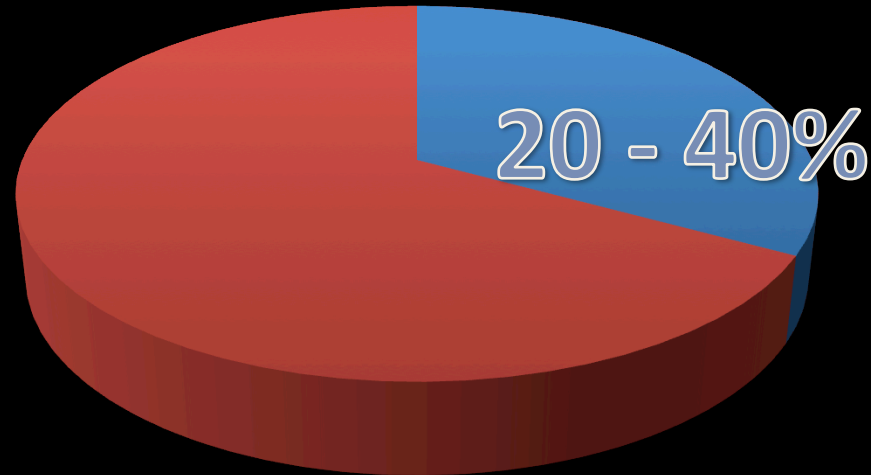
470 PATIENTS WITH EPILEPSY



■ 47% Controlled

■ UNCONTROLLED

- Prevalence of Refractory Epilepsy



- 1 of 4

2 of 4

3 of 4

- 4 of 4



SEIZURES:

WHAT'S SHAKE'N?



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ElectroEncepheloGram: EEG

- Routine EEG
 - Specificity 78-98%
 - Helpful when it's positive
 - Sensitivity
 - Not helpful when it's negative

TREATMENTS

- Medications:

Oldest Epilepsy Medication?

- 1857: Too much sex drive -> Seizures
- KBr

1st Generation

- Phenobarbital (Luminal) 1912
- Phenytoin (Dilantin) 1938
- Carbamazepine (Tegretol) 1974
- Valproate (Depakote) 1978

- Bad

- ER Drug Level
- CYP450
- Impaired Bone Health
- Endocrine Dysfunction
- Cholesterol Changes
- Vascular Issues
- Pregnancy

- Good

- Drug Level
- \$4.00 list: Tegretol
- WHO Phenobarbital
- Depakote – Broad spectrum

2nd Generation

Felbamate (Felbatol)
Lamictal (Lamotrigine)
Neurontin (Gabapentin)
Zonagran (Zonisamide)
Topamax (Topiramate)
Gabitrin (Racibine)
Keppra (Levetiracetam)
Trileptal (Oxcarbazepine)
Lyrica (Pregabalin)

- 'newer drugs'
 - Good efficacy
 - Fewer toxic effects
 - Better tolerability
 - Limited CYP450
 - No blood level monitoring

3rd Generation

- Eslicarbazepine (Aptiom)
- Onfi (Clobazam)
- Banzil (Rufinamide)
- Vimpat (Lacosamide)
- Perampanel (Fycompa)
- Brivaracetam (Briviact)

CURE rate for Keppra (Levetiracetam) ?

ZERO

First Seizure:
Who/When do we medicate?

FIRST SEIZURE IS FREE

After the second?

—70%

First Seizure: start medications?

Who to treat?

Odds Ratio

EEG abnormality

2.16

MRI/CT abnormality

2.44

Nocturnal

2.1



Evidence-based guideline: Management of
an unprovoked first seizure in adults

Report of the Guideline Development Subcommittee of the
American Academy of Neurology and the American Epilepsy Society

2015, American Academy of Neurology and American Epilepsy Society

Treatments, meds fail?

- **Surgery** (partial onset)
 - After 2-3 failed medications
- **Diet**
 - After 2-3 failed medications



- Jim Abrahams
 - Movie Director
 - Charlie (20 months old) 30-100 seizures / day
 - UCLA



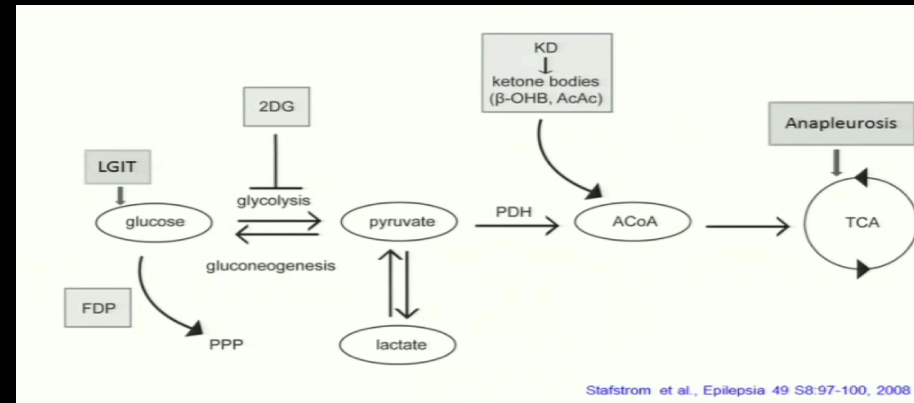
Ketogenic Diet

- 4 gm fat : 1 gm protein/carb
- “Adkins diet on steroids”
- Wean off diet after 2 years
- Success in 3 months
- CURE **15-25%...50%** with 50% improvement

- Charlie Foundation

- Diets:

- Ketogenic
- Modified Atkins
- Medium Chain Triglyceride
- Low Glycemic Index



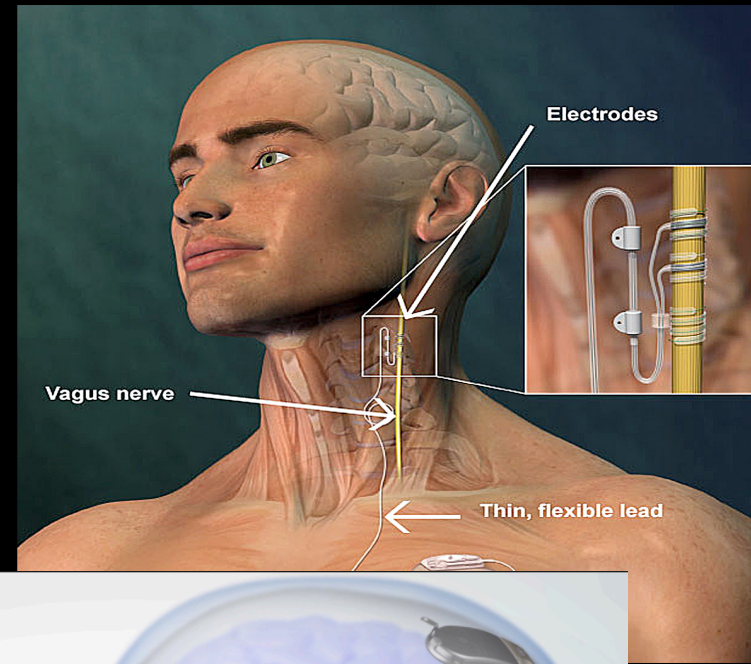
- Vagal Nerve Stimulator

- Auto detection

- 84% ictal-tachycardia

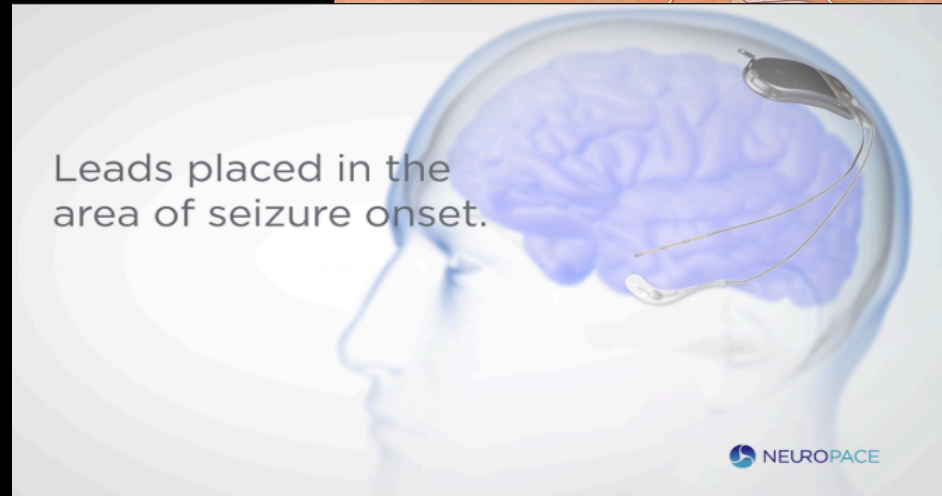
30 sec

5 minutes



- NeuroPace

- 2014



Status Epilepticus

Tintinalli's Emergency Medicine: A Comprehensive Study Guide, 8e, 2016 >

in Infants and Children

Judith E. Tintinalli, J. Stephan Stapczynski, O. John Ma, Donald M. Yealy, Garth D. Meckler, David M. Cline

[Download \(.pdf\)](#) | [Print](#)

TABLE 135-5
Medications for Refractory Status Epilepticus

Drug	Route	Loading Dose	Repeat Dose	Maximum	IV Infusion
Fosphenytoin	IV, IM	20–30 milligrams/kg PE	5–10 milligrams/kg PE	30 milligrams/kg PE	3 milligrams/kg/min PE
Phenobarbital	IV	20–30 milligrams/kg	5–10 milligrams/kg	40 milligrams/kg	1–30 milligrams/min
Valproic acid	IV	20–40 milligrams/kg	15–20 milligrams/kg	40 milligrams/kg	5 milligrams/kg/h
Levetiracetam	IV	20–60 milligrams/kg	—	3 grams	—

RAMPART

Rapid Anticonvulsant Medication Prior to Arrival Trial

ORIGINAL ARTICLE

Intramuscular versus Intravenous Therapy for Prehospital Status Epilepticus

Robert Silbergleit, M.D., Valerie Durkalski, Ph.D., Daniel Lowenstein, M.D., Robin Conwit, M.D., Arthur Pancioli, M.D., Yuko Palesch, Ph.D., and William Barsan, M.D. for the NETT Investigators*

NO IV:

IV:

NEJM 2012

When the Benzo's fail?



ORIGINAL ARTICLE

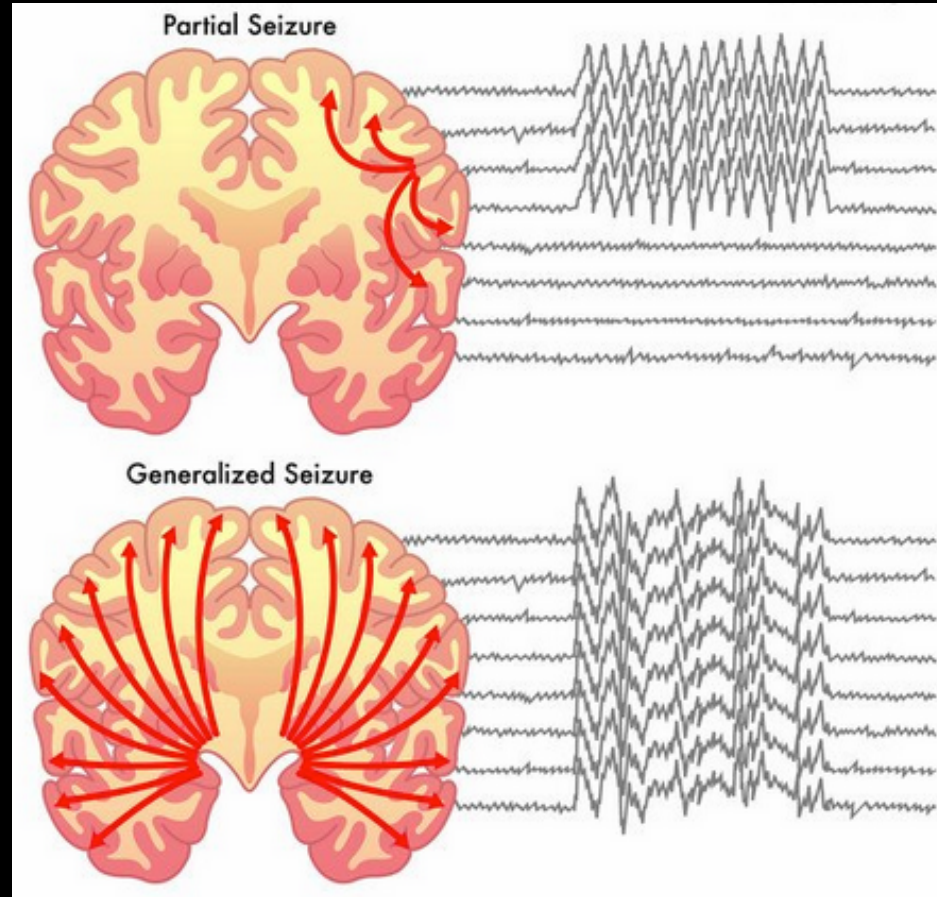
Randomized Trial of Three Anticonvulsant Medications for Status Epilepticus

What are the 3 drugs?

- Keppra / Levetiracetam
- Depakote / Valproic Acid
- Phosphenytoin / Dilantin-Phosphorus group

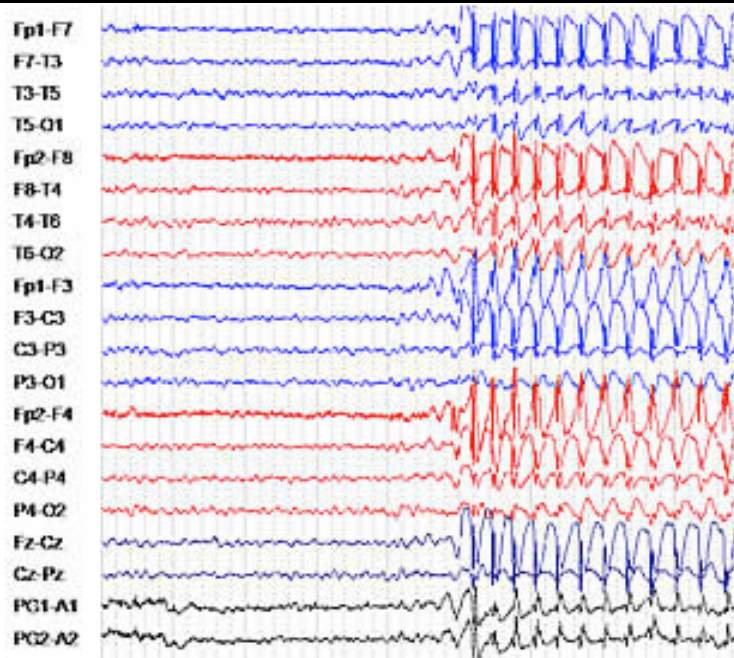
Classification

- Partial
- General



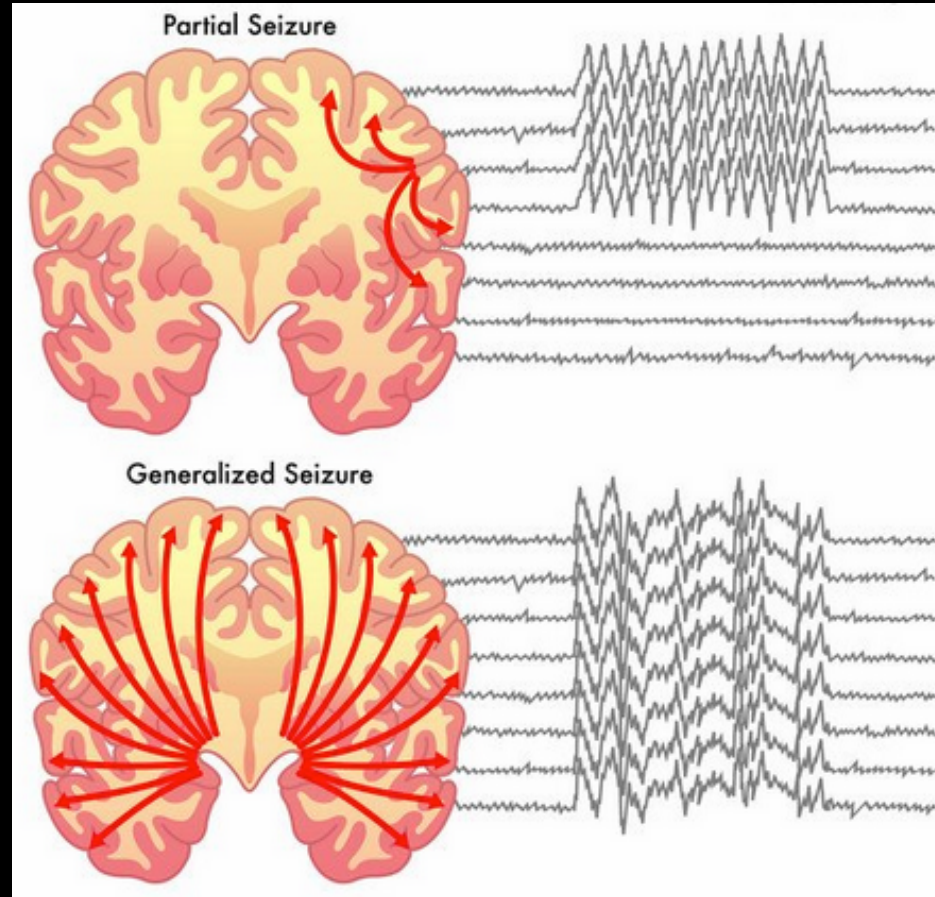
Epilepsy: **GOLD** Standard?

Video EEG



Classification

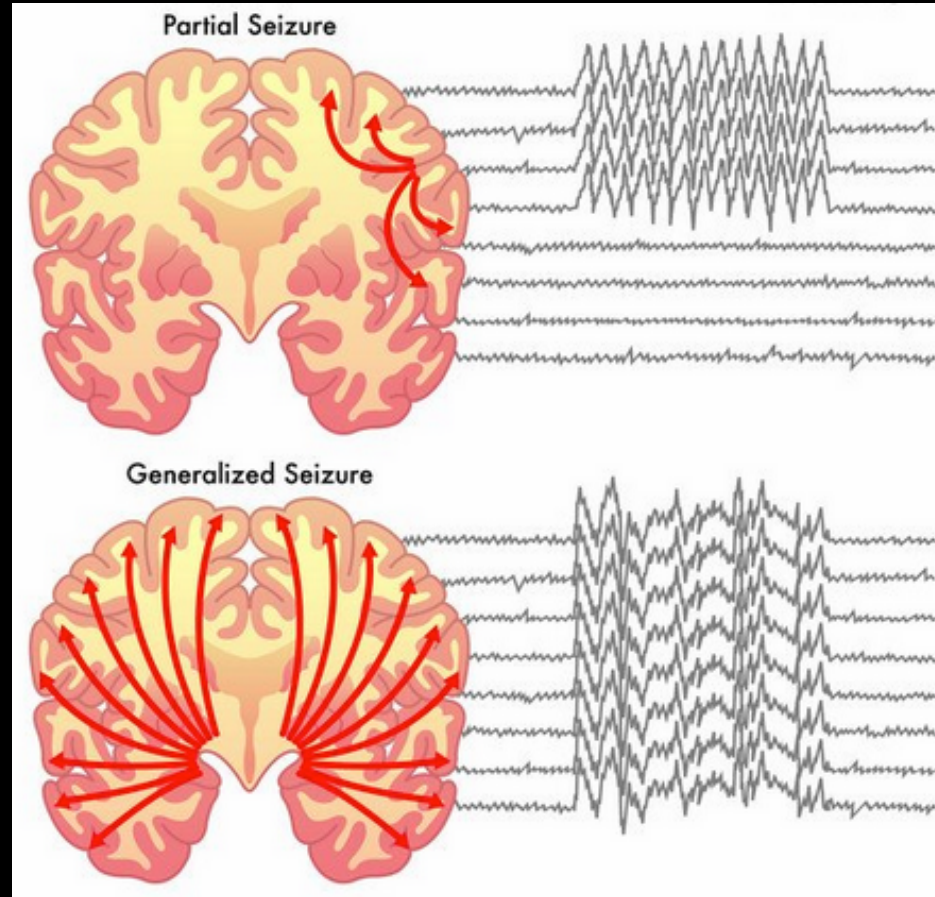
- Partial / Focal
- General



video

Classification

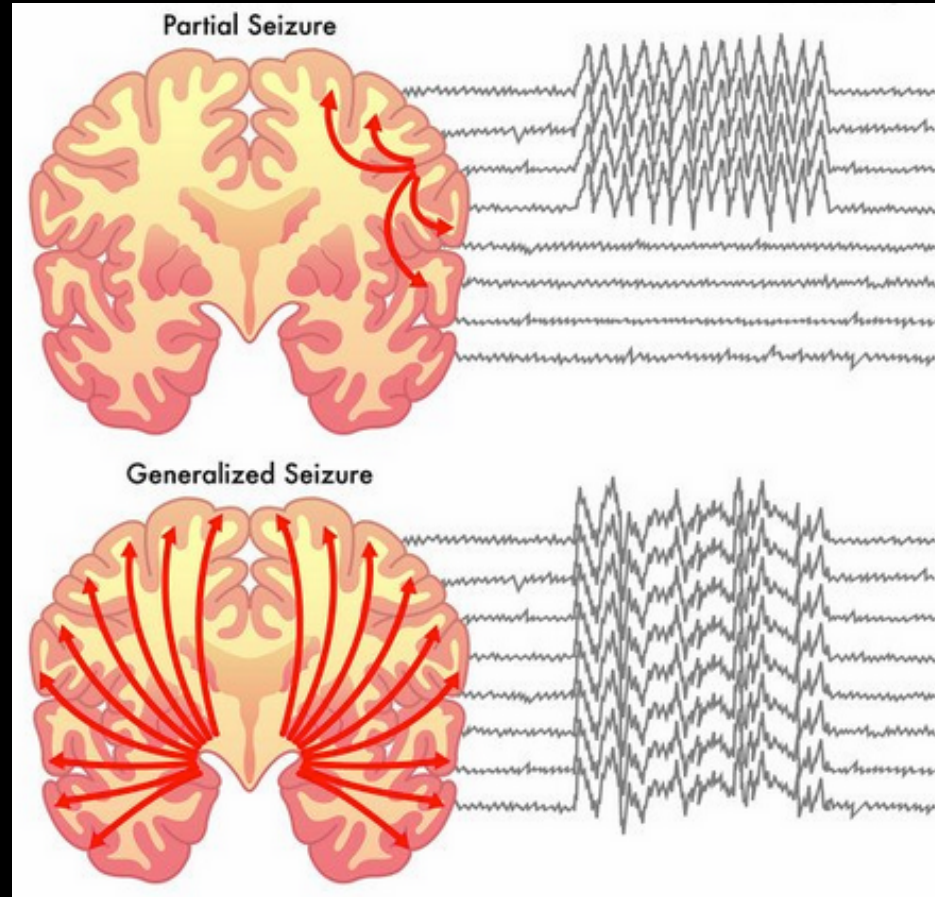
- Partial / Focal
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video

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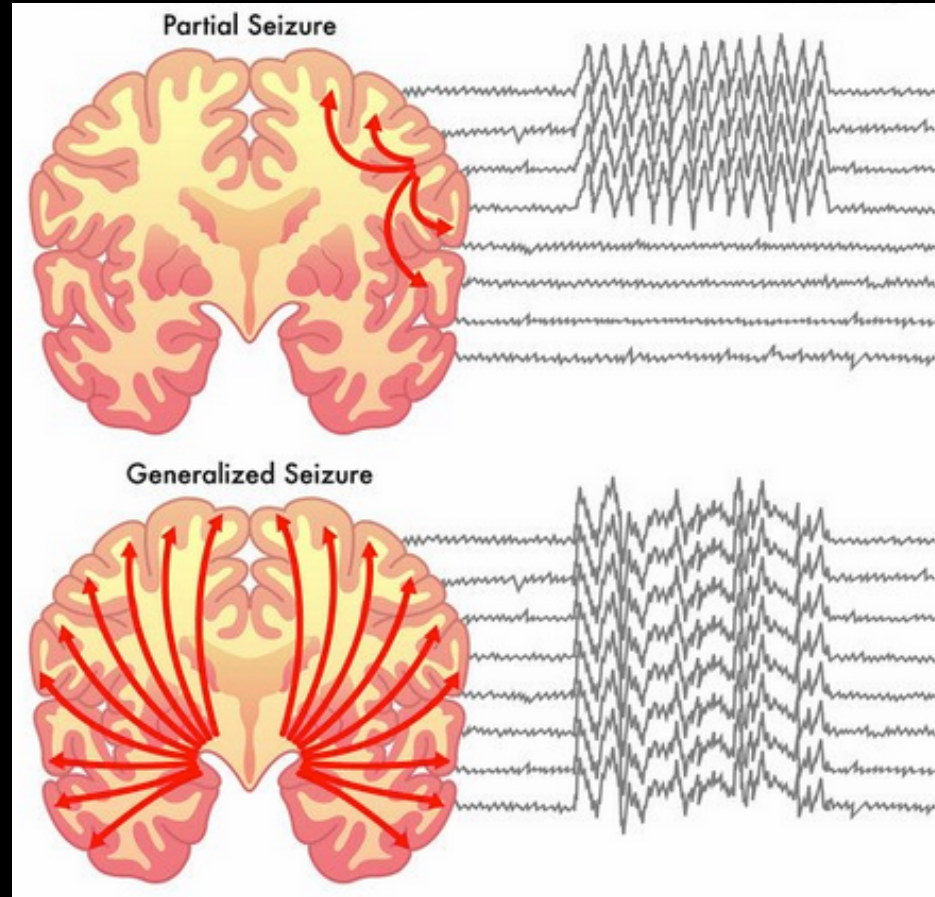
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video

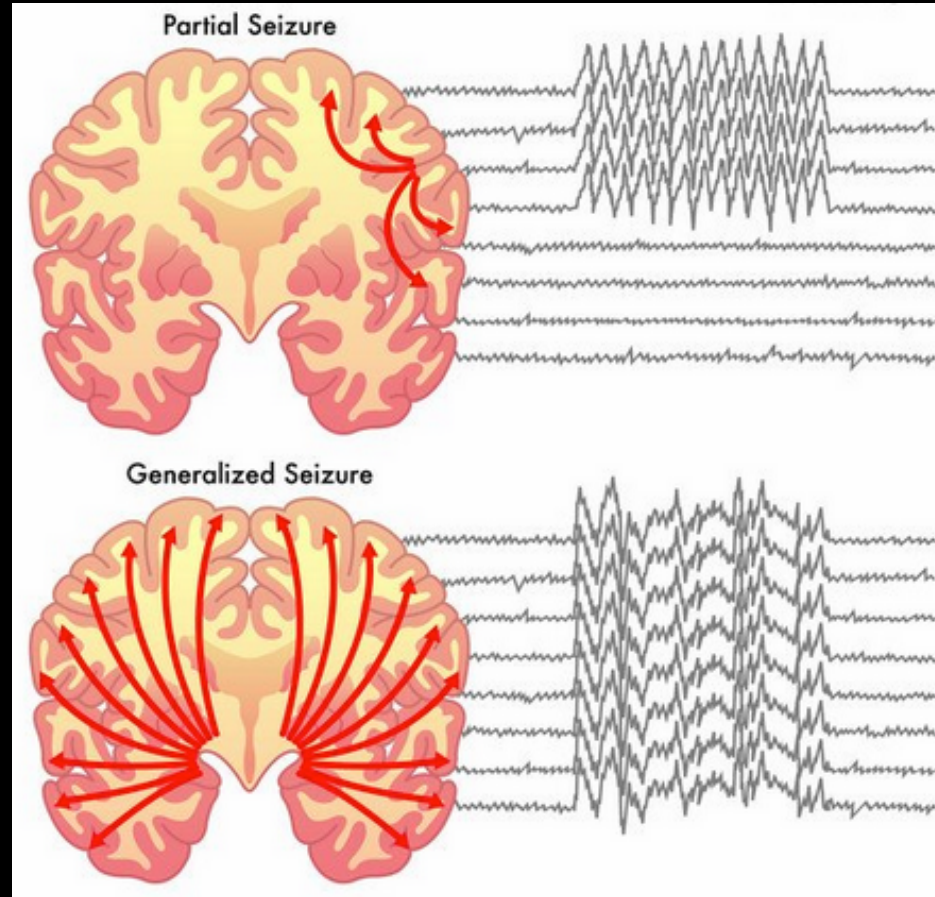
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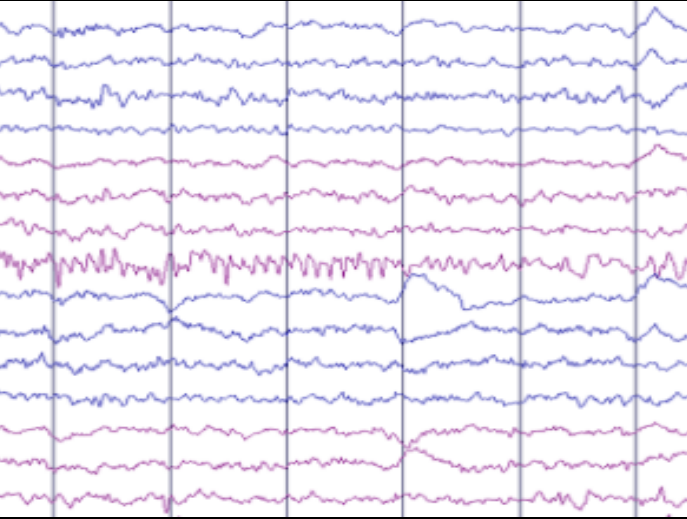


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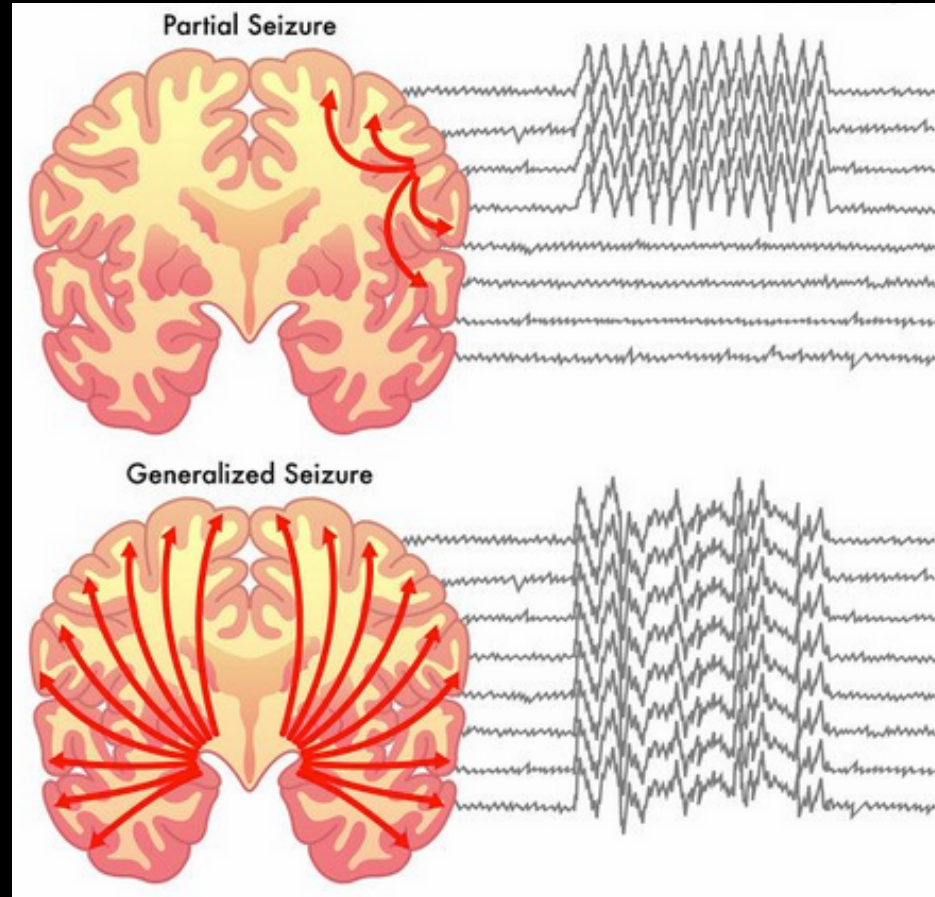
Can you respond during a seizure?



video

Classification

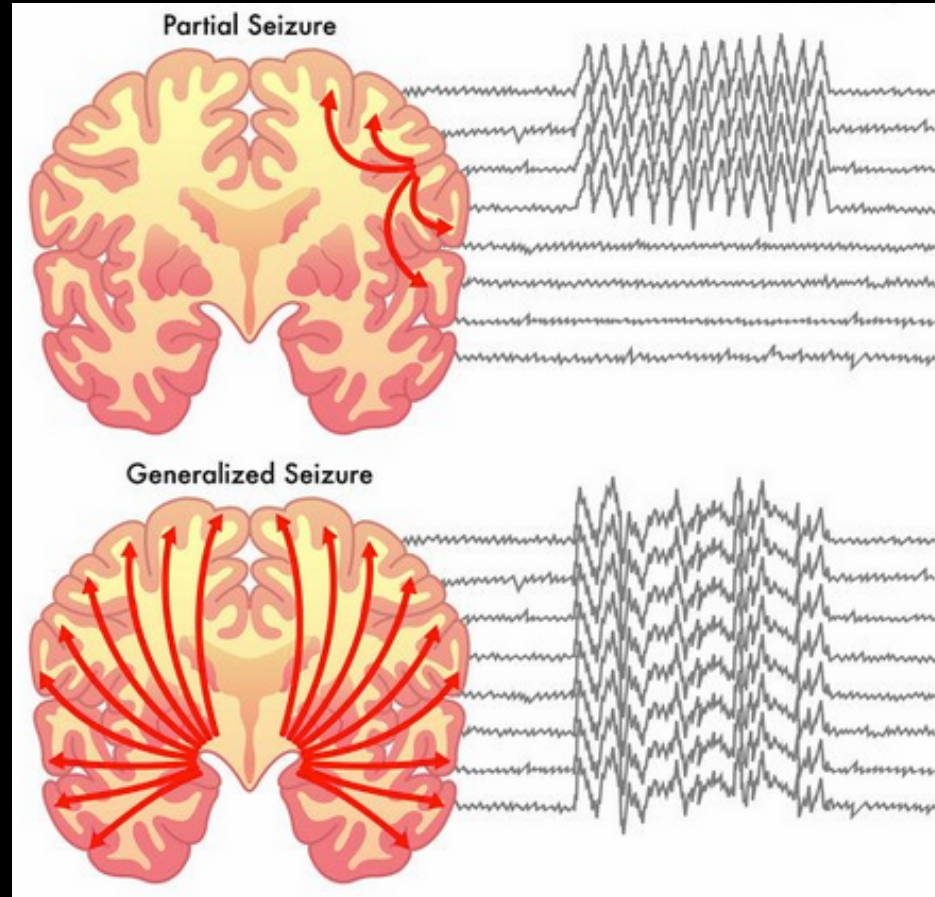
- Partial / Focal
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video

Classification

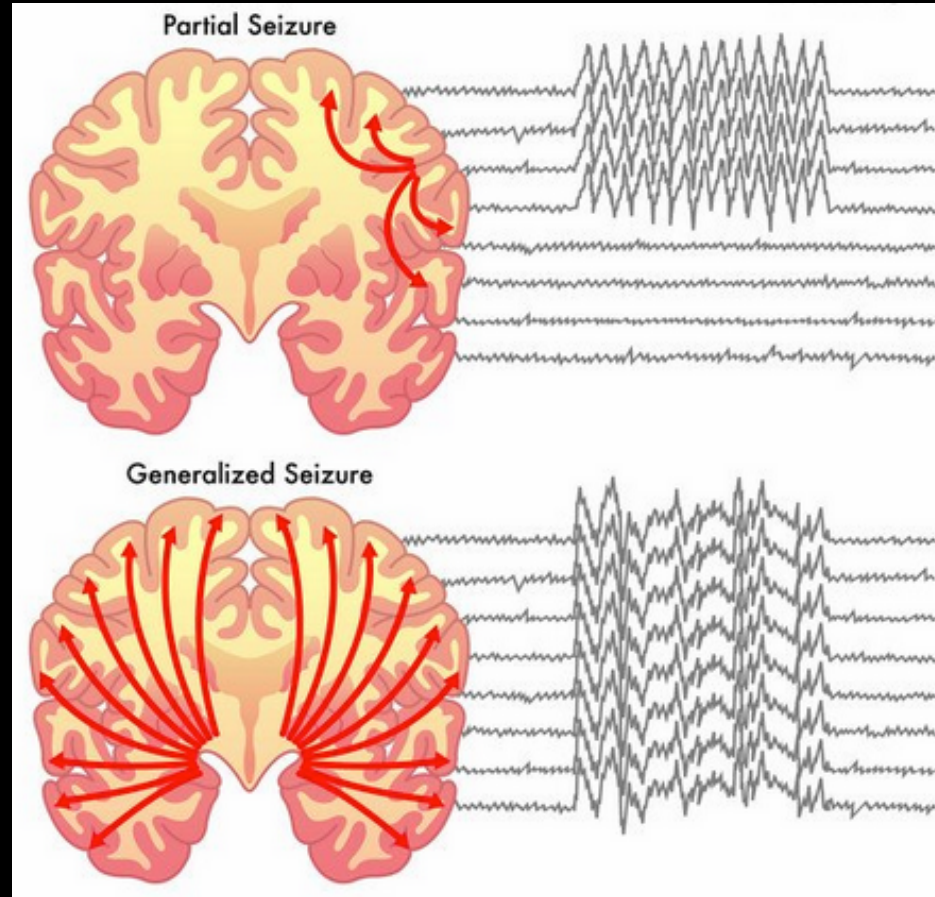
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video

Classification

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- General



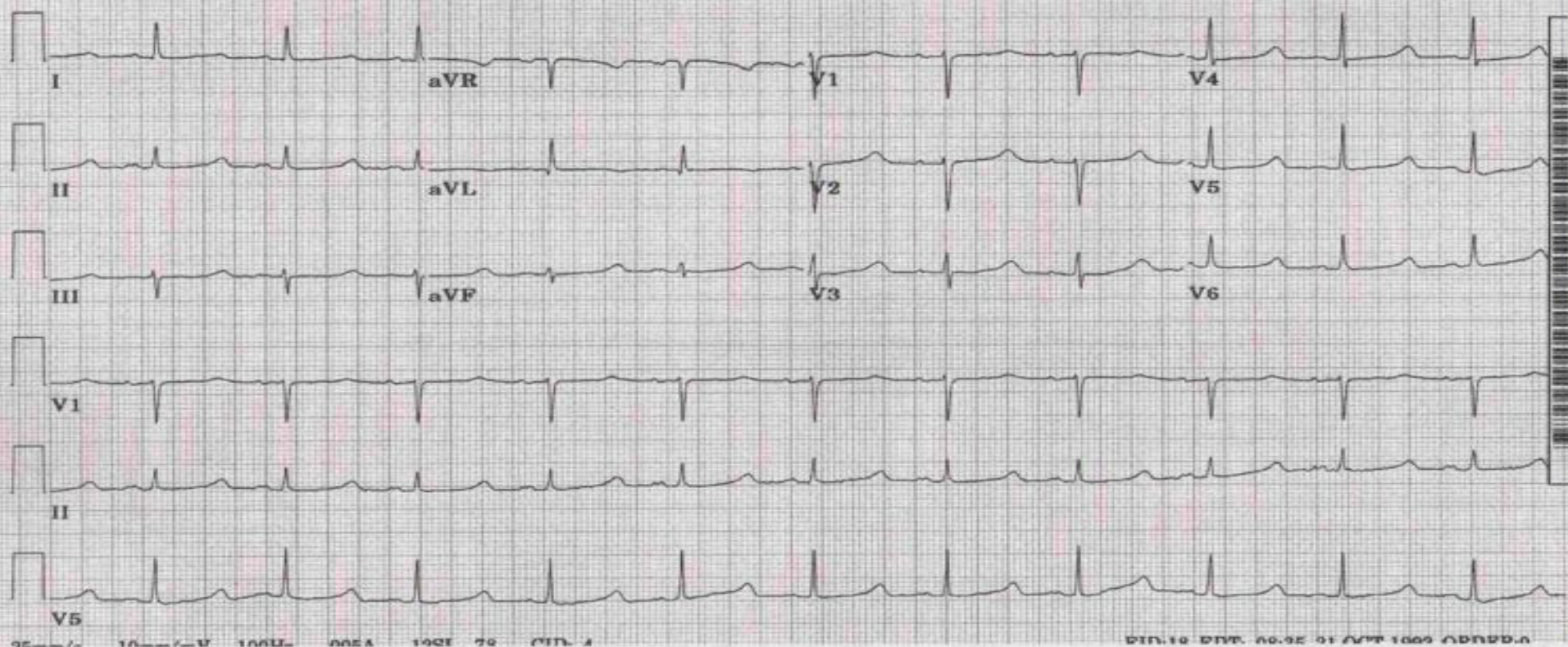
video

- NOT ALL SEIZURES SHAKE
- NOT ALL SHAKING is a SEIZURE

- video

Consider CARDIAC if the Dx is not clear!

- 22 y/o mother of 2
 - *Seizure and dizziness... vasovagal syndrome*
 - *18 days later*
 - *3 days later*
 - *Next day....*
 - ***-\$16,662,154***



Convulsive Syncope

- Annals of Neurology
Aug 1994

90% with motor activity
(0.7 – 15.9 sec)

- Transfusion
Dec 2001

46%: with motor activity

Convulsive Syncope

- Journal of the American College of Cardiology
July 2002

15% limb jerking

- Annals of Emergency Medicine
July 2009

Delay to diagnosis..... 2 ½ yrs (one 20)

video

NOT ALL SHAKING IS A SEIZURE

—Consider EKG in Sz workup

- Consider BAD Dx

video

ER case with a “smart” resident...

26 y/o male, first-time “seizure”

Resident:

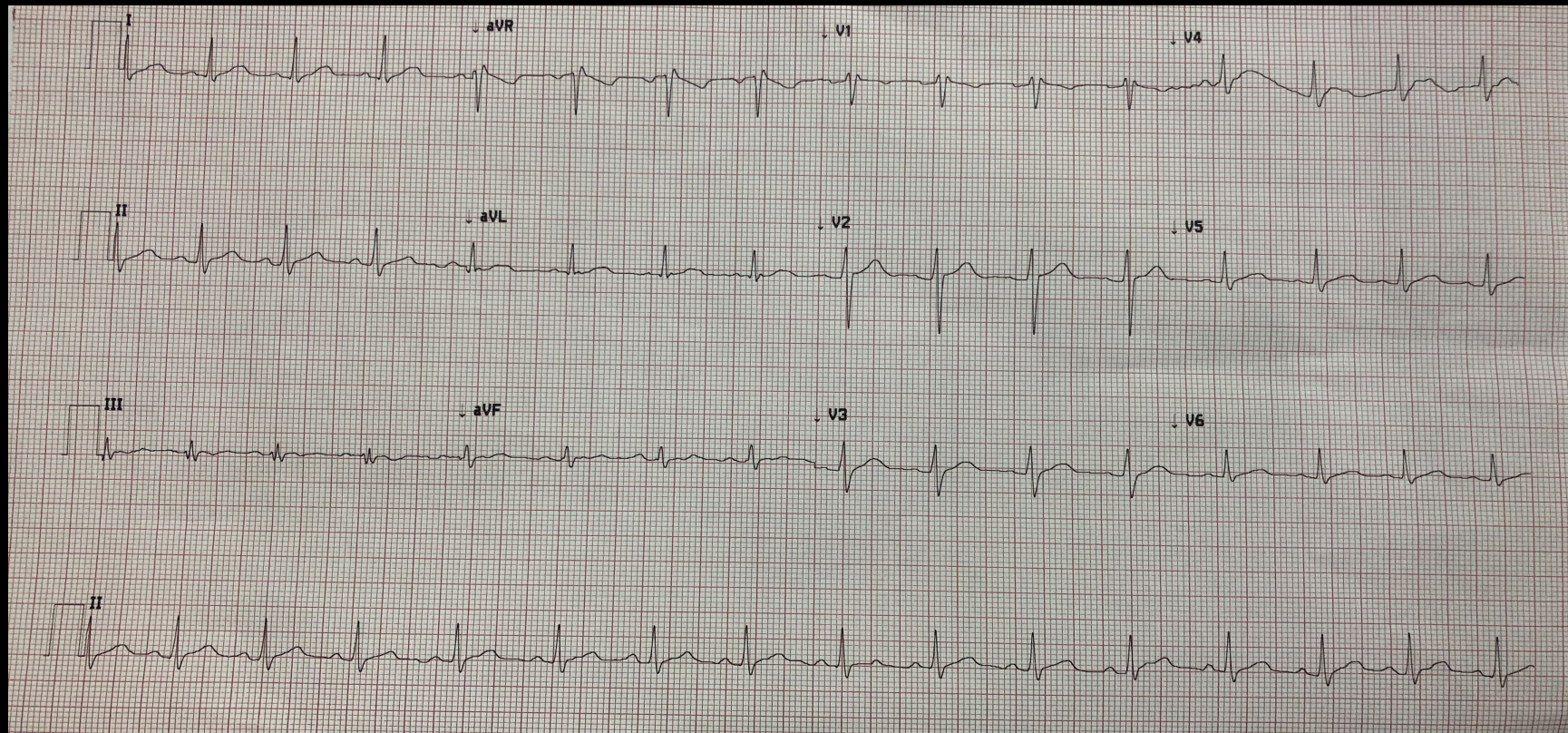
“doesn't sound like a seizure....

no postictal state

healthy

EKG looks good

I'm going to cancel the labs.....”



- Ready for DC
- *“Doctor, he just had a seizure again.....”*
- Awake and alert after
- Rhythm strip?

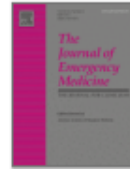
video

- Postictal Confusion for Seizure
 - Great Predictor
 - 5x's more likely a seizure if confused
 - 94% Sensitive (not confused, consider NOT Seizure)
 - 70% Specific (confused, consider Seizure)



The Journal of Emergency
Medicine

Volume 52, Issue 5, May 2017, Pages 645-653



Clinical Review

An Emergency Medicine–Focused Review of Seizure Mimics

James Webb MD *, Brit Long MD † ☺, Alex Koyfman MD ‡



Volume 57, Number 6
DECEMBER 2019
ISSN 0736-4679

www.jem-journal.com

*The
Journal of
Emergency
Medicine*

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Official Journal of

American Academy of Emergency Medicine



video

EYES

OPEN OR CLOSED?

video

SEIZURE:

- Pseudo-Seizure
 - Hysterical Seizure
 - Non-Epileptic Seizure
 - Psychogenic Non-Epileptic Seizure
 - PNES
-
- NOT FAKING

Psychogenic Non-Epileptic Seizure

Who:

Female

Onset 20-30's

'No drugs work'

Clinically:

- Eyes closed
- Not typical pattern
 - Opisthotonus
 - Bicycle
- Someone around
- > 5 minutes
- Not Tachycardic (130)

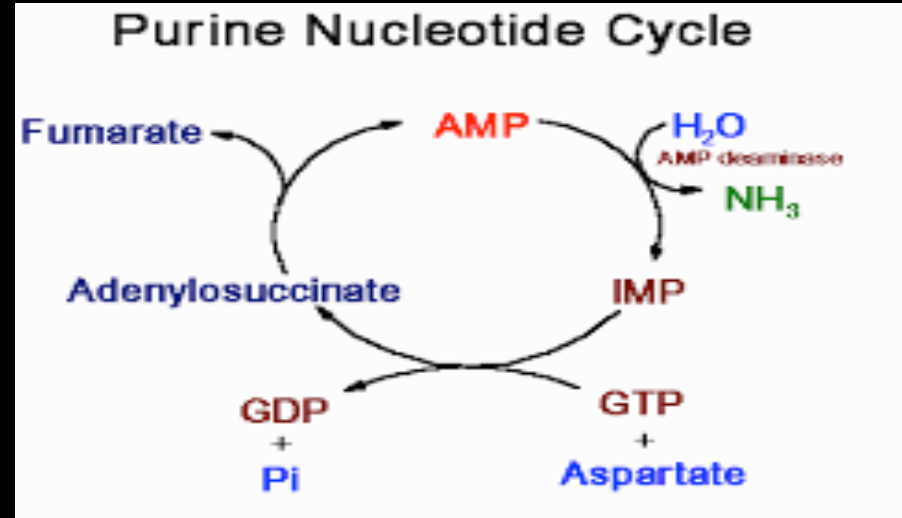
Afterward:

- +urinate
- +tongue bite
- +trauma
- Intact corneal reflex

video

Psychogenic Non-Epileptic Seizure

- LABS?
 - Rule IN Seizure
 - NOT Rule IN PNES
 - WBC
 - Lactate
 - Anion Gap
 - CK
 - Prolactin
 - Ammonia



video

video

video

Pseudo-Seizure / PNES

Average time to Dx?

7.2 years

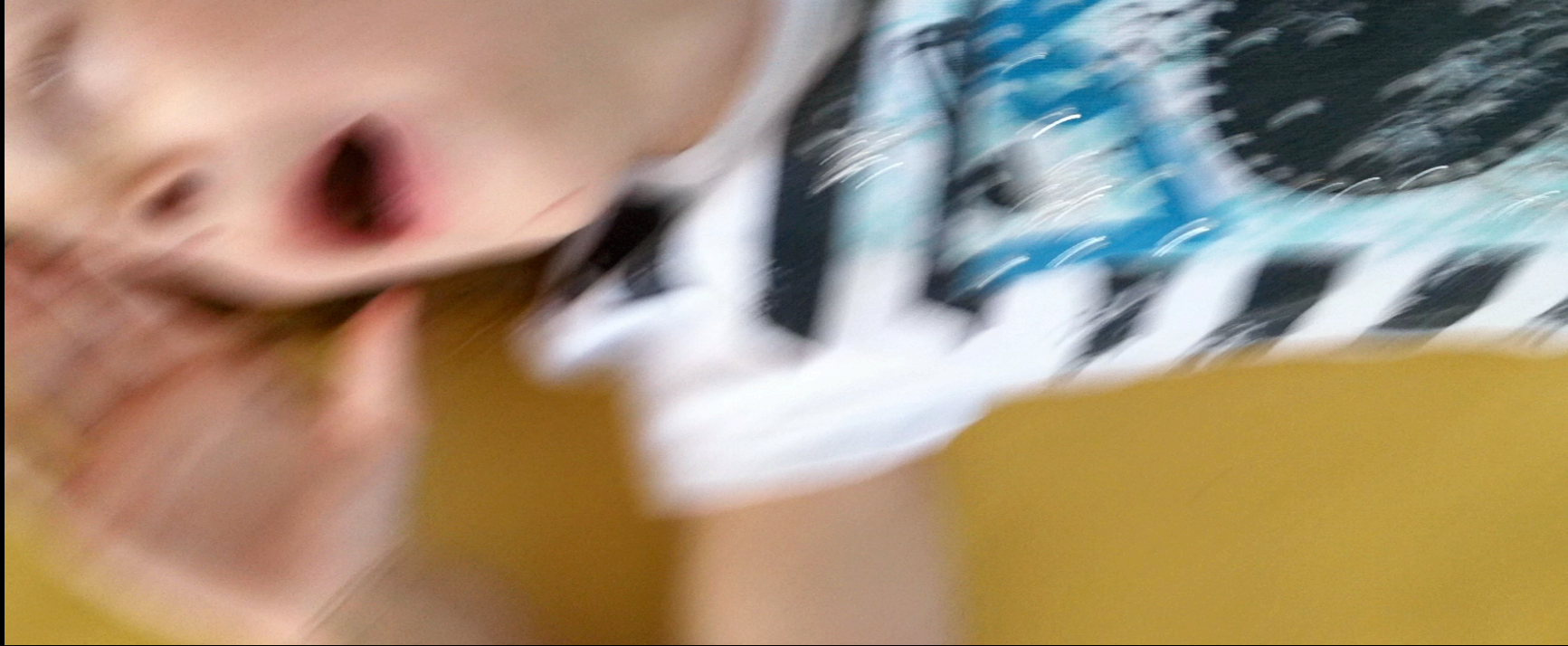
Diagnostic delay in psychogenic nonepileptic seizures

Abstract—Delay to diagnosis was studied in 313 consecutive patients with psychogenic nonepileptic seizures (PNES). On average, patients with PNES were diagnosed 7.2 years after manifestation (SD 9.3 years). Younger age, interictal epileptiform potentials in the EEG, and anticonvulsant treatment were associated with longer delays. Other patient factors did not explain the great variability of the time to diagnosis, suggesting that physician factors contributed to delays.

NEUROLOGY 2002;58:493–495

video

video



Pseudo-seizure: follow-up

- No seizure meds
- Get video of the seizures
- Psychologist/psychiatrist

TAKE HOME

- Seizures don't always shake
- Shaking is NOT always a seizure
 - Consider Cardiac
 - Consider PNES: Female, 20-30's new onset
 - Eyes
 - Heart Rate
 - General Sz but follows commands
- EEG is good when it's positive
- Surgery, Diet Therapy – CURE

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Questions?

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