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## **Personalized Programming for VNS: A Single Center Experience**

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# Acknowledgement

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- This symposium is supported by LivaNova
- The presentation has been created by Dr. Kullasate Sakpichaisakul, in collaboration with LivaNova, for the Customize VNS Therapy® to suit patient's needs webinar.
- It is based on the personal experience of Dr. Kullasate Sakpichaisakul and his colleagues at Queen Sirikit National Institute of Child Health in Thailand.

# Case RT

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- 3-year-old female, not established handedness
  - Seizure onset: 3-month-old
  - **Seizure Details:**
    - Seizure #1 Epileptic spasm (onset at 8-month-old)**
      - Description: brief body stiffening with flexion or extension of the extremities
      - Duration: 2-3 sec, 10 times/cluster, Frequency: 4-5/days
    - Seizure #2 GTC**
      - Description: full body and extremities jerking
      - Duration: 1 min, Frequency: none since 3 months of age
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# Case RT

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**Birth History:** Late preterm 36 wk, BW 1985 gm, no complication

**Development History:** global delays before onset of spasms, currently head lag, social smiles, track objects, cooing, no grabbing objects

**Family History:** none

**Metabolic/Genetic testing:** normal plasma amino acid & urine organic acid, Trio WES: normal

**Current ASMs:** ZNS, Nitrazepam, VGB, LTG

**Previous ASMs:** Prednisolone, TPM, VPA

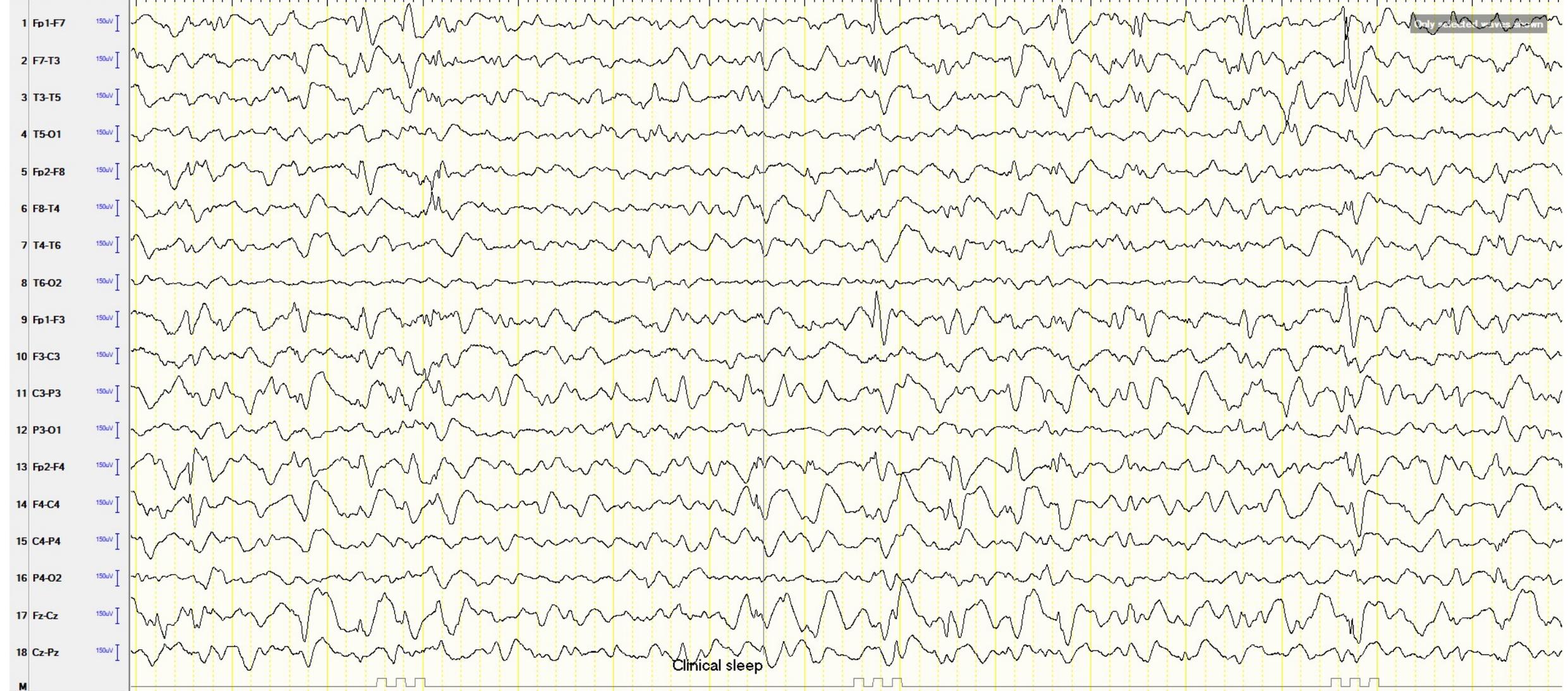
Ketogenic diet-aggravated seizures

**Physical Examination:** hypotonia, no focal features

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# Interictal EEG Pattern: Sleep

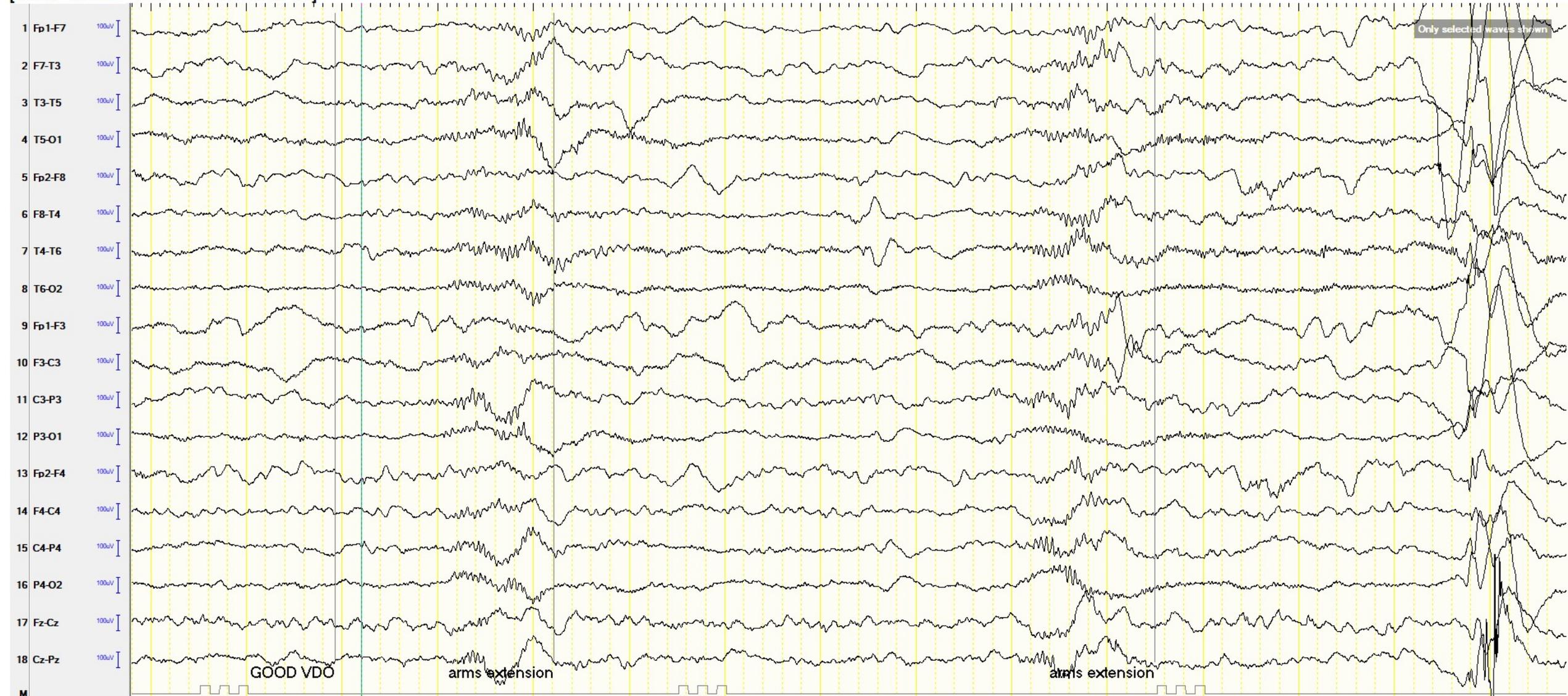
[SENS \*30 HF \*50RP TC \*0.1 CAL \*50]



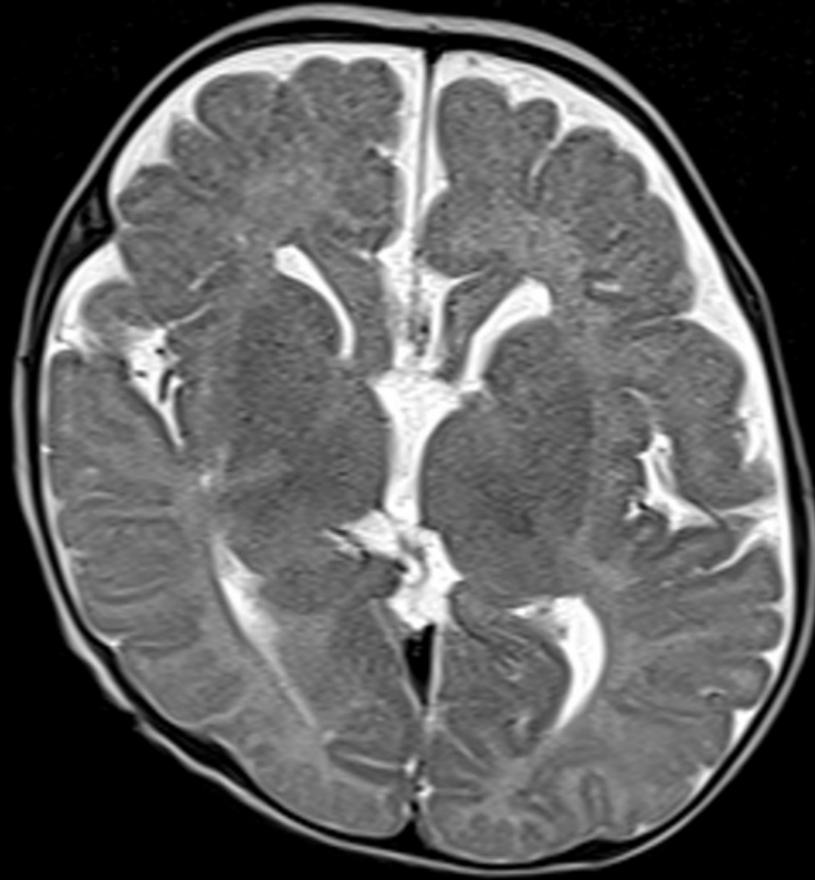
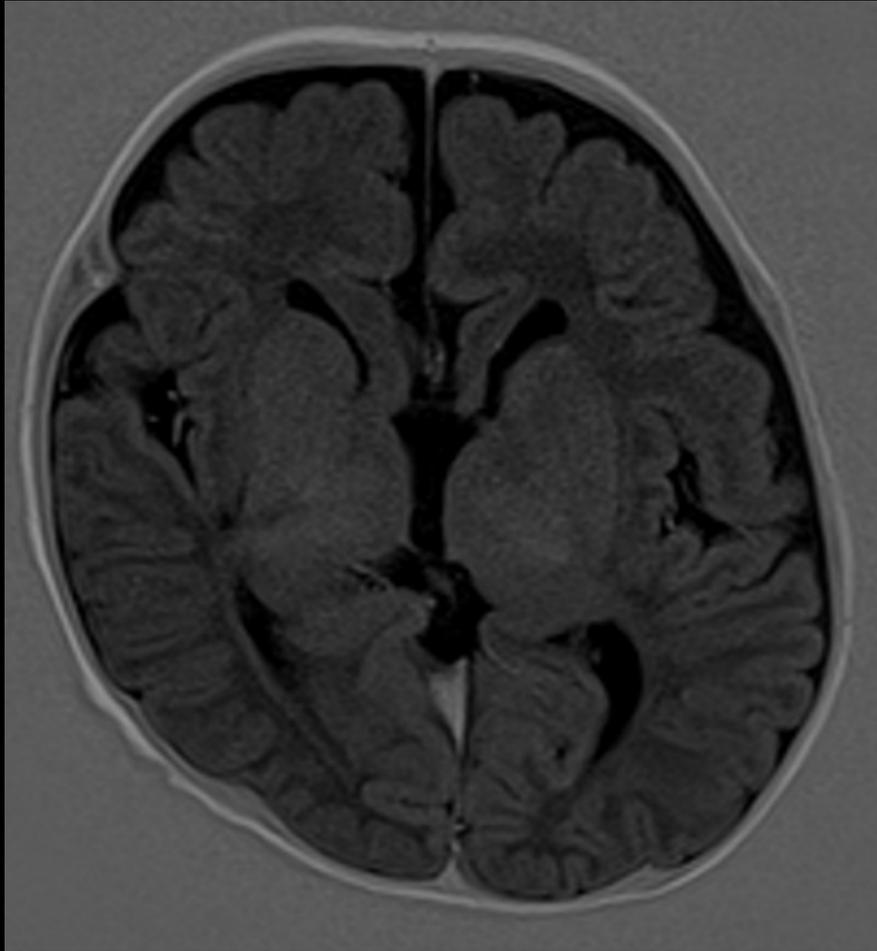
Clinical sleep

# Electroclinical Epilptic Spasms

[SENS \*20 HF \*50RP TC \*0.1 CAL \*50]

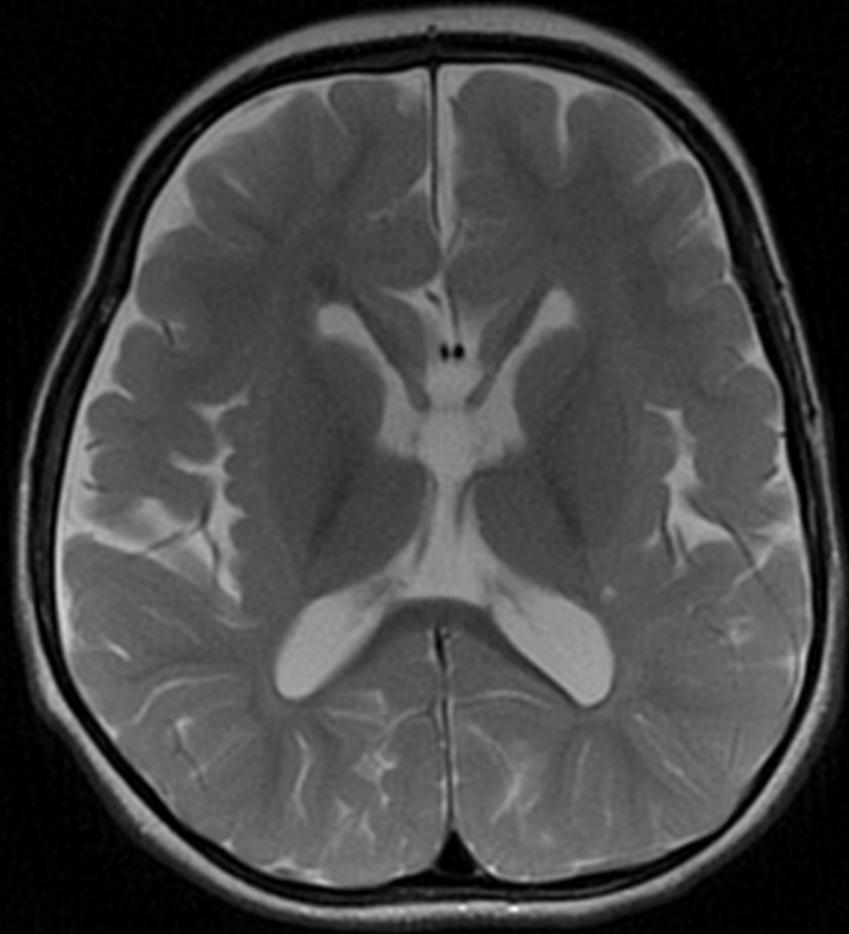
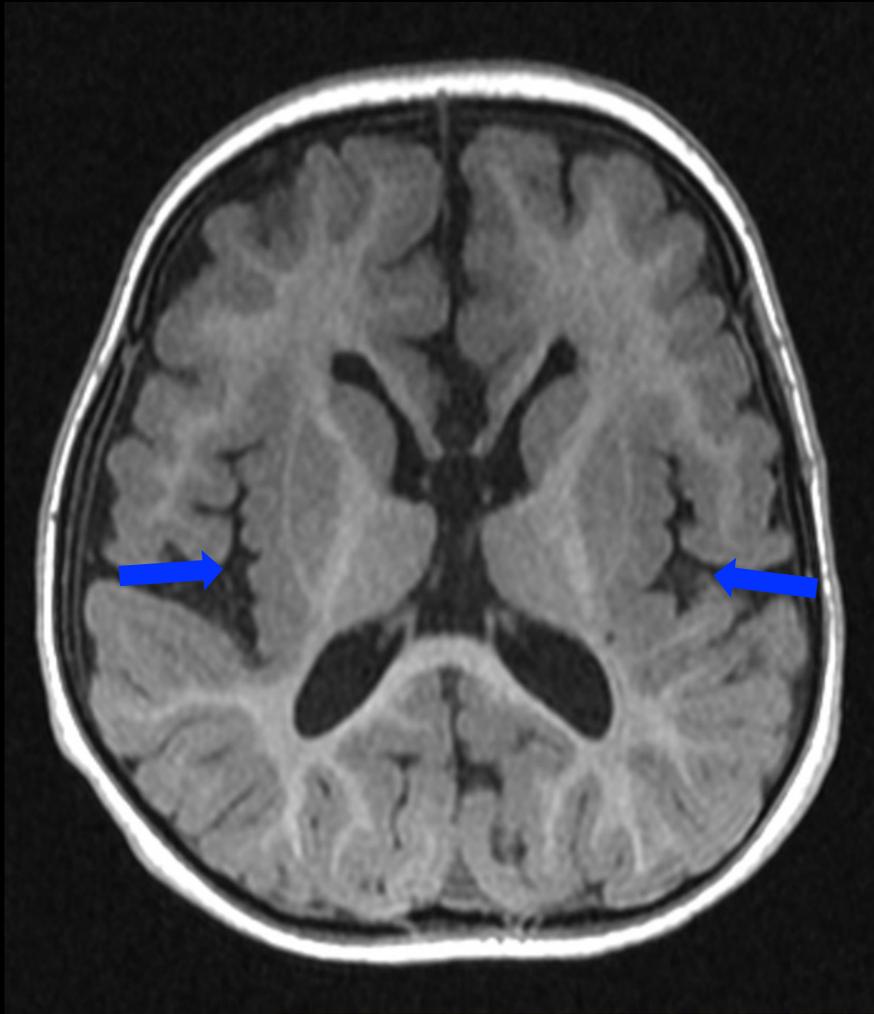


# MRI Brain (4-month-old)



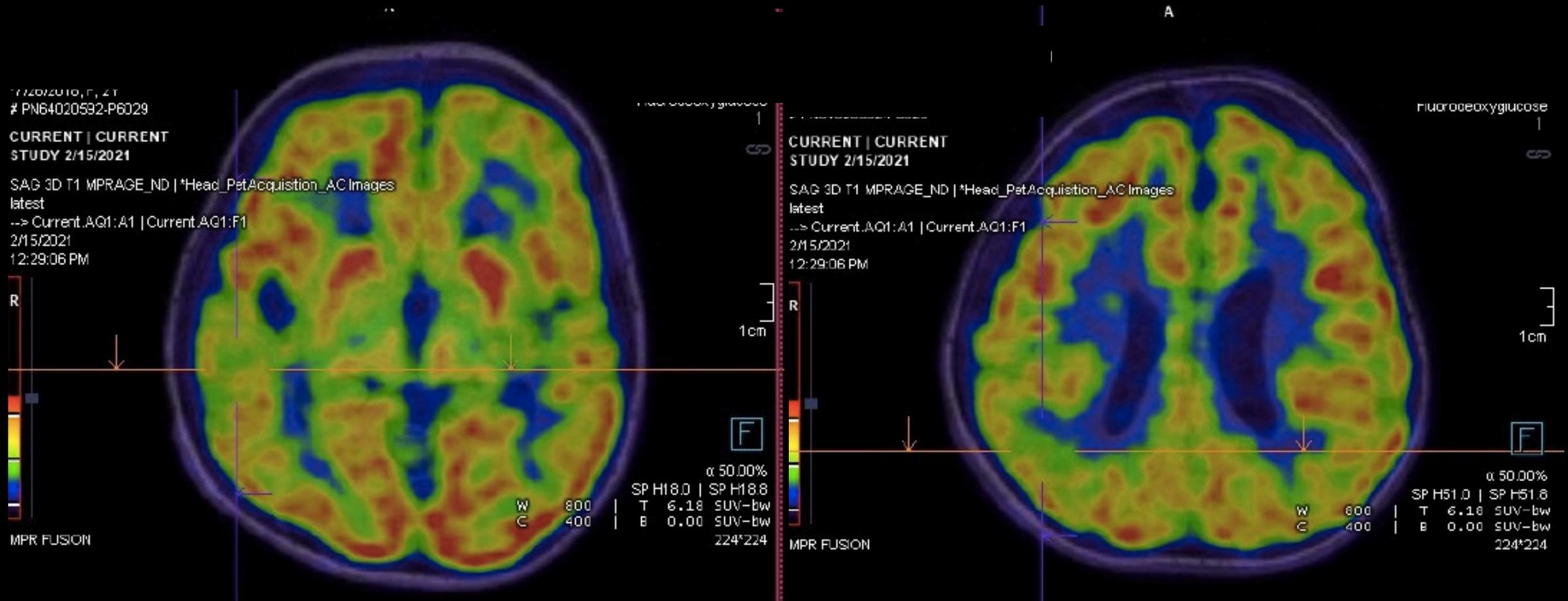
Normal report

# MRI Brain (3-year-old)



Bilateral perisylvian polymicrogyria

# FDG-PET (3-year-old)



Hypometabolism in bilateral temporal (R > L) and right parietal lobe

# Case RT

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- **Summary:**
  - Refractory epileptic spasms x 2 years
  - Currently on 4 ASMs and had previously failed 2
  - Profound developmental delays
  - MRI and PET show potentially bilateral epileptogenic foci
  - EEG with non-localizable seizures
  - Failed ketogenic diet
- Treatment options discussed
  - 1) More ASMs: success < 7% seizure free
  - 2) Corpus callosotomy
  - 3) VNS therapy

# Surgical Outcomes of Corpus Callosotomy (CC) for West Syndrome

- 56 patients with WS who underwent CC during 2000-2014
- 79% of patients had favorable seizure outcome

**TABLE 1** Seizure outcomes after corpus callosotomy

	Total (n = 56)	ES (n = 56)	TS (n = 9)	Nondelayed (n = 27)	Delayed (n = 29)
Seizure-free (F)	18 (32.1%)	24 (42.9%)	0	11 (40.8%)	7 (24.1%)
Excellent (E)	15 (26.8%)	13 (23.2%)	2 (22.2%)	10 (37.0%)	5 (17.2%)
Good (G)	10 (17.9%)	7 (12.5%)	3 (33.3%)	3 (11.1%)	7 (24.1%)
Poor (P)	13 (23.2%)	12 (21.4%)	4 (44.5%)	3 (11.1%)	10 (34.5%)
Worse (W)	0	0	0	0	0

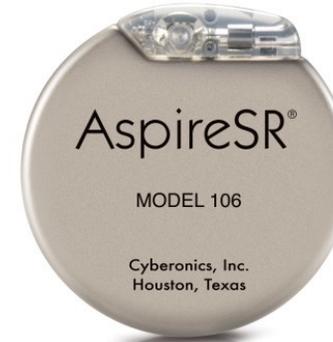
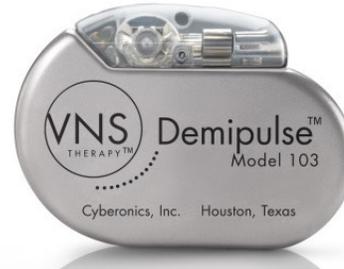
ES, epileptic spasms; TS, tonic seizure; Nondelayed, patients with no developmental delay before the onset of epilepsy; Delayed, patients with developmental delay before the onset of epilepsy.

# Case RT

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- Underwent complete corpus callosotomy on 23 Mar 2021
- Achieved seizure free outcome for 6 months
- Spasms reappeared 7 months after CC
- Excellent seizure outcome ( $> 80\%$  reduction in seizure frequency) by Williamson criteria at 9 months after CC
- Seizure frequency 1-2/day
- Decide to pursue VNS implantation
- Lives 10 h driving far from our center

# VNS Models Available in Thailand



Model	103	106	Sentiva
Guided programming	✓	✓	✓
Autostimulation	X	✓	✓
Scheduled programming	X	X	✓
Day/Night programming	X	X	✓
Custom protocol	X	X	✓
Low heartbeat & prone detection	X	X	✓

# Case RT

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- VNS therapy
- Model Sentiva® implanted 28 Jan 2022
- Schedule programming was used and achieved parameters
  - Generator output 1.75 mA, frequency 20 Hz, pulse width 250  $\mu$ s
  - Auto-stimulation output 1.875 mA, pulse width 250  $\mu$ s, on time 60 s
  - Magnet output 2 mA, pulse width 500  $\mu$ s, on time 60 s
  - On time 30 s, off time 5 min (duty cycle 10%)
- ASMs: VGB, LTG

# Case RT

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- Follow-up at the 5 months post-implantation (June 2022)
- Seizures were reduced from 4 months post-implantation
- Seizure frequency 1-2/week (pre-implantation sz frequency 1-2/day)
- Side effect: minimal and gone over time
- Parents report her to be more alert and much improved in development
- Current development: hold her head, roll over, more social interaction

# Conclusions

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- 83% of DRE children achieved >50 seizure reduction in QSNICH experience
- VNS therapy has a positive impact on alertness and development
- Scheduled programming is convenient and safe
- High cost in different health insurances raised concerns about access and equity

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# Q & A