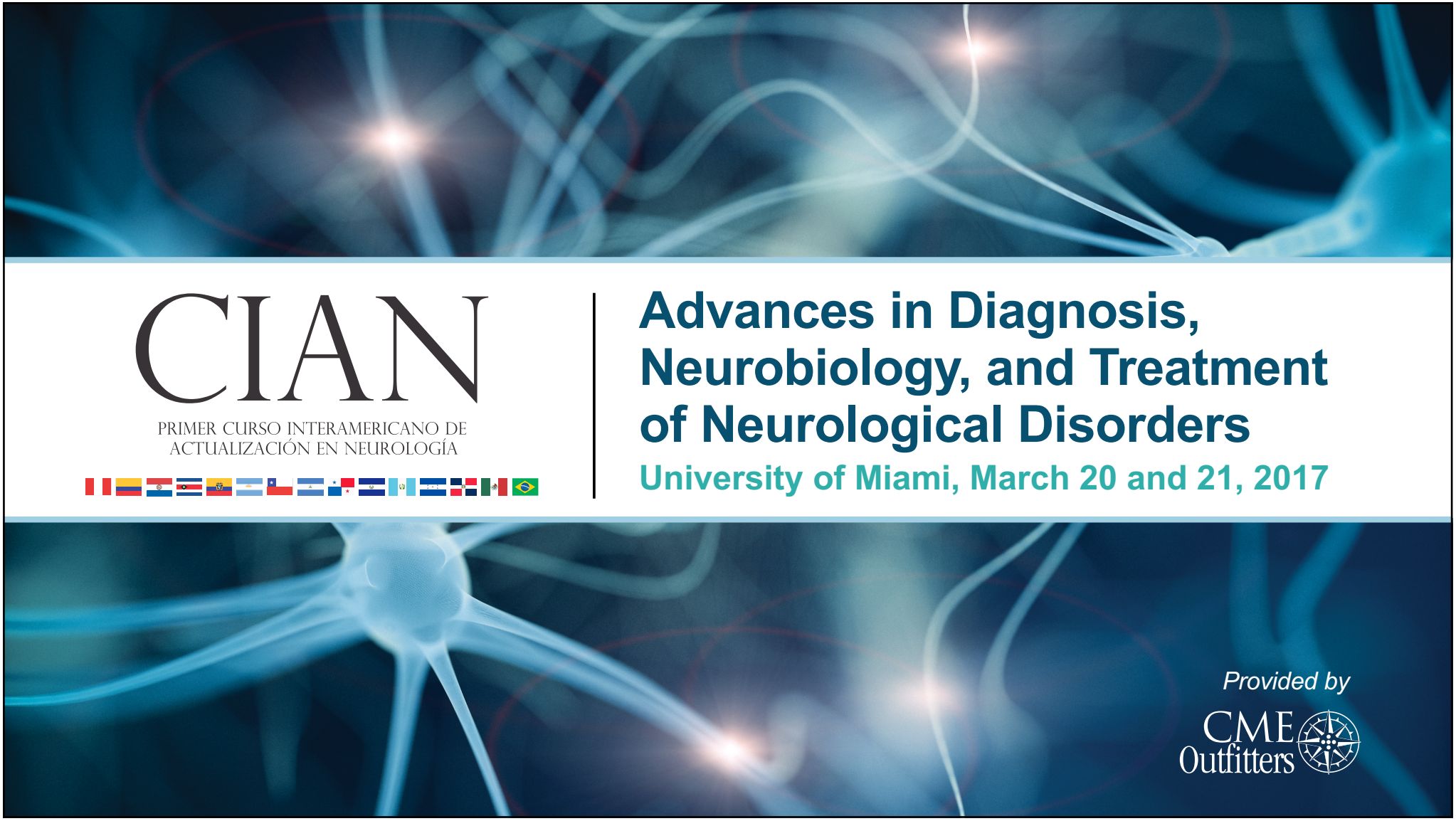

CIAN

PRIMER CURSO INTERAMERICANO DE ACTUALIZACIÓN EN NEUROLOGÍA

Advances in Diagnosis, Neurobiology, and Treatment of Neurological Disorders

University of Miami, March 20 and 21, 2017

Provided by

CME Outfitters

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Disclosures

- Dr. Delgado-Escueta has no disclosures to report.

Refractory Epilepsy

Learning Objective 1

Examine key clinical concepts in the assessment of refractory epilepsy.

ILAE Definition of "Refractory," 2010

- "Failure to achieve sustained seizure freedom with adequate trial of at least two appropriately chosen anti-epileptic drugs (AEDs) as monotherapy or in combination."
- AED side effects causing discontinuation doesn't count
- Efficacy counts for two AEDs
- Seizure freedom: means NO aura, no TC, no focal without LOC
- For at least 1 year or 3x the previous longest seizure free period.

ILAE = International League Against Epilepsy

Kwan P, et al. *Epilepsia*. 2010. 51:1069-1077.; Leach LP, et al. *Seizure*. 2005;14:514-520.
Hao X, et al. *Epilepsy Behavior*. 2013;29:4-6.

Approach To Patient with Refractory Seizures

1. Verify that seizures are epileptic in nature: r/o PNES
2. Define seizure type and epilepsy syndrome; 72 hrs EEG, smartphone videos of seizures, MRI epilepsy protocol and 2FDG PET scan and neuropsychological evaluation including MMPi
3. Prove the likely cause of epileptic seizures and stop trigger factors
4. Establish an early treatment plan with appropriate antiepileptic drugs. Monitor seizure control and adverse effects on quality of life
5. Evaluate for possible surgery if seizures are resistant to 2 antiepileptic drugs
6. Discuss with family: complication, expected pathology, results of surgery

Part 1.

Is the patient really drug resistant?

- Is it really epilepsy?
- Does diagnosis match AED used? Misdiagnosis: 5-30%
- Common Errors
- Drug dosing and timing
- Drug Interactions
- Predictors of drug resistance
- Consider dietary therapies earlier
- Diet, sleep and other lifestyle changes

Psychogenic Non-Epileptic Seizures (PNES)

- Incidence in Women
  - In Iceland: 1.4/100,000 >15 yrs old; 78%
  - In Hamilton, OH: 3.03/100,000; 73
- Risk factors in Men
  - Work-related stressors
  - Low socioeconomic status
  - Increased psychosocial stressors
  - Depression and anxiety
  - Personality disorders (borderline)

Asadi-Pooya AA, et al. *Epilepsy Behav*. 2015;46:60-65.

PNES: Characteristics

- Prolactin
  - Measure within 30 minutes of a seizure
    - Highly specific (95% - 96%)
    - Not sensitive (46% - 60%)
    - 300% increase from baseline:
      - ↑25 – 32 ng/ml for females;
      - >23 ng/ml for males
- Heart Rate
  - Accelerates in epileptic seizures (ES) but not PNES
- Respiration
  - Shallow and rapid with PNES; deep and heavy in ES

Ben-Menachem E. *Epilepsy Curr*. 2006;6:78-79; Wyllie E. Wyllie's Treatment of Epilepsy: Principles and Practice. 2015.

Clinical Characteristics of PNES and True Epileptic Seizures

PNES		True Epileptic Seizures
59.2%	In sleep	47%
44%	Urinary Incontinence	67%
59%	Prodome Sensory Aura Presentation	95% in TLE, <30% in FLE
55%	Postictal Confusion	✓
✓ (52% - 96%)	Forced Eye Closure	
✓ (9% - 96%)	Asynchronous Movements	
✓ (15% - 36%)	Side-to-Side Head Movements	
✓ (7% - 44%)	Pelvic Thrusts	
✓	Preserved Awareness	

Wyllie E. Wyllie's Treatment of Epilepsy: Principles and Practice. 2015.

PNES: Symptoms of Underlying Stressors

- Minnesota Multiphasic Personality Inventory (MMPI) is important
- Separate:
  - Conversion reaction (somatoform)
  - Dissociative disorder (trance-like state)
  - Malingering
- Treatment
  - Cognitive behavioral therapies
    - **25% to 65% seizure freedom**
    - **>50% reduction in seizures in 70% to 80%**
  - Pharmacotherapy
    - Sertraline
      - **45% reduction of seizures**
    - Venlafaxine
      - Plus unipolar depression
      - Psychotherapy + SSRI arms

LaFrance WC, et al. *JAMA Psychiatry*. 2014;71:997-1005; LaFrance WC, et al. *Neurology*. 2010;75:1166-1173.

Definición de “refractaria” por la ILAE, 2010

- “Fallo en lograr control un sostenido de crisis mediante un manejo adecuado con al menos dos AE escogidos apropiadamente usados en monoterapia o en combinación”.
- La descontinuación de un AE por efectos secundarios no cuenta
- La eficacia cuenta para dos AE
- Libertad de crisis: significa NO aura, NO crisis TC, NO crisis focales sin pérdida de conciencia
- Por al menos 1 año o por 3 veces el período más largo que ha habido sin crisis

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Kwan P, et al. *Epilepsia*. 2010. 51:1069-1077.; Leach LP, et al. *Seizure*. 2005;14:514-520.; Hao X, et al. *Epilepsy Behavior.* 2013;29:4-6.

Predictors of Drug Resistance

- Age at onset
  - <1 year (Neonatal seizures)
  - >12 years
- Focal seizures
- Multiple seizure types
- High Frequency at onset/start
- Hippocampal atrophy <10% remit
- Cortical dysplasia <25% remit
- Dual pathology
- Abnormal EEG
- Failing 2 or more AEDs

Brodie MJ, et al. *Epilepsia*. 2013;54:194-198.

Wiebe S, et al. *Nat Rev Neurol*. 2012;8:669-677.

Not Refractory ➔ Pseudo Resistance if Misdiagnosis in 5-30%

Examples

- Genetic generalized epilepsies (GGE) can have
  - Focal spikes or sharp waves EEG
  - Focal features in semiology, e.g., head turning to one side
- Wrong AED
- Incorrect or suboptimal: Hence “pseudo-refractory”
  - In Newly diagnosed: **56%**
  - In Chronic epilepsies: **41%**
- Pseudo-resistance are drug responsive to correct AEDs

30-45%

71%

78%

Wiebe S, et al. *Nat Rev Neurol*. 2012;8:669-677.; Leach LP, et al. *Seizure*. 2005;14:514-520.; Hao X, et al. *Epilepsy Behavior.* 2013;29:4-6.

Examples of Misdiagnosis

- Focal motor  Myoclonic
- Focal SMA  Tonic
- Focal dyscognitive or Focal with LOC  Atypical Absence

SMA = supplementary motor area

Montalenti E, et al. *J Neurol Sci*. 2001;184:65-70.
Hao X, et al. *Epilepsy Behavior.* 2013;29:4-6.

No refractaria ➔ Pseudo resistencia si hay diagnóstico equivocado en 5 to 30%

EJEMPLOS

- Epilepsias Genéticas Generalizadas (EGG) pueden tener en
  - Puntas focales o bien ondas agudas en EEG
  - Manifestaciones focales en semiología, por ej.: versión de la cabeza a un lado
- Antiepiléptico equivocado
- AE incorrecto o subóptimo: por tanto, “epilepsia pseudo-refractaria”
  - En diagnosticados nuevos **56%**
  - En epilepsias crónicas **41%**
- Pseudo-resistentes: responden bien al AE correcto

30-45%

71%

78%

Wiebe S, et al. *Nat Rev Neurol*. 2012;8:669-677.
Leach LP, et al. *Seizure*. 2005;14:514-520.
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Making the Right AED Work

- Common Errors
- Sodium channel blockers and GABAergic drugs aggravate genetic generalized epilepsies
- Carbamazepine[1] for absence seizures
- Ethosuximide[2] for focal seizures with loss of consciousness (LOC) (previously called complex partial seizures)
- Phenytoin[3] for epileptic spasms
- Vigabatrin[4] for myoclonic seizures

[1]Carbamazepine is not FDA-approved for absence seizures.; [2]Ethosuxomide is not FDA-approved for focal seizures.; [3]Phenytoin is not FDA-approved for epileptic spasms.; [4]Vigabatrin is not FDA-approved for myoclonic seizures.

Leach JP, et al. *Seizure*. 2005;14:514-520.

Making the Right AED Work

50% lower than DDD

- Low dose because of side effects
  - 60% seizure-free with further AED trials

Use of 50% to 75% of DDD

- **Seizures persist**
  - **TRUE RESISTANCE**

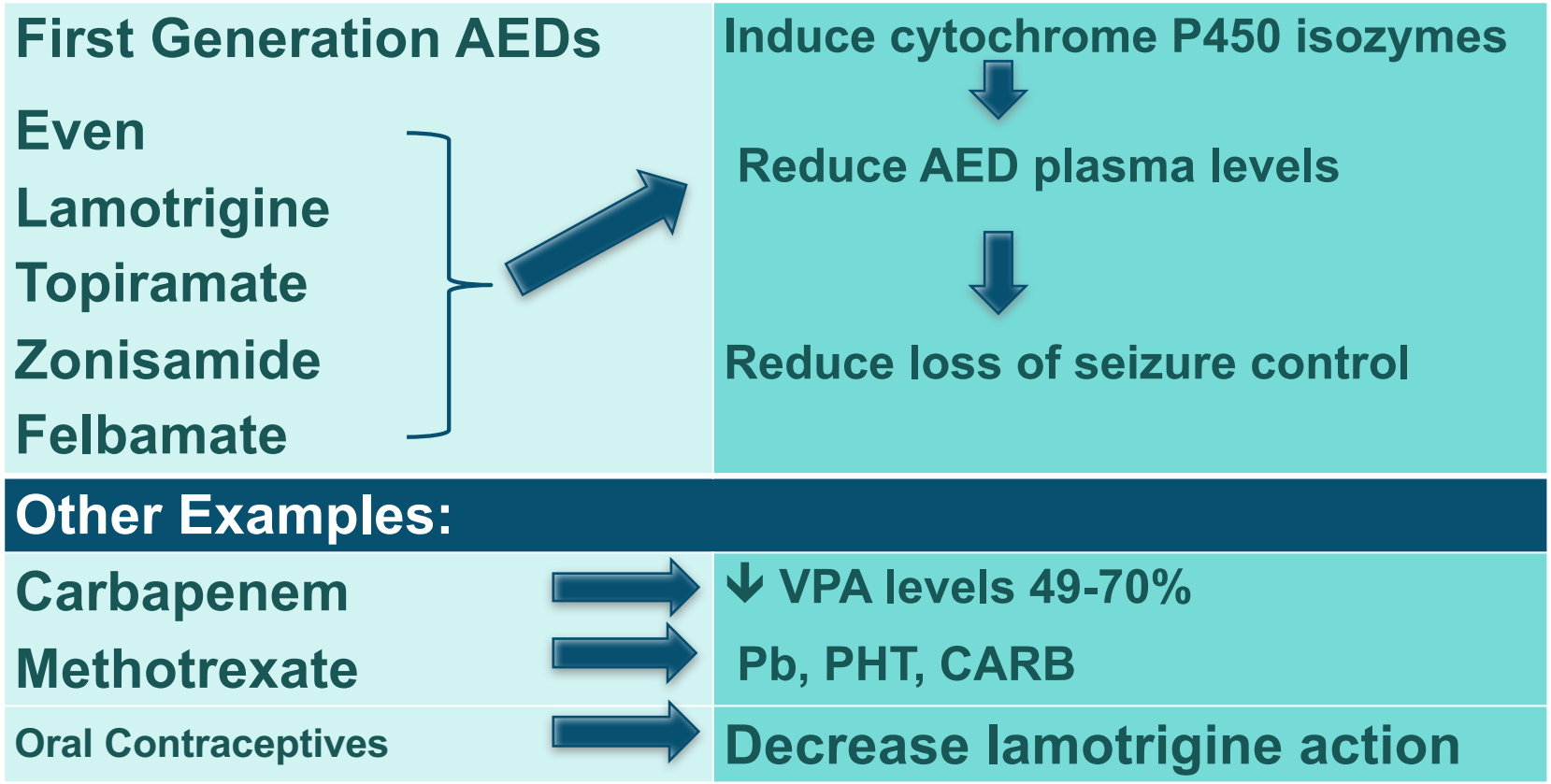
Use of higher dose >75% of DDD

- Refer for surgical evaluation

DDD, World Health Organization defined daily dose

Wiebe S, et al. *Nat Rev Neurol*. 2012;8(12):669-677.

Making the Right AED Work – Drug Interactions



Patsalos PN, et al. *Lancet Neurol*. 2003;2:473-481; Patsalos PN, et al. *Lancet Neurol*. 2003;6:347-356.

Uso apropiado de los antiepilépticos - Interacciones

Antiepilépticos de primera generación **Lamotrigina** **Topiramate** **Zonisamida** **Felbamato**	**Induce isoenzimas del citocromo P450** ↓ **Reduce niveles séricos de AE** ↓ **Reduce o pierde el control de crisis**
Other Examples:	
Carbapenem	**↓ niveles de AVP en 49-70%**
Methotrexate	**Pb, PHT, Carb**
Oral Contraceptives	**Disminuye acción de lamotrigina**

Patsalos PN, et al. *Lancet Neurol*. 2003;2:473-481; Patsalos PN, et al. *Lancet Neurol*. 2003;6:347-356.

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Changing Landscape
EMU and Epilepsy Surgery

- Actual literature does not reflect contemporary surgical practice and results
- Know who are highly experienced epilepsy specialists and epilepsy surgeons in well established centers
- Patient selection criteria and operative approaches – intraoperative/extraoperative mapping, Functional BOLD MRI – have changed our approaches for the better
- Bottom Line: Experienced clinical specialist and epilepsy surgeon e.g. “things happen”

EMU y Cirugía de Epilepsia

- La literatura actual no refleja las prácticas quirúrgicas contemporáneas
- Especialistas en epilepsia y cirujanos de epilepsia altamente experimentados en centros establecidos
- Criterios de selección de pacientes y enfoques operatorios
- Mapeo intraoperatorio y extraoperatorio, BOLD MRI funcional -- han cambiado nuestro enfoque para mejor

Part 2.

- Routine EEG vs 72 hour ambulatory EEG
- Smart phone video to validate patient description

Imaging Targets

- Hippocampal Sclerosis (HS)
- Cortical Dysplasias
- MRI negative Cortical Dysplasias

Epilepsy Monitoring Unit

- IV portal, EKG monitoring, Continuous pulse oximetry
- Interictal
- Ictal semiology/EEG (video EEG)
- SPECT during ictus
- Are intracranial electrodes needed? If yes, stereo EEG, IC strip/grids

Neurologist: Discuss results

Order functional MRI for language and recent memory mapping
Neuropsychological psychometrics; Need MEG? MagnetoEEG? Need Wada?

Changing Landscape
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Answer

- Temporal lobe: amygdalo-hippocampal is engaged during oroalimentary automatisms
- EEG - did not show focal onset until she started masticating when 5 Hz sharp waves appeared at T3 F7 SP1 with phase reversal at T3 & SP1.

First 10 Seconds of Extra-Temporal: Focal with Loss of Awareness

- Motor automatisms of both upper and lower extremities described as frenetic, bizarre, bimanual, bipedal bicycling movements.
- Almost always mean engagement of frontal lobe.

Delgado-Escueta AV, et al. *Neurology.* 1977;27:144-155; Delgado-Escueta AV, et al. A*nnals of Neurology.* 1982;11: 292-300; Walsh GO, et al. *Neurology.* 1984;34(1):1-13; Delgado-Escueta AV, et al. *Neurology.*1985;35(2):143-154; Maldonado H, et al. *Epilepsia*.1988;29(4):420-433; Swartz BE, et al. *Epilepsy Research*.1990;5:61-73.

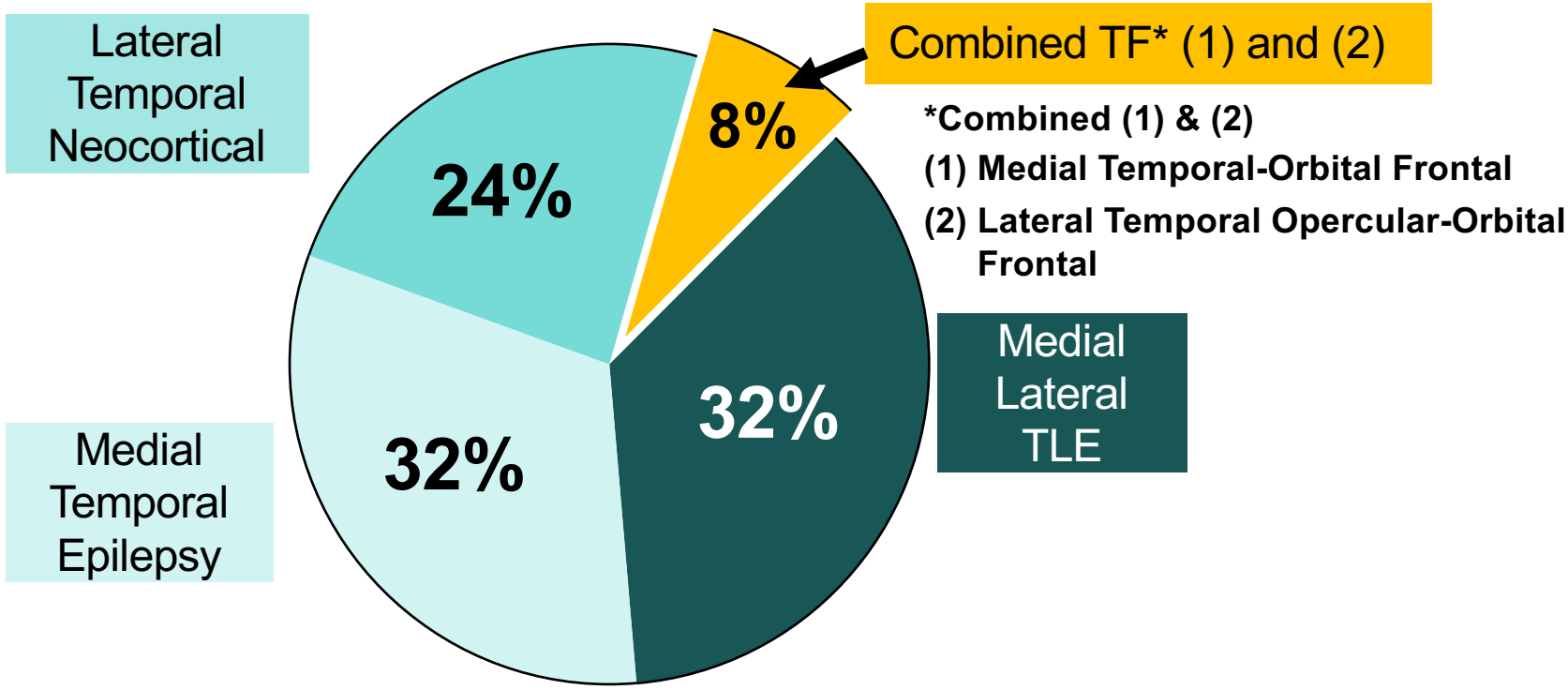
Reconstructing Focal with Loss of Awareness (Psychomotor Seizures)

Of all temporal lobe epileptic seizures, slightly over half (60%) will start with arrest, motionless staring, mastication, lip-smacking.

Delgado-Escueta AV, et al. *Neurology.* 1977;27:144-155; Delgado-Escueta AV, et al. A*nnals of Neurology.* 1982;11:292-300; Walsh GO, et al. *Neurology.* 1984;34(1):1-13; Delgado-Escueta AV, et al. *Neurology.*1985;35(2):143-154; Maldonado H, et al. *Epilepsia*.1988;29(4):420-433; Swartz BE, et al. *Epilepsy Research*.1990;5:61-73.

First 10 Seconds of CPS

Arrest, motionless staring, mastication, and lip-smacking almost always signify Temporal Lobe Epilepsy



Delgado-Escueta AV, et al. *Epilepsy Behav*. 2002;3(6):550-556.

53 seconds after onset of TLE: CPS

Contralateral dystonic posturing of an arm was first noted by Kotagal et al., 1989, in 15% of temporal lobe complex partial seizures, **53 seconds after onset.**

Kotagal P, et al. *Neurology*. 1989;39:196-201.

Auras

Parietal Lobe Origin	
Parietal opercular and temporal-insular cortex	Gustatory auras
Postcentral cortex	Somatosensory auras
Temporal Lobe Origin	
Cortex of transverse superior temporal gyrus (Heschl's gyrus)	Simple auditory hallucinations Psychical seizures
Cortex of superior temporal gyrus	Psychical seizures and Complex auditory hallucinations
Cortex of temporoparietal-occipital junctions	Complex auditory and visual hallucinations
Combined	
Temporal neocortex and medial temporolimbic structures	Dreamy state: experiential hallucinations, dysmnestic phenomena, illusions of comparison

Wyllie E. Wyllie's Treatment of Epilepsy: Principles and Practice. 2015.

Focal with Loss of Awareness (ILAE, 2017)

Temporal

3 consecutive phases:

1. Motionless stare
2. Oroalimentary automatisms
3. Reactive quasi-purposeful movements

Extratemporal

No motionless stare and/or oroalimentary automatisms at onset.

Motor Signs:

1. Suprasylvian signs such as contraversive head/eye movements, postures, or partial motor jerks
2. Early complex bimanual/bipedia automatisms, pelvic thrusts, sexual gestures
3. Ambulatory Automatisms / Running, Walking

Delgado-Escueta AV, et al. A*nnals of Neurology.* 1982*;*11:292-300; Walsh GO, et al. *Neurology.* 1984;34(1):1-13; Delgado-Escueta AV, et al. *Neurology.*1985;35(2):143-154.

Epilepsy Surgery Change in Landscape, 2017

Focal		Multi-Focal
RESECTION / ABLATION		STIMULATION / MODULATION
TLE Tailored **vs.** Classic ATL **vs.** Thermal laser ablation **vs.** Ultrasound laser ablation	Extra-TLE Corticectomy Lobectomy Hemispherotomy Hemispherectomy Corpus Callosotomy Multiple Subpial Transection	Vagal Nerve Stimulation (VNS) Trigeminal Nerve Stimulation (TNS) Ant. Thalamus Stimulation Responsive Neurostimulation (RNS)

Part 3.

- Follow-up by Neurologist

Brain Stimulation/ Neuromodulation

- VNS
- Anterior Nucleus Thalamus
- Responsive Neurostimulation (RNS)
- Thermal or ultrasound laser ablation

Surgery Results

- Tailored Resection vs ATL in TLE vs HS
- TLE + Cortical Dysplasia
- Hemispherectomy / Hemperectomy
- Corpus Callosotomy / Multiple Subpial transection

Return to Neurologist for follow-up care

Epilepsy Surgery Change in Landscape, 2017

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Temporal Lobe Epilepsy

- 40-50% adult epilepsies
- 25-30% childhood epilepsies
- History of febrile seizures
- Usually symptomatic with structural lesion (rarely genetic)

Tellez-Zenteno JF, et al. *Epilepsy Res Treat*. 2012:630853.

Fontana E, et al. 2006. *Epilepsia*. 2006;47:26-30.

Temporal Lobe Epilepsy (TLE)

- Mesial Amygdala-Hippocampectomy TLE
  - Temporal basal limbic (Weiser)
- Anterior Temporal Polar
- Combined Mesial-Orbitofrontal
- Temporal Opercular
  - Heschl gyrus epilepsy
- Temporal Plus
  - 27% of suspected TLE
  - Inferior frontal cortex; suprasylvian opercular; temporo-parieto-occipital (TPO) junction

Tellez-Zenteno JF, et al. *Epilepsy Res Treat*. 2012:630853.

Brain Imaging and Outcome after Anterior Temporal Lobectomy (ATL) Surgery

- Unilateral hippocampal sclerosis
  - 78% seizure free at 2 years
  - 54% seizure free at 10 years
- MRI Normal
  - 18% seizure free at 10 years
  - 41-48% seizure free at 8 years
- Bilateral MRI lesions
  - 58% seizure free at 2 years

Fong JS, et al. *Epilepsia*. 2011;52:1393-1401.

LoPinto-Khoury C, et al. *Epilepsia*. 2012;53:342-348

Surgery Outcome: TLE with Hippocampal Sclerosis – Best Outcome

- Seizure free between 60% to 80%;
- 84% with Temporal Lobectomy + Ahippocampectomy risks:
  - Infection
  - Hemorrhage
  - Deep venous thrombosis
  - Anesthesia complications
  - Visual field defects
  - Language/naming
  - CN paresis
  - Paresis/plegia

Vadera S, et al. *J Neurosurg Pediatr.* 2012;10:103-107.

Complications of Temporal Lobe Epilepsy Surgery

Mortality (hemorrhage, infarct, PE, SUDEP)	<1%
Persistent Dysphasia	1-3%
Severe Visual Field Defects	2-4%
Hemiparesis (transient or permanent)	2-4%
Transient Anomia (language dominant resection)	20%
Minimal Visual Field Defects	>50%

Pilcher WH, Ojemann GA. Presurgical Evaluation of Epilepsy Surgery. 1993.

Follow-up after Surgery for Refractory TLE +/- HS: Seizure Free Classification

Engel 1	1 yr	2 yrs	5 yrs	5-10 yrs	Average
Wieser et al. 1975-1999 368 cases (mean 7.2 yrs) SAH : Engel1	71%	70%	65%	62%	66.95%
McIntosh et al 1978-1998 325 cases (mean 9.6 yrs) ATL : Engel1	68%	62%	54%	47%	
Spencer et al 1996-2001 339 cases Modified ATL : Engel1		46%	69%		

Wyllie E. Wyllie's Treatment of Epilepsy: Principles and Practice. 2015.

Surgical Rates in Epilepsy

- Surgical success rates for temporal lobe epilepsy at the California Comprehensive Epilepsy Program, UCLA & VA Med Centers

Status	Lateral (%)	Medial (%)	Mediolateral (%)	Total (%)
No seizures	**4**	→ **70**	**43**	**48**
Rare auras	**14**	**10**	**7**	**11**
Rare CPS	**23**	**10**	**21**	**20**
90-95% reduction	**5**	**10**	**0**	**4**
50% reduction	**18**	**0**	**14**	**14**

Delgado-Escueta AV. Personal experience: 1987-1995.

Surgery Outcome: TLE with Focal Cortical Dysplasia

Cortical Dysplasia		Seizure Free
Type I	Dyslamination on Histology MRI ↓ volume white matter ↑ signal FLAIR and T2	43%
Type II	Dyslamination and dysmorphology of neurons including:	75%
Type IIA	↓ FLAIR at GM-WM junction	
Type IIB	Balloon cells (tumor like, ↑ dense FLAIR MRI ↑ thickness, sulcal depth ↑ FLAIR across cerebral cortex and subcortical ↑ T1 weighted only in subcortical ↑ T1 weighted and FLAIR at GM-WM junction	88%
Type III	Plus other lesions HS Tumor vascular malformations	

Hong SJ, et al. *Neurology*. 2017;88:734-742.

Resultado quirúrgico: epilepsia del lóbulo temporal con displasia cortical focal

Displasia cortical		Libre de crisis
Tipo I	Dislaminación en histología IRM ↓ volumen de sustancia blanca ↑ señal FLAIR y T2	43%
Tipo II	Dislaminación y dismorfología de neuronas incluyendo:	75%
Tipo IIA	**↓ FLAIR en unión sustancia gris-blanca**	
Tipo IIB	Células en balón (simulando tumor	
	↑ densidad y grosor en MRI FLAIR, profundidad de surcos	
	↑ FLAIR en corteza cerebral y región subcortical	
	↑ T1 pesado solo en subcortical subcortical	
	↑ T1 FLAIR en unión sustancia gris-blanca	88%
Tipo III	Más otras lesiones, esclerosis hipocampal Malformaciones tumorales vasculares	

Hong SJ, et al. *Neurology*. 2017;88:734-742.

Epilepsy Surgery Change in Landscape, 2017

Focal

RESECTION / ABLATION

TLE

Tailored
vs Classic ATL
vs Thermal laser ablation
vs Ultrasound laser ablation

Extra-TLE

Corticectomy
Lobectomy
Hemispherotomy
Hemispherectomy
Corpus Callosotomy
Multiple Subpial Transection

Multi-Focal

STIMULATION / MODULATION

Vagal Nerve Stimulation (VNS)
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Ant. Thalamus Stimulation
Responsive Neurostimulation (RNS)

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1. Verify that seizures are epileptic in nature: r/o PNES
2. Define seizure type and epilepsy syndrome; 72 hrs EEG, smartphone videos of seizures, MRI epilepsy protocol and 2FDG PET scan and neuropsychological evaluation including MMPi
3. Prove the likely cause of epileptic seizures and stop trigger factors
4. Establish an early treatment plan with appropriate antiepileptic drugs. Monitor seizure control and adverse effects on quality of life
5. Evaluate for possible surgery if seizures are resistant to 2 antiepileptic drugs
6. Discuss with family: complication, expected pathology, results of surgery

Discussion

Answer

- Description
  - While sitting/reading, she pressed the call button and closed her eyes. She took deep breaths for a few seconds then started masticating, swallowing, smacking her lips - not responding to questions. She put the magazine away, placed her left hand behind her head while masticating/swallowing/lip-smacking. She was unable to name a pencil. She looked at the nurse but did not speak.
- Focal seizures with loss of consciousness (LOC) with initial oroalimentary automatisms and gradual recomposure

Brief Clinical History

24-year-old R-handed Female

- 6 months of age:
  - She was lying on a bed which fell from a balcony 10 stairs high. The bed fell apart on impact and she hit the left side of her head on the marble floor. She was not stiff but her eyes rolled up and she was unresponsive.
  - She regained consciousness within 30 minutes.
  - Several hours later, she had repeated episodes of eye blinking with the eyes rolling upwards which stopped in the hospital.
- No seizure recurrence until 11 years of age.

Brief Clinical History

24-year-old R-handed Female

- 11-24 years of age, she had > 500 seizures:
  - Warnings: stomach pain +/- discomfort in breast/chest
    - No nausea or vomiting. Occasional pain in left hand.
  - Seizure: Her eyes look different. She is pale/yellow. The hair on her arms stand. She salivates excessively and loses speech. Her eyes roll up and blink repeatedly. She masticated and smacked her lips - like eating.
  - She starts to speak in Farsi/English, but with no sense. Many times she has difficulty speaking on recovery.
  - She may have had 2 GTC without incontinence.

Examination

- General examination - unremarkable
- Neurologic examination - unremarkable except
  - Recent memory - 4/7 pictures, 2/5 words
  - Concrete interpretation of proverbs, similarities and differences

Based on the Aura, Name Possible Sites of Seizure Engagement

- Warnings: stomach pain +/- discomfort in breast/chest
  - No nausea or vomiting
  - Occasional pain in left hand
  - The hair on her arms stand

Answer

- Medial or amygdalo-hippocampal or temporal-opercular or orbitofrontal or mesial frontal
  - Aura of epigastric discomfort
  - Pallor, deep breathing, piloerection

Classification of Temporal Lobe Epilepsy

1. **Medial TLE (temporal lobe epilepsy)**
   a) Hippocampal-Parahippocampal epilepsy
   b) Amygdalar epilepsy
   c) Hippocampal Parahippocampal-Amygdalar epilepsy
2. **Lateral TLE**
   a) Superotemporal neocortical epilepsy
   b) Inferotemporal neocortical epilepsy

Classification of Temporal Lobe Epilepsy

3. **Combined medial and lateral TLE**
4. **Syndromes of Combined Temporal and Extra TLE**
   a) Perisylvian TLE
      - Anterior perysilvian or temporofrontal opercular epilepsy
      - Posterior perysilvian or temporo-central-parietal opercular epilepsy

   b) Combined temporal opercular and posterior orbital frontal epilepsy
   c) Combined mesial temporal and posterior orbital frontal epilepsy

Seizure Location and Clinical Symptoms

	Aura	Ictus
Hippocampal-Parahippocampal	Olfactory or gustatory sensations; Epigastric or abdominal symptoms	Confusion, Apnea, Masticatory/ Gesticulatory/ Verbal automatisms
Amygdalar	Viscerovegetative symptoms ie. changes in respiration/ heart rate, pupillodilation	Early masticatory automatisms
Lateral Superotemporal neocortical	Vestibular/Auditory hallucinations	Initial staring and arrest of motion followed by verbalization, vocalization, swallowing, orobuccal dyskinetic movements, hypersalivation, coughing and hiccups during confusion & amnesia
Lateral Inferotemporal neocortical	Prosopagnosia or no aura	Arrest of motion, verbalization, vocalization, hypersalivation and orobuccal dyskinesias

Description

- **First seizure**
  - She stopped reading, she quickly rolled her eyeballs upwards, blinked three times, moved her head upwards and slightly, blinked two more times as she stared for 8 seconds unresponsive.
- What is the seizure type?

Description

- **Second seizure:**
  - She stopped hyperventilating and stared as she blinked once, paused, eyeballs rolled quickly upwards as she blinked three times and continued staring unresponsive for 13 sec.
- What is the seizure type?

Answer

- ABSENCE with 3 per second spike and wave complexes, typical for pyknoleptic (2 to 200 attacks per day) Childhood Absence Epilepsy (CAE).

Questions & Answers

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