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EEG patterns in status epilepticus

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Salzburg Consensus Criteria for diagnosis
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Classification of **status epilepticus** .

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SPECIAL REPORT

A definition and classification of status epilepticus – Report of the ILAE Task Force on Classification of Status Epilepticus

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Epilepsia, 56(10):1515–1523, 2015
doi: 10.1111/epi.13121

Epilepsia, 56(10):1515–1523, 2015

American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology: 2021 Version

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INTERICTAL EPILEPTIFORM DISCHARGES

Interictal epileptiform discharges aid in the diagnosis of epilepsy and are sometimes the only abnormal finding encountered on routine EEG.

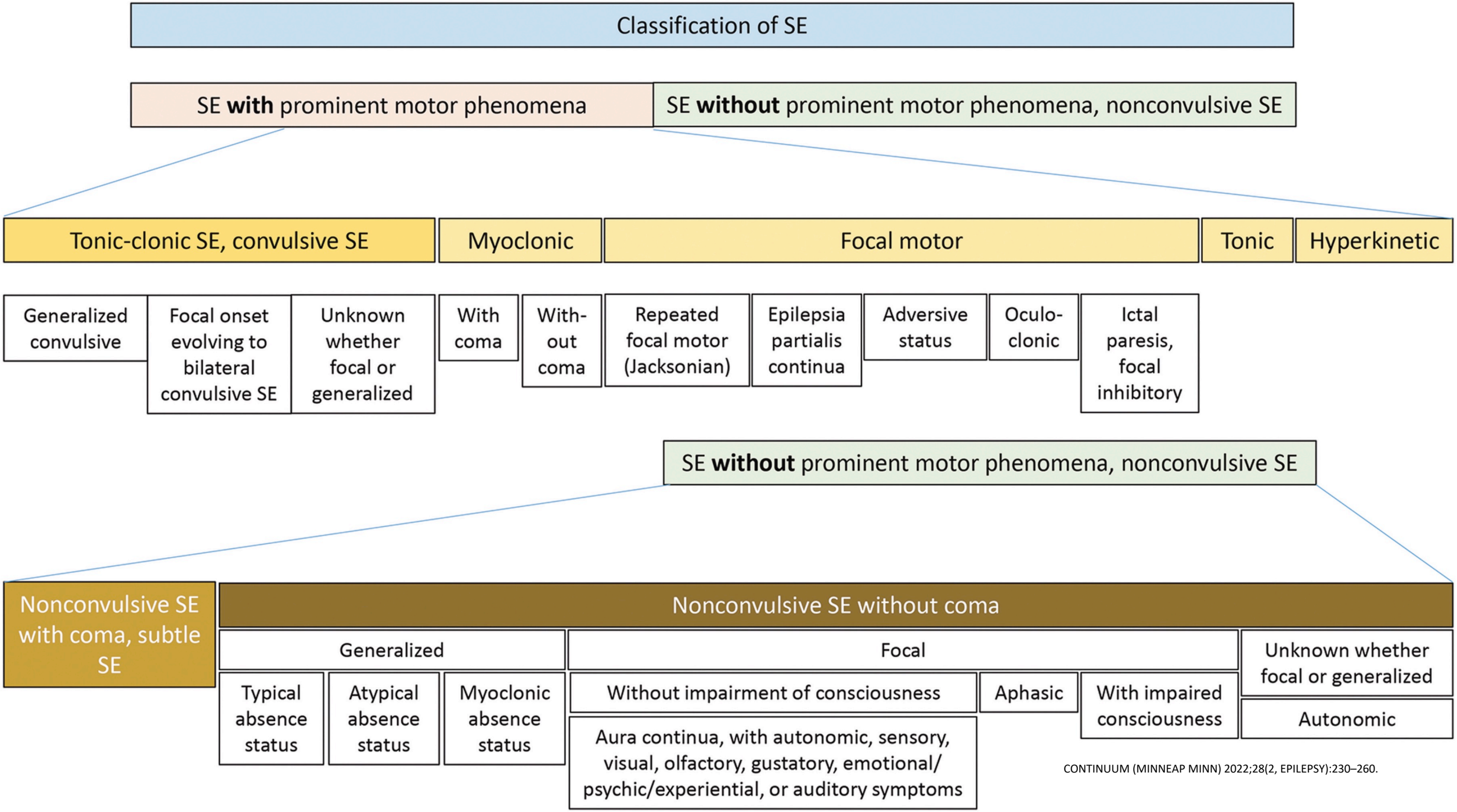
ICTAL DISCHARGES

An epileptic seizure is defined as “a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain.”
According to their clinical and electrographic onsets, seizures are classified as focal, generalized, or unknown

ICTAL PATTERNS

observed EEG changes during seizures. The ictal discharges during seizures do not always consist of repetitive spikes or sharp waves; instead, ictal discharges vary in morphology (eg, sharply contoured or not), frequency, and distribution. Frequently, ictal discharges show evolution patterns with changes in **frequency, amplitude**, **field, or morphology** during the course of the seizure

Neurology continuum Epilepsy April 2019, Vol.25, No.2



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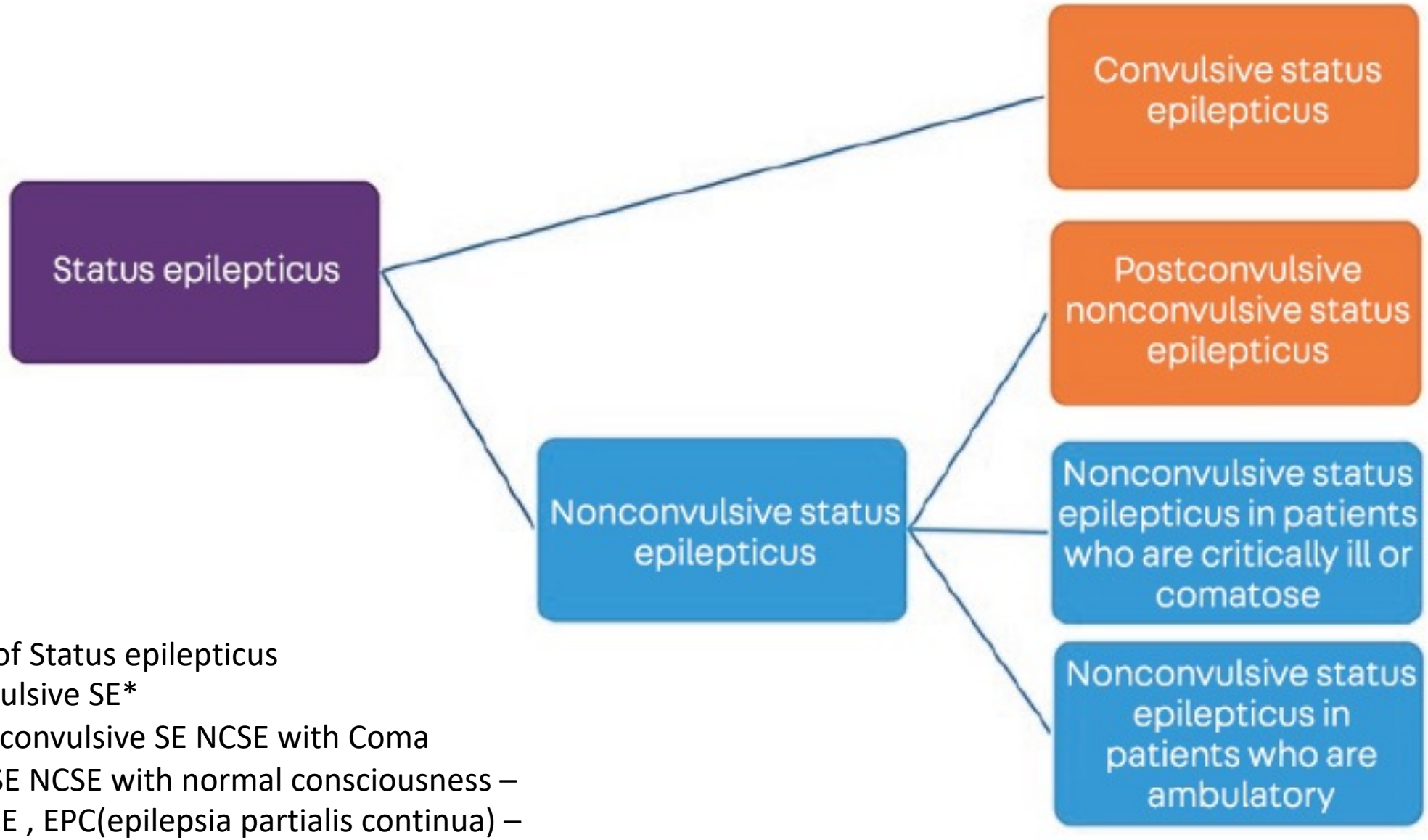

Types of Status epilepticus

- Convulsive SE*
- Non-convulsive SE NCSE with Coma

suble SE NCSE with normal consciousness –
Focal SE , EPC(epilepsia partialis continua) –
Focal SE with dyscognitive feature –
Generalized : Absence Seizure

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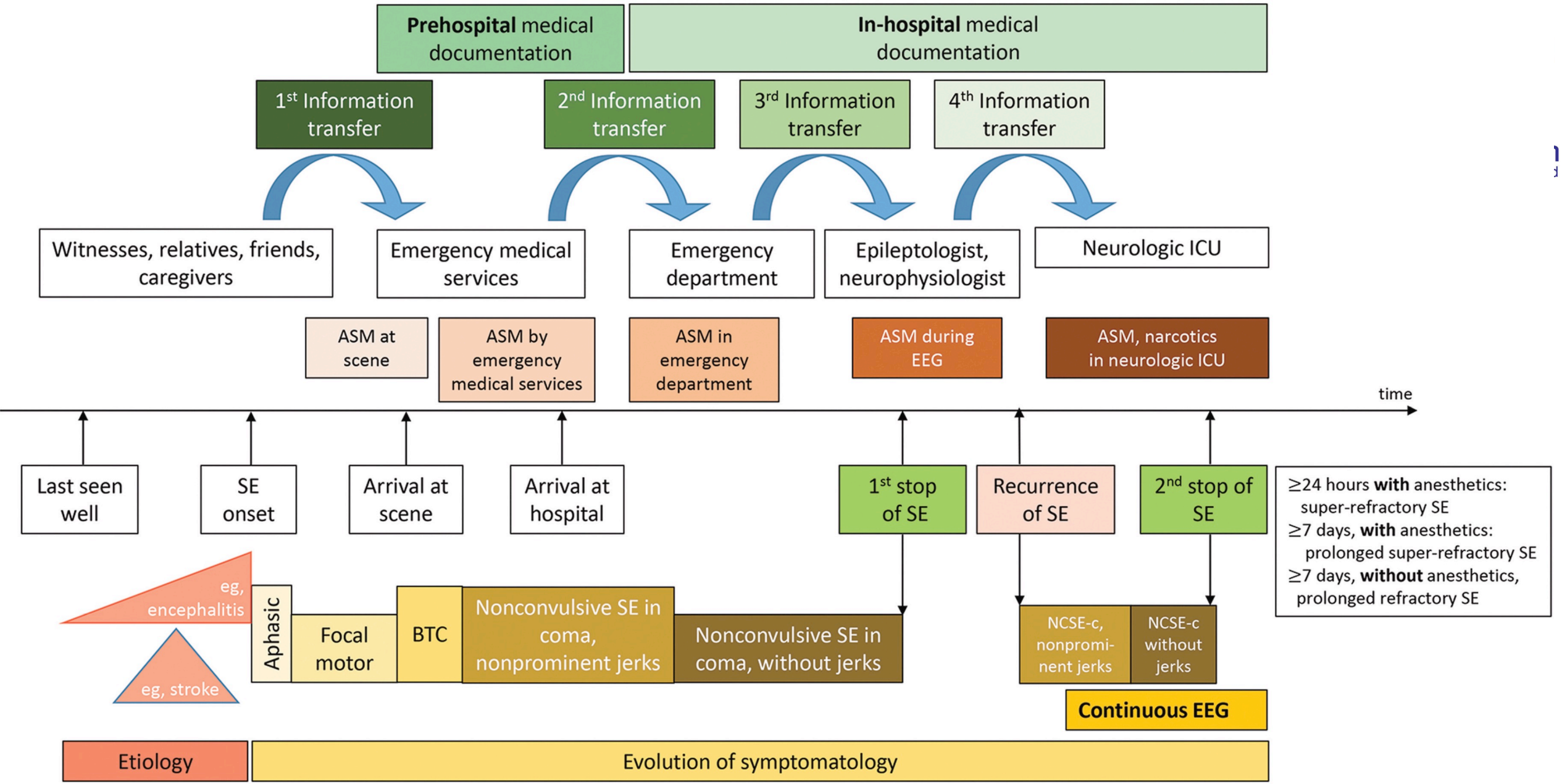
Table 1. Operational dimensions with t_1 indicating the time that emergency treatment of SE should be started and t_2 indicating the time at which long-term consequences may be expected

Type of SE	Operational dimension 1 Time (t_1), when a seizure is likely to be prolonged leading to continuous seizure activity	Operational dimension 2 Time (t_2), when a seizure may cause long term consequences (including neuronal injury, neuronal death, alteration of neuronal networks and functional deficits)
Tonic–clonic SE	5 min	30 min
Focal SE with impaired consciousness	10 min	>60 min
Absence status epilepticus	10–15 min[a]	Unknown

[a]Evidence for the time frame is currently limited and future data may lead to modifications.

Epilepsia, 56(10):1515-23,2015



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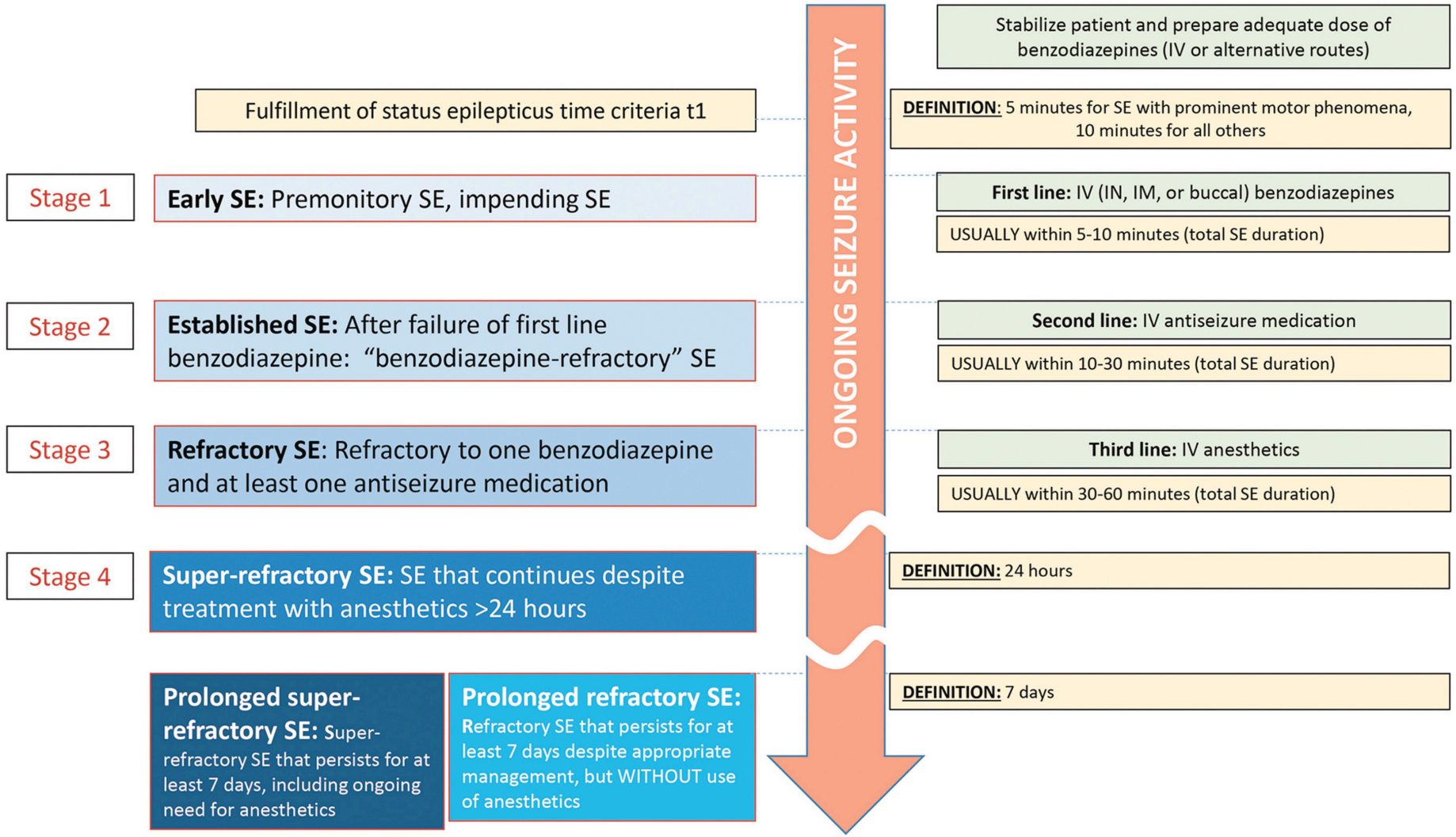

The clinical course of convulsive status epilepticus and its therapeutic implications.

Trinka E, et al, Drugs 2015. CONTINUUM (MINNEAP MINN) 2022;28(2, EPILEPSY):559–602.

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Table 5. SE in selected electroclinical syndromes according to age

SE occurring in neonatal and infantile-onset epilepsy syndromes
Tonic status (e.g., in Ohtahara syndrome or West syndrome)
Myoclonic status in Dravet syndrome
Focal status
Febrile SE
SE occurring mainly in childhood and adolescence
Autonomic SE in early-onset benign childhood occipital epilepsy (Panayiotopoulos syndrome)
NCSE in specific childhood epilepsy syndromes and etiologies (e.g., Ring chromosome 20 and other karyotype abnormalities, Angelman syndrome, epilepsy with myoclonic-atonic seizures, other childhood myoclonic encephalopathies; see Appendices 1–3)
Tonic status in Lennox-Gastaut syndrome
Myoclonic status in progressive myoclonus epilepsies
Electrical status epilepticus in slow wave sleep (ESES)
Aphasic status in Landau-Kleffner syndrome
SE occurring mainly in adolescence and adulthood
Myoclonic status in juvenile myoclonic epilepsy
Absence status in juvenile absence epilepsy
Myoclonic status in Down syndrome
SE occurring mainly in the elderly
Myoclonic status in Alzheimer's disease
Nonconvulsive status epilepticus in Creutzfeldt-Jakob disease
De novo (or relapsing) absence status of later life

These forms of SE may be encountered prevalently in some age groups, but not exclusively.

Table 4. Etiology of status epilepticus

Known (i.e., symptomatic)
Acute (e.g., stroke, intoxication, malaria, encephalitis, etc.)
Remote (e.g., posttraumatic, postencephalitic, poststroke, etc.)
Progressive (e.g., brain tumor, Lafora's disease and other PMEs, dementias)
SE in defined electroclinical syndromes
Unknown (i.e., cryptogenic)

Epilepsia, 56(10):1515–1523, 2015

AXIS 3 : EEG correlates

Currently there are no evidence-based EEG criteria for SE. Based on large descriptive series and consensus panels from 5 papers

terminology to describe EEG patterns in SE:

1 **Location:** generalized (including bilateral synchronous patterns), lateralized, bilateral independent, multifocal.

2 **Name of the pattern**: Periodic discharges, rhythmic delta activity or spike-and-wave/sharp-and-wave plus subtypes.

3 **Morphology:** sharpness, number of phases (e.g., triphasic morphology), absolute and relative amplitude, polarity.

4 **Time-related features:** prevalence, frequency, duration, daily pattern duration and index, onset (sudden vs. gradual), and dynamics (evolving, fluctuating, or static).

5 **Modulation:** stimulus-induced vs. spontaneous.

6 **Effect of intervention** (medication) on EEG.

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ACNS Standardized Critical Care EEG Terminology (2012)

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Overview

Standardized terminology of periodic and rhythmic EEG patterns in the critically ill has been proposed by the ACNS and is reproduced in outline form below. This terminology is designed for research purposes, not for clinical use. Terms were chosen to avoid clinical connotations and to ensure adequate inter-rater reliability.

The full text of the article: *American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology: 2012 version* can be found at the ACNS website, here: http://www.acns.org/pdf/guidelines/Guideline-14.pdf

Rhythmic or periodic patterns

All terms consist of main term # 1 followed by #2, with modifiers added as appropriate.

Main Term 1

- Generalized (G)
- Lateralized (L)
- Bilateral Independent (BI)
- Multifocal (Mf)

Main Term 2

- Periodic Discharges (PD)
- Rhythmic Delta Activity (RDA)
- Spike or Sharp and Wave (SW)

Modifiers

- Prevalence
- Duration
- Frequency
- Number of phases
- Sharpness
- Amplitude
- Polarity
- Stimulus-Inducing (SI)
- Evolving OR Fluctuating
- Plus (+)

Minor Modifiers

- Quasi-
- Sudden OR gradual onset
- Triphasic morphology
- A-P or P-A lag

Sporadic epileptiform

- Abundant
- Frequent
- Occasional
- Rare

Background EEG

Symmetry
Posterior Dominant Rhythm
Predominant frequency
Anterior-Posterior Gradient
Variability
Reactivity
Voltage
Stage II sleep transients
Continuity

- Continuous
- Nearly continuous
- Discontinuous
- Burst attenuation / suppression
- Suppression

J Clin Neurophysiol . 2013 Feb;30(1):1-27

TABLE 1. ACNS Standardized Critical Care EEG Terminology: Major and Minor Changes Between the 2012 and 2021 Versions

Major changes

EEG background

- *"Variability"* and "*Stage II sleep transients (K-complexes and spindles)"* now combined under "*State changes"*.
- Cyclic Alternating Pattern of Encephalopathy (CAPE) *(new term: Section A7, page 7)*
- Identical bursts *(new term: Section A4d, page 6)*

Rhythmic and Periodic Patterns (RPPs: PDs, RDA and SW)

- Unilateral Independent (UI) *(new Main Term 1 option: Section C1d, page 10)*
- Lateralized (bilateral asynchronous) *(Main Term 1: Section C1b, page 9)*
  - Patterns that consistently begin in one hemisphere and propagate to the other hemisphere can now be included as a lateralized (bilateral asynchronous) pattern.
- Frequency
  - For PDs and SW, typical frequencies >2.5 Hz can only be applied to RPPs <10 s duration ("very brief" by definition); if PDs or SW have a typical frequency >2.5 Hz and are ≥ 10 s these would qualify as electrographic seizures (criterion A) and should be referred to as such rather than as PDs or SW.
  - No RPP in this terminology can have a typical frequency of >4 Hz; if a pattern is > 4 Hz and ≥ 0.5 s, it would always meet criteria for either BIRDs (if <10 s) or an electrographic seizure (if ≥ 10 s) (see definitions below). If <0.5 s, this would not qualify as any RPP, but might qualify as a polyspike.
- Evolution
  - Evolution of an RPP is now limited to patterns that are ≤4 Hz AND <10 s duration. Any >4-Hz RPP with evolution lasting <10 s would qualify as a definite BIRD (see Section E, page 24). Any RPP with evolution lasting ≥ 10 s meets criterion B of an electrographic seizure and should be coded as such.
- Extreme Delta Brush (EDB) *(new term: Section C3i, page 19)*
- Stimulus-Terminated *(new modifier)*

Electrographic and Electroclinical Seizure Activity

- Electrographic seizure (ESz) *(new term: Section D1, page 22)*
- Electrographic *status epilepticus* (ESE) *(new term: Section D2, page 23)*
- Electroclinical seizure (ECSz) *(new term: Section D3, page 24)*
- Electroclinical *status epilepticus* (ECSE) (*new term: Section D4, page 24)*
- *Possible* electroclinical status epilepticus *(new term: Section D4b, page 24)*

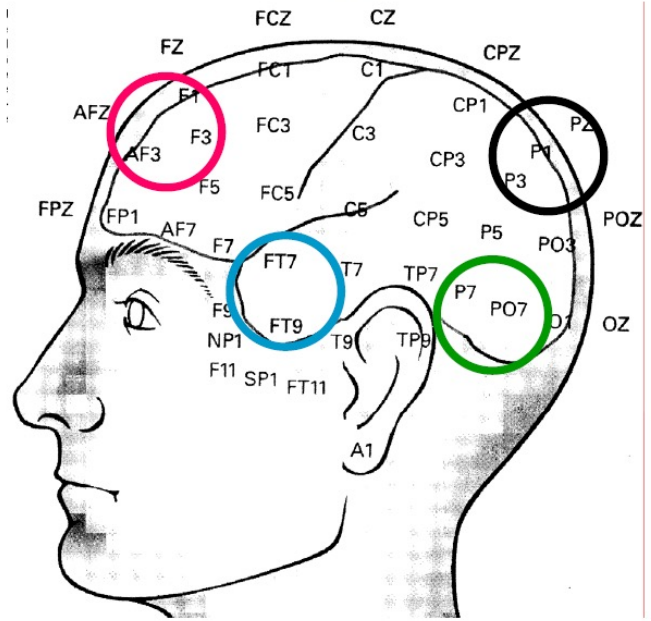
Brief Potentially Ictal Rhythmic Discharges (BIRDs) (*new term: Section E, page 24*)

Ictal-Interictal Continuum (IIC) (*new term: Section F, page 25*)

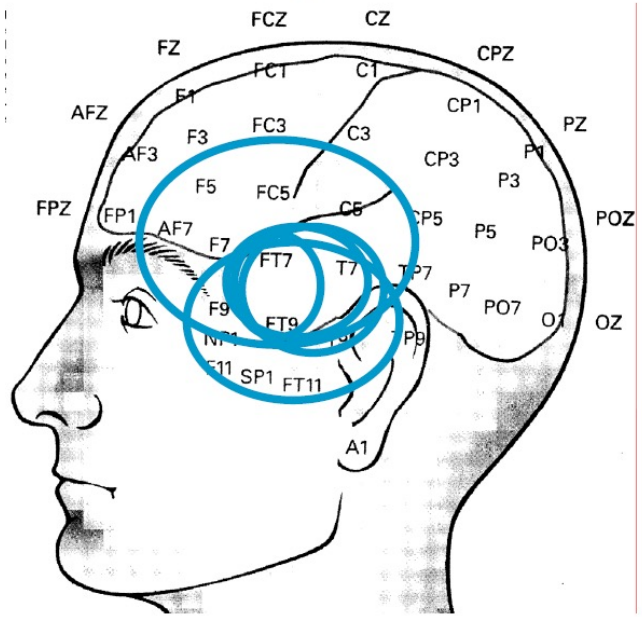
American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology, 2021

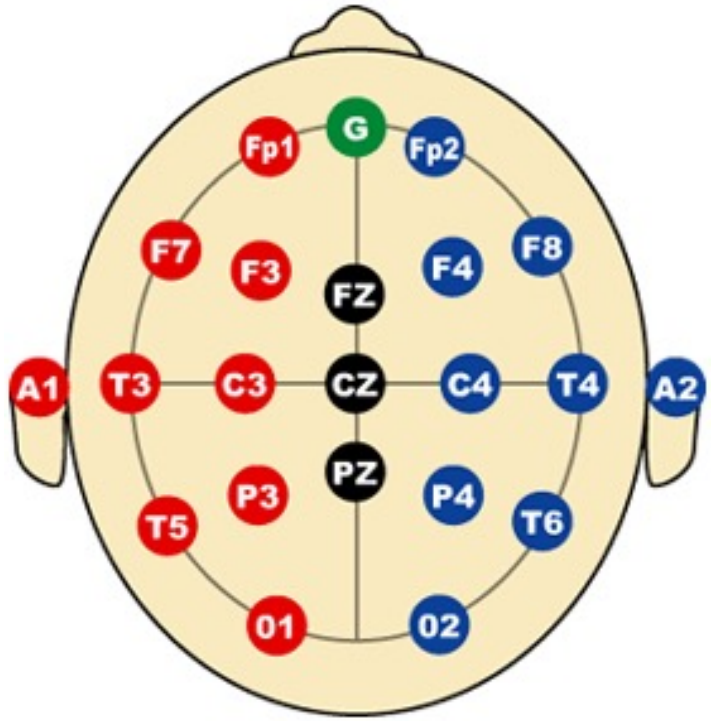
AXIS 3: EEG correlates: Location

Multiregional

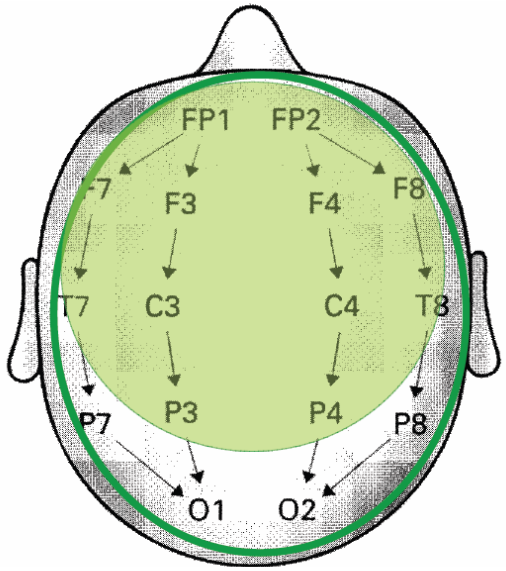


Regional

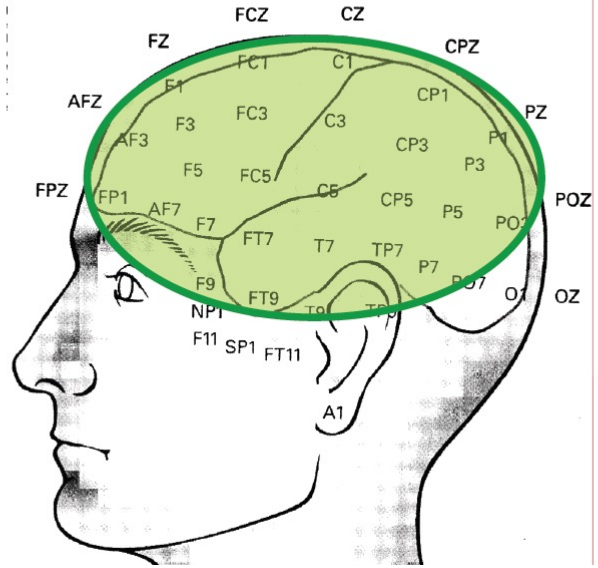




Generalized



Lateralized



Location

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AXIS 3: EEG correlates: Name of the pattern

Main Term 2

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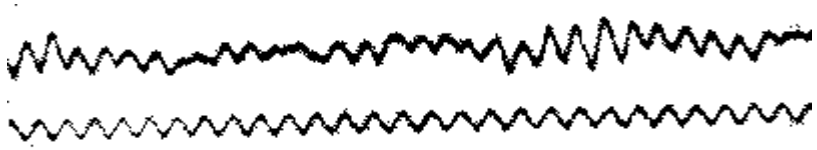
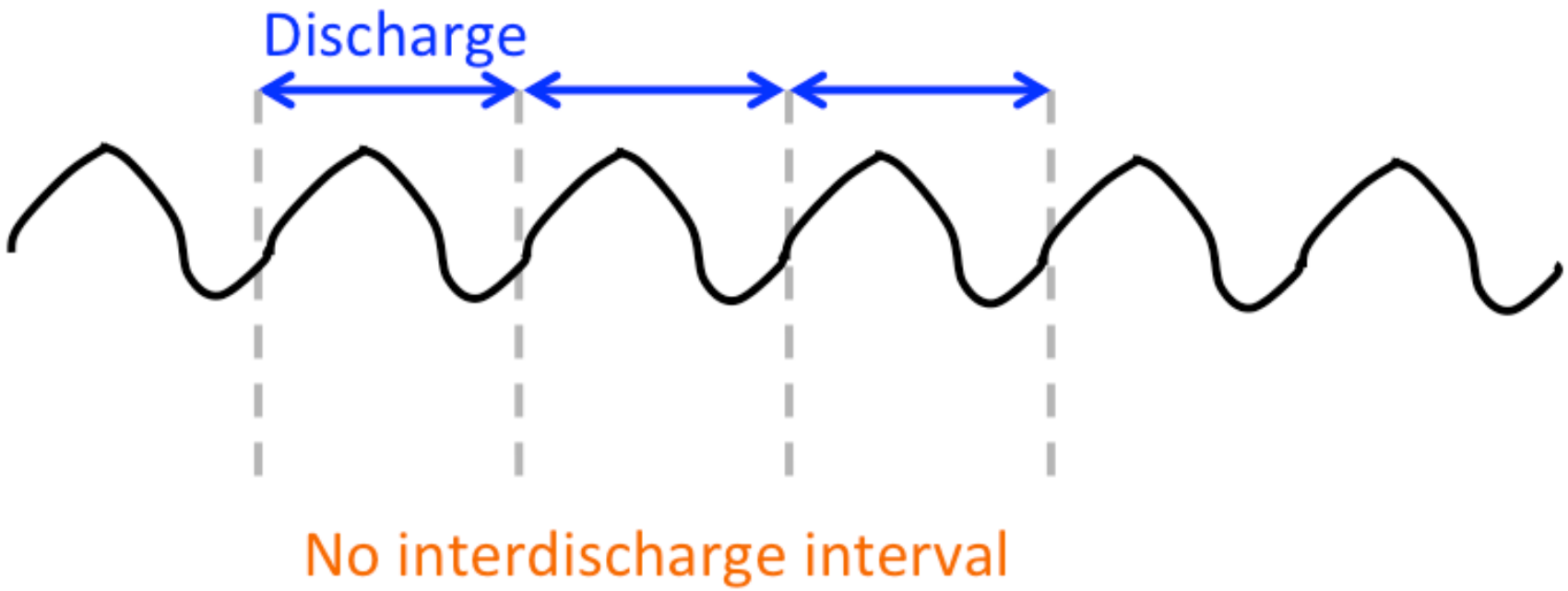
- ***Rhythmic*** = repetition of a waveform with relatively uniform morphology and duration and without an interval between consecutive waveforms.

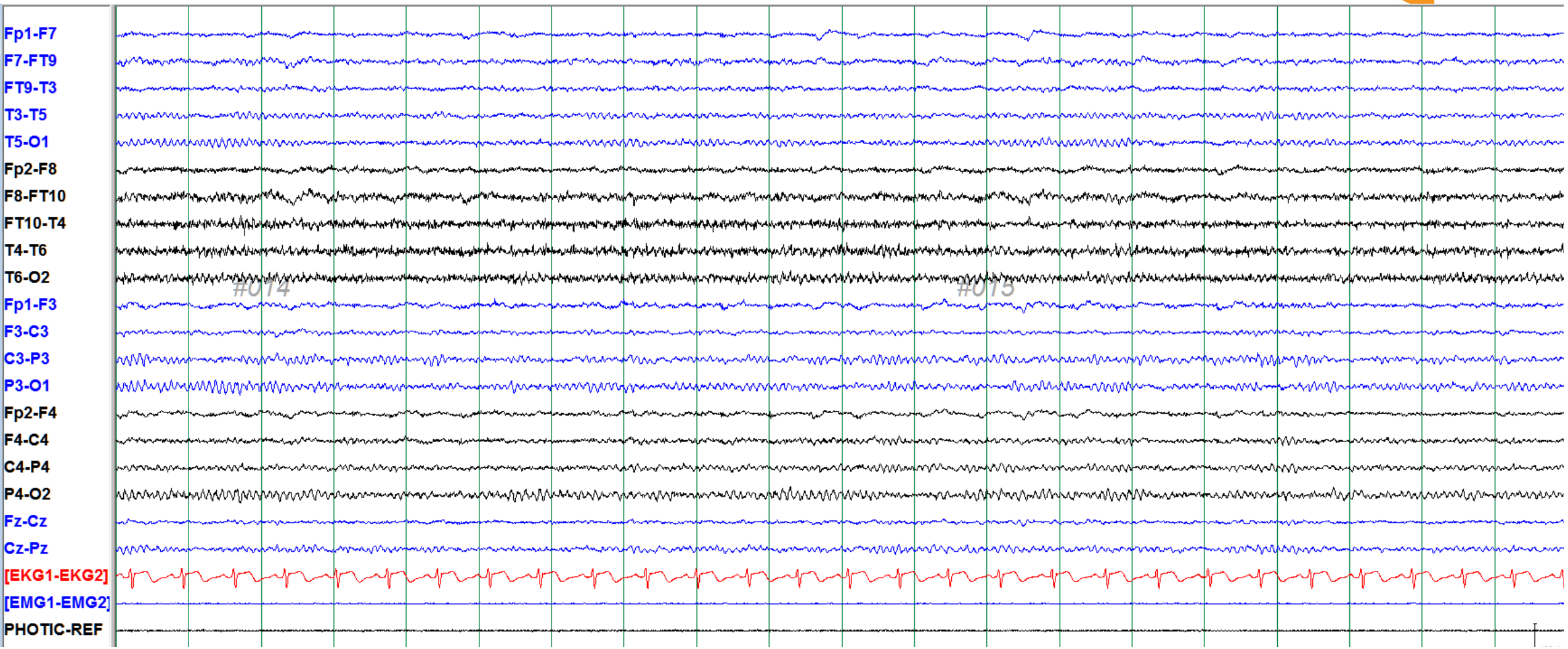
Duration of one cycle (the period) should vary by <50% from the duration of the subsequent cycle for the majority (>50%) of cycle pairs to qualify as a rhythmic pattern.



- ***Periodic discharges***= repeating waveforms/discharges with (relatively) uniform morphology at nearly regular intervals. Applies *only* to **single discharges** (must have ≤3 phases [i.e. ≤2 baseline crossings] or any discharge lasting ≤0.5 sec regardless of number of phases) and *not* to **bursts** (discharges lasting >0.5 sec and having ≥4 phases [i.e. ≥3 baseline crossings]). "Nearly regular intervals" = cycle length (period) varying by <50% from one cycle to the next in most (>50%) cycle pairs.

Main term: Rhythmic




Fp1-F7
F7-FT9
FT9-T3
T3-T5
T5-O1
Fp2-F8
F8-FT10
FT10-T4
T4-T6
T6-O2
Fp1-F3
F3-C3
C3-P3
P3-O1
Fp2-F4
F4-C4
C4-P4
P4-O2
Fz-Cz
Cz-Pz
[EKG1-EKG2]
[EMG1-EMG2]
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AXIS 3: EEG correlates: Name of the pattern

Main Term 2

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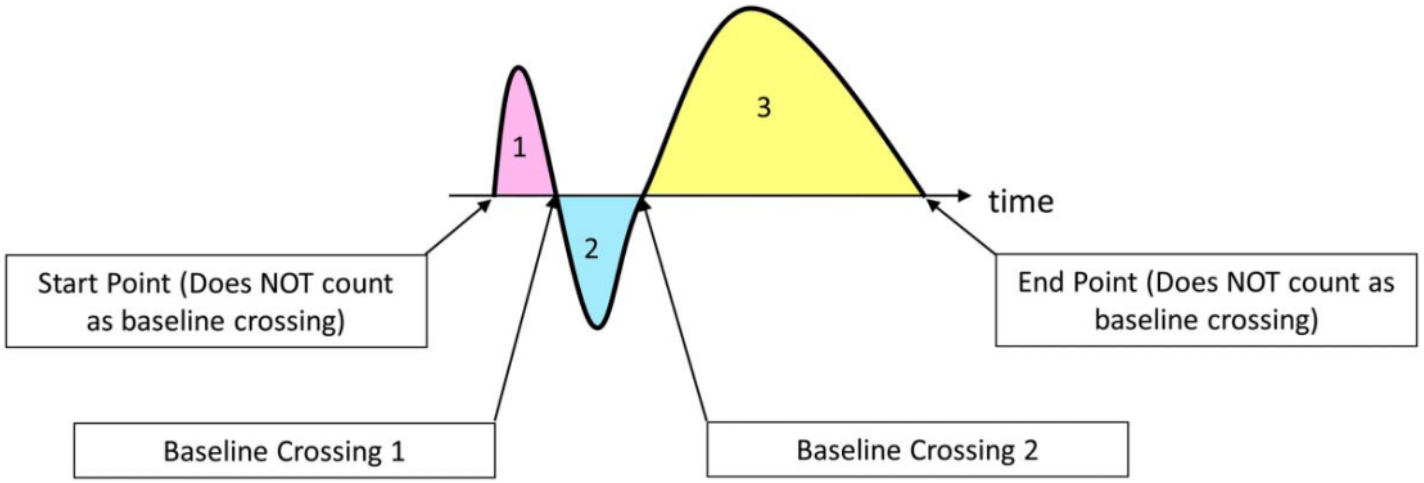
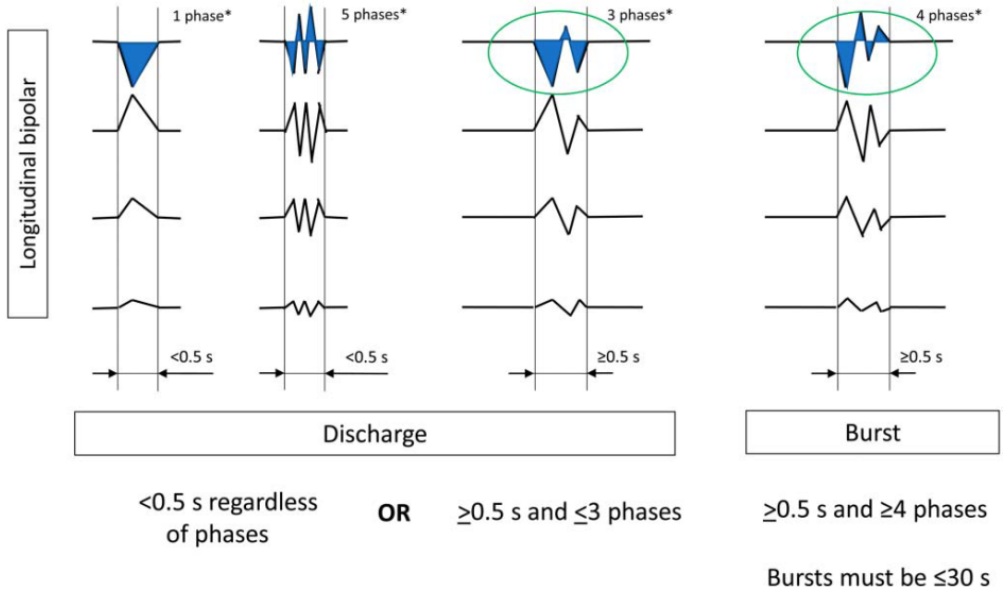
•***Periodic discharges***= repeating waveforms/discharges with (relatively) uniform morphology at nearly regular intervals. Applies *only* to **single discharges** (must have ≤3 phases [i.e. ≤2 baseline crossings] or any discharge lasting ≤0.5 sec regardless of number of phases) and *not* to **bursts** (discharges lasting >0.5 sec and having ≥4 phases [i.e. ≥3 baseline crossings]). "Nearly regular intervals" = cycle length (period) varying by <50% from one cycle to the next in most (>50%) cycle pairs.





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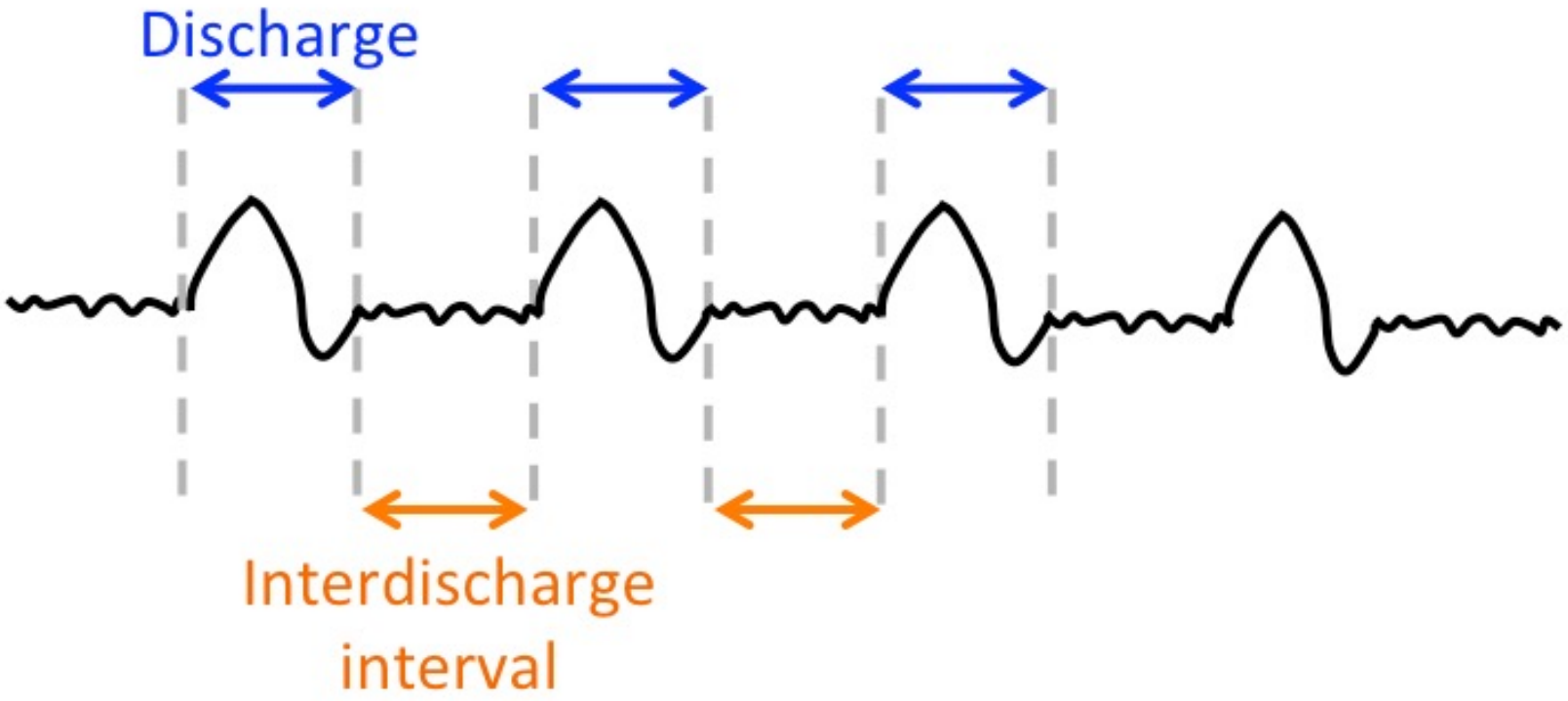
Main term : Periodic



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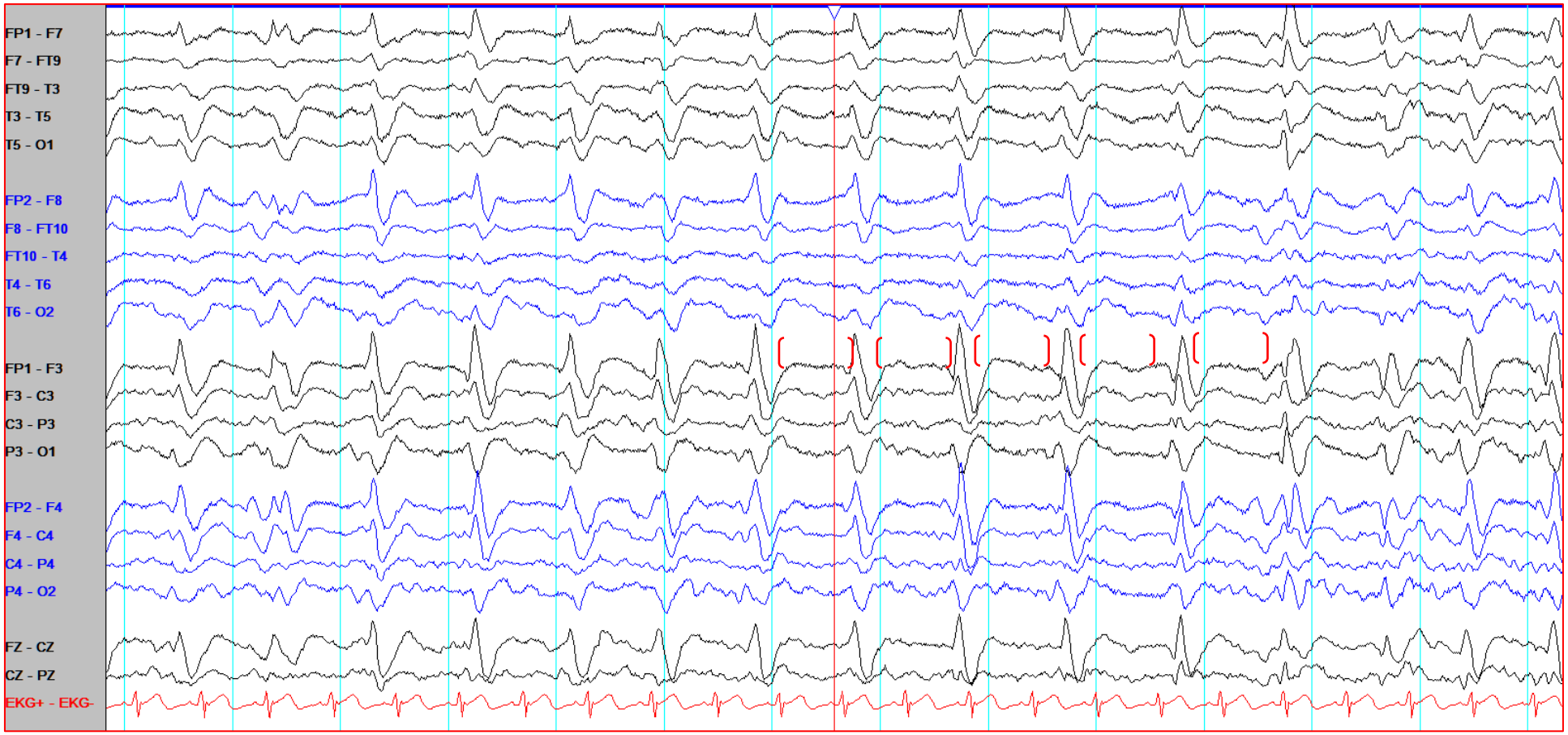

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Periodic discharges= repeating waveforms/discharges with (relatively) uniform morphology at nearly regular intervals.

Applies *only* to **single discharges** (must have ≤3 phases [i.e. ≤2 baseline crossings] or any discharge lasting ≤0.5 sec regardless of number of phases) and *not* to **bursts** (discharges lasting >0.5 sec and having ≥4 phases [i.e. ≥3 baseline crossings]). "Nearly regular intervals" = cycle length (period) varying by <50% from one cycle to the next in most (>50%) cycle pairs.

IIC EEG patterns

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- **Rhythmic delta activity (RDA):** LRDA, GRDA
- **Periodic discharges (PDs):** LPD, GPD, BiPD, MfPD
- **Spike or sharp wave discharges (SW)**

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Table 1
Old and new terms of EEG patterns in the patients with critical illness, modified according to the 2012 version of the American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology [2].

Commonly used terminology	New terminology
Triphasic waves (TWs)	Continuous 2/s GPDs with triphasic morphology
Periodic lateralized epileptiform discharges (PLEDs)	Lateralized periodic discharges (LPDs)
Bilateral periodic epileptiform discharges (BiPLEDs)	Bilateral periodic discharges (BPDs)
Generalized periodic epileptiform discharges (GPEDs)	Generalized periodic discharges (PDs)
Frontal intermittent rhythmic delta activity (FIRDA)	Occasional frontally predominant brief 2/s generalized rhythmic delta activity
Stimulus-induced rhythmic, periodic, or ictal discharges (SIRPIDs) with focal evolving rhythmic delta activity	Stimulus-induced-evolving lateralized rhythmic delta activity (SI-evolving LRDA)
Lateralized seizure, delta frequency range	Evolving lateralized rhythmic delta activity (LRDA)
Semirhythmic delta	Quasi RDA
Coma with lateralized epileptiform discharges (coma-LEDs) [14]	Coma with lateralized periodic discharges (coma-LPDs)
Coma with generalized epileptiform discharges (coma-GEDs)	Coma with generalized periodic discharges (coma-GPDs)

Hirsch LJ et al; J Clin Neurophysiol 2013

TABLE 1. New Terms for Older Terms

OLD Term		NEW Term
Triphasic waves, most of record	=	continuous 2/s GPDs (with triphasic morphology)
PLEDs	=	LPDs
BIPLEDs	=	BIPDs
GPEDs/PEDs	=	GPDs
FIRDA	=	Occasional frontally predominant brief 2/s GRDA (if 1-10% of record)
PLEDS+	=	LPDs+
SIRPIDs* w/ focal evolving RDA	=	SI-Evolving LRDA
Lateralized seizure, delta frequency	=	Evolving LRDA
Semirhythmic delta	=	Quasi-RDA

*SIRPIDs = stimulus-induced rhythmic, periodic or ictal discharges.

ELECTROGRAPHIC AND ELECTROCLINICAL SEIZURES

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Electrographic Seizures (ESz) **based on the Salzburg criteria**

a. Epileptiform discharges* averaging > 2.5 Hz for ≥10 seconds (> 25 discharges in 10 seconds)
b. Any pattern with definite **evolution** and lasting ≥ 10 seconds

Electrographic Status Epilepticus (ESE)

an Electrographic Seizures (Esz) for ≥ 10 continuous minutes or for a total duration of ≥ 20% of any 60-minute period of recording.

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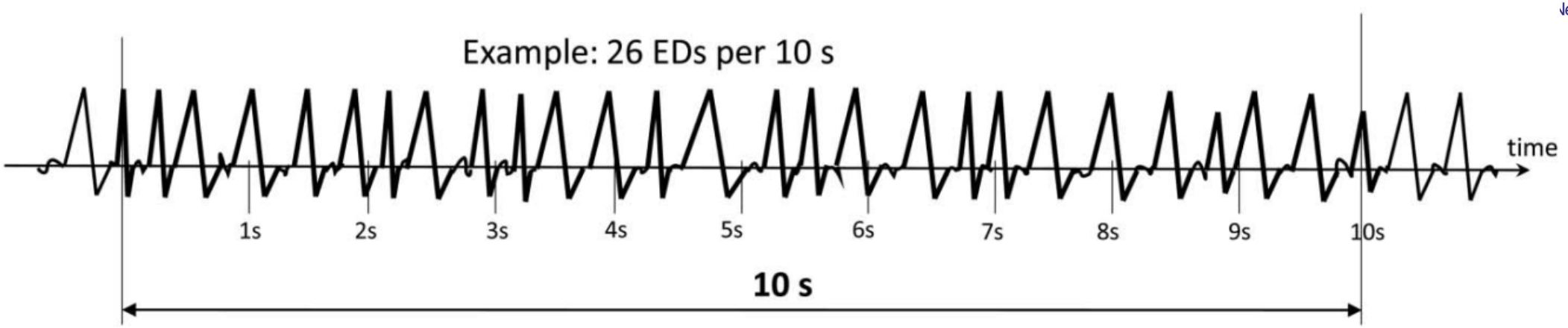
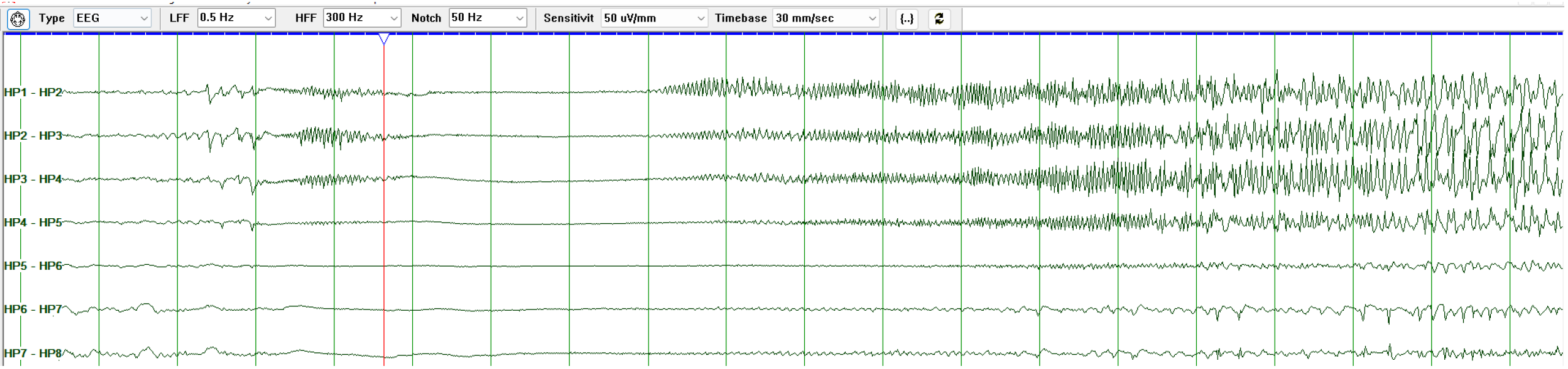
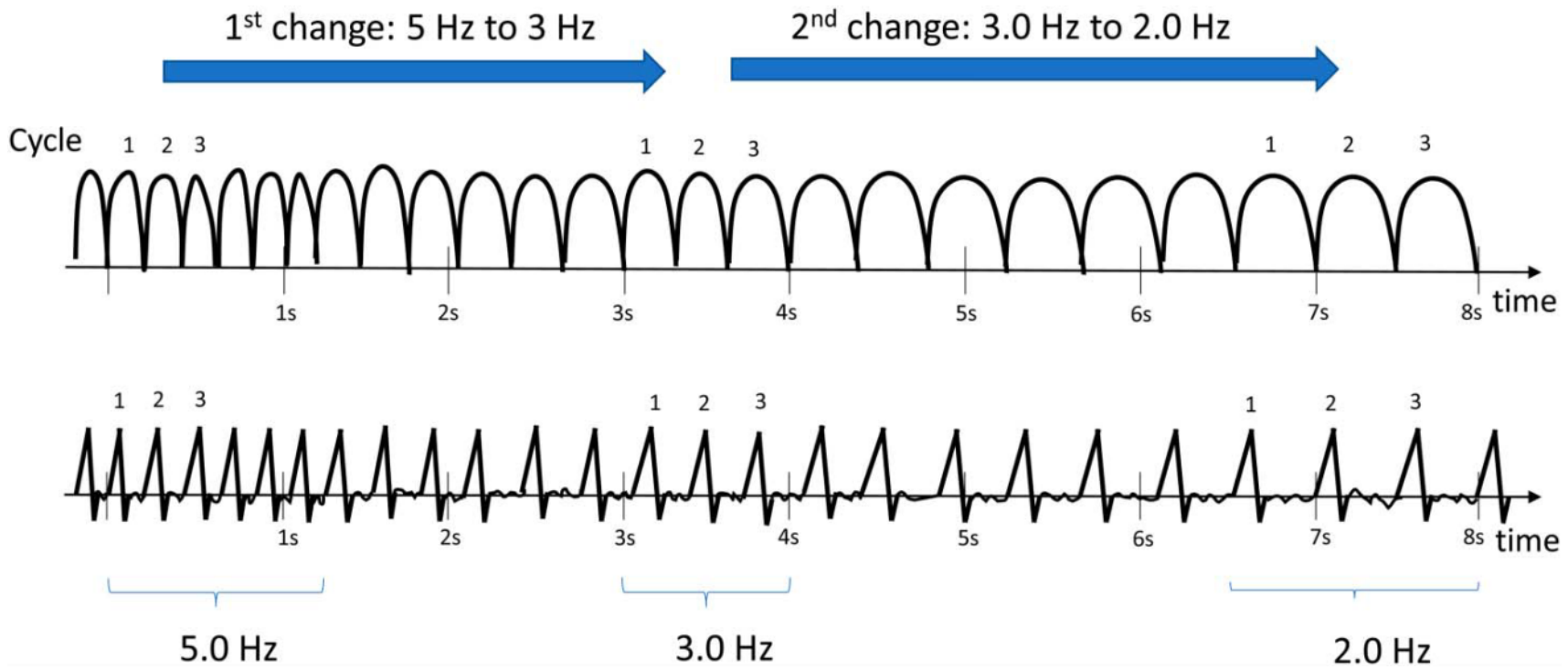
Epileptiform discharges averaging **>2.5 Hz** for **≥10 s** (>25 discharges in 10 s)





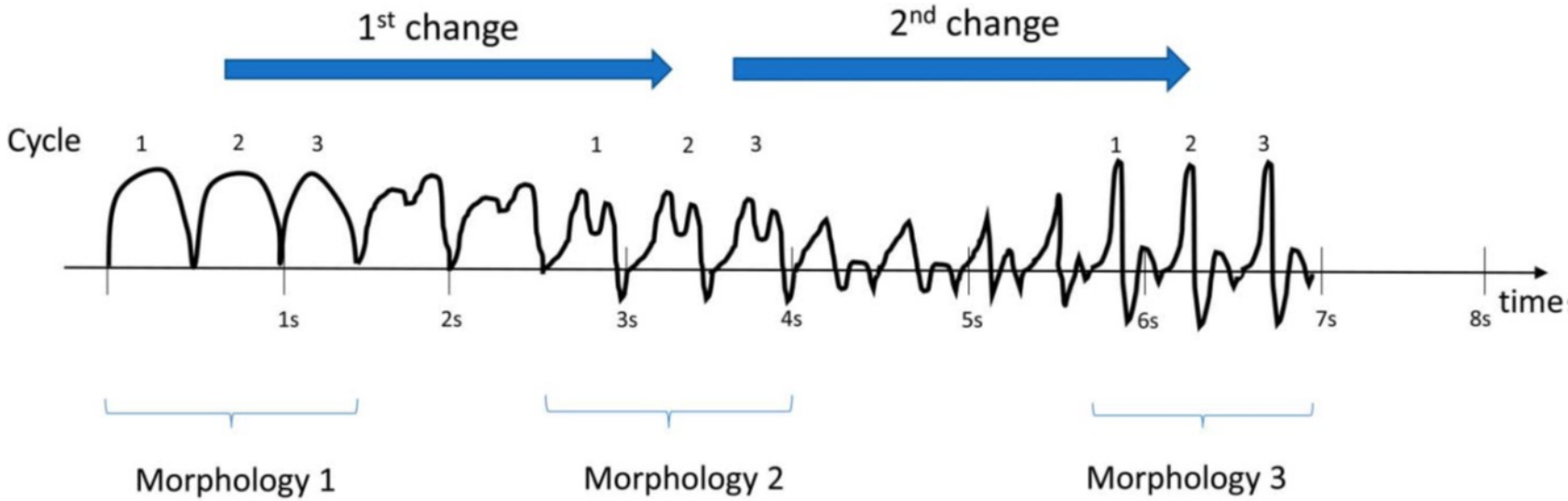
Evolution: Evolving changes in **frequency,** location, or morphology



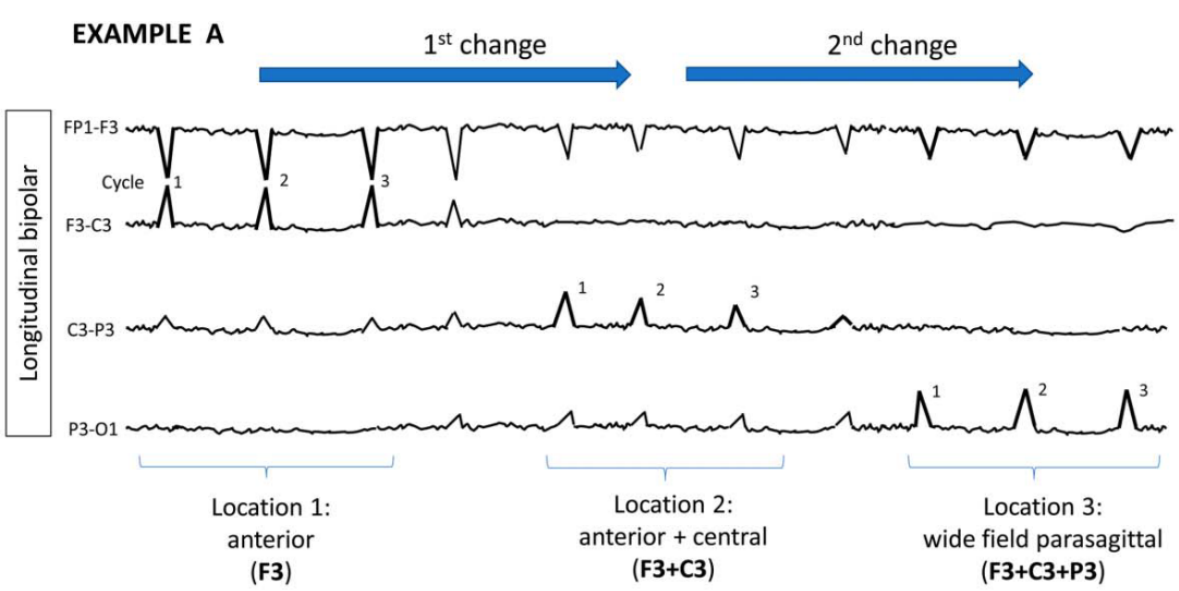
changes in the same direction by at least 0.5 Hz, e.g., from 2 to 2.5 to 3 Hz, or from 3 to 2 to 1.5 Hz

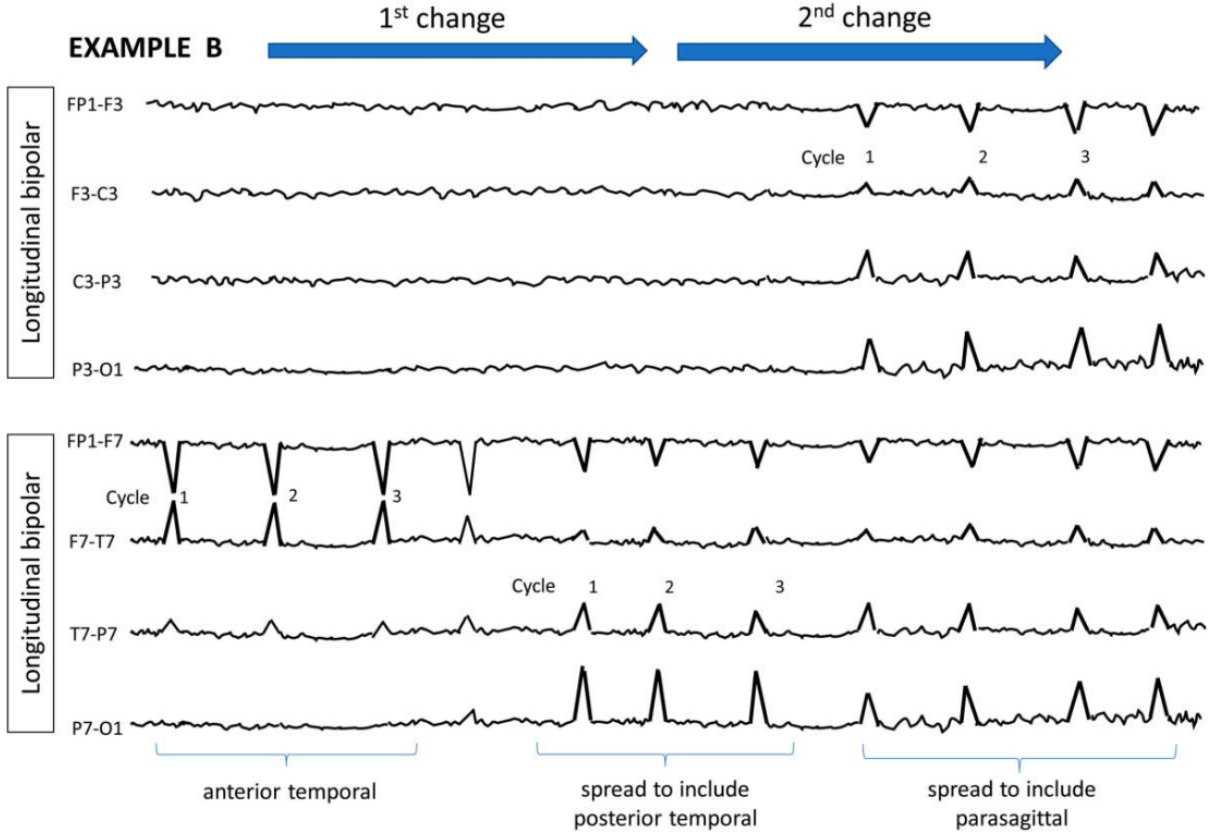
A single frequency must persist for at least three cycles

Evolution: Evolving changes in frequency, location, or **morphology**



Evolution: Evolving changes in frequency, **location**, or morphology





Electroclinical Seizure (ECSz) Electroclinical Status Epilepticus (ECSE)

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- Definite clinical correlate* time-locked to the pattern (of any duration)
- EEG AND clinical improvement with a parenteral (typically IV) antiseizure medication

Electroclinical Status Epilepticus (ECSE)

an electroclinical seizure for ≥ 10 continuous minutes or for a total duration of ≥ 20% of any 60-minute period of recording.

6 **Effect of intervention** (medication)

EEG patterns and their correlation with NCS/NCSE

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EEG patterns	Do NOT reflect NCSE <u>NOT TREATED</u>	Reflect NCSE Should be <u>TREATED</u>	<u>BORDERLINE</u> Of NCSE in coma One additional criteria is needed to diagnose NCSE
❖ Classical coma patterm - Diffuse polymorphic delta activity - Spindle coma - Alpha/theta coma - Low votage - Burst suppression	× × × × ×		
❖ Ictal patterns with typical spatiotemporal evolution ❖ Epileptiform discharges > 2.5 Hz in comatose patients		× ×	
❖ GPDs or LPDs < 2.5 Hz ❖ Rhythmic discharges (RDs) > 0.5 Hz			× ×

Trinka U and Leitinger M; Epilepsy & Behav 2015

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Ictal EEG patterns and criteria for nonconvulsive status epilepticus

EEG Diagnosis of NCSE

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2013:
Salzburg Consensus Criteria for diagnosis
of Non-Convulsive Status Epilepticus (SCNC) were proposed at the 4th London-Innsbruck Colloquium on status epilepticus in Salzburg

In Addition, 2012:
American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology, 2012 version (ACNS criteria) In Addition, 2012:

American Clinical Neurophysiology Society's Standardized Critical Care EEG Terminology, 2021 version (ACNS criteria)

Epilepsia, 54(Suppl. 6):28–29, 2013
doi: 10.1111/epi.12270

STATUS EPILEPTICUS 2013

Unified EEG terminology and criteria for nonconvulsive status epilepticus

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*Department of Clinical Neurophysiology, Danish Epilepsy Center, Dianalund, Denmark; †University of Aarhus, Aarhus, Denmark; ‡Department of Neurology, Yale University School of Medicine, New Haven, Connecticut, U.S.A.; §Department of Neurology, The Johns Hopkins Bayview Medical Center, Baltimore, Maryland, U.S.A.; ¶Great Ormond Street Hospital for Children, NHS Foundation Trust, London, United Kingdom; **Department of Neurology, Medical University of Innsbruck, Innsbruck, Austria; ††Department of Neurology, Haukeland University Hospital, Bergen, Norway; ‡‡Department of Clinical Medicine, University of Bergen, Bergen, Norway; and §§Department of Neurology, Paracelsus Medical University, Salzburg, Austria

Working Clinical Criteria for Nonconvulsive Status Epilepticus

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Patients without known epileptic encephalopathy

-Epileptiform Discharges > 2.5 Hz

-Epileptiform Discharges ≤ 2.5 Hz or rhythmic delta/theta activity (>0.5 Hz)

AND one of the following:

- EEG and clinical improvement after IV AED
- Subtle clinical ictal phenomena during the EEG patterns mentioned
- Typical **spatiotemporal evolution**

Epilepsia, 54(Suppl. 6):28–29, 2013

Working Clinical Criteria for Nonconvulsive Status Epilepticus

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Patients with known epileptic encephalopathy

West, Landau/Kleffner, Otahara, Early Myoclonic infancy, Dravet, Lennox-Gastaut, Doose)

- Increase in prominence or frequency of the features mentioned above, when compared to baseline **with observable change in clinical state**
- Improvement of clinical and EEG features with IV AEDs

- -Epileptiform Discharges > 2.5 Hz
- -Epileptiform Discharges ≤ 2.5 Hz or rhythmic delta/theta activity (>0.5 Hz)

Epilepsia, 54(Suppl. 6):28–29, 2013

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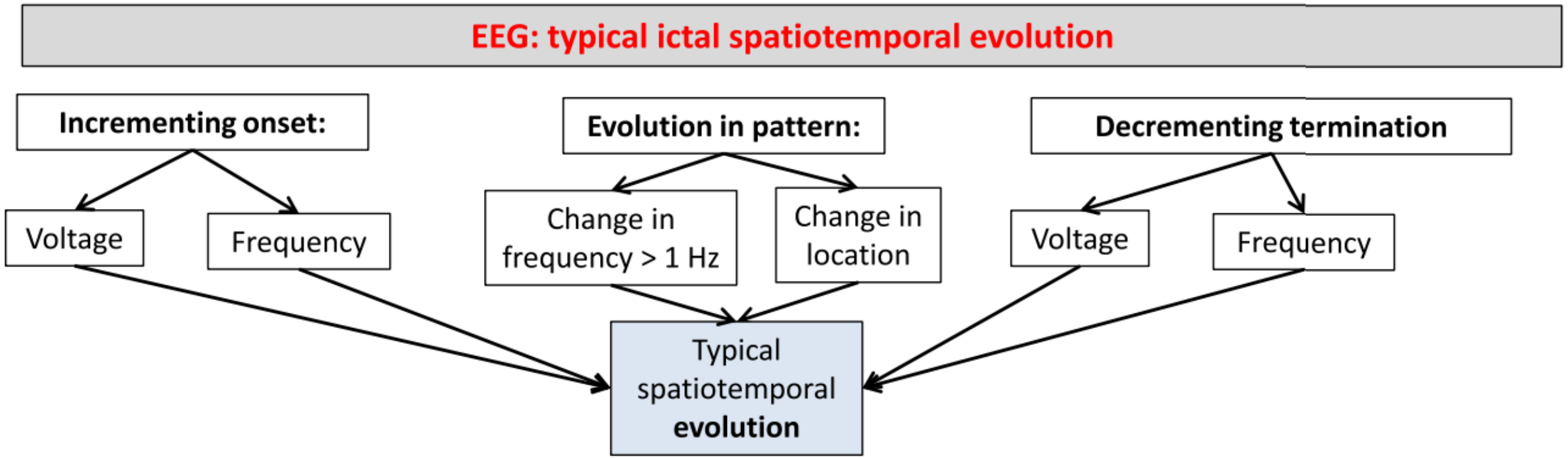
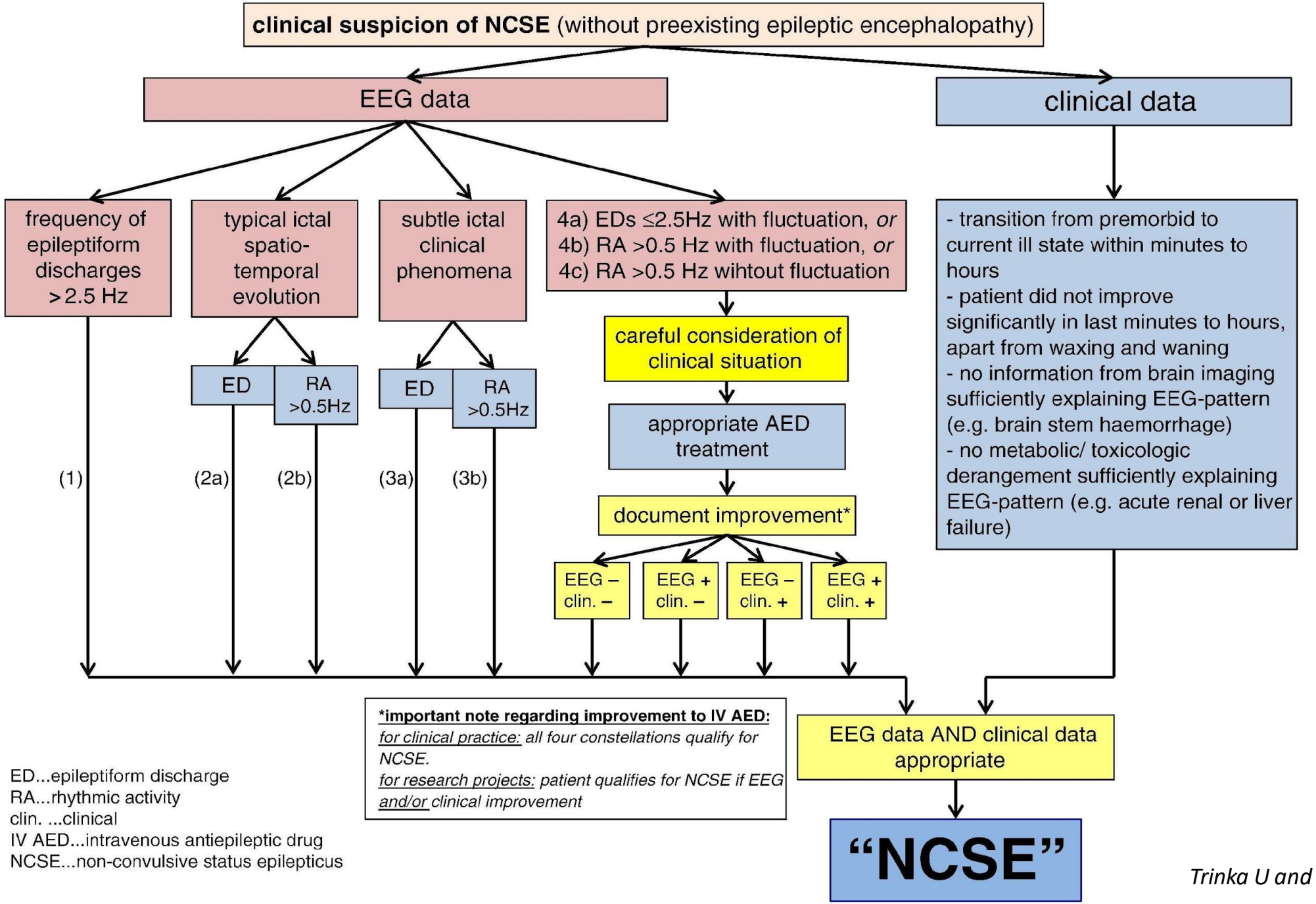


Trinka U and Leitinger M; Epilepsy & Behav 2015



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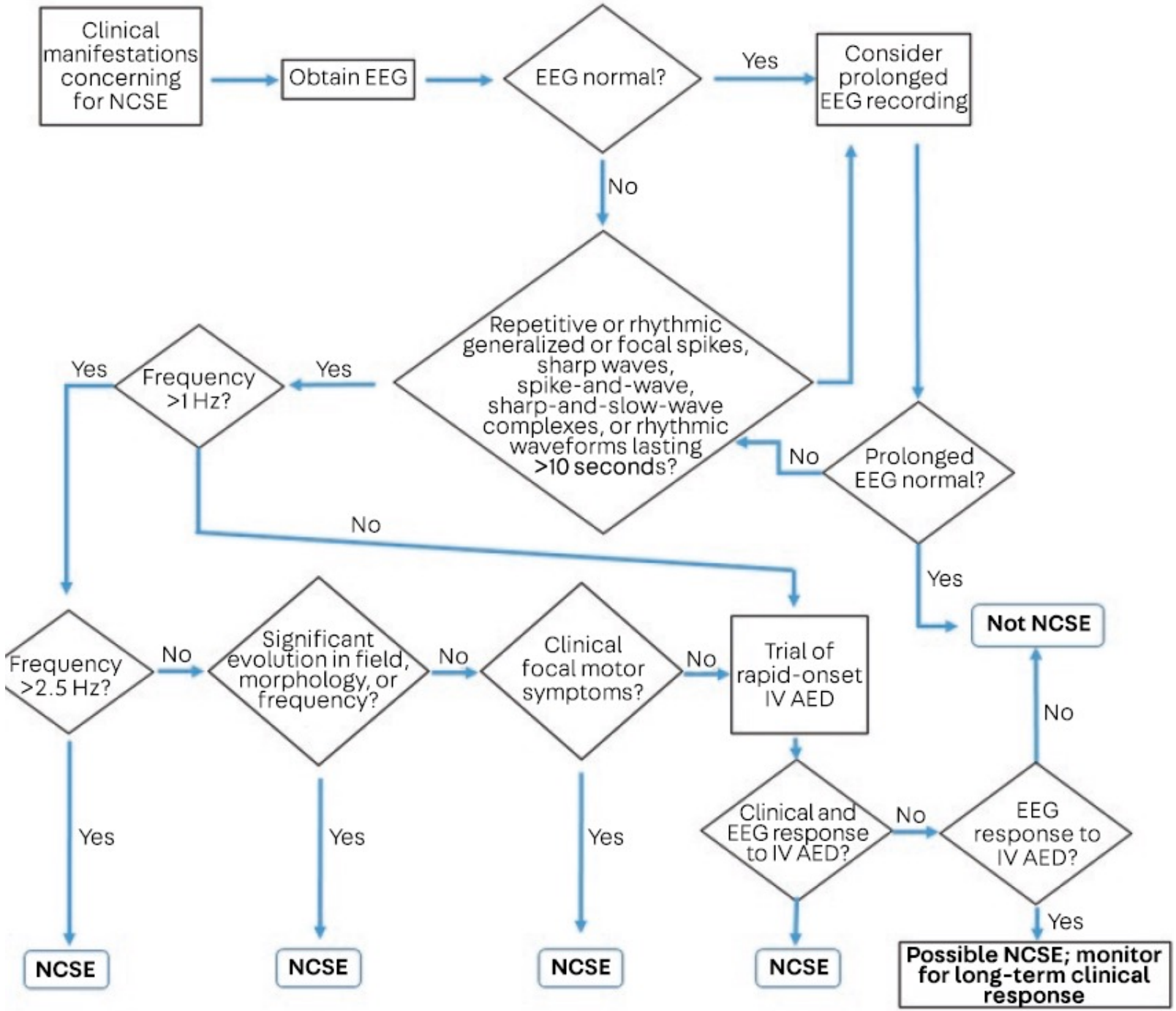
Trinka U and Leitinger M; Epilepsy & Behav2015



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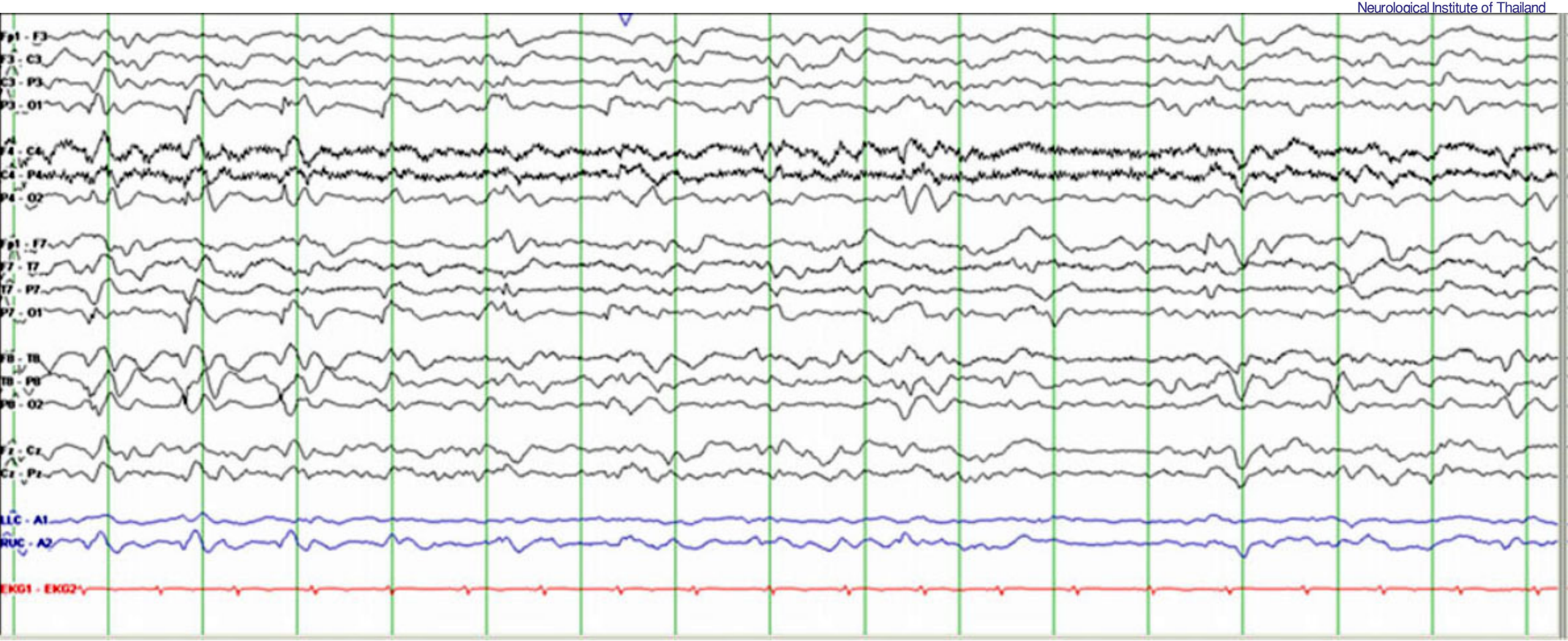
Neurology continuum Epilepsy April 2019, Vol.25


Fp1 - F3
F3 - C3
C3 - P3
P3 - O1
Fp2 - F4
F4 - C4
C4 - P4
P4 - O2
Fp1 - F7
F7 - T7
T7 - P7
P7 - O1
Fp2 - F8
F8 - T8
T8 - P8
P8 - O2
Fz - Cz
Cz - Pz
LLC - A1
RUC - A2
EKG1 - EKG2

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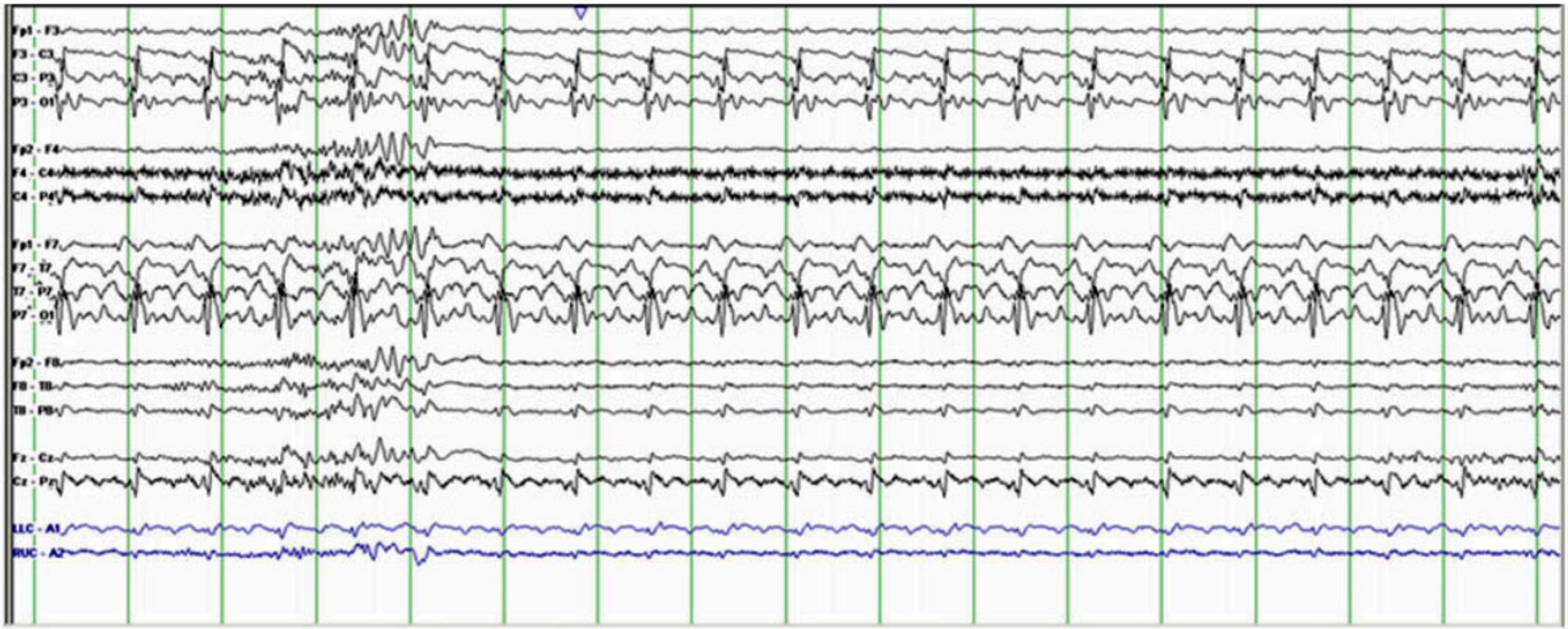

THE ICTAL-INTERICTAL CONTINUUM (IIC)

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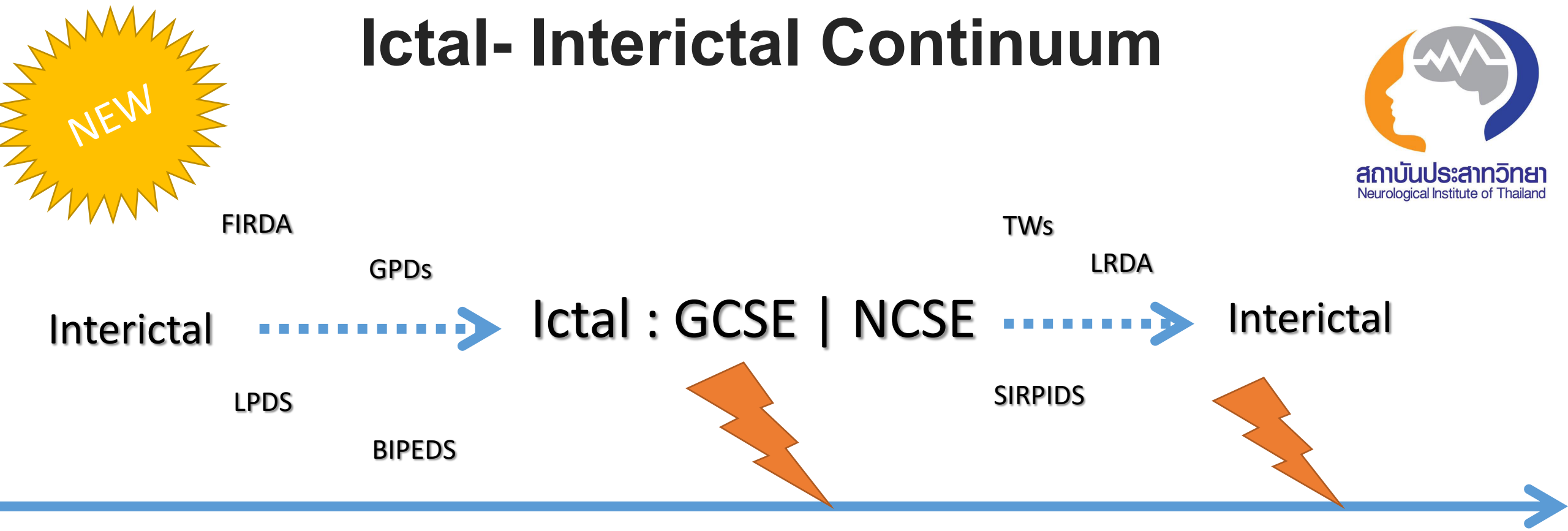
- Any PD or SW pattern that averages > 1.0 and >= 2.5 Hz over 10 seconds (> 10 and <= 25 discharges in 10 seconds)

- Any PD or SW pattern that averages >= 0.5 Hz and <=1.0 Hz over 10 seconds (>=5 and <=10 discharges in 10 seconds) and has a plus modifier or fluctuation

- Any lateralized RDA averaging .1 Hz for at least 10 seconds (at
- least 10 waves in 10 seconds) with a plus modifier or fluctuation
- Does not qualify as an ESz or ESE

Ictal- Interictal Continuum

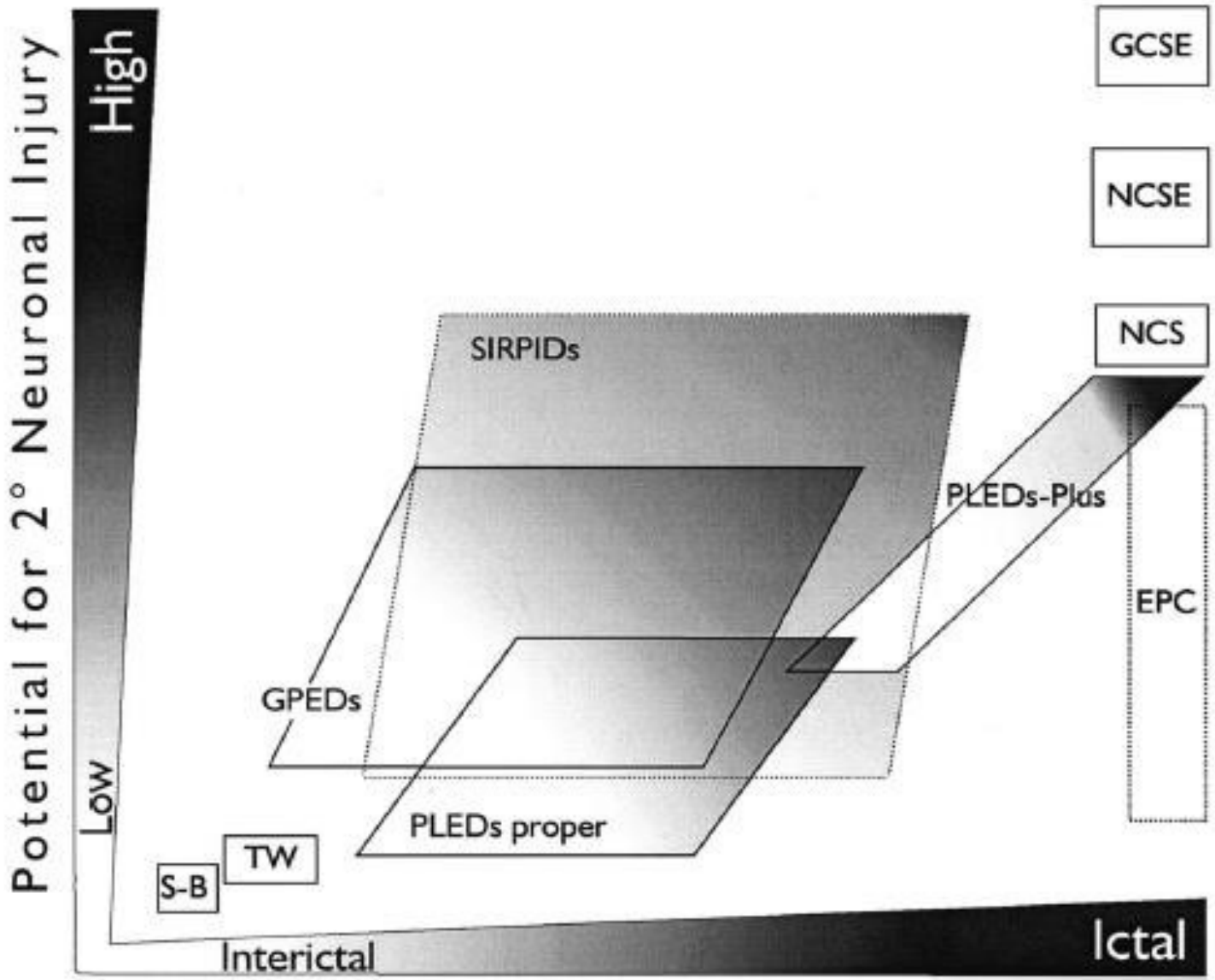


Etiology :
clinical evaluation / Imagine / Laboratory test

Treatment :
Benzodiazepine / Antiepileptic

Outcomes : clinical and neurophysiology improvement / worsening

The Ictal-Interictal-Injury Continuum



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Chong DJ and Hirsch LJ et al; J Clin Neurophysiol 2005

AS in IGE
Late AS de novo
Atypical AS

Focal SE with impaired consciousness,
Aura continua,
Status aphasicus

Acute symptomatic focal SE +/- EPC
Subtle SE

Coma with GPD
Coma with LPD

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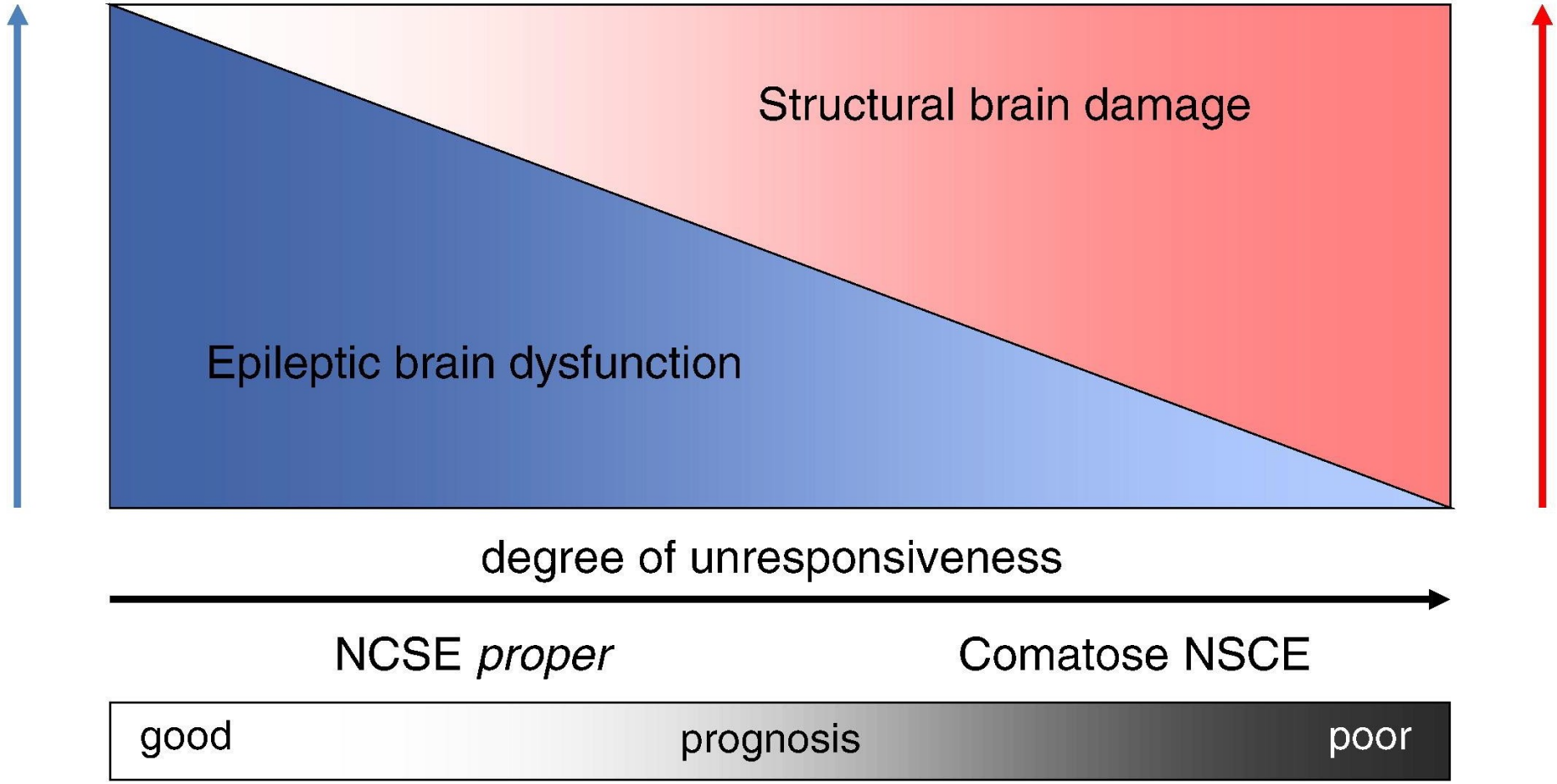

Trinka U and Leitinger M; Epilepsy & Behav 2015

Coma and PLEDs were predictors of Delayed time to first seizure

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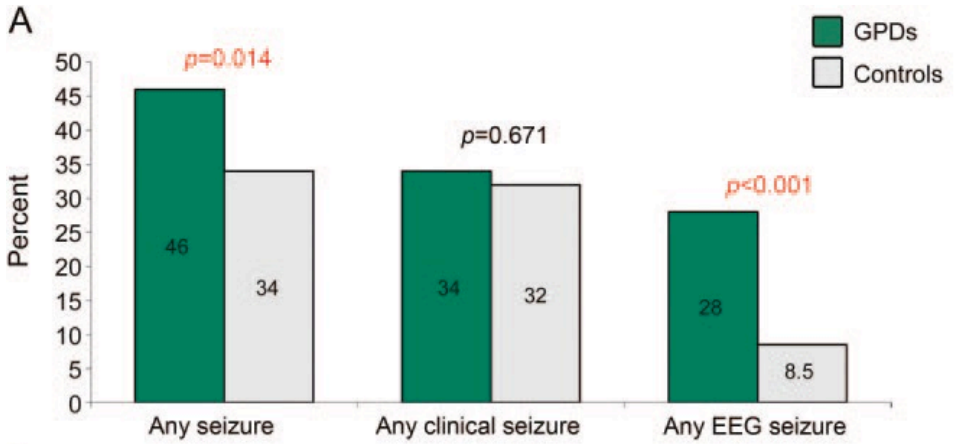
Table 4 *Other cEEG findings in patients with seizures on cEEG, n = 110*

	Seizures on cEEG monitoring			Time of cEEG monitoring to first seizure >24 h		
Findings	Yes, n = 110	No, n = 460	*p*	Yes, n = 14	No, n = 96	*p*
Periodic epileptiform findings						
Any	49 (45)	82 (20)	<0.001	9 (64)	40 (42)	NS
PLED	44 (40)	46 (11)	<0.001	9 (64)	35 (37)	0.047
GPED	19 (17)	24 (6)	<0.001	2 (14)	17 (18)	NS
BiPLED	7 (6)	13 (3)	NS	0 (0)	7 (7)	NS
Triphasic waves	4 (4)	25 (6)	NS	0 (0)	4 (4)	NS
Frontal intermittent rhythmic delta activity	11 (10)	35 (9)	NS	2 (14)	9 (10)	NS
Suppression burst	35 (32)	13 (3)	<0.001	4 (29)	31 (32)	NS

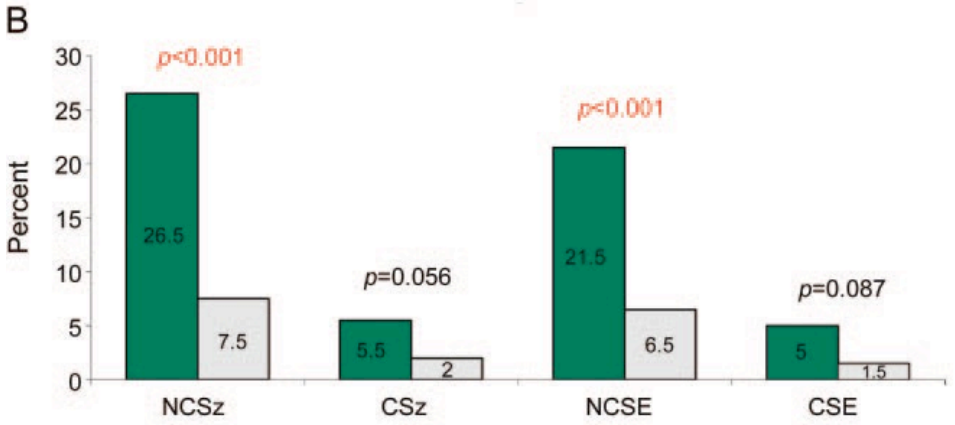
Data are given as n (%). Some patients had multiple EEG patterns documented on continuous EEG (cEEG). The observed EEG findings do not have a constant temporal relationship, and seizures may precede other EEG findings in individual patients or vice versa.

PLED = periodic lateralized epileptiform discharges; GPED = generalized PED; BiPLED = bilateral PLED.

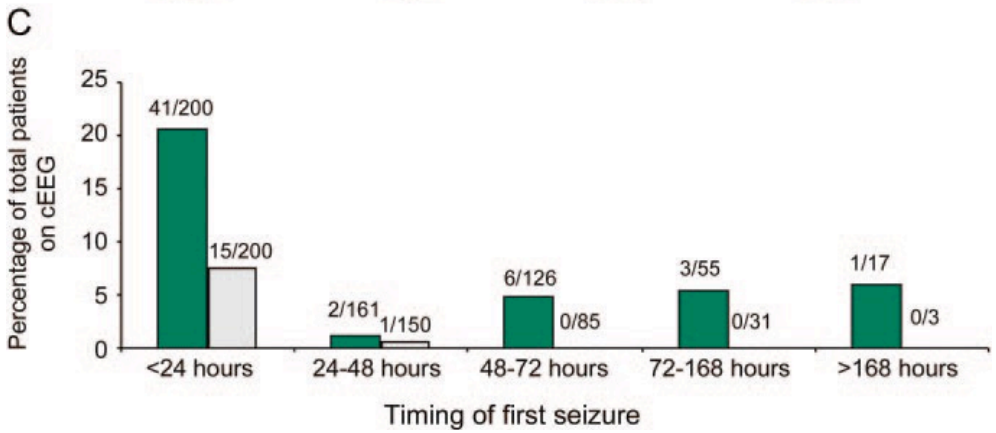
Hirsch et all 2012



(A) Comparison of seizure occurrence at any time in patients with GPDs vs controls (%).



(B) Comparison of seizures during continuous EEG monitoring (cEEG) in patients with GPDs vs controls (%)



(C) Timing of first recorded seizure in patients with GPDs vs controls.

Neurology. 2012 Nov 6; 79(19): 1951–1960.

axis 5: Modulation: (SIRPIDs)
Stimulus-induced rhythmic, periodic, or ictal discharges

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- induced by alerting stimuli such as auditory stimuli, sternal rub, examination, suctioning, turning, and other patient-care activities
- commonly elicited by stimulation in critically ill (stuporous or comatose), encephalopathic patients
- Pathophysiology of SIRPIDs is unknown
- The relationship between clinical seizures and SIRPIDs is unclear, although some association is found between SIRPIDs and clinical status epilepticus

Epilepsia . 2004 Feb;45(2):109-23.

NEW

BRIEF POTENTIALLY ICTAL RHYTHMIC DISCHARGES (BIRDs)

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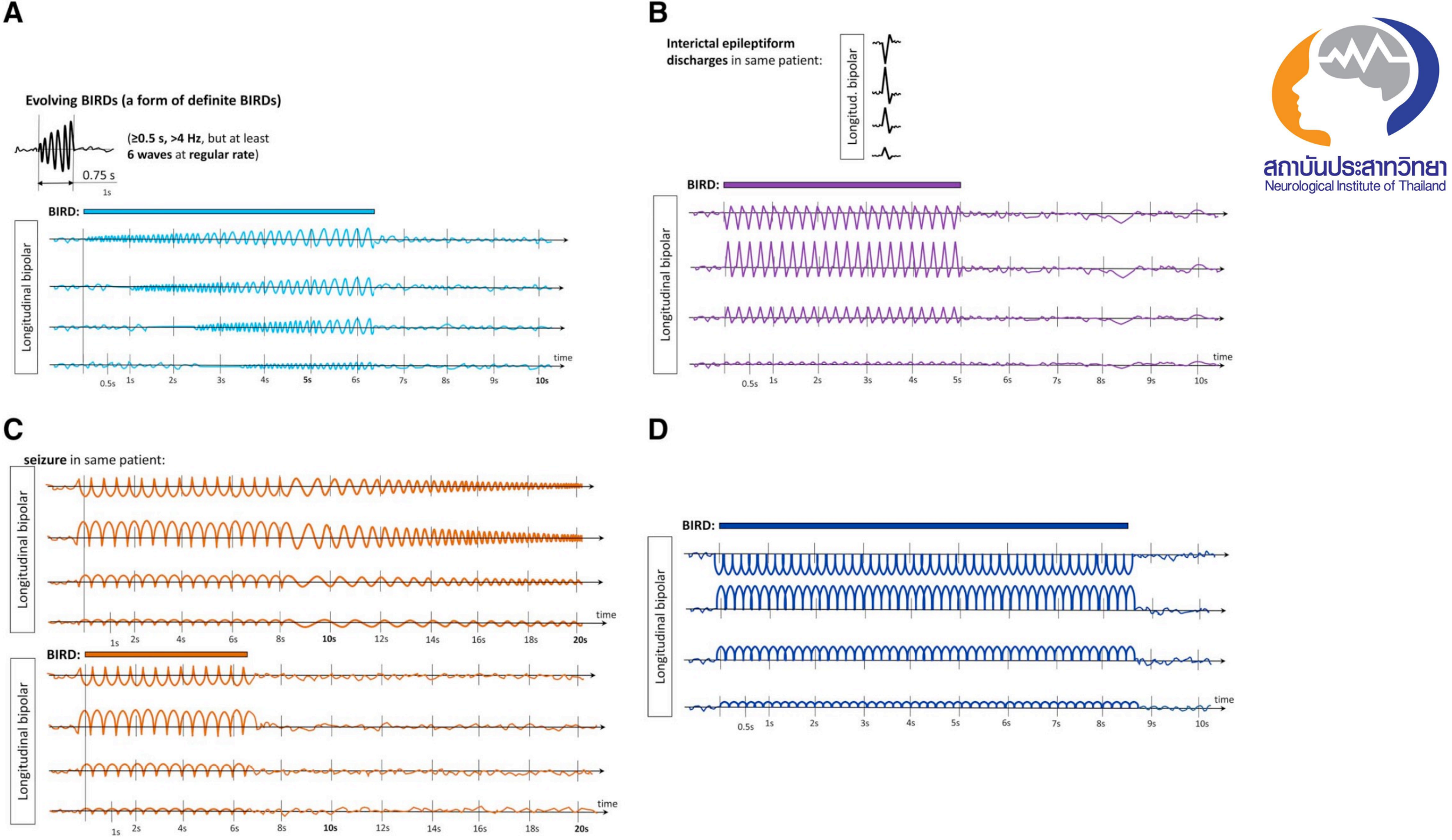
- Focal (including L, BI, UI or Mf) or generalized rhythmic activity

Activity > 4 Hz (at least six waves at a regular rate) lasting ≥ 0.5 to < 10 seconds,

Not consistent with a known normal pattern or benign variant, not part of burst-suppression or burst-attenuation, without a definite clinical correlate, and that has at least one of the following features



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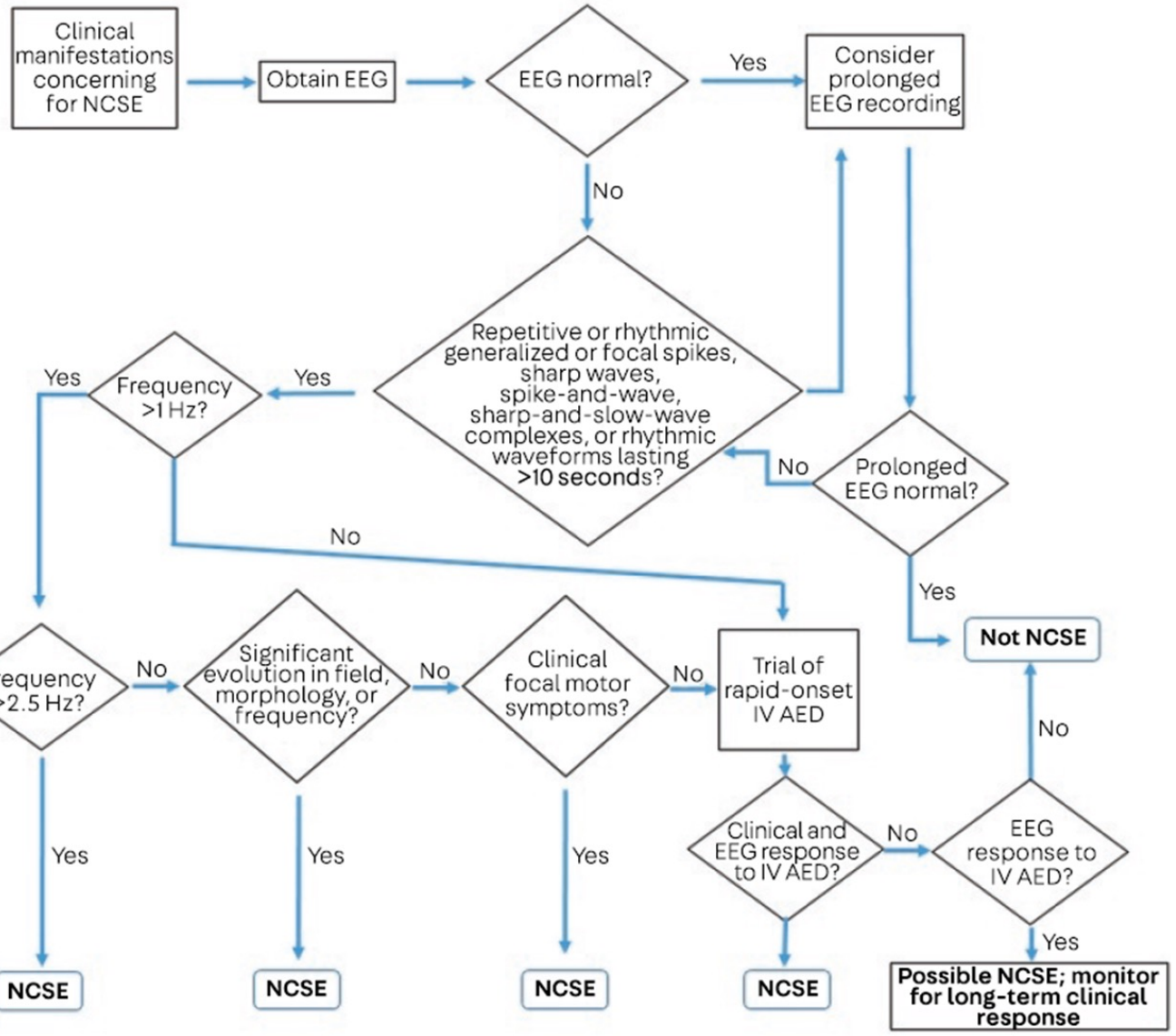
Review Example

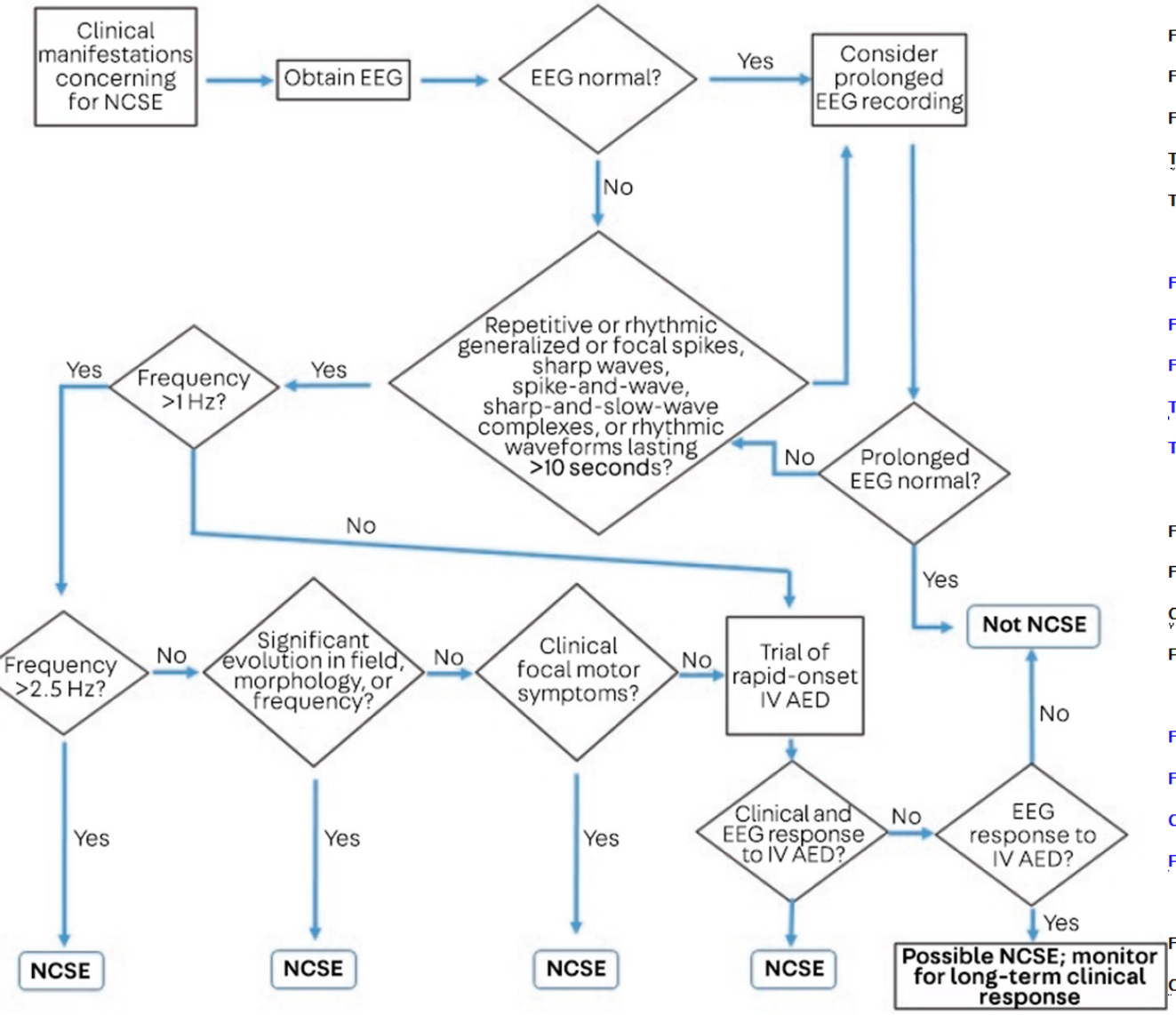
Patient with fever and unresponsive



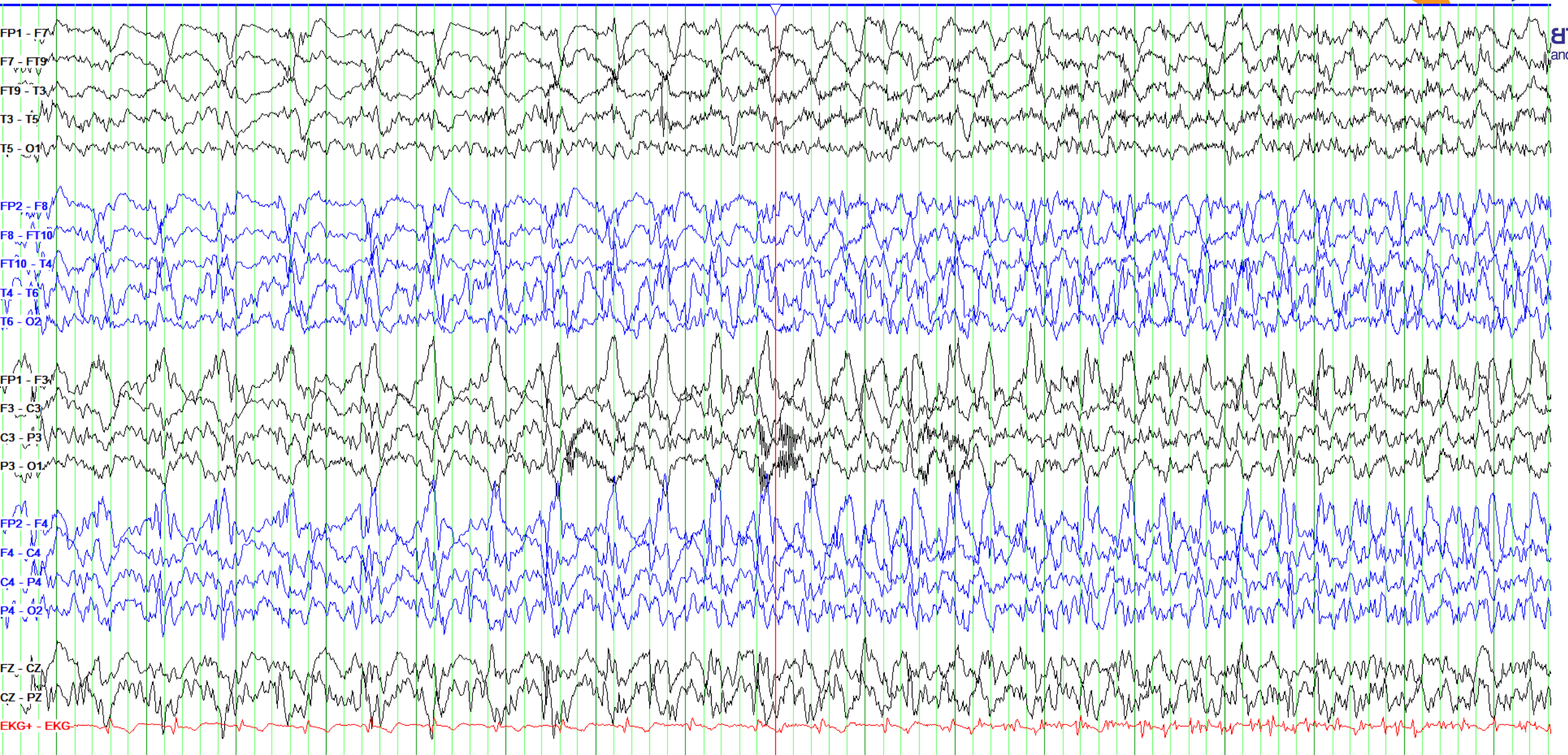
Patient with fever and unresponsive

Review Example

Patient with fever and unresponsive

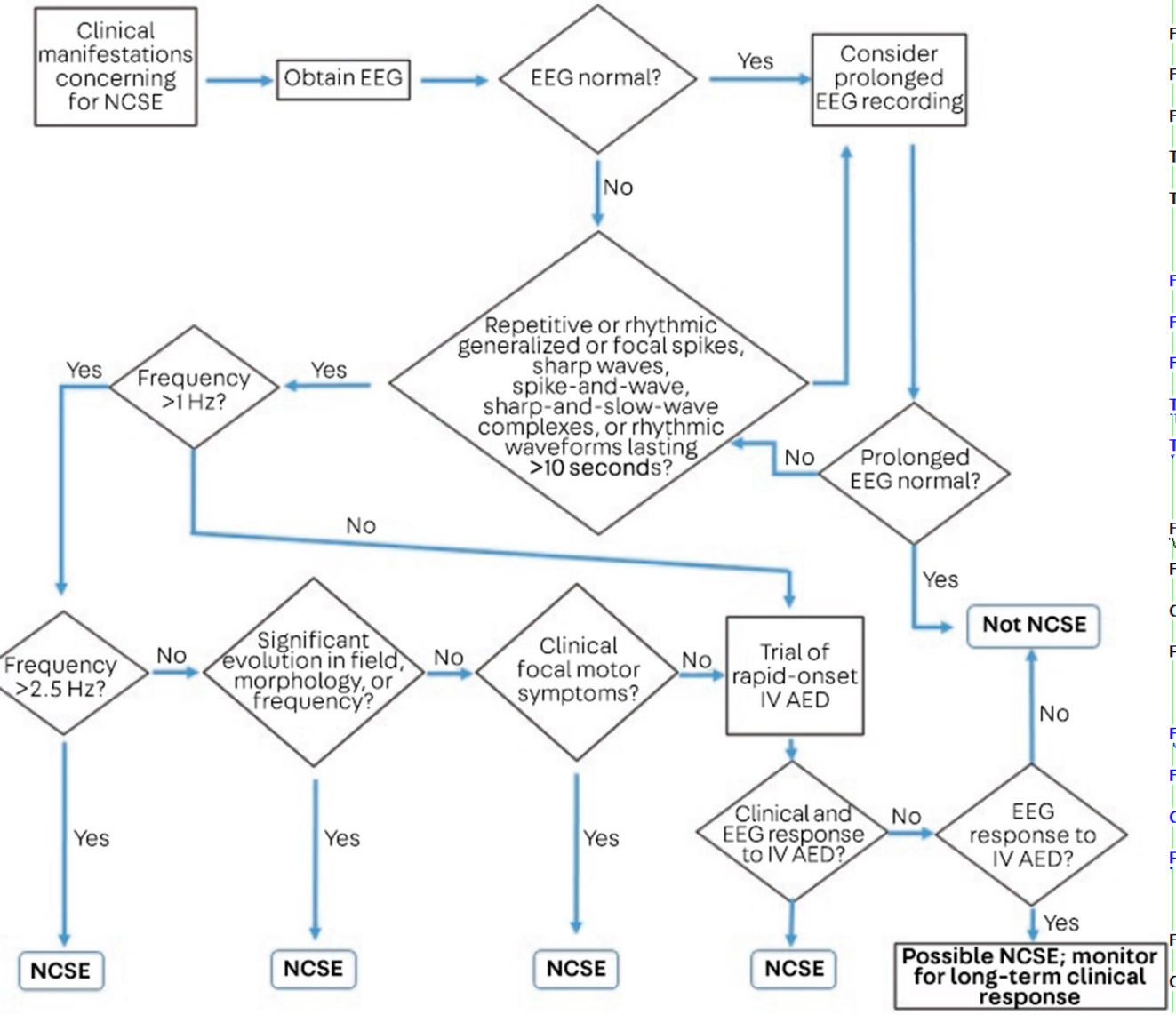


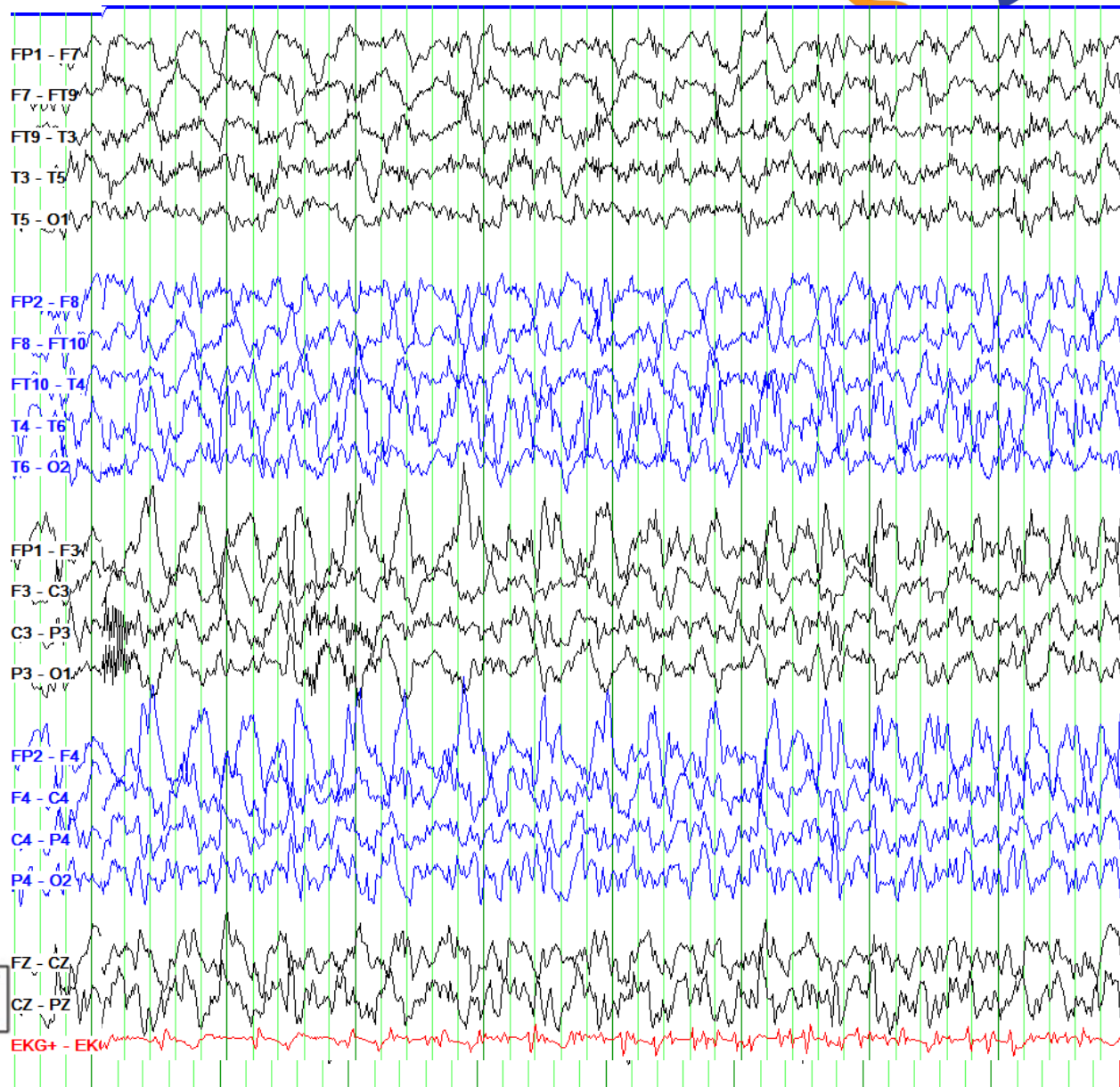
Patient with fever and unresponsive



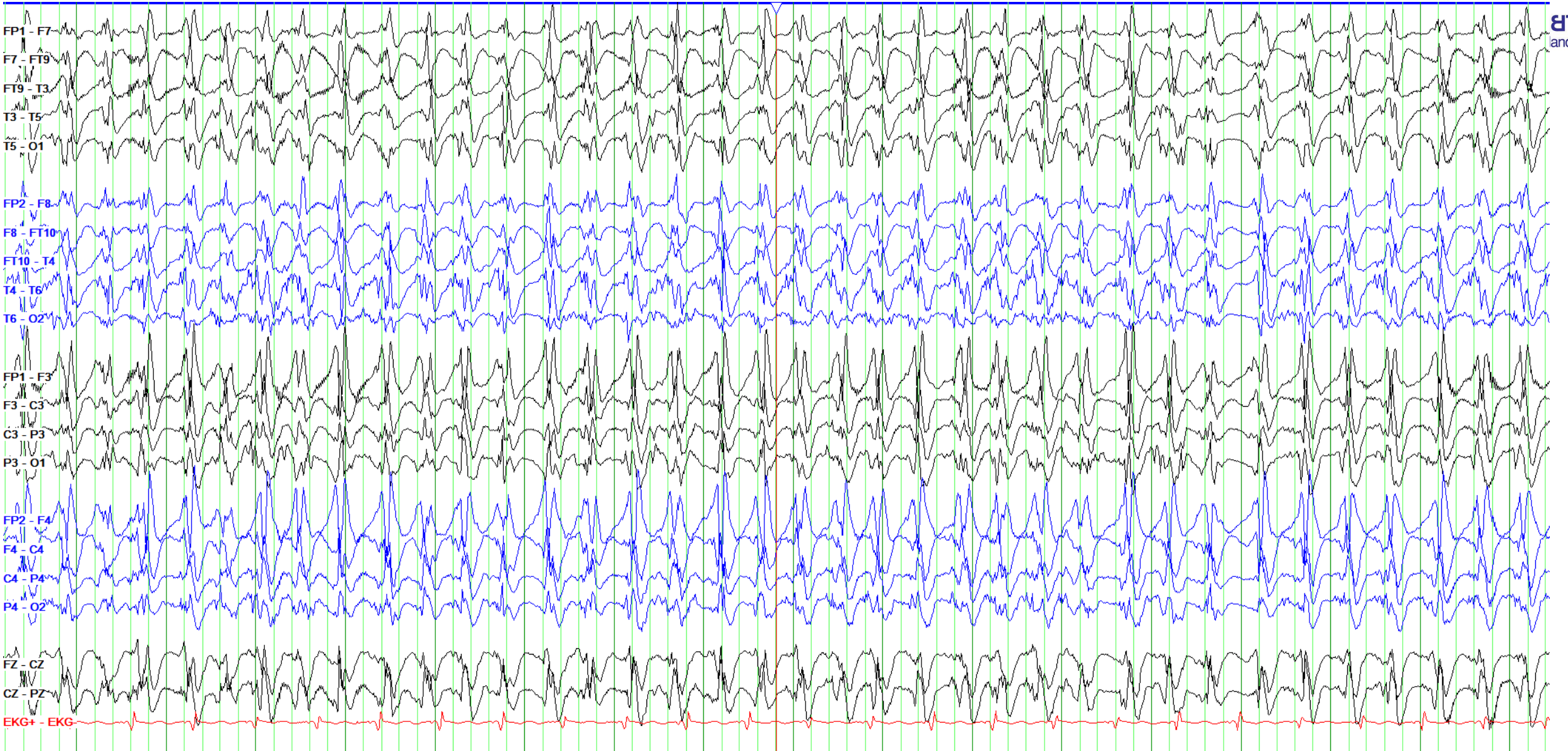
Review Example

Patient with fever and unresponsive



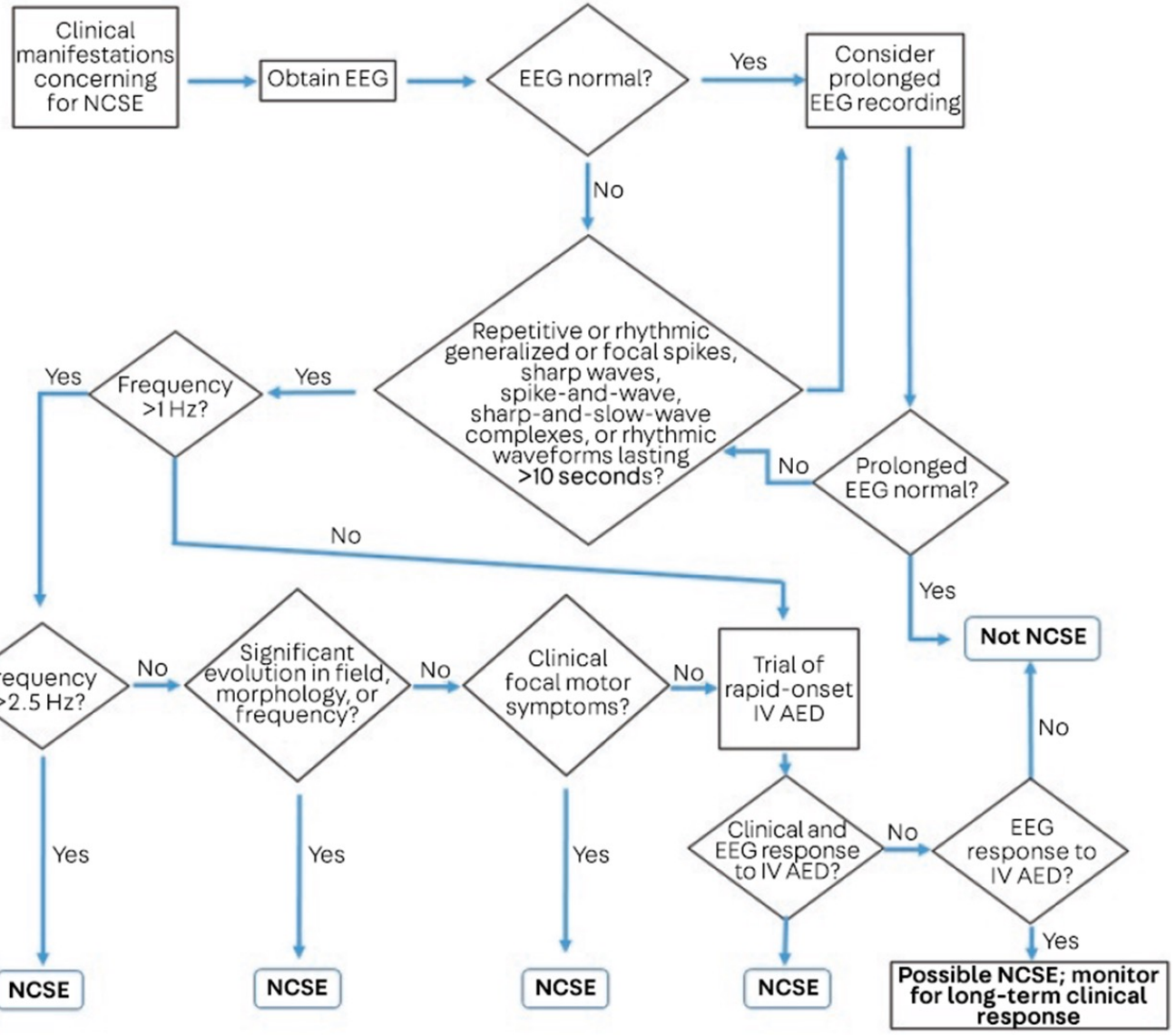


Patient with fever and unresponsive

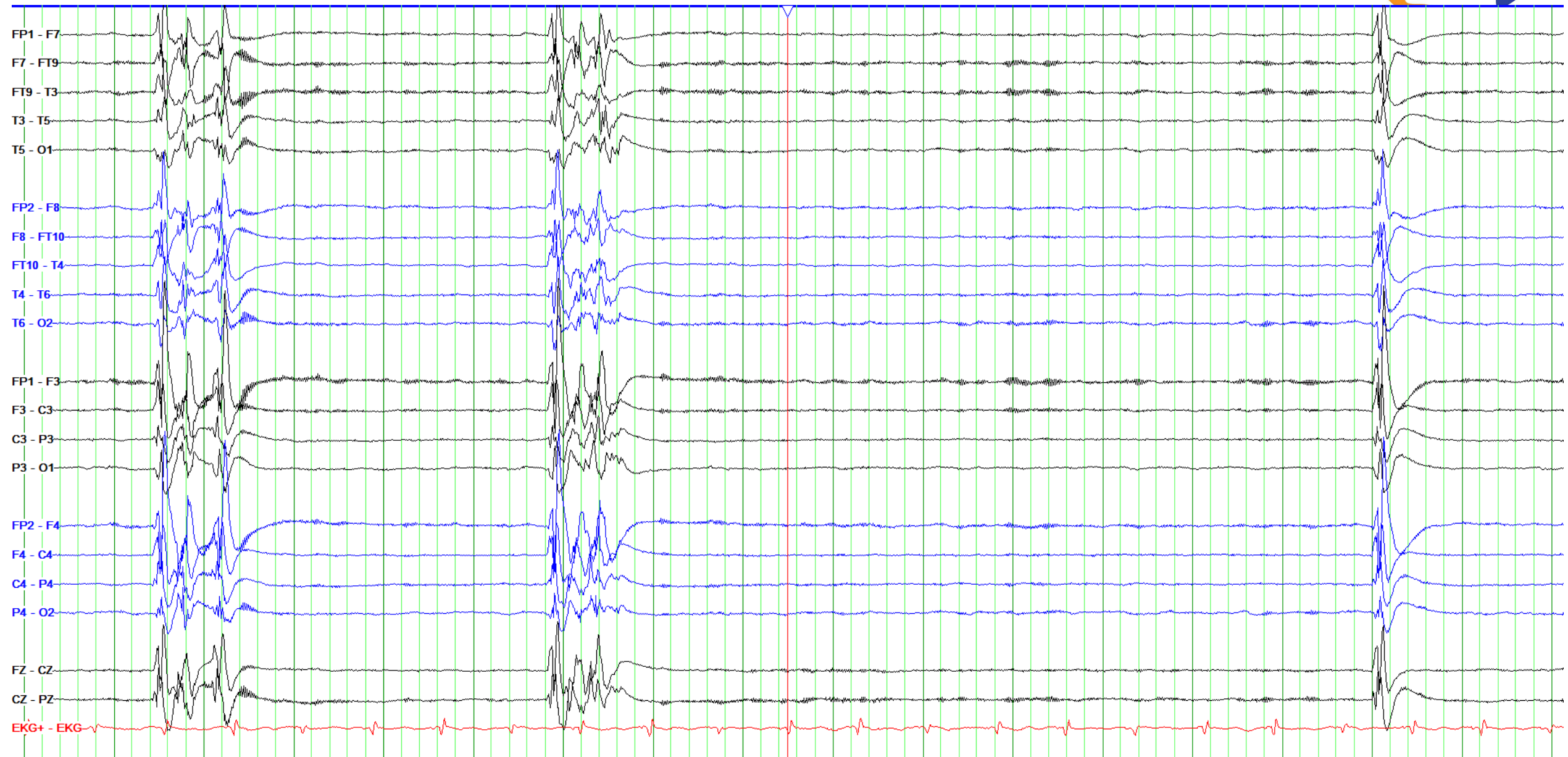


Review Example

Patient with fever and unresponsive

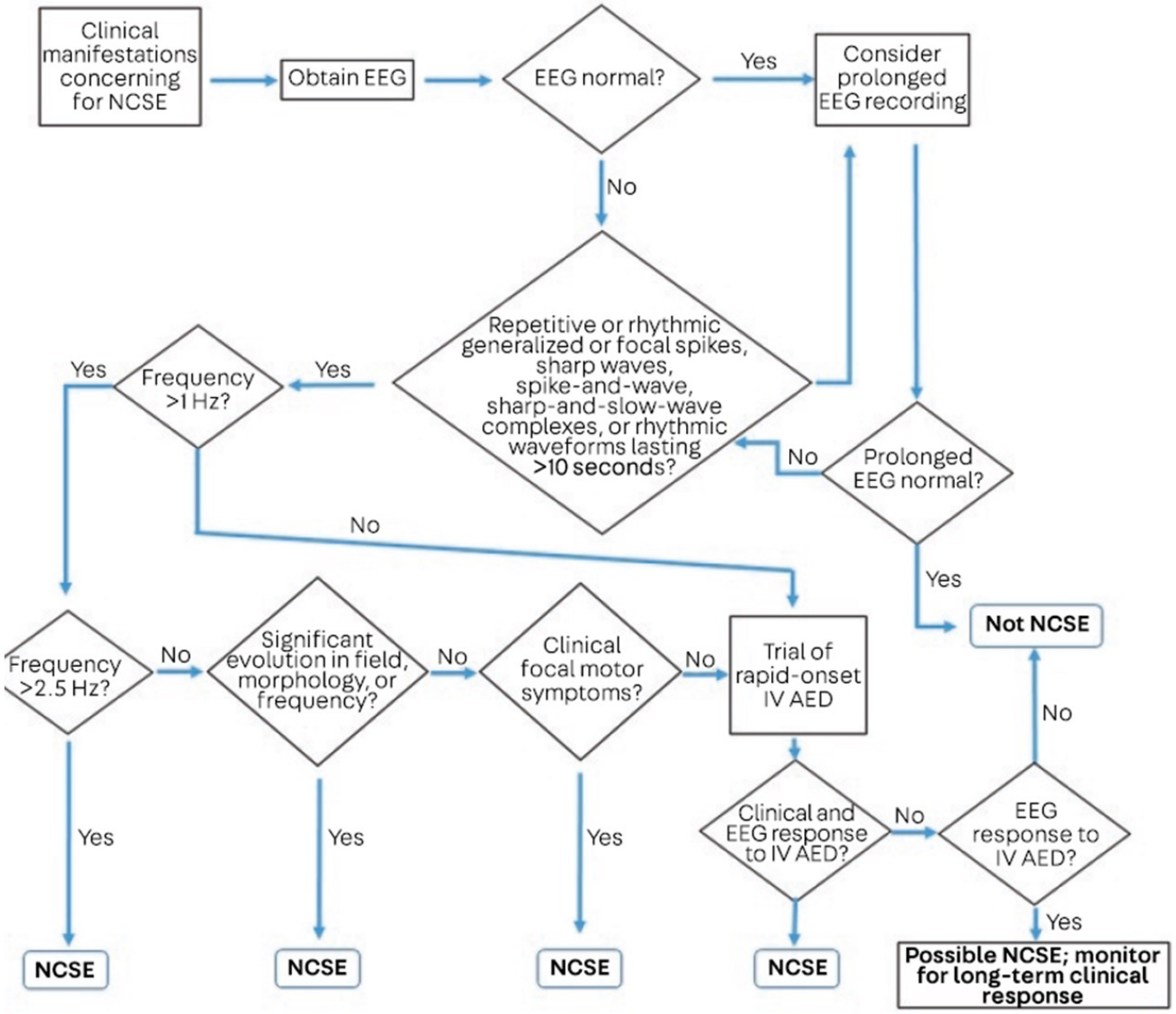


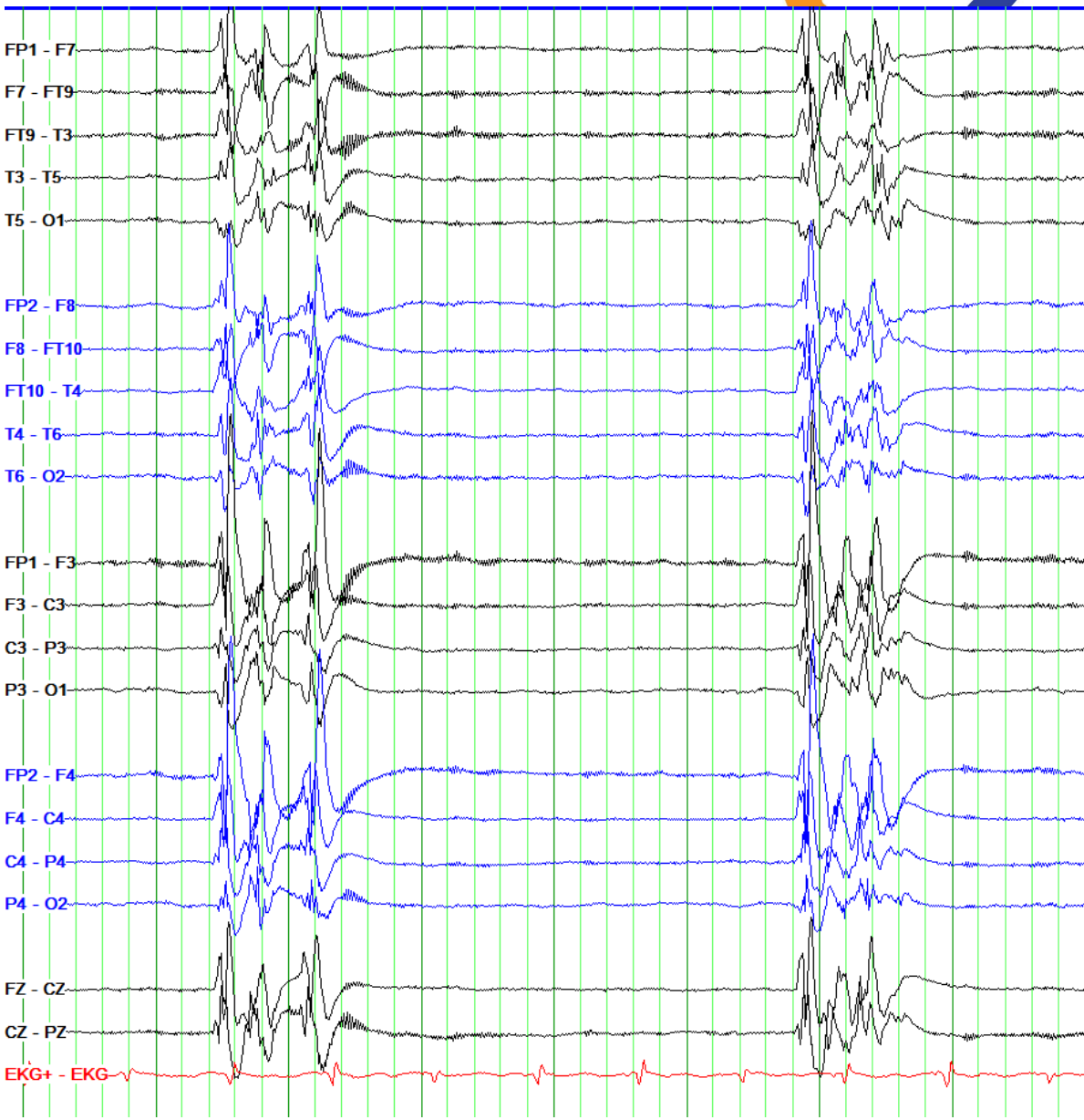
Patient with fever and unresponsive



Review Example

Patient with fever and unresponsive

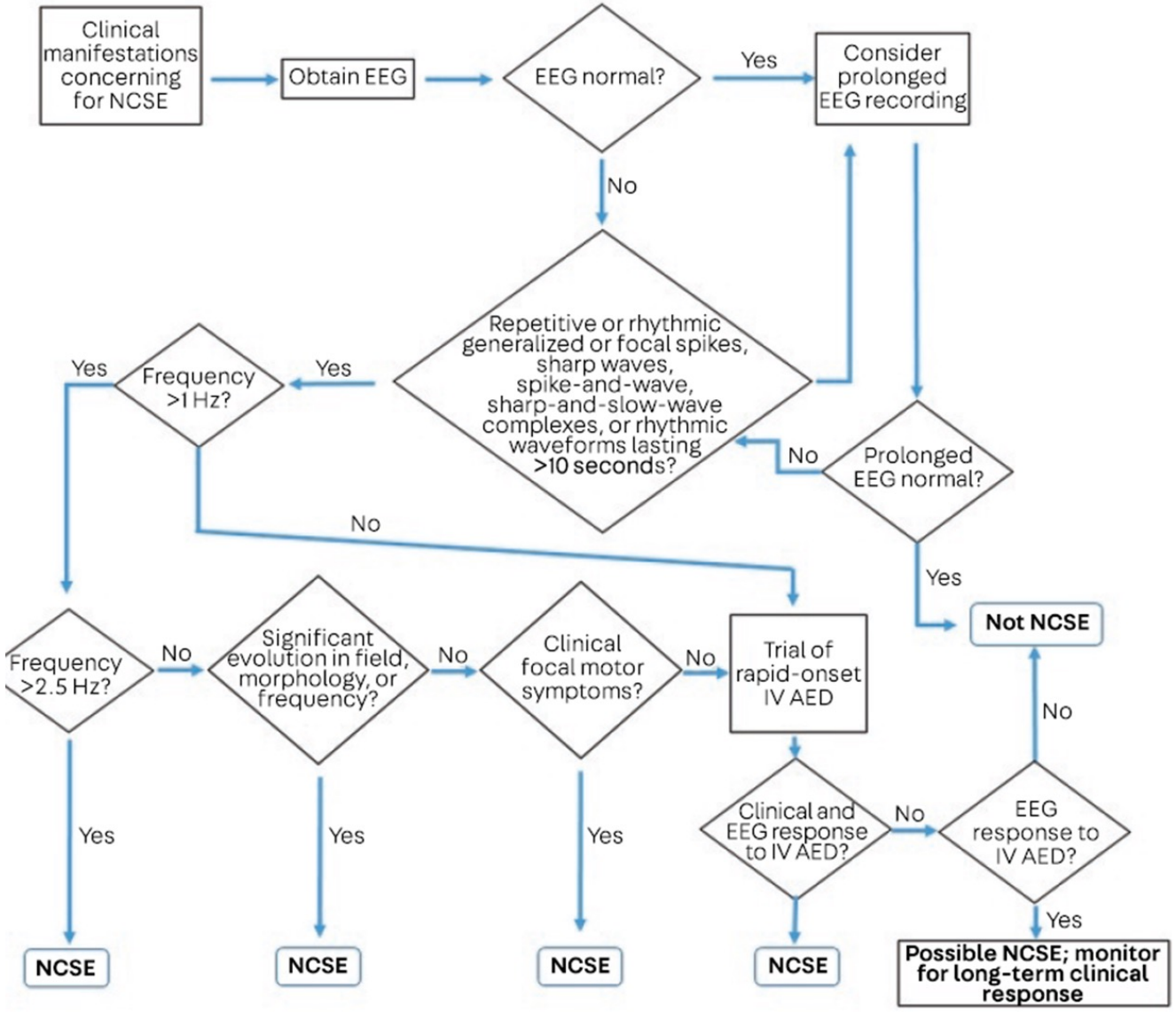




Patient with fever and unresponsive

Review Example

Patient with fever and unresponsive




Type EEG
LFF 1 Hz
HFF 70 Hz
Notch 60 Hz
Sensitivity 5 uV/mm
Timebase 15 mm/sec
Speed 1.0
Page
All
Clips
New Tab
New Tab
Spikes
Fp1 - F3
F3 - C3
C3 - P3
P3 - O1
Fp2 - F4
F4 - C4
C4 - P4
P4 - O2
Fp1 - F7
F7 - T7
T7 - P7
P7 - O1
Fp2 - F8
F8 - T8
T8 - P8
P8 - O2
100 uV
2 sec
Fz - Cz
Cz - Pz
L EKG - R EKG
[ ] SCS

ICTAL PATTERNS

observed EEG changes during seizures. The ictal discharges during seizures do not always consist of repetitive spikes or sharp waves; instead, ictal discharges vary in morphology (eg, sharply contoured or not), frequency, and distribution. Frequently, ictal discharges show evolution patterns with changes in **frequency, amplitude, field, or morphology** during the course of the seizure