

Classification of Epilepsy: What's new?

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Epilepsia, **(*)1-10, 2010
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SPECIAL REPORT

Revised terminology and concepts for **organization** of seizures and epilepsies: Report of the ILAE Commission on Classification and Terminology, 2005–2009

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The following material on the new epilepsy classification is based on the following 3 papers:

- Scheffer et al. ILAE classification of the epilepsies: Position paper of the ILAE Commission for Classification and Terminology. [*Epilepsia*, 58\(4\): 512-521,2017.](#)
- Fisher et al. Operational classification of seizure types by the International League Against Epilepsy: Position Paper of the ILAE Commission for Classification and Terminology. [*Epilepsia*, 2017, 58\(4\): 522-530](#)
- Fisher et al. Instruction manual for the ILAE 2017 operational classification of seizure types. [*Epilepsia*, 58\(4\): 531-542, 2017.](#)

Proposal for a Framework for Epilepsy Classification and Diagnosis

- Allows diagnosis at multiple levels
- Classification is primarily for clinical purposes and is relevant in all environments.
- Inherently dynamic

Operational (practical) definition of Epilepsy. ILAE, 2014

Epilepsy is a disease of the brain defined by any of the following conditions:

1. At least two unprovoked (or reflex) seizures occurring >24h apart.
2. One unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk (at least 60%) after two unprovoked seizures, occurring over the next 10 years.
3. Diagnosis of an epilepsy syndrome.

Epilepsy Resolved

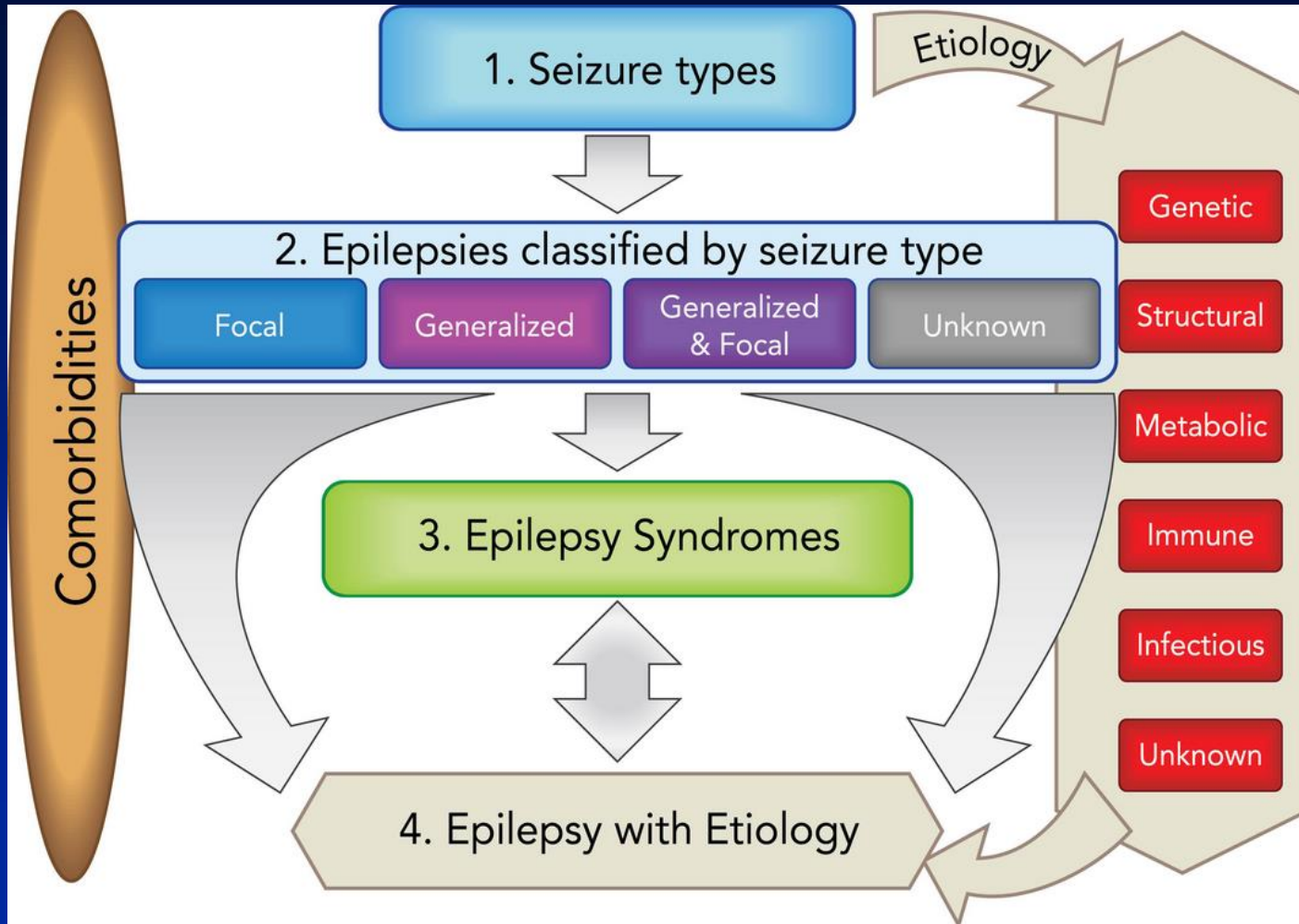
Epilepsy is now considered resolved for individuals who had an age-dependent epilepsy syndrome but are now past the applicable age

Or

those who have remained seizure free for past 10 years with no seizure medicines for last 5 years.

Framework for epilepsy classification.

Epilepsia 2017,58(4)512-21



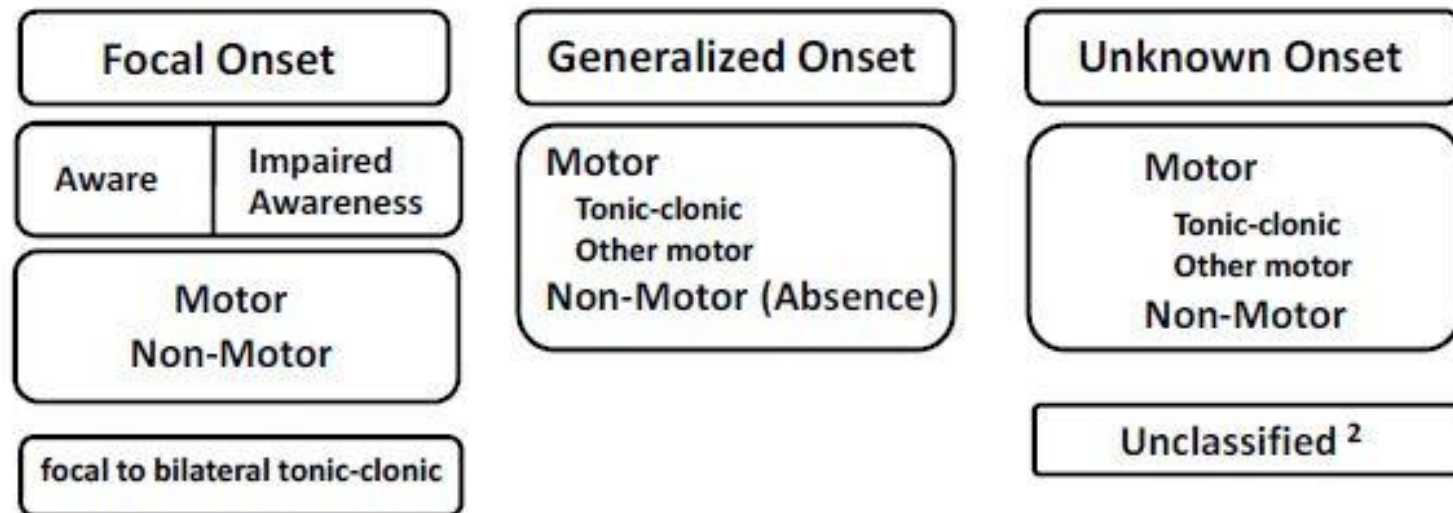
Framework of Epilepsy classification

- **First Step** : What is the seizure type?

Mode of seizure onset and classification of seizures.

- Focal seizures are conceptualized as originating within networks limited to one hemisphere.
 - For each seizure type ictal onset is consistent from one seizure to another, with preferential propagation patterns that can involve the contralateral hemisphere.
- Generalized epilepsies are conceptualized as at some point within, and rapidly engaging bilateral distributed networks.
 - Can include cortical and subcortical structures, but not necessarily include entire cortex
 - Generalized seizures may appear asymmetric
- Maybe of Unknown Onset

ILAE 2017 Classification of Seizure Types Basic Version ¹



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

Descriptors of focal seizures according to degree of impairment during seizure

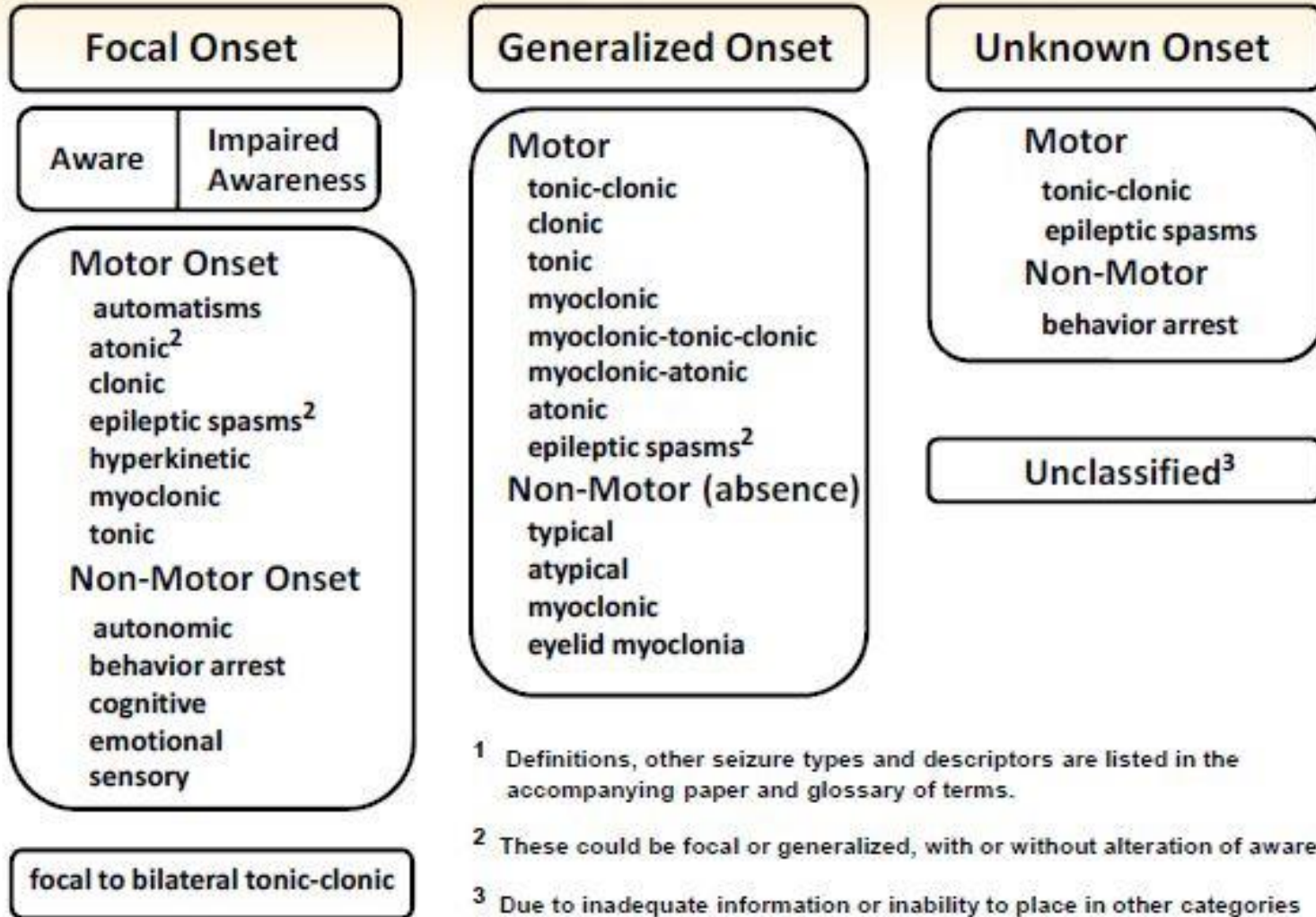
- Key role of **Awareness** in seizure classification because of practical importance for
 - Driving
 - Safety during seizures
 - Interference with schooling and learning
- **Classification uses Awareness as seizure name**
 - Focal seizure with awareness: replaces Simple Partial Seizure
 - Focal seizure with impaired awareness: Replaces Complex Partial Seizure

Spread of focal seizure

Evolving to a bilateral convulsive seizure

- May include tonic, clonic or tonic and clonic components in any order
- Replaces term “secondarily generalized seizure”
- Example: Focal motor left face/ arm/leg → bilateral convulsive

ILAE 2017 Classification of Seizure Types Expanded Version¹



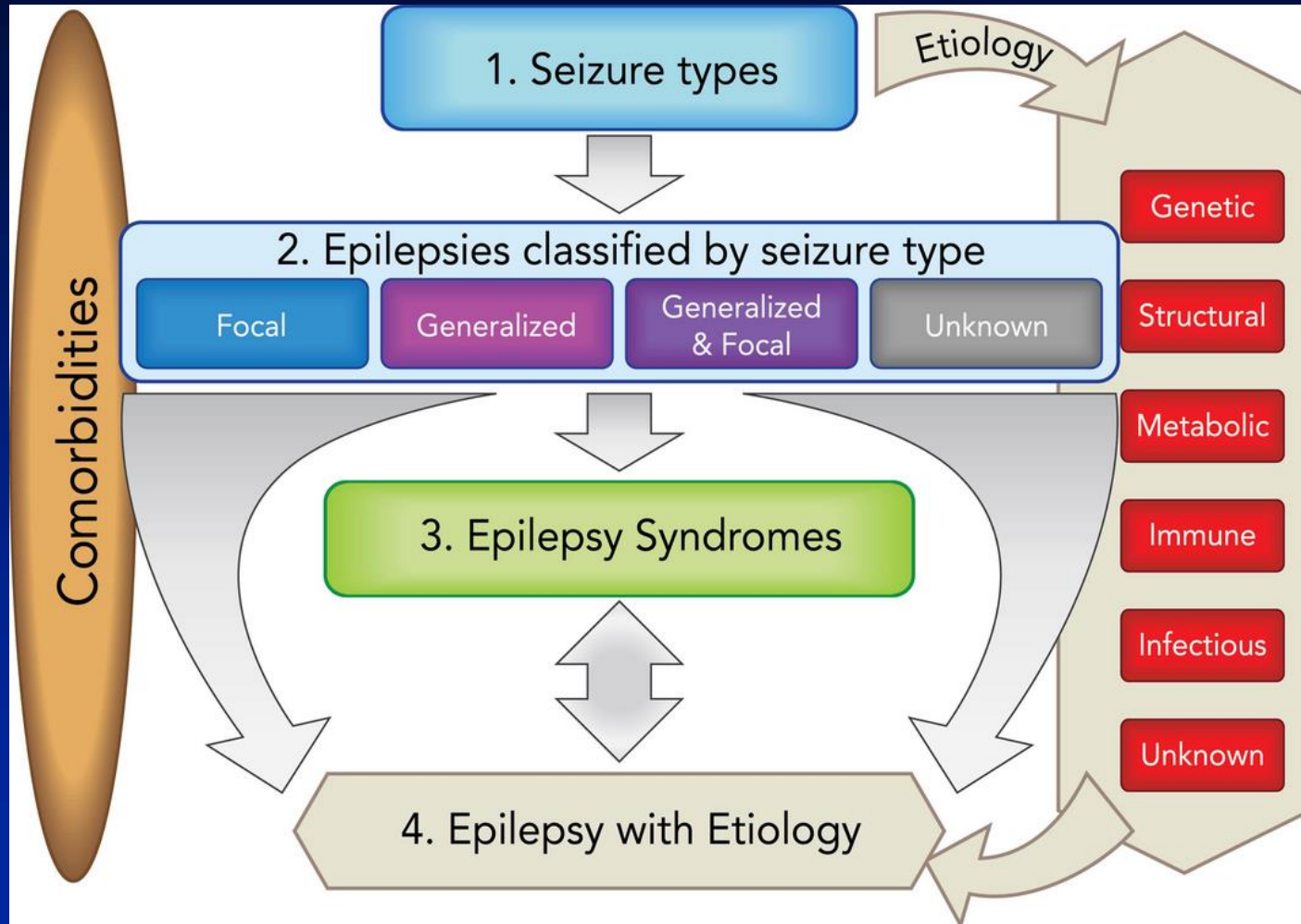
¹ Definitions, other seizure types and descriptors are listed in the accompanying paper and glossary of terms.

² These could be focal or generalized, with or without alteration of awareness

³ Due to inadequate information or inability to place in other categories

Framework for epilepsy classification.

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Framework of Epilepsy Classification

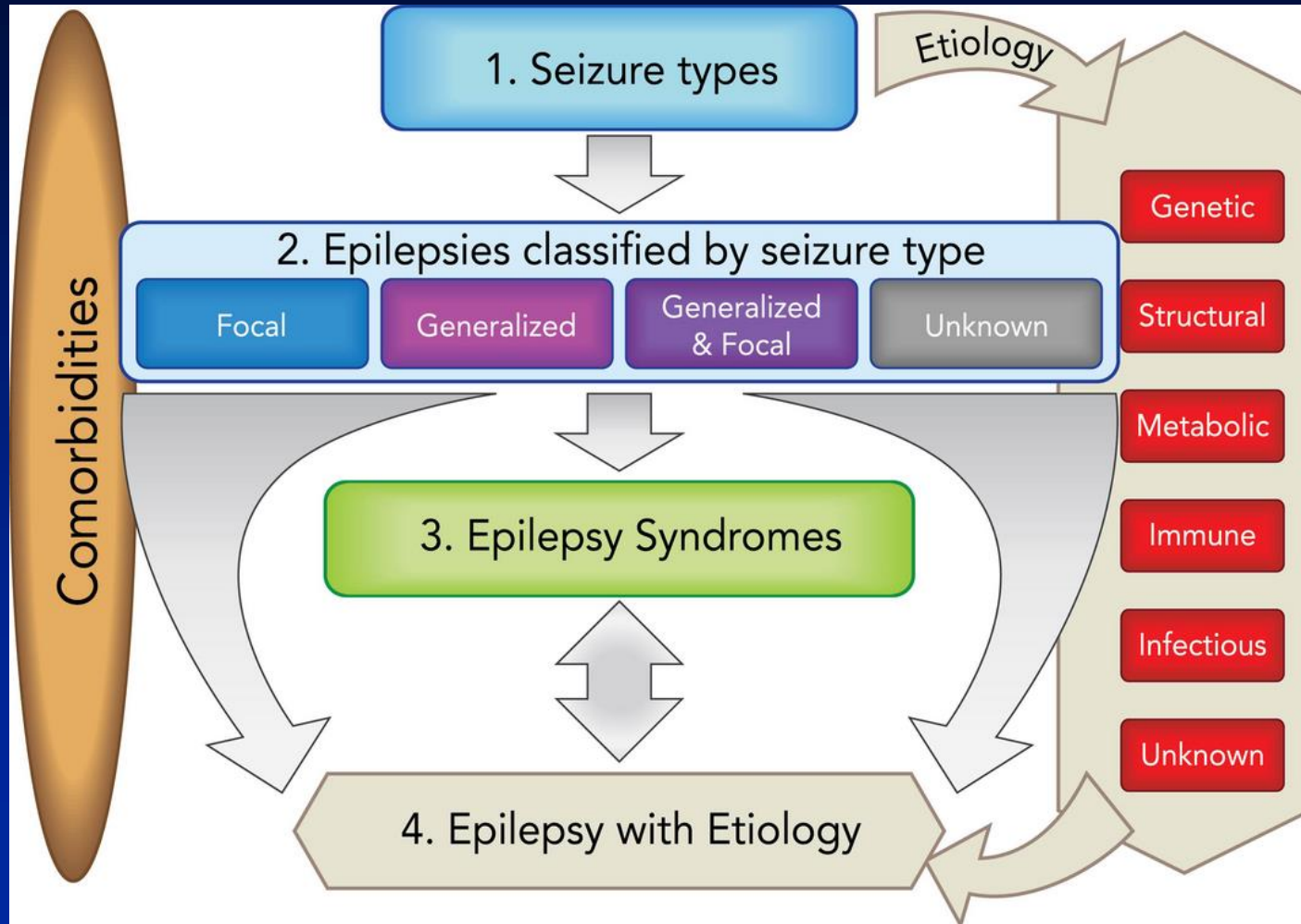
- **Step 2: Epilepsies classified by seizure type:**
 - Generalized Seizures
 - Focal Seizures
 - Generalized and Focal
 - Unknown

Epilepsy Type

- Generalized epilepsy:
 - Range of seizures types
 - Generalized spike and wave on EEG (need supportive evidence in patient with generalized tonic clonic seizures.)
- Focal epilepsies:
 - Unifocal, multifocal, one hemisphere.
 - EEG: focal epileptiform discharges
- Combined generalized and focal:
 - Diagnosis made on clinical grounds
 - Dravet and Lennox Gastaut Syndromes
- Unknown:
 - Incomplete data or data non informative.
 - Example: 5years old with 2 symmetrical tonic clonic seizures, normal EEG

Framework for epilepsy classification.

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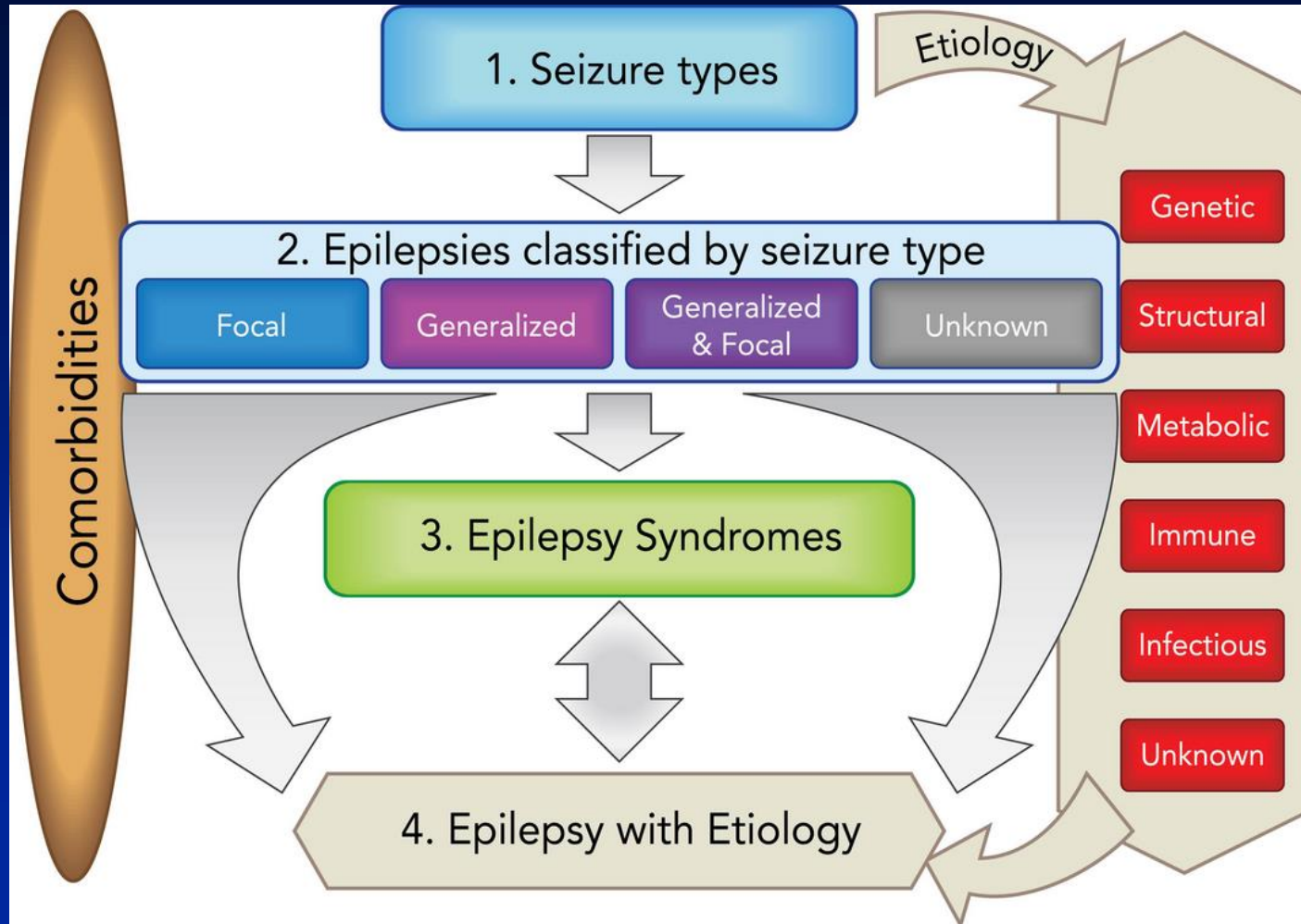
Framework of Epilepsy classification

- **Step 3: Diagnosis based on Syndrome-**

- Distinctive clinical entities that carry treatment and prognostic implications
- Can be classified according to age:
 - Neonatal eg Self limited familial neonatal epilepsy
 - Infancy: eg Dravet syndrome
 - Childhood: eg Self-limited epilepsy with centrotemporal spikes
 - Adolescence: eg Juvenile myoclonic epilepsy
- The arrangement of syndromes does not reflect aetiology.
- Syndromes may have range of aetiologies eg West syndrome
- Age only one way syndromes can be organized.

Framework for epilepsy classification.

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The epilepsy diagnosis

- **Step 4: Based on Aetiology:**
 - Genetic
 - Structural
 - Metabolic
 - Immune
 - Infectious
 - Unknown

Changes in Terminology: the term “Genetic”

Epilepsia 2017,58(4), 512-21

- Genetic replaces Idiopathic.
 - This does not mean that underlying genetic mutation is known or inherited
 - Specific genetic mutations are known in only a small minority of patients with epilepsy
 - De novo mutations are found increasingly. Explains lack of family history.
 - A genetic mutation maybe inherited but not fully penetrant.
 - Complex inheritance maybe present. Several genes contribute to risk. Susceptibility variants.
 - In most instances term “genetic” denotes that twin and family studies provide strong evidence for genetic basis. Here genes not usually known.

Framework for epilepsy classification.

Scheffer et.al *Epilepsia* 2017,58(4),512-521

- In some cultures use of word “genetic” not acceptable: use phrase “of unknown aetiology”
- Genetic causes maybe associated with several epilepsy syndromes
- Increasing number of genetic abnormalities causing both severe and mild epilepsies – SCNIA (Dravet and GEFS+). Mosaicism.
- In many incidences multiple aetiologies apply eg Tuberous Sclerosis : structural and genetic.
 - Provide 2 diverse treatment paths.
- Description of specific comorbidities with known aetiologies provides earlier recognition
 - eg PCDH19 mutations have high risk of behavioural and autistic features

Aetiology: Structural

- Need for careful imaging
 - Cortical malformation eg bottom of sulcus dysplasia
 - Hypothalamic hamartoma
 - Double cortex
- Underlying cause of abnormality maybe genetic or acquired - polymicrogyri
 - Secondary to gene mutation in gene - GPR56. Aetiology:Genetic/Structural
 - Intrauterine CMV
 - Vascular insult

Terminology changes

- In: Developmental and Epileptic Encephalopathy
- Out:
 - Symptomatic generalized
 - Benign

Developmental and epileptic encephalopathies

- Epileptic encephalopathy: epileptic activity itself contributes to severe cognitive and behavioural impairments above and beyond what might be expected from underlying pathology.
 - Global or selective impairments can be seen along a spectrum of severity and across all epilepsies
- Developmental encephalopathy: Developmental impairment without frequent epileptiform activity associated with regression.
- Concept of two entities important for parents and their expectations.

The term “ Benign”

- Use of this term underestimates comorbidities that maybe associated with “milder” epilepsies such as BRE, CAE.
- New terms suggested:
 - self limited
 - Pharmacoresponsive.
- Terms such as catastrophic and malignant have been abandoned.

Example

- 4m (F): Description from discharge summary. Presented to country hospital multiple seizures- lip smacking, eye rolling, staring, floppy, generalized tonic clonic activity with duskiess, 1 minute events. Post ictal drowsiness. No family history. Normal exam. Given phenytoin and keppra loads with good effect. Normal MRI. Discharged keppra.
- 4d later: multiple seizure recurrence, 50 daily. History emerged father (tonic clonic seizures), paternal grandmother and aunt had seizures at same age. All had good outcome with seizure freedom second year of life.
- EEG normal
- Treated low dose topimax and low dose tegretol. No further seizures. Withdrawal of medicines at 12 months seizure freedom

Epilepsy diagnosis and classification

- Seizure type: Focal with loss of awareness, evolving to bilateral convulsive
- Epilepsy based on seizure type: Focal
- Syndrome Self limiting infantile familial convulsions
- Aetiology : Genetic SCN2A gene mutation.
 - Second commonest syndrome after West syndrome , 12 months
 - Epilepsia 2016, 57,10, 1594-1601

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