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ILAE classification of epilepsy syndromes

Jerome Engel Jr.

Departments of Neurology and Neurobiology and the Brain Research Institute, David Geffen School of Medicine at UCLA, 710 Westwood Plaza, Los Angeles, CA 90095-1769, USA

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Abstract

The efforts of the International League against Epilepsy (ILAE) to devise classifications of the epilepsies has greatly improved communication among epileptologists and influenced both basic and clinical research. Several classifications have been proposed since 1970; the most recent classification of epilepsy syndromes and epilepsies was published in 1989. Since 1997, the ILAE Task Force on Classification and Terminology has been evaluating this classification and some modifications have been recommended. Although the 1989 classification can be criticized and needs to be updated, it has been widely accepted and is universally employed. Consequently, the Task Force has agreed not to propose a replacement until a clearly better classification can be created.

Keywords: Classification; Epilepsy syndromes; Terminology; Diagnostic scheme

The International League against Epilepsy (ILAE) Task Force on Classification and Terminology has been working since 1997 to evaluate the current 1981 International Classification of Epileptic Seizures (Commission of ILAE, 1981) and the 1989 International Classification of Epilepsies, Epileptic Syndromes and Related Seizure Disorders (Commission of ILAE, 1989), in order to propose improvements or complete revisions. Although this Task Force has published several reports (Engel, 1998, 2001; Blume et al., 2001) and its members have participated in a published discussion of the concept of classification (Wolf, 2003; Engel, 2003; Lüders et al., 2003; Berg and Blackstone, 2003; Avanzini, 2003), there is as yet no proposal for a new classification.

The 1989 International Classification of the Epilepsies has been criticized since its inception, but it has been widely accepted and serves a useful purpose. It was an early decision of the ILAE Task Force not to propose a replacement for this classification unless a clearly better classification could be devised. Numerous studies on the application of the 1989 epilepsy classification have been reported, with conflicting conclusions regarding its utility (Berg et al., 1999; Freitag et al., 2001; Kellinghaus et al., 2004; Manford et al., 1992; Onsurbe et al., 1999). There is general agreement, however, that it is most useful for the pediatric population.

E-mail address: engel@ucla.edu.

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Table 1
Definitions of key terms

Epileptic seizure type: An ictal event believed to represent a unique pathophysiological mechanism and anatomical substrate. This is a diagnostic entity with etiological, therapeutic and prognostic implications (new concept).

Epilepsy syndrome: A complex of signs and symptoms that define a unique epilepsy condition with different etiologies. This must involve more than just the seizure type; thus frontal lobe seizures per se, for instance, do not constitute a syndrome (changed concept).

Epilepsy disease: A pathological condition with a single specific, well-defined etiology. Thus, progressive myoclonus epilepsy is a syndrome, but Unverricht–Lundborg is a disease (new concept).

Epileptic encephalopathy: A condition in which the epileptic processes themselves are believed to contribute to the disturbance in cerebral function (new concept)

Benign epilepsy syndrome: A syndrome characterized by epileptic seizures that are easily treated, or require no treatment and remit without sequelae (clarified concept).

Reflex epilepsy syndrome: A syndrome in which all epileptic seizures are precipitated by sensory stimuli. Reflex seizures that occur in focal and generalized epilepsy syndromes that are also associated with spontaneous seizures are listed as seizure types. Isolated reflex seizures can also occur in situations that do not necessarily require a diagnosis of epilepsy. Seizures precipitated by other special circumstances, such as fever or alcohol withdrawal, are not reflex seizures (changed concept).

Focal seizures and syndromes: Replaces the terms partial seizures and localization-related syndromes (changed terms).

Simple and complex partial epileptic seizures: These terms are no longer recommended, nor will they be replaced. Ictal impairment of consciousness will be described when appropriate for individual seizures, but will not be used to classify specific seizure types (new concept)

Idiopathic epilepsy syndromes: A syndrome that is only epilepsy, with no underlying structural brain lesion or other neurological signs or symptoms. These are presumed to be genetic and are usually age-dependent (unchanged term).

Symptomatic epilepsy syndrome: A syndrome in which the epileptic seizures are the result of one or more identifiable structural lesions of the brain (unchanged term).

Probably symptomatic epilepsy syndrome: Synonymous with, but preferred to, the term cryptogenic, used to define syndromes that are believed to be symptomatic, but no etiology has been identified (new term).

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Table 2
Proposed diagnostic scheme for people with epileptic seizures and with epilepsy

Epileptic seizures and epilepsy syndromes are to be described and categorized according to a system that utilizes standardized terminology and that is sufficiently flexible to take into account the following practical and dynamic aspects of epilepsy diagnosis:
(1) Some patients cannot be given a recognized syndromic diagnosis.
(2) Seizure types and syndromes change as new information is obtained.
(3) Complete and detailed descriptions of ictal phenomenology are not always necessary.
(4) Multiple classification schemes can, and should, be designed for specific purposes (e.g. communication and teaching; therapeutic trials; epidemiological investigations; selection of surgical candidates; basic research; genetic characterizations).

This diagnostic scheme is divided into five parts, or Axes, organized to facilitate a logical clinical approach to the development of hypotheses necessary to determine the diagnostic studies and therapeutic strategies to be undertaken in individual patients:

Axis 1: Ictal phenomenology—from the Glossary of Descriptive Ictal Terminology, can be used to describe ictal events with any degree of detail needed.

Asix 2: Seizure type: from the List of Epileptic Seizures. Localization within the brain and precipitating stimuli for reflex seizures should be specified when appropriate.

Axis 3: Syndrome: from the List of Epilepsy Syndromes, with the understanding that a syndromic diagnosis may not always be possible.

Axis 4: Etiology: from a Classification of Diseases Frequently Associated with Epileptic Seizures or Epilepsy Syndromes when possible, genetic defects, or specific pathological substrates for symptomatic focal epilepsies.

Axis 5: Impairment: this optional, but often useful, additional diagnostic parameter can be derived from an impairment classification adapted from the WHO ICIDH-2.

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The ILAE Task Force has noted that the localization-related versus generalized and idiopathic versus symptomatic dichotomies of the 1989 epilepsy classification are overly simplistic and often difficult to apply. It was agreed that there is no need to require that all epilepsy syndromes be divided in this manner (Engel, 2001). Some revisions in the definitions of key terms have been proposed (Table 1), as well as a diagnostic scheme to be used to describe individual patients with epilepsy (Table 2) (Engel, 2001).

Axis 1 of the diagnostic scheme involves a detailed description of ictal phenomenology utilizing a glossary of descriptive ictal terminology (Blume et al., 2001). This can be extremely valuable for older patients with focal epilepsy who are being evaluated for surgical resection, but is not likely to be necessary in infants and young children, so it is optional.

Axis 2 is diagnosis of specific seizure type(s). The concept of seizure type as a diagnostic entity, rather than merely a description of clinical behavior and EEG, as in the current 1981 seizure classification (Commission of ILAE, 1981), is a new concept (Engel, 2001). The intention is that the seizure-type diagnosis will have implications with respect to etiology, approaches to diagnostic evaluation, treatment and prognosis. One criticism of the ILAE approach to classification is that syndromic diagnoses often cannot be made. The establishment of seizure types as diagnostic entities makes it possible for patient management and prognosis to be derived from a diagnosis of a specific seizure type when a syndromic diagnosis is not evident. Recognized seizure types are listed in Table 3. Whereas there remains controversy regarding some seizure types, particularly focal seizures that occur mostly in older children and adults, there is general agreement on those seizure types that occur in infancy and early childhood.

Axis 3 is diagnosis of a specific syndrome. Recognized syndromes are listed in Table 4. Approximately half of these occur in infancy and early childhood, most of which are non-controversial.

Axis 5 is an optional assessment of impairment taken from the WHO ICIDH-2 classification. This Axis is intended for application to older patients.

Most recently, a Core Group of the ILAE Task Force (Table 5) has been concerned with developing evidence-based criteria for evaluating epileptic seizure types and epilepsy syndromes as discrete diagnostic entities. The intention is to ultimately pattern the approach to classifying seizure types and syndromes after the approach to biological classifications (Ax, 1996); that is, to treat each diagnostic entity as a natural class that can be reproducibly distinguished from all other diagnostic entities or natural classes. Criteria for evaluating epileptic seizure types could include pathophysiologic mechanisms; anatomic substrates; response to AEDs; ictal EEG patterns; propagation; postictal features: and the epilepsy syndromes in which they occur. Criteria for evaluating epilepsy syndromes could include epileptic seizure type(s); age of onset; progressive nature; interictal EEG; associated interictal signs and symptoms; pathophysiologic mechanisms; anatomic substrates; etiological categories: and genetic basis. Seizure types and syndromes will be proposed as testable working hypotheses subject to verification, falsification and revision. At any point, hypotheses can be disproved as new information becomes available.

Organizing the list of recognized syndromes into one or more classifications is the next step in this process. Features that might be considered when organizing syndromes of infancy and early childhood into clusters with specific commonalities include autosomal-dominant epilepsies; epileptic encephalopathies; idiopathic generalized epilepsies; idiopathic focal epilepsies: and the family of GEFS+ conditions. This would replace the obligatory dichotomies, and it is conceivable that some syndromes could belong to more than one group, whereas others may be unique and belong to none of these groupings. The objective, however, will be to make any new classification adaptable to be used for specific purposes, including exchange of clinical information among physicians, teaching, clinical research activities such as epidemiological studies and drug trials, basic research, and genetic investigations.

The current ILAE Task Force on Classification and Terminology completed its 4-year term at the end of 2005. It was replaced by a full commission, which will continue this work. Once proposals are made for new seizure and epilepsy classifications, they will be field-tested, and pediatric neurologists throughout the world will provide important input. Any new classifications will be viewed as dynamic systems subject to change if new information becomes available, including information about ease of application and utility, as well as experimental data regarding the validity of specific seizure types and syndromes as diagnostic entities.

Table 3
Epileptic seizure types and precipitating stimuli for reflex seizures

- Self-limited seizure types
  - *Generalized seizures*
    - Tonic-clonic seizures (includes variations beginning with a clonic or myoclonic phase)
    - Clonic seizures
      - Without tonic features
      - With tonic features
    - Typical absence seizures
    - Atypical absence seizures
    - Myoclonic absence seizures
    - Tonic seizures
    - Spasms
    - Myoclonic seizures
    - Eyelid myoclonia
      - Without absences
      - With absences
    - Myoclonic atonic seizures
    - Negative myoclonus
    - Atonic seizures
  - *Focal seizures*
    - Focal sensory seizures
      - With elementary sensory symptoms (e.g., occipital and parietal lobe seizures)
      - With experiential sensory symptoms (e.g., temporo parieto occipital junction seizures)
    - Focal motor seizures
      - With elementary clonic motor signs
      - With asymmetrical tonic motor seizures (e.g., supplementary motor seizures)
      - With typical (temporal lobe) automatisms (e.g., mesial temporal lobe seizures)
      - With hyperkinetic automatisms
      - With focal negative myoclonus
      - With inhibitory motor seizures
    - Gelastic seizures
    - Hemiclonic seizures
    - Secondarily generalized seizures
- Continuous seizure types
  - *Generalized status epilepticus*
    - Generalized tonic-clonic status epilepticus
    - Clonic status epilepticus
    - Absence status epilepticus
    - Tonic status epilepticus
    - Myoclonic status epilepticus
  - *Focal status epilepticus*
    - Epilepsia partialis continua of Kojevnikov
    - Aura continua
    - Limbic status epilepticus (psychomotor status)
    - Hemiconvulsive status
- Precipitating stimuli for reflex seizures
  - Visual stimuli
    - Flickering light: color to be specified when possible
    - Patterns
    - Other visual stimuli
  - Thinking
  - Music
  - Eating
  - Praxis
  - Somatosensory
  - Proprioceptive
  - Reading
  - Hot water
  - Startle

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Table 4
Epilepsy syndromes and related conditions

Benign familial neonatal seizures
Early myoclonic encephalopathy
Ohtahara syndrome
[a]Migrating partial seizures of infancy
West syndrome
Benign myoclonic epilepsy in infancy
Benign familial infantile seizures
Benign infantile seizures (non-familial)
Dravet's syndrome
HHE syndrome
[a]Myoclonic status in non-progressive encephalopathies
Benign childhood epilepsy with centrotemporal spikes
Early onset benign childhood occipital epilepsy (Panayiotopoulos type)
Late onset childhood occipital epilepsy (Gastaut type)
Epilepsy with myoclonic absences
Epilepsy with myoclonic-astatic seizures
Lennox–Gastaut syndrome
Landau–Kleffner syndrome
Epilepsy with continuous spike-and-waves during slow-wave sleep (other than LKS)
Childhood absence epilepsy
Progressive myoclonus epilepsies
Idiopathic generalized epilepsies with variable phenotypes
Juvenile absence epilepsy
Juvenile myoclonic epilepsy
Epilepsy with generalized tonic-clonic seizures only
Reflex epilepsies
Idiopathic photosensitive occipital lobe epilepsy
Other visual sensitive epilepsies
Primary reading epilepsy
Startle epilepsy
Autosomal dominant nocturnal frontal lobe epilepsy
Familial temporal lobe epilepsies
[a]Generalized epilepsies with febrile seizures plus
[a]Familial focal epilepsy with variable foci
Symptomatic (or probably symptomatic) focal epilepsies
Limbic epilepsies
Mesial temporal lobe epilepsy with hippocampal sclerosis
Mesial temporal lobe epilepsy defined by specific etiologies
Other types defined by location and etiology
Neocortical epilepsies
Rasmussen syndrome
Other types defined by location and etiology
Conditions with epileptic seizures that do not require a diagnosis of epilepsy
Benign neonatal seizures
Febrile seizures
Reflex seizures
Alcohol-withdrawal seizures
Drug or other chemically induced seizures
Immediate and early post cerebral insult seizures
Single seizures or isolated clusters of seizures
Rarely repeated seizures (oligoepilepsy)

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[a] Syndromes in development

Table 5
Core group members

Jerome Engel, Jr. (Chair), Los Angeles, CA
Frederick Andermann, Montreal, Canada
Giuliano Avanzini, Milan, Italy
Anne Berg, DeKalb, IL
Samuel Berkovic, Melbourne, Australia
Warren Blume, London, Canada
Olivier Dulac, Paris, France
Natalio Fejerman, Buenos Aires, Argentina
Hans Lüders, Cleveland, OH
Masakazu Seino, Shizuoka, Japan
Peter Williamson, Lebanon, NH
Peter Wolf, Dianalund and Copenhagen, Denmark

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