Pediatric Epilepsy-

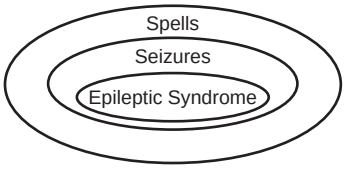
Larry D. Olson, M.D.
Division of Child Neurology

Definition of Terms

Spell (or event or attack) is a noncommital (honest) term used when the nature of an attack is uncertain. Is it a seizure or a seizure equivalent? Is the seizure really a generalized or a focal brain disturbance? Unless the nature of concurrent brain electrical activity is known with certainty, medically precise terms like "petit mal seizure" should not be applied to an attack of stereotyped behavior.

Seizure is a paroxysmal disturbance of brain electrical activity. Seizure types are classified based on <u>*both EEG and behavioral changes*</u> during a seizure.

Figure 1



8-10% of the population will have a seizure by age 80,
4-5% by age 20,
3-4% by age 6 will have a febrile seizure.

Epilepsy is recurrent unprovoked seizures. Prevalence, or percent of the population actively experiencing recurring seizures, varies from 0.2 - 1%, usually 0.7%. In other words, most seizures do not recur, and those that do often do not persist.

Syndrome is a characteristic clinical constellation of one or more seizure types, plus certain EEG, genetic, pathological or prognostic features. Unlike disease, it may not have uniform etiology and prognosis.

CAT scans, MRI scans, PET scans, interictal EEGs, psychological tests, etc. cannot determine whether or not a certain behavior is a seizure. They may help define the seizure type and syndrome and therefor the treatment and prognosis.

The Paradigm

The logic of classification and treatment involves certain steps:

Is an event an epileptic seizure?
If a seizure, has it or will it recur; is it epilepsy?
Are the seizures focal or generalized in onset?
Which medicine is the most appropriate for the seizure type?
Are there EEG or clinical features to define an epileptic syndrome?
Are other diagnostic tests needed? What is the prognosis?
Are there other therapeutic options?

Nonepileptic Seizure "Equivalents"

20-30% of patients being treated with antiepileptic drugs (AEDs) for epilepsy actually have nonepileptic attacks, usually psychogenic pseudoseizures in adults, which may begin in adolescence. They may have concurrent real epileptic seizures. Migraines are most common in childhood.

Table 1

Childhood	Adolescents and adults
*** Migraine**	*** Pseudoseizures**
* Tics, chorea, other movement disorders	* Tics, chorea, other movement disorders
* Gastroesophageal reflux	* Migraine
* Benign paroxysmal vertigo	* Transient ischemic attack
Shudders and Startles	* Hyperventilation
Syncope	Syncope
Arrhythmia, mitral valve prolapse	Arrhythmia, mitral prolapse
Breath-holding spells, pallid infantile syncope	Transient global amnesia
Sleep disorders (somnabulism, night terrors)	Narcolepsy
Cyclic vomiting, recurrent abdominal pain	Automatic behavior syndrome

* May not always be associated with impairment of consciousness

Points to take home:

Pseudoseizures are rare in prepubertal children.
Migraines are common, often unrecognized as such, especially if "complicated".
Reflux is a common cause of limpness or movements in infants prompting referral.
Breathholding spells are usually recognized by pediatricians, except when dramatic.
Cyanotic syncope occurs with distress or anger.
Pallid syncope occurs with fright.

Special pediatric seizures and syndromes

Neonatal seizures are never generalized, due to the incomplete myelination and inability to produce synchrony. They often appear fragmentary or multifocal, and may be "subtle", but apnea alone is rarely a seizure. Synchronous motor events usually reflect brainstem activity with severe injuries. Pre and perinatal injury and metabolic causes are most common. Neonatal ictal behaviors usually change within a few months.

Febrile seizures are common. They are classified separately:
Simple febrile seizures are (1) brief, (2) do not recur within 24 hours, and (3) are not focal.
Complex febrile seizures are not simple.

- ☞ Simple febrile seizures do not increase the risk of epilepsy or developmental problems, and are often not treated unless they are frequently recurrent.
- ☞ Complex febrile seizures may increase the risk of epilepsy slightly (to 3-10%), but are usually not treated unless problematic or associated with other risks.
- ☞ Daily phenobarbitol (or valproate) or intermittent Valium with fever are the only effective preventative treatments.

Classification of Seizures

Table 2

Clinical seizure type		"Best" Medications
· **Focal or partial seizures** originate in a focus or part of the brain. *They may or may not spread to other parts or the whole brain.*		*Note:* (VPA, LTG, and ZNS may have efficacy for all seiure types)
- SPS	Focal seizures which do not spread are called simple partial seizures. They are often associated with auras ("a breeze", or momentary disturbance of function).	**CBZ** (Tegretol / carbamazepine) **PHT** (Dilantin / phenytoin) **PB** (phenobarbitol) **LEV** (Keppra / levetiracetam) **LTG** (Lamictal / lamotrigine) **OCBZ** (Trileptal / oxcarbazepine) **TGB** (Gabitril / tiagabine) **TPM** (Topamax / topiramate) **VPA** (Depakote / valproic acid) **ZNS** (Zonegran / zonisamide)
- CPS	Focal seizures which spread bilaterally are called complex partial seizures. They are associated with loss of awareness and inability to correctly respond to the environment.	
- GTCS	Focal seizures which spread to the entire brain are called secondarily generalized partial seizures (SGTCS). They are associated with convulsions.	
· **Generalized seizures** originate uniformly in the entire brain. *There is no focus. There is no aura.*		
- GTCS	Nonfocal (primary generalized) tonic stiffening alternating with rhythmic clonus.	**VPA / LTG / TPM / ZNS / PHT / PB / CBZ /** most AEDs
- Tonic	Pure bilateral stiffening.	
- Clonic	Pure rhythmic bilateral flexion and extension.	
- Absences	Brief behavioral arrest with unresponsiveness only, or with very simple occular or oral automatisms.	**VPA / LTG / ZNS / ESM** (Zarontin / ethosuximide) / **CZP** (Klonipin / clonazepam)
- Atypical Absence	Longer absence, complicated automatisms, poorer response to medications, < 3 / sec spike wave.	
- Myoclonic	Lightening fast single bilateral jerk, may repeat.	**VPA / LTG / ZNS / CZP**
- Atonic	Sudden generalized loss of tone, uncommon.	
- Astatic	Drop attacks due to tonic, myoclonic, or atonic seizures.	

Points to take home:

+ **Description** is most helpful in suggesting an event was or was not a seizure, but not whether it origintes focally or is generalized in onset, unless there is a typical aura or focal motor component.

·Syncope or apnea are most unlikely to be seizures.
·Odds of a seizure being generalized vs. partial are 50:50 in childhood, 20:80 in adults.
·"Staring spells" may be CPS or absences, but should be easily distinguished.
·GTC seizures may be focal "secondarily generalized" or "primarily generalized".

+ **EEG** when abnormal can suggest the nature of the seizure tendency as focal or generalized, but does not determine whether or not a spell was a seizure or whether or not to treat, therefor help in drug selection, the value of a sca n, and the prognosis.

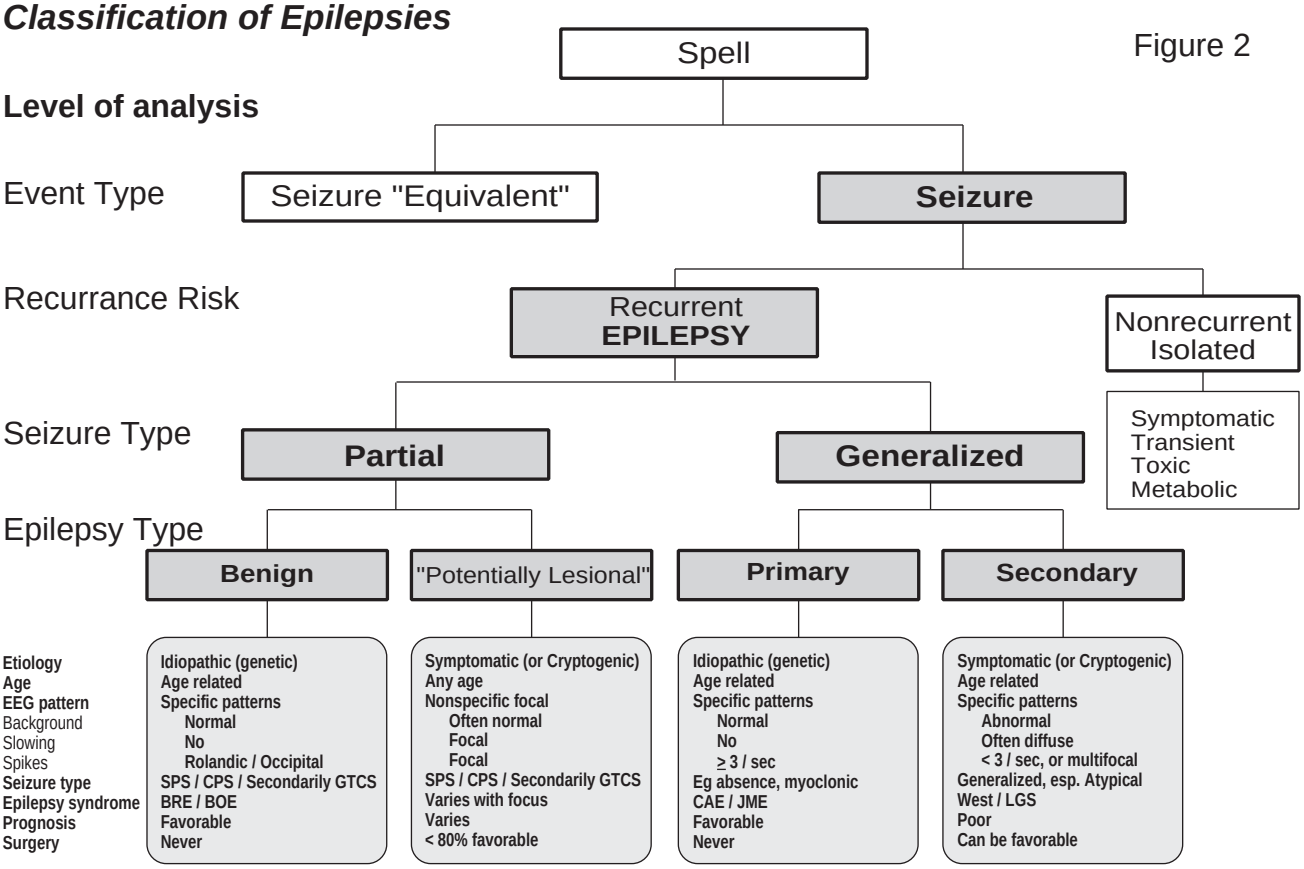
·50% of patients with partial seizures show focal spikes (or slowing), up to 75% after repeat studies or sleep deprivation.
·90% of patients with generalized seizures show generalized spikes, more with sleep deprivation, hyperventilation, or photic stimulation.
·A normal EEG would favor partial onset seizures in a patient with epilepsy.
·1-2% of nonepileptics have spikes on their EEGs.
·20% of patients with spikes on the EEG do not have epilepsy.

+ There is no "perfect medication" (yet) that treats all seizure types.

·Most AEDs treat partial seizures or convulsions (whether focal or generalized in onset), but there is a great deal of individual variation among patients.
·VPA, LTG and ZNS are the only drugs effective for all types of generalized seizures.
·CBZ, GBP (Neurontin) and TGB may worsen or cause generalized seizures (absence or myoclonus).
·LTG is not recommended as first choice in children, especially if on VPA, because of frequent serious rashes.

Classification of Epilepsies

Figure 2



(May read the figure from the bottom up: Epileptic syndromes are divided into benign and nonbenign partial epilepsies and into benign and nonbenign generalized epilepsies).

Points to take home:

Recurrence frequency and risk determine the need for medication.
Seizure type determines the type of medication
Epilepsy syndrome determines etiology (and need for scans), age limited features (and prognosis for remission), as well as such issues as potential surgical interventions and developmental liabilities.

Q: "Will my child outgrow the seizures?" **A**: Only in the *benign* partial or generalized epilepsies excepting juvenile myoclonic epilepsy. On the other hand, most patients with nonbenign partial epilepsy do not continue to forever seize, while most with secondary generalized epilepsies do.

Common semantic confusion:
"Secondarily generalized seizures" are partial-onset seizures that spread and generalize. They exist at the level of analysis of seizure type, and may be seen in either benign partial or common potentially lesional partial epilepsies.
"Secondary generalized epilepsy" is a constellation of any number of generalized-onset seizure types. It exists at the level of analysis of epilepsy type, and is associated with an unfavorable prognosis for seizure control or normal development.

Synonymns

Common Parlance	Formal Terminology	Proposed Terminology
Benign Partial	Idiopathic Localization-related	Idiopathic Focal
(Various terms for nonidiopathic focal seizures or epilepsy)	-Cryptogenic Localization-related -Symptomatic Localization-related	-Probably Symptomatic Focal -Symptomatic Focal
Primary Generalized	Idiopathic Generalized	Idiopathic Generalized
Secondary Generalized	-Cryptogenic Generalized -Symptomatic Generalized	-Probably Symptomatic Generalized -Symptomatic Generalized
Simple Partial Seizures	Simple Partial Seizures	Focal Seizures (elaborate)
Complex Partial Seizures	Complex Partial Seizures	Focal Seizures (elaborate)

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 uses standardized terminology, and that is sufficiently flexibleto take into account the following practical and dynamic aspects of epilepsy diagnosis:

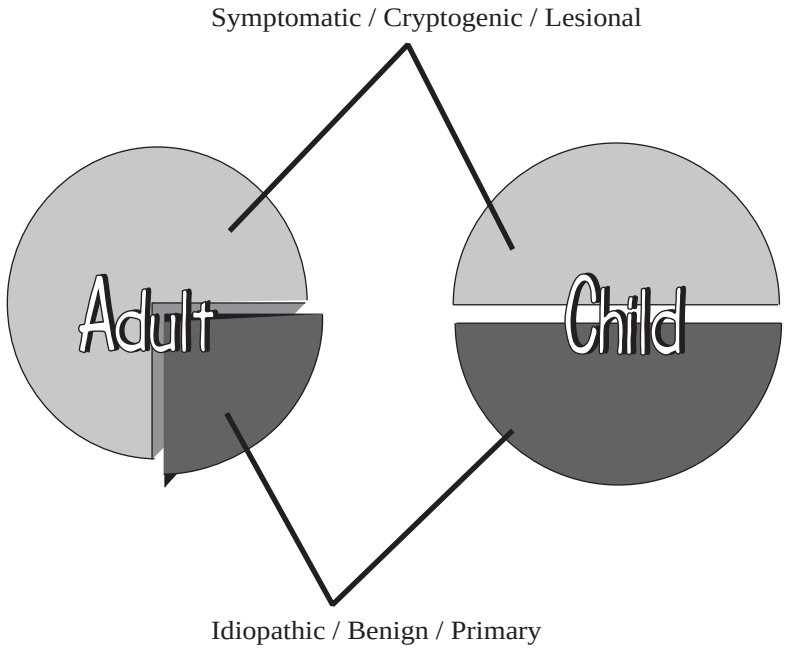
1. Some patients cannot be given a recognized syndromic diagnosis.
2. Seizure types and syndromes change as new information is obtained.
3. Complete and detailed descriptions of ictal phenomenonology are not always necessary.
4. Multiple classification schemes can, and should, be designed for specific purposes (e.g., communication and teaching; therapeutic trials; 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 phenomenonology, from the Glossary of Descriptive Ictal Terminology, can be used to describe ictal events with any degree of detail needed.
Axis 2: Seizure types, from the List of Epileptic Seizures. Localization within the brain and precipitating stimuli for reflex seizures should be specified when appropriate.
Axis 3: Syndromes, from the List of Epilepsy Syndromes, with the understanding that a syndromic diagnosis may not always be possible.
Axis 4: Etiology, from the Classification of Diseases Frequently Associated with Epileptic Seizures or Epilepsy Syndromes when possible, genetic defects, or specific pathologic 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.

Engle J. ILAE Commission Report, A Proposed Diagnostic Scheme for People with Epileptic Seizures and with Epilepsy: Report of the ILAE Task Force on Classification and Terminology,*Epilepsia*, 42 (6): 796-803,2001.

The Major Epilepsy Syndromes



The Major Benign Partial Syndromes

<u>Benign Rolandic Epilepsy</u> (BRE, Benign Partial Epilepsy with Centro-Temporal Spikes of Childhood)

Frequency 15 - 20%
Genetic predisposition 40%
Male preponderance 60%
Onset 2 - 13 years (peak: 9-10 years)

EEG Blunt, high voltage centro-temporal (Rolandic sulcus) spikes, often followed by slow waves, activated by sleep and tending to shift from side to side.
Seizures: Older children- Brief, hemifacial motor, with frequent associated somatosensory symptoms, usually nocturnal. Younger children- Hemiclonic or GTCS (especially at night).

Rx: None if seizures are mild and rare. Most AEDs very effective.
Evolution: Recovery before 15 - 16 years.

<u>Benign Occipital Epilepsy</u> (BOE, Benign Partial Epilepsy of Childhood with Occipital Paroxysms)

Frequency rare
Genetic 37%, migraine 17%
Male = female
Onset 2 - 17 years (peak:7 - 8 years)

EEG Paroxysms of high amplitude spike-waves, recurring more or less rhythmically on the occipital and postero-temporal areas of one or both hemisphere, and occurring *when the eyes are closed* ("fixation off response").
Seizures: Initial visual symptoms, often followed by a hemiclonic seizure or by automatisms when the occipital discharge spreads anteriorly. **Postictal** migrainous cephalgia in a quarter of the cases.

Rx: Most AEDs with control in 60%.
Evolution: Recovery by end of adolescence. **Caution:** Lesional cases may have identical features.

The Major Primary Generalized Syndromes

Childhood Absence Epilepsy (CAE, True Petit Mal Epilepsy)

Frequency 8%
Genetic predisposition- strong 20%
Female preponderance 75%
Onset 3 - 12 years (peak: 6 - 7 years)

EEG: bilateral, synchronous, symmetrical 3 / sec spike wave, normal background.
Seizures: Very frequent simple absences.

Rx: VPA or ESM with control in 70 - 80%.
Evolution: Remission- 95%.
Rare persistence of absences only- 6%.
GTCS during adolescence or later- 40%.

Juvenile Myoclonic Epilepsy (JME)

Frequency 5%
Genetic predisposition- strong >25%
Male = female
Onset 8-26 (peak: 16 - 17)

EEG: Rapid 4 - 5 / sec spike or polyspike-wave ictally and interictally; often photosensitive.
Seizures: Myoclonus on waking or after sleep deprivation. GTCS often also occur, occasional absence.

Rx: VPA with control in 60 - 100%
Evolution: Rarely remits (<10%)

Grand Mall on Awakening (GMA)

Frequency ?%
Genetic predisposition- strong >10%
Male > female
Onset 6-24 (peak: puberty)

EEG: One of the patterns of generalized epilepsy; often photosensitive.
Seizures: GTS exclusively or predoninantly (90%) on after awakening, or evening leisure, worse with sleep deprivation. Myoclonic or absence may occur.

Rx: VPA with control in 60 - 100%
Evolution: Rarely remits (<20%)

The Major Secondary Generalized Syndromes

Infantile Spasms (West Syndrome)

Frequency rare
Genetic predisposition- no
Male preponderance
Onset < 1 year (peak: 3 - 7 months)

EEG: Hypsarrythmia.
Seizures: Very brief, frequent flexion (and/or extension), often in clusters.

Rx: ACTH or prednisone with control in >50%; CZP and VPA may be used.
Evolution: Often evolves to LGS or other secondary generalized epilepsy; the spasms always stop by age 5.
Poor prognosis in most cases (<5% develop normally).

Lennox Gastaut Syndrome (LGS)

Frequency 3 - 10%
Genetic predisposition- no
Male preponderance
Onset 1 - 8 years (peak: 3 - 5 years)
Evolution: Often frequent seizures wax and wan, becoming less common and more "temporal" over decades.
Poor prognosis in most cases (<10% develop normally).

EEG Abnormal background, slow generalized spike-wave (≤2.5 / sec), generalized fast paroxysms.
Seizures: Tonic, atypical absence, drop attacks, other generalized or partial seizures.

Rx: VPA, often with other drugs appropriate for seizure types, rarely with complete control.
Evolution: Cognitive slowing, persisting seizures.

REFERENCES

General Points

Etiology and Incidence

Prevalence of the epilepsies in children and adolescents. Cowan LD, Bodensteiner JB, Leviton A, Doherty L: *Epilepsia* (1989) 30(1):94-106

Predisposing and causative factors in childhood epilepsy. Nelson KB, Ellenburg JH: *Epilepsia* (1987) 28 *Suppl* 1:S16-S24

Benign epilepsy of children with centrotemporal EEG foci. A study of the incidence rate in outpatient care. Heijbel J, Blom S, Bergfors PG: *Epilepsia* (1975) 16:657-664

The epidemiology of epilepsy in children. Hauser WA, Nelson K: Cleve Clin J Med (1989) 56 Suppl Pt 2:S185-S194

Genetics

* Genetic considerations in childhood epilepsy. Bird TD: *Epilepsia* (1987) 28 *Suppl* 1:S71-S81

Genetic aspects of childhood epilepsy. Doose H, Baier W: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 1:S105-10; discussion S121-S123

Genetics of the partial epilepsies: a review. Ottman R: *Epilepsia* (1989 Jan-Feb) 30(1):107-111

Benign partial epilepsy and related conditions: multifactorial pathogenesis with hereditary impairment of brain maturation. Doose H, Baier WK: *Eur J Pediatr* (1989 Dec) 149(3):152-158

Mapping the gene for juvenile myoclonic epilepsy. Delgado-Escueta AV, Greenberg DA, Treiman L, Liu A, Sparkes RS, Barbetti A, Park MS, Terasaki PI: *Epilepsia* (1989) 30 *Suppl* 4:S8-S18; discussion S24-S27

Seizure equivalents/Nonepileptic paroxysmal events

* Nonepileptic spells in children. Lenn NJ: *Dev and Behav Ped* (1981) 2(2):54-60

"Not everything that shakes is epilepsy": the differential diagnosis of paroxysmal nonepileptiform disorders. Rothner AD: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 2:S206-213

The natural history and predictive significance of head-banging, head-rolling and breath-holding spells. Abe K, Oda N, Amatome M: *Dev Med Child Neurol* (1984) 26:644-648.

Fits and other frightening or funny turns in young children. Bower: *Practitioner* (1981 Mar) 225(1353):297-304

Breath-holding attacks in children. Holmes GL: *Postgrad Med* (1988 Nov 1) 84(6):191-2, 196-198

Initial evaluation

** Initial evaluation and management of the child with seizures. Erenberg G: *Cleve Clin J Med* (1989) 56 Suppl Pt 2:S202-S205

How to evaluate the patient after a first seizure. Holmes GL: *Postgrad Med* (1988 Feb 1) 83(2):199-209

A clinical approach to the child with seizures and epilepsy. Freeman JM: *Epilepsia* (1987) *Suppl* 1:103-109

The evaluation of patients with intractable complex partial seizures. Lesser RP, Fisher RS, Kaplan P: *Electroencephalogr Clin Neurophysiol* (1989 Nov) 73(5):381-388

The first seizure in adult life. Value of clinical features, electroencephalography, and computerized tomographic scanning in prediction of seizure recurrence. Hopkins A, Garman A, Clarke C: *Lancet* (1988 Apr 2) 1(8588):721-726

EEG

* Electroencephalography and pediatric epilepsy. Blume WT, Moshé SL, Tharp BR: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 2:S226-S233

The EEG in infants and children: Normal patterns. Westmoreland, BF, Stockard JE: *Am J EEG Technol* (1977) 17(4):187-206

Sleep, epilepsy, and the EEG in infancy and childhood. Donat JF, Wright FS: *J Child Neurol* (1989 Apr) 4(2):84-94

Applications of intensive monitoring in epilepsy. Sheridan PH, Sato S: *J Clin Neurophysiol* (1985 Jul) 2(3):221-229

Intensive monitoring in the epileptic child. Duchowny MS: *J Clin Neurophysiol* (1985 Jul) 2(3):203-219

Spike EEG abnormalities in patients without epileptic seizures: a clinical and long-term follow-up study. Sunami K, Endo S: *Jpn J Psychiatry Neuro*l (1988 Mar) 42(1):73-80

Classification of Seizures

Proposal for revised clinical and electroencephalographic classification of epileptic seizures. Commission on classification and terminology of the International League Against Epilepsy: *Epilepsia* (1981) 22:489-501

Experience with the International League Against Epilepsy proposals for classification of epileptic seizures and the epilepsies and epileptic syndromes in a pediatric outpatient epilepsy clinic. Eslava-Cobos J, Narino D: *Epilepsia* (1989) 30(1):112-115

Status epilepticus

Complex partial status epilepticus. Murasaki M, Takahashi A: *Jpn J Psychiatry Neurol* (1988 Sep) 42(3):515-519

Comparing "absence status" to "complex partial status". Miyasaka M: *Jpn J Psychiatry Neurol* (1988 Sep) 42(3):521-523

Low morbidity and mortality of status epilepticus in children. Maytal J, Shinnar S, Moshé SL, Alvarez LA: *Pediatrics* (1989) 83(3):323-331

Classification of Epilepsies

* Proposal for revised classification of epilepsies and epileptic syndromes. Commission on classification and terminology of the International League Against Epilepsy: *Epilepsia* (1989) 30(4):389-399

** Syndromes of epilepsy in childhood and adolescence. Ogunyemi AO, Dreifuss FE: *J Child Neurol* (1988 Jul) 3(3):214-224

Epileptic Syndromes: an Underutilized Concept. Benbaclis SR, Luders HO: *Epilepsia* (1996) 37(11):1029-1034.

Classification of the epilepsies: an investigation of 402 children. Alving J: *Acta Neurol Scand* (1979) 60:157-163

Relative frequency of different types of epilepsy: a study employing the classification of the International League Against Epilepsy. Gastaut H, Gastaut JL, Goncalves e Silva GE, et al: *Epilepsia* (1975) 16:457-461

Epileptic syndromes in childhood. Aicardi J: *Epilepsia* (1988) 29 *Suppl* 3: S1-S5

Epilepsies of Infancy and Childhood. Gomez MR, Klass DW: *Ann Neurol* (1983) 13:113-124

An overview of pediatric seizure disorders and epileptic syndromes. Tharp BR: *Epilepsia* (1987) 28 *Suppl* 1:S36-S45

Neonatal Seizures
* Neonatal seizures: current concepts and revised classification. Volpe JJ: *Pediatrics* (1989 Sep) 84(3):422-428
Clinical and neurophysiologic correlates of neonatal seizures. Mizrahi EM: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 1:S100-4; discussion S121-S123
Consensus and controversy in the clinical management of neonatal seizures. Mizrahi EM: *Clin Perinatal* (1989 Jun) 16(2):485-500
Neonatal seizures: problems in diagnosis and classification. Mizrahi EM: *Epilepsia* (1987) *Suppl*1:S46-S55
Neonatal seizures: a commentary on selected aspects. Camfield PR Camfield CS: *J Child Neurol* (1987 Oct) 2(4):244-251
Are all neonatal seizures true epileptic seizures? Giacoia GP: *South Med J* (1989 Jun) 82(6):692-695

Febrile seizures
* Febrile seizures. Rosman NP: *Emerg Med Clin North Am* (1987 Nov) 5(4):719-737

Infantile Spasms
* Infantile spasms. Hrachovy RA, Frost JD: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 1:S10-S16

Lennox-Gastaut syndrome
* The Lennox-Gastaut syndrome. Roger J, Dravet C, Bureau M: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 2:S172-S180
The Lennox-Gastaut syndrome. Livingston JH: *Dev Med Child Neurol* (1988 Aug) 30(4):536-540

Childhood absence
* Pyknoleptic petit mal. Drury I, Dreifuss FE: *Acta Neurol Scand* (1985) 72:353-362
Concepts of absence epilepsies: discrete syndromes or biological continuum? Berkovic SF, Anderman F, Anderman G, Gloor P: *Neurology* (1987) 37:993-1000
Long-term follow-up of absence seizures. Sato S, Dreifuss FE, Penry JK, et al.: *Neurology* (Cleavland) (1983) 33:1590-1595

Rolandic epilepsy
* Benign childhood epilepsy with centrotemporal spikes. Loiseau P, Duche B: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 1:S17-S22; discussion S40-S42

Juvenile myoclonic epilepsy
* Juvenile myoclonic epilepsy: characteristics of a primary generalized epilepsy. Dreifuss FE: *Epilepsia* (1989) 30 *Suppl* 4:S1-7; discussion S24-S27

Treatment

Medicinal treatments
* Emergency management of seizures: an overview. Uthman BM, Wilder BJ: *Epilepsia* (1989) 30 *Suppl* 2:S33-S37
* Special pharmacokinetic considerations in children. Dodson WE: *Epilepsia* (1987) *Suppl* 1:S56-S70
Pharmacokinetics and clinical use of benzodiazepines in the management of status epilepticus. Treiman DM: *Epilepsia* (1989) 30 *Suppl* 2:S4-S10
Pharmacokinetics and clinical use of parenteral phenytoin, phenobarbital, and paraldehyde. Ramsay RE: *Epilepsia* (1989) *Suppl* 2:S1-S3
Treatment of status epilepticus. Cruse RP: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 2:S254-S259
Intermittent home treatment of status and clusters of seizures. Lombroso CT: *Epilepsia* (1989) 30 *Suppl* 2:S11-S14
Specific problems of children with epilepsy. Henrikson O: *Epilepsia* (1988) 29 *Suppl* 3:S6-S9
Rational use of antiepileptic drugs in children. Bourgeois BFD: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 2:S248-S253
Problems of combination drug therapy in children. Bourgeois BFD: *Epilepsia* (1988) 29 *Suppl* 3:S20-S24
Aspects of antiepileptic treatment in children. Dodson WE: *Epilepsia* (1988) 29 *Suppl* 3:S10-S14
Discontinuing antiepileptic drug therapy in children with epilepsy. Shinnar S, Kang H: Current Trends in Epilepsy: A self-study course for physicians. Hauser WA (ed.): Epilepsy Foundation of America (1988)

Nonmedicinal treatments
* The importance of seizure-inducing factors in youth. Aird RB: *Brain Dev* (1988) 10(2):73-76
Sleep and pediatric epilepsy. Dinner DS: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 2:S234-S239

Epilepsy surgery
Pediatric epilepsy surgery. Goldring S: *Epilepsia* (1987) 28 *Suppl* 1:S82-S102
EEG evaluation for epilepsy surgery in children. Luders H, Dinner DS, Morris HH 3d, Wylie E, Godoy J: *Cleve Clin J Med* (1989) 56 *Suppl* Pt 1:S53-S61; discussion S79-S83