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Clinical and Electroencephalographical Classification of Epileptic Seizures

Current classifications of epileptic seizures vary considerably, and the need for a standardized and uniform system of grouping is very apparent. For this purpose one hundred and twenty members of several European branches of the *International League Against Epilepsy (ILAE)* met in Marseilles, 1–2 April, 1964, to discuss a possible international classification. After two days of lively discussion, H. Gastaut (chairman), H. Landolt, D. A. Pond, A. Subirana and R. Vizioli, in the names of the French, German, Swiss, British, Spanish and Italian branches of the ILAE presented a preliminary classification.

This classification was submitted to a Commission on Terminology consisting of representatives of the American and European Branches of the ILAE (W. F. Caveness, H. Gastaut, H. Landolt, A. M. Lorentz de Haas, F. L. McNaughton, O. Magnus, J. K. Merlis and D. A. Pond) and of representatives of the *World Federation of Neurology* and of the *International Federation of Societies for Electroencephalography and Clinical Neurophysiology (IFSECN)* (J. Radermecker and W. Storm van Leeuwen).

This Commission met at "Meer en Bosch", Heemstede (The Netherlands), 11–13 May, 1964, with H. Gastaut as chairman, and discussed the Marseilles proposal, taking into account the principal previous classifications and the electroencephalographic terms as proposed by the Terminology Committee of the IFSECN and avoiding, so far as possible, both neologisms and too new or outrageous points of view.

After the meeting the Commission on Terminology proposed a scheme of classification that was published later in 1964 in *Epilepsia* (**5**: pp. 297–306). Together with the programme for the 8th International Neurological Congress, an extract of this proposal was sent to all neurologists who are members of a National Neurological Society, with the request to send their comments to Gastaut.

On 5 September 1965 Gastaut presented this scheme of classification in Vienna, at a joint meeting of the 8th International Neurological Congress and the Quadrennial Reunion of the ILAE. All criticisms formulated during this meeting and those addressed by 170 neurologists directly to Gastaut, were used to correct the scheme of classification. This was sent to the members of the Commission on Terminology, which had been enlarged to include M. Gozzano (Italy), J. Kugler (West-Germany), P. M. Saradzisvili (U.S.S.R.), Z. Servít (Czechoslovakia), A. Subirana (Spain), T. Wada (Japan) and A. Earl Walker (U.S.A.), the latter representing the *World Federation of Neurosurgical Societies (WFNS)*. The proposal was finally reviewed in New York on 30 November, 1967, by the members of the Executive Committee of the ILAE, who were joined by Earl Walker.

All these discussions have yielded a revised scheme of classification, although no complete agreement has been reached with regard to some terms, *e.g.* the two electroclinical absence variants which some wish to refer to as "typical" and "atypical", whereas others prefer to maintain the terms "petit mal" and "petit mal variant", while yet others wish to refrain from any differentiation; another case in point are the somato-inhibitory partial seizures, which some consider ill-defined while others doubt their very existence; the same applies to the "déjà vu" and "jamais vu" phenomena, which some consider to be illusions of the apperceptive type while others regard them as dysmnesic or intellectual manifestations.

Allowing for these contradictions and bearing in mind that the first scheme published in 1964 has already been adopted by numerous authors in the international literature, and notably by the experts of the WHO who are editing a glossary of epilepsy terms, the members of the Executive Committee of the ILAE nevertheless considered it useful to publish the modified and perfected scheme of classification. It has already been published in the Supplement of *Epilepsia*, 1969, which contained the program and the working papers for the 11th International Congress of the ILAE, held in New York, 27 September, 1969.

As regards the previously published "Summary Form of Classification", the majority of those who commented on the first proposal did not agree with this abbreviated version, because they considered it too short and too different from the detailed classification. It therefore appeared not feasible to make a widely acceptable Summary form and so this will not be re-published. It is considered that those who wish to use an abbreviated version might simplify the original classification themselves.

The Executive Committee is fully aware of the fact that all attempts at classification of epileptic seizures are hampered by our limited knowledge of the underlying pathological processes within the brain, and that any classification must of necessity be a tentative one and will be subject to change with every advance in the scientific understanding of epilepsy. Without hesitation, however, the Executive Committee recommends this classification, imperfect as it may be, in the hope that it will bring some measure of uniformity in the use of diagnostic terms, facilitate comparison of cases, improve methods of evaluating therapy and eventually further our understanding of the causes of epileptic seizures.

H. GASTAUT
Secretary General of the ILAE

CLINICAL AND ELECTROENCEPHALOGRAPHICAL

recommended

the *International League against Epilepsy*, the *World Federation of Neurology*, the *World Federation of Neurosurgical*

Clinical seizure type	*Electroencephalographic seizure type*	*Electroencephalographic interictal expression**
		I. PARTIAL SEIZURES OR
Seizures in which the first clinical changes indicate activation of an anatomical and/or functional system of patterns are restricted, at least at their onset, to one region of the scalp (the area corresponding to the cortical ly limited or even quite diffuse cortical (the most accessible and vulnerable) part of such a system.		
Elementary or complex symptomatology depending on the discharge of a system localized in one or, sometimes, both hemispheres	Rhythmic discharge of spikes and/or of more or less slow waves more or less localized over one or, sometimes, both hemispheres	Intermittent local discharges, generally over one hemisphere only
A. Partial seizures with elementary symptomatology (generally without impairment of consciousness)	local contralateral discharge starting over the corresponding area of cortical representation (not always recorded on the scalp)	local contralateral discharges
1. With motor symptoms (i) focal motor (without march), including localized epileptic myoclonus (ii) jacksonian (iii) versive (generally contraversive) (iv) postural (v) somatic inhibitory(?) (vi) aphasic (vii) phonatory (vocalization and arrest of speech)		
2. With special sensory or somatosensory symptoms (i) somato-sensory (ii) visual (iii) auditory (iv) olfactory (v) gustatory (vi) vertiginous		
3. With autonomic symptoms		
*4. Compound forms***		

* The incidence of interictal abnormalities varies; they may be absent.

** Compound implies a joining together of elementary or (and/or) complex symptoms.

CLASSIFICATION OF EPILEPTIC SEIZURES

by

Societies, and the *International Federation of Societies for Electroencephalography and Clinical Neurophysiology*

Anatomical substrate	*Etiology*	*Age*
SEIZURES BEGINNING LOCALLY		
neurones limited to a part of a single hemisphere; in which the inconsistently present electrographic seizure representation of the system involved); and in which the initial neuronal discharge usually originates in a narrow-		
Various cortical and/or subcortical regions corresponding with functional representation in one hemisphere	Usually related to a wide variety of local brain lesions (cause known, suspected or unknown). Constitutional factors may be important	Possible at all ages but more frequent with increasing age
usually in the cortical region of one hemisphere corresponding to functional representation	as above	as above

Clinical seizure type	*Electroencephalographic seizure type*	*Electroencephalographic interictal expression*
B. Partial seizures with complex symptomatology* ** (generally with impairment of consciousness; may sometimes begin with elementary symptomatology)	unilateral or bilateral discharge, diffuse, or focal in temporal or fronto-temporal regions	unilateral or bilateral, generally asynchronous focus; usually in the temporal region(s)
1. With impaired consciousness only		
2. With cognitive symptomatology (i) with dysmnesic disturbances (conscious amnesia, "déjà vu", "déjà vécu") (ii) with ideational disturbances (including "forced thinking", dreamy state...)		
3. With affective symptomatology		
4. With "psychosensory" symptomatology (i) illusions (*e.g.*: macropsia, metamorphopsia...) (ii) hallucinations		
5. With "psychomotor" symptomatology (automatisms)		
6. Compound forms		
C. Partial seizures secondarily generalized (all forms of partial seizures, with elementary or complex symptomatology, can develop into generalized seizures, sometimes so rapidly that the focal features may be unobservable. These generalized seizures may be symmetrical or asymmetrical, tonic or clonic, but most often tonic-clonic in type)	above discharge becomes secondarily and rapidly generalized	←

*** Complex *vs.* elementary, implies an organized, high-level cerebral activity.

Anatomical substrate	*Etiology*	*Age*
usually cortical and/or subcortical temporal or fronto-temporal regions (including rhinencephalic structures), unilateral or bilateral	as above	as above

←refer to partial seizures in general

Clinical seizure type	*Electroencephalographic seizure type*	*Electroencephalographic interictal expression*
II. GENERALIZED SEIZURES, BILATERAL SYMMETRICAL		
Seizures in which the clinical features do not include any sign or symptom referable to an anatomical and/or motor changes which are generalized or at least bilateral and more or less symmetrical and may be accompanied bilateral, grossly synchronous and symmetrical over the two hemispheres; and in which the responsible neuronal taneously on both sides.		
Convulsive or non-convulsive symptomatology, without sign referable to a unilateral system localized in one hemisphere	Bilateral, essentially synchronous and symmetrical discharge from the start	Bilateral, essentially synchronous and usually symmetrical discharges
1. Absences		
(a) Simple absences, with impairment of consciousness only	1. with rhythmic 3 c/s spike and wave discharge ("petit mal" or typical absence)	spike and waves and/or polyspike and wave discharges
	2. without 3 c/s spike and wave (variant of "petit mal" or atypical absence) (i) low-voltage fast activity or rhythmic discharge at 10 or more c/s, or (ii) more or less rhythmic discharge of sharp and slow waves, sometimes asymmetrical	more or less rhythmic discharges of sharp and slow waves, sometimes asymmetrical
(b) Complex absences, with other phenomena associated with impairment of consciousness (i) with mild clonic components (myoclonic absences) (ii) with increase of postural tone (retropulsive absences) (iii) with diminution or abolition of postural tone (atonic absences) (iv) with automatisms (automatic absences) (v) with autonomic phenomena (*e.g.* enuretic absences) (vi) as mixed forms		

Anatomical substrate	*Etiology*	*Age*
SEIZURES OR SEIZURES WITHOUT LOCAL ONSET		
functional system localized in one hemisphere, and usually consist of initial impairment of consciousness, by an "en masse" autonomic discharge; in which the electroencephalographic patterns from the start are discharge takes place, if not throughout the entire grey matter, then at least in the greater part of it and simul-		
Unlocalized (? meso-diencephalon)	No cause found or: (i) diffuse or multiple bilateral lesions, and/or: (ii) toxic and/or metabolic disturbances, and/or: (iii) constitutional, often genetic factors (epileptic predisposition)	all ages
as above	as above (organic etiology is unusual)	especially in children
as above	as above (organic etiology is usual; cerebral metabolic disturbances superimposed on previous brain lesion may be important)	especially in children
as above	as above	as above

Clinical seizure type	*Electroencephalographic seizure type*	*Electroencephalographic interictal expression*
2. *Bilateral massive epileptic myoclonus* (myolonic jerks)	polyspike and waves or, sometimes, spike and waves or sharp and slow waves	polyspike and waves, or spike and waves, sometimes sharp and slow waves
3. *Infantile spasms*	flattening of the hypsarhythmia during the spasm, or exceptionally, more prominent spikes and slow waves	hypsarhythmia
4. *Clonic seizures*	mixture of fast (10 c/s or more) and slow waves with occasional spike and wave patterns	spike and waves and/or polyspike and wave discharges
5. *Tonic seizures*	low voltage fast activity or a fast rhythm (10 c/s or more) decreasing in frequency and increasing in amplitude	more or less rhythmic discharges of sharp and slow waves, sometimes asymmetrical
6. *Tonic-clonic seizures* ("grand mal" seizures)	rhythm at 10 or more c/s, decreasing in frequency and increasing in amplitude during the tonic phase, interrupted by slow waves during the clonic phase	polyspike and waves and/or spike and waves or, sometimes, sharp and slow wave discharges
7. *Atonic seizures* sometimes associated with myoclonic jerks (myoclonic-atonic seizures)		
(a) of very brief duration (epileptic drop attacks)	polyspike and waves (more waves than in the myoclonic polyspike and wave)	polyspike and wave
(b) of longer duration (including atonic absences)	rhythmic spike and wave (3 to 1 c/s) or mixture of fast and slow waves with occasional spike and wave patterns	polyspike and waves and/or spike and waves or, sometimes, sharp and slow wave discharges
8. *Akinetic seizures* (loss of movement without atonia)	rhythmic spike and wave (3 to 1 c/s) or mixture of fast and slow waves with occasional spike and wave patterns	polyspike and waves and/or spike and waves or, sometimes, sharp and slow wave discharges

Anatomical substrate	*Etiology*	*Age*
as above	as above	all ages
as above	as above (cerebral metabolic disturbances superimposed on previous brain lesion may be important)	infants only
as above	as above	especially in children
as above	as above (organic etiology is usual)	especially in children
as above	as above	less frequent in young children than other forms of generalized seizures. All ages except infancy
as above	as above (organic etiology is usual)	especially in children
as above	as above	especially in children

Clinical seizure type	*Electroencephalographic seizure type*	*Electroencephalographic interictal expression*
	III. UNILATERAL OR PREDOMINANTLY	
Seizures in which the clinical and electrographic aspects are analogous to those of the preceding group (II), graphic discharges are recorded over the contralateral hemisphere. Such seizures apparently depend upon a sphere and its subcortical connections.		
Characterised by clonic, tonic or tonic-clonic convulsions, with or without an impairment of consciousness, expressed only or predominantly in one side. Such seizures sometimes shift from one side to the other but usually do not become symmetrical	(i) partial discharge very rapidly spreading over only one hemisphere (corresponding with only contralateral seizures), or:	focal contralateral discharges
	(ii) discharges generalised from the start but considerably predominant over one hemisphere, susceptible to change from one side to the other at different moments (corresponding to alternating seizures)	bilateral and synchronous symmetrical or asymmetrical discharges of spike and waves and/or polyspike and waves
	(iii) partial discharge, susceptible to change, from time to time, in morphology and topography (from area to area and, sometimes, from one side to the other)	focal discharges, susceptible to change, from time to time, in morphology and topography
	IV. UNCLASSIFIED	
	Includes all seizures which cannot be classified	

ADDENDUM

Epileptic seizures have been considered in the light of clinical, electroencephalographic, anatomical and etiological factors. They may also be classified according to their frequency:

(1) Isolated epileptic seizures: epileptic seizures that occur only once. They are usually generalized tonic-clonic seizures provoked by some accidental cause in subjects prediposed to convulsions, but they may be spontaneous epileptic seizures of any other type. A subject who shows an isolated epileptic seizure is not to be regarded as an epileptic.