Definition of Seizure and Epilepsy

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1. General issues
    a. Why should we have definition for seizures and epilepsy?
        i. Standardized definitions improve accuracy and applicability of treatment guidelines
        ii. Enable accurate communication between physicians and patients
        iii. Standardize research studies
    b. Definition of seizures and epilepsy should be useful for clinical and in research settings.
2. Definition of a seizure
    a. As a word, *seizure* derives from the Greek meaning *to take hold*.
    b. Early definitions
        i. “Symptom of an occasional, an excessive and a disorderly discharge of nerve tissue”, Hughlings Jackson in 1870
        ii. "a state produced by an abnormal excessive neuronal discharge within the central nervous system” Penfield 1941
    c. In 1969 ILAE publishes first classification of epileptic seizures.
        i. “A clinical manifestation presumed to result from an abnormal and excessive discharge of a set of neurons in the brain”, reported by ILAE in 1993[1]
    d. In 2005, Fisher redefined a seizure as follows:
        i. “A transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain”, ILEA 2005 led by Fisher[2].

3. Components common to all seizures:
    a. Direct causal relationship between abnormal brain activity and clinical symptoms
    b. Clinical presentation/semiology depends on location of seizure onset in the brain, patterns of propagation, maturity of the brain, confounding disease processes, sleep–wake cycle, and medications
    c. Seizures have onset and termination
        i. Pathophysiology of onset and offset is different
    d. Neurophysiological process which underlies seizures is not well understood and does not have a specific name. This is often called by imprecise language because the true physiology of seizures continues to be controversial
        i. Abnormal neural activity
        ii. Abnormal neuronal synchronization
        iii. Discussion of systems giving rise to epileptic seizures properly falls more within the realm of seizure pathophysiology than within that of seizure definition
4. Seizure may be defined purely by electrographic criteria
    a. The ILAE definitions of a seizure require clinical criteria, not EEG criteria.
    b. Increase in intensive care unit EEG monitoring has ushered of new era of “EEG only” criteria for recognition of seizures
5. Definition of epilepsy
    a. “A condition characterized by recurrent (two or more) epileptic seizures, unprovoked by any immediate identified cause”, this definition given by ILAE 1993[1]
    b. Problem with original definition is with cases of single seizure but high risk of future seizures. Should such patients be given the diagnosis of epilepsy as they likely will require AEDs?
    c. “Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures and by the neurobiologic, cognitive, psychological, and social consequences of this condition”, this definition was offered by Fisher in 2005

d. Controversy in 2005 on the definition of seizure and epilepsy[3]
    i. Problems with Fisher's definition
        1. Does not mention unprovoked, i.e. acute symptomatic seizures would be included under the definition of epilepsy
        2. Not clear what the work enduring means, this is qualitative not quantitative
        3. The definition seems to say that comorbidities are required for the diagnosis of epilepsy
        4. In 2014, ILEA task force proposed changes to the 2005 definition of epilepsy. It suggested having a "conceptual" definition and a more practical "operational" definition.
        5. Conceptual definition would be like provided by Dr. Fisher.
        6. Operational definition would differ:
            a. "The task force proposed that epilepsy be considered to be a disease of the brain defined by any of the following conditions: (1) At least two unprovoked (or reflex) seizures occurring >24 h 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"[4]
        7. Conceptual definitions can be translated for specific purposes into operational (practical) definitions.[4]
        8. In addition, the task force added a practical resolution of epilepsy definition "Epilepsy is considered to be 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 the

last 10 years, with no seizure medicines for the last 5 years."[4]

6. What aspects of the definition are new and perhaps the biggest differences from the previous ILAE epilepsy definitions
    a. Comorbidities
        i. Psychiatric
        ii. Cognitive
    b. Social consequences of the disease
        i. medical disorder where the social consequences of it are prominently present in the definition
        ii. How does epilepsy impact the lives of patients?
    c. The issues of epilepsy comorbidities is included in the 2017 classification of epilepsy

7. Case examples of definition of epilepsy[4]

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