An epileptic syndrome is an epileptic disorder characterized by a cluster of signs and symptoms customarily occurring together; we will discuss the electroencephalogram (EEG) findings of the major pediatric epileptic syndrome.

**Benign childhood epilepsy with centro-temporal spikes (BECTS).** It is a common idiopathic localized epilepsy with age of onset between 4 and 12 years. Nocturnal motor attacks, often as hemifacial spasm with speech arrest, occurs in more than 50% of these children; however, generalized tonic clonic seizure especially nocturnal is reported in up to 20%. At times, seizures can be diurnal especially early morning. The EEG is characterized by normal background rhythm with discharges at the centro-temporal areas. The discharges have a negative pole in the centro-temporal region and lower amplitude positivity at the vertex or frontal region. Some patients have generalized spike and wave complexes. Benign childhood epilepsy with centro-temporal spikes spontaneously resolved at 14 to 16 years of age.

**Childhood epilepsy with occipital paroxysms.** This type of epilepsy shares all the characteristics of an idiopathic syndrome (normal examination, intelligence and neuroimaging studies). Age of onset is 4 to 8 years. Seizures are rare and primarily nocturnal and often involve visual symptoms. Sharp waves have a maximum occipital negativity, often in long bursts of spike wave complexes and are markedly activated by eye closure and suppressed by visual fixation.

**Childhood absence epilepsy (CAE).** It is known as petit mal epilepsy, with an onset between 3 and 12 years of age and peak at 6-7 years of age. The predominant seizure type is absence characterized by brief staring or inattention usually with eyelid fluttering and frequently by automatism. The EEG at the time of the spell shows the 3/sec spike and wave complexes. During sleep, the epileptiform discharges may become fragmented and include polyspikes. Clinical seizures and the 3/sec spike and wave complexes are often precipitated by hyperventilation. In addition, 10-15% of the patients have a photoparoxysmal response. Approximately 50% of patients also have generalized tonic clonic seizures. If polyspikes are seen in the waking record, then the EEG finding often foretells that generalized tonic clonic attacks may occur.

**Juvenile absence epilepsy.** This is variant generalized absence epilepsy, characterized by late age of onset, peaking around the age of 12 years. In addition, less frequent seizures and milder impairment of consciousness are seen compared to those with the childhood form. EEG is similar to CAE.

**Juvenile myoclonic epilepsy (JME).** Juvenile myoclonic epilepsy manifests with myoclonic seizures between 12 and 18 years of age. Seizures tend to occur in the morning upon awakening, often in clusters. Almost all patients eventually have generalized tonic clonic seizures as well. Electroencephalogram in JME shows generalized polyspikes and spike and wave complexes at 4 to 6 Hz, usually maximal in the frontal electrodes. Also, seen occasionally 3 Hz spike and wave complexes, typically in patients who have absence as well as myoclonic and generalized tonic clonic seizures. Electroencephalogram discharges may be increased by sleep deprivation followed by abrupt awakening from a nap. Photosensitivity is frequent (30-42%). Precipitation of polyspikes, spike and wave complexes and myoclonic by eye closure is observed in 10-17.5% of the patients. Remission is rare and medications may need to be taken lifelong.

**West Syndrome (WS).** West Syndrome manifests in the first year of life with infantile spasm, hypsarrhythmia and developmental delay. Age of onset peaks between 3 and 7 months of age, with cluster of spasms especially upon arousal or in drowsiness. The spasms and hypsarrhythmia are an age specific response of the immature brain to focal or generalized insults. Thorough etiologic testing is important including neuroimaging, metabolic and genetic investigations. Hypsarrhythmia is characterized by chaotic mixture of high amplitude, asynchronous slow waves with sharp waves, spikes or spike and wave complexes seen independently on all
cortical regions, with posterior accentuation. The background rhythm is poorly organized and developed. Flat stretches of EEG activity can be seen during sleep. Ictal EEG is usually characterized by electrodecrement. Diffuse fast activity or diffuse alpha activity can be of an ictal pattern. Also, high amplitude slow wave on the frontal areas or train of repetitive slow waves or sharp and slow wave complexes can be seen; however in 13% there is no change in the EEG during the seizures. When features are atypical the term modified hypsarrhythmia can be used such as significant asymmetry or unilateral hypsarrhythmia, the rapid variant and suppression burst type of tracing. The hypsarrhythmia evolves to slow spike and wave complexes (Lennox-Gastaut) in 40-60%. However, it can evolve into a normal pattern in idiopathic cases.

**Lennox-Gastaut Syndrome (LGS).** Lennox-Gastaut Syndrome begins in early childhood (one to 8 years of age) and consists of intractable generalized epilepsy with multiple seizure types and mental retardation. Clinical attacks are usually tonic in character but atypical absence, clonic, tonic, atonic, myoclonic attacks and GTC seizures can occur. Attacks are usually not precipitated by hyperventilation and photic stimulation. Electroencephalogram findings include generalized slow spike and wave complexes at 1-2/1/sec and slow background rhythm. During sleep, polyspikes and paroxysmal fast activity can be seen. Multifocal spikes may also be present. Ictal patterns include diffuse attenuation followed by a low amplitude fast rhythm, generalized fast activity, more hypersynchronous spike and waves or no changes from background features.

**Further Reading**
