Lennox-Gastaut syndrome (LGS) is a rare and severe form of epilepsy characterized by multiple types of seizures, mental retardation or regression and abnormal electroencephalogram (EEG) with generalized slow spike and wave discharges. Onset of LGS typically occurs between two and eight years of age and a large number of patients with a history of LGS continue to have multiple seizure types from childhood through adulthood. Some of these seizures, including atonic, tonic and myoclonic seizures, may cause “drop attacks,” which may result in a slumping of the head or fall to the ground.

**General Facts**
- LGS is a rare and severe form of epilepsy. The prevalence has been estimated at 1-4 percent of all childhood epilepsies, although figures as high as 10 percent have been reported.
- LGS typically occurs between two and eight years of age with peak onset at 3-5 years.
- Eighty percent of those diagnosed with LGS will have continued seizures throughout childhood and into their adult years.
- LGS is commonly characterized by a triad of features that include multiple types of seizures, mental retardation or regression and an abnormal EEG with generalized slow spike-and-wave discharges (1.5-2 Hz).
- While not diagnostic for LGS, about one-third to two-thirds of LGS patients are reported to experience seizures that can cause “drop attacks.” These drop attacks can be caused by multiple seizure types and may consist of only the head or the whole body, resulting in a fall.
- LGS can take an enormous toll on the physical and developmental health of the patient, as well as the well-being of the patient’s family, due to the severity of seizures, frequent injuries, developmental delays and behavioral problems of the patient.

**Seizures Associated with LGS**
- Most patients with LGS experience multiple types of seizures with periods of frequent seizures, and daily seizures are common. Seizures most often associated with LGS include:
  - Tonic - stiffening of the body, upward deviation of the eyes, dilation of the pupils and altered respiratory patterns; as the most common seizure type associated with LGS and sudden tonic seizures may be responsible for drop attacks, over three-fourths of LGS patients monitored with prolonged sleep or video EEG recordings have been reported to have tonic seizures.
  - Atypical absence - staring spells; difficult to identify because of their gradual onset and occurrence in patients whose diminished cognitive abilities might already limit their responsiveness.
  - Atonic - brief loss of muscle tone and consciousness, causing abrupt falls.
  - Myoclonic - sudden muscle jerks.
- In addition to tonic seizures, atonic and myoclonic seizures may cause drop attacks. More rarely, atypical absence, complex partial and generalized tonic-clonic seizures may also cause drop attacks.
- Drop attacks can result in recurrent injury, including lacerations that leave scars.
- Due to recurrent drop attacks, some patients with LGS wear protective helmets with face guards to maximize protection of the forehead, nose and teeth.
- Most patients with LGS will have at least one episode of status epilepticus (a state of continuous seizure activity) in their history. Non-convulsive status epilepticus occurs in more than 50 percent of those with LGS.
- Tonic, atypical absence and atonic are the most common seizure types associated with LGS, but are not always present at the onset of the syndrome, and other types of seizures and EEG features can occur.
Seizures Associated with LGS (continued)

- As patients age, LGS symptoms may change.
  - One retrospective study of 27 LGS patients ranging from 40 to 59 years of age noted that during the early stages of their disease, all patients had tonic seizures during both wakefulness and sleep. As adults, while all still had tonic seizures during sleep, just 11 had them during wakefulness.\(^{10}\)
  - In this study, EEG readings had also changed during the period between first diagnosis as children and later assessment as adults.\(^{10}\)

Etiology

- LGS is divided into symptomatic or cryptogenic cases.\(^5\)
- Symptomatic cases account for the majority of LGS patients (approximately 80 percent).\(^6\) In these cases:
  - An underlying cause is evident and significant abnormalities may be seen in neuroimaging studies.\(^6\)
  - Causes may include brain malformations, oxygen deprivation at birth, severe head injury, central nervous system infection and inherited degenerative or metabolic conditions.\(^7\)
  - Symptomatic LGS is often preceded by other epilepsy syndromes, such as infantile spasms or focal seizures.\(^2\)
- Cryptogenic cases account for approximately 20 percent of LGS patients. In these cases, no identifiable underlying cause is evident and neuroimaging studies show normal findings.\(^6\)

Developmental Impact

- The progression of LGS after seizure onset is often associated with slowing and/or arrest of cognitive development, and, in 50 percent of cases, behavioral problems including hyperactivity and aggressiveness.\(^2\)
- Patients with symptomatic LGS often have delayed development at onset of LGS (20-60 percent), while development in children with cryptogenic cases may seem normal before the appearance of seizures.\(^3\)
- The proportion of patients who have cognitive impairment increases to 75-95 percent by five years from onset of LGS,\(^3\) and 90 percent will eventually become mentally handicapped.\(^2\)
- Factors associated with more common or more severe mental retardation are symptomatic etiology, history of infantile spasms, onset of symptoms before 12-24 months of age and more frequent seizures.\(^11\)
- Older children with LGS experience character problems, acute or chronic psychosis with aggressiveness, irritability or social isolation.\(^11\)
- As LGS patients age, their IQ often deteriorates and they continue to experience multiple seizure types, including tonic seizures.\(^2,8\) Many of those with LGS will eventually need institutional care when their parents are no longer able to care for them.\(^5\)

Prognosis

- The long-term prognosis for LGS is generally poor due to uncontrolled seizures,\(^5,12\) with only 10 percent of cases (mostly cryptogenic) experiencing full seizure remission.\(^5\)
- Up to 10 percent of children with LGS die before reaching the age of 11, some due to injuries sustained during drop attacks.\(^12\)
- A large number of patients with LGS continue to have persistent refractory epilepsy with multiple seizure types from childhood through adulthood.\(^4,5\)

Diagnosis and Management

- LGS is typically identified by a triad of features including multiple types of seizures, mental retardation or regression and abnormal EEG with generalized slow spike and wave discharges.\(^1,3\) Physicians use EEG and may use magnetic resonance imaging (MRI) to assist in diagnosing LGS.\(^2\)
- Diagnosis may be difficult at onset because the triad of features associated with LGS, such as tonic seizures, may not be fully established, and EEG during sleep is required to confirm the condition.\(^3\)
- Because EEG readings and seizure types may evolve and change as the patient grows older, it may be difficult to identify a history of LGS in adult patients.\(^10\)
- There is no cure for LGS.\(^7\) Management options include antiepileptic drugs (AEDs), ketogenic diet, brain surgery (e.g. corpus callosotomy) and vagus nerve stimulation (VNS).\(^5\)
- Due to the refractory nature of LGS and multiple seizure types, only a minority achieve satisfactory control of seizures.\(^4\)
SOURCES


