The Causes, Symptoms, And Treatments Of Epilepsy

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Introduction

Epilepsy is a chronic neurological disorder characterized by an enduring predisposition to epileptic seizures, but one isolated seizure does not automatically establish the diagnosis. Clinicians consider whether events are unprovoked, the likelihood of recurrence, the clinical history, electroencephalography, brain imaging, and evidence of an underlying epilepsy syndrome or cause. The World Health Organization estimates that about 50 million people worldwide live with epilepsy and emphasizes that many could become seizure-free with appropriate diagnosis and treatment, although major treatment gaps remain in low-income settings (World Health Organization, 2024). Epilepsy is not one uniform disease. Causes may be structural, genetic, infectious, metabolic, immune, or unknown, and seizure manifestations vary according to the networks involved. Current terminology also continues to evolve. The International League Against Epilepsy updated its seizure classification in 2025, retaining four main classes—focal, generalized, unknown whether focal or generalized, and unclassified—while revising descriptors and replacing “awareness” with consciousness as a classifier in focal and unknown seizures (Beniczky et al., 2025). Accurate classification matters because diagnosis, medication choice, counseling, and prognosis depend on the seizure type and epilepsy syndrome.

Causes, Risk Factors, and Seizure Classification

Epilepsy can follow many different biological pathways. Structural causes include stroke, traumatic brain injury, developmental malformations, brain tumors, and some forms of perinatal brain injury. Genetic epilepsies may result from a single pathogenic variant or more complex inherited susceptibility, while infections such as meningitis, encephalitis, and neurocysticercosis can damage neural tissue and lead to recurrent seizures. Metabolic and immune mechanisms account for additional cases, and in many people no definitive cause is identified despite appropriate evaluation (World Health Organization, 2024). Risk therefore varies with age, neurological history, family history, and exposure to brain injury or infection, but a risk factor does not make epilepsy inevitable. The 2025 ILAE framework classifies seizures as focal, generalized, unknown, or unclassified and uses descriptors to characterize observable manifestations, consciousness, and the chronological sequence of symptoms (Beniczky et al., 2025). Focal seizures arise within networks limited to one hemisphere

and may involve motor, sensory, autonomic, emotional, or cognitive phenomena, whereas generalized seizures engage bilateral networks and include absence, generalized tonic-clonic, and other recognized types.

Symptoms and Common Seizure Presentations

Seizure symptoms range from a few seconds of altered consciousness to prolonged convulsions, and the outward appearance does not always reveal where the event began. Generalized tonic-clonic seizures typically involve sudden loss of consciousness, body stiffening during the tonic phase, and rhythmic jerking during the clonic phase, followed by fatigue, confusion, headache, or muscle soreness. Absence seizures usually cause brief interruptions of consciousness and activity, sometimes repeated many times in a day, and can be mistaken for inattention. Focal seizures may produce unusual sensations, déjà vu, autonomic changes, repetitive movements, speech disturbance, or impaired responsiveness; some spread into bilateral tonic-clonic seizures. Sleep deprivation, missed medication, alcohol withdrawal, illness, and stress can precipitate seizures in susceptible people, but triggers should be distinguished from the underlying cause of epilepsy. Photosensitivity applies only to a minority of patients. Not every episode of shaking, collapse, or reduced responsiveness is epileptic, because syncope, metabolic disturbances, cardiac arrhythmias, sleep disorders, and psychogenic nonepileptic seizures can produce similar events. Careful observation and witness descriptions are therefore central to diagnosis.

Diagnosis and the Role of EEG and Imaging

Diagnosis begins with a detailed reconstruction of what occurred before, during, and after an event. Clinicians ask about consciousness, movement, sensory symptoms, duration, recovery, injuries, sleep, medications, substance use, medical history, and family history, while eyewitness or video information can be especially valuable when the patient cannot remember the episode. Electroencephalography can reveal epileptiform abnormalities and help classify epilepsy, but a normal routine EEG does not exclude the disorder because abnormal activity may not appear between seizures. Brain MRI is commonly used to identify structural abnormalities such as tumors, cortical malformations, vascular injury, or scarring, while laboratory studies can investigate metabolic, toxic, or infectious causes when clinically indicated. Prolonged or video-EEG monitoring may be needed when the diagnosis remains uncertain or when surgery is being considered. Classification should be revised when new evidence emerges rather than forcing every event into an early label. The ILAE’s updated framework is designed to provide a common clinical language while recognizing that some seizures remain unknown or unclassified until sufficient information becomes available (Beniczky et al., 2025).

Antiseizure Medication and Drug-Resistant Epilepsy

Antiseizure medication is the main treatment for most people with epilepsy, but the appropriate drug depends on seizure type, syndrome, age, comorbidities, potential drug interactions, adverse effects, reproductive plans, and individual response. Commonly used medicines include lamotrigine, levetiracetam, valproate, carbamazepine, oxcarbazepine, lacosamide, topiramate, and others, although a medicine that is effective for one seizure type can be unsuitable for another. Patients should not stop therapy abruptly without medical guidance because withdrawal can precipitate seizures or status epilepticus. Treatment aims for seizure freedom with acceptable adverse effects rather than simply maximizing dosage. When adequately chosen and tolerated medication regimens fail to provide sustained seizure control, specialist evaluation is important because repeated medication changes may delay other effective options. WHO notes that up to 70 percent of people with epilepsy could become seizure-free with appropriate treatment, yet access remains highly unequal across countries (World Health Organization, 2024). Medication counseling should include adherence, interactions, mood or cognitive effects, and a plan for what to do if seizures recur or adverse reactions develop.

Surgery, Devices, Dietary Therapy, and Emergency Care

People with persistent seizures despite appropriate medication trials may benefit from evaluation at a comprehensive epilepsy center. When seizures consistently arise from a brain region that can be removed or disconnected without unacceptable neurological loss, epilepsy surgery can provide major improvement and, for selected patients, seizure freedom. If resection is not suitable, neuromodulation approaches such as vagus nerve stimulation, responsive neurostimulation, or deep brain stimulation can reduce seizure frequency in some patients. Ketogenic and related dietary therapies can also be useful, particularly in selected drug-resistant epilepsies, but require clinical and dietetic supervision because of nutritional and metabolic risks. Status epilepticus is a medical emergency; a convulsive seizure lasting about five minutes or repeated seizures without recovery should trigger the person’s emergency plan and urgent medical assistance. During a convulsion, bystanders should remove nearby hazards, cushion the head, time the seizure, and place the person on the side when feasible. They should not restrain the person or place objects in the mouth. Emergency help is especially important for prolonged or repeated seizures, breathing difficulty, serious injury, pregnancy, water-related events, or a first known seizure.

Pregnancy, Safety, Mental Health, and Long-Term Care

Epilepsy management extends beyond seizure counts because treatment affects driving, employment, bathing, swimming, sleep, mental health, and reproductive planning. Depression and anxiety occur more often among people with epilepsy and should be recognized rather than dismissed as inevitable consequences of the disorder. Sudden unexpected death in epilepsy is uncommon but serious, with risk particularly associated with uncontrolled generalized tonic-clonic seizures, making seizure control and medication adherence important components of counseling. Pregnancy requires individualized planning because both seizures and antiseizure medicines can affect maternal and fetal outcomes. Updated guidance from the American Academy of Neurology, American Epilepsy Society, and Society for Maternal-Fetal Medicine advises clinicians to optimize treatment before pregnancy where possible and to consider medication-specific risks rather than stopping treatment abruptly (AAN, AES, & SMFM, 2024). Driving and occupational restrictions vary by jurisdiction and should reflect law and actual seizure risk rather than stigma. Everyday safety planning may include showering rather than unsupervised bathing, caution around heights or heat, and individualized arrangements for work or school while preserving independence whenever reasonably possible.

Conclusion

Epilepsy is a group of neurological disorders defined by an enduring susceptibility to epileptic seizures rather than a single uniform disease. Structural, genetic, infectious, metabolic, immune, and unknown causes can produce different seizure types and syndromes, and diagnosis requires careful clinical history supported when appropriate by EEG, MRI, laboratory testing, or prolonged monitoring. The 2025 ILAE classification reflects contemporary practice by organizing seizures into focal, generalized, unknown, and unclassified classes and using clearer descriptors for consciousness and observable manifestations (Beniczky et al., 2025). Most patients begin treatment with antiseizure medication, while surgery, neuromodulation, or dietary therapy may help selected people whose seizures remain resistant. First aid and emergency planning are equally important because prolonged convulsions require rapid response, while common myths such as placing an object in the mouth can cause additional injury. Long-term care should also address pregnancy planning, mental health, SUDEP counseling, daily safety, and discrimination. With accurate diagnosis and accessible treatment, many people can achieve sustained seizure control and participate fully in education, employment, relationships, and community life (World Health Organization, 2024).

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