EPILEPSY: An Overview

What is epilepsy?

Epilepsy is a disease of the brain characterized by recurrent seizures.[1,2]

Seizures are transient changes in how a person behaves, thinks, or feels, caused by abnormal excessive or synchronous neuronal activity in the brain.[1–4]

The nature of seizures is highly variable,[1,3,5] for example:

- Small involuntary muscle jerks vs severe and prolonged convulsions
- Retained awareness vs loss of consciousness
- Lasting for a few seconds vs a few minutes
- Fewer than one per year vs several per day

Classifying seizures helps, for example, when selecting treatments.[3,6,7]

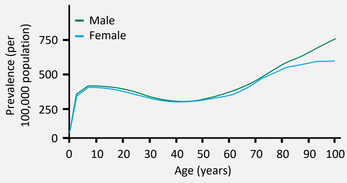
Focal onset	Generalized onset	Unknown onset
Start in one area of the brain	Affect both sides of the brain	
May account for **60%** of all epilepsies[8]		

Seizures that are not controlled by treatment can interfere with life, e.g. affecting education, employment, and relationships.[4]

Quantifying epilepsy

- **>70 m** — >70 million people worldwide[9]
- **~3.4 m** — ~3.4 million people in the U.S.[5,10]
- **1 in 26 people** — 1 in 26 people in the U.S. will have epilepsy at some point in their lifetime[6]

Prevalence is highest in young children and older adults[11]



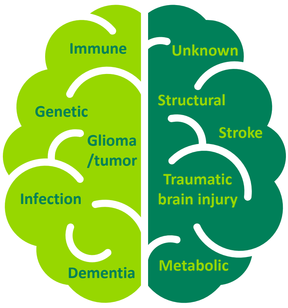
- **470,000 children** — About 6 in every 1,000 children aged 0–17 years in the U.S. have active epilepsy – that's about 470,000 children[7]
- Older people are the fastest-growing group with epilepsy[6,12]
- **>7 times higher in nursing homes** — The prevalence of epilepsy/seizures in older people is >7 times higher in nursing homes than in the community[13]

Diagnosing epilepsy

Epilepsy has many different underlying causes and is best understood as a collection of individual disorders that share a tendency to cause seizures[14,15]

Causes of epilepsy:[14–16]

The cause of epilepsy is unknown in 2/3 of people[5]



A range of investigations help with diagnosis:[17,18]

- **Assessing patterns of brain activity** e.g. electroencephalogram (EEG)
- **Brain imaging** e.g. CT scan, Magnetic Resonance Imaging (MRI)
- **Medical history**
- **Neurological examination**
- **Blood tests**

Seizures can only be definitively diagnosed using EEG; all other investigations are supportive and may help to determine etiology

Comorbidities

Comorbidities are common in people with epilepsy[4,19]

66% of adults with epilepsy have at least **4** other chronic conditions[4]

Examples of comorbidities include[14,19]

DEPRESSION · ANXIETY · PSYCHOSOCIAL CONCERNS · SEVERE HEADACHE · AUTISM SPECTRUM DISORDERS · STROKE · CHRONIC BRONCHITIS · ASTHMA · HYPERTENSION · CANCER · HEART DISEASE · DERMATITIS · ARTHRITIS · PREDIABETES · MIGRAINE · EMPHYSEMA · LEARNING DIFFICULTIES · INTELLECTUAL AND DEVELOPMENTAL DISABILITIES

Early identification, diagnosis, and management of comorbidities are important[6,14,15,19]

Some comorbidities may cause epilepsy	e.g. stroke, brain tumors, and Alzheimer's disease
Some are caused by epilepsy	e.g. seizure-related skeletal fractures
Some may share risk factors with epilepsy	e.g. migraine
Some may involve bidirectional effects, with the two conditions affecting each other	e.g. depression and anxiety

EPILEPSY

Treatment approaches

People with epilepsy require coordinated care from multidisciplinary teams[5,20]

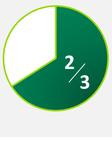
EEG TECHNOLOGISTS · PEDIATRICIANS · PRIMARY CARE CLINICIANS AND NURSES · NEUROLOGISTS · NEUROPSYCHOLOGISTS · NURSE SPECIALISTS · NEUROSURGEONS · SPECIALISTS IN COMORBIDITIES

Treatment goals include:[20,21]

- Controlling seizures
- Improving quality of life
- Minimizing side effects

Treatment options:[5,8,18]

- **Anti-seizure medications**
- **Surgery to remove the area of the brain where seizures start**
- **Neuromodulation using an implanted device (e.g. vagus nerve stimulator)**
- **Ketogenic diet: a high-fat, low carbohydrate diet**



Nearly two-thirds of patients become seizure-free on anti-seizure medication(s) and may not need to consider additional options[22]

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