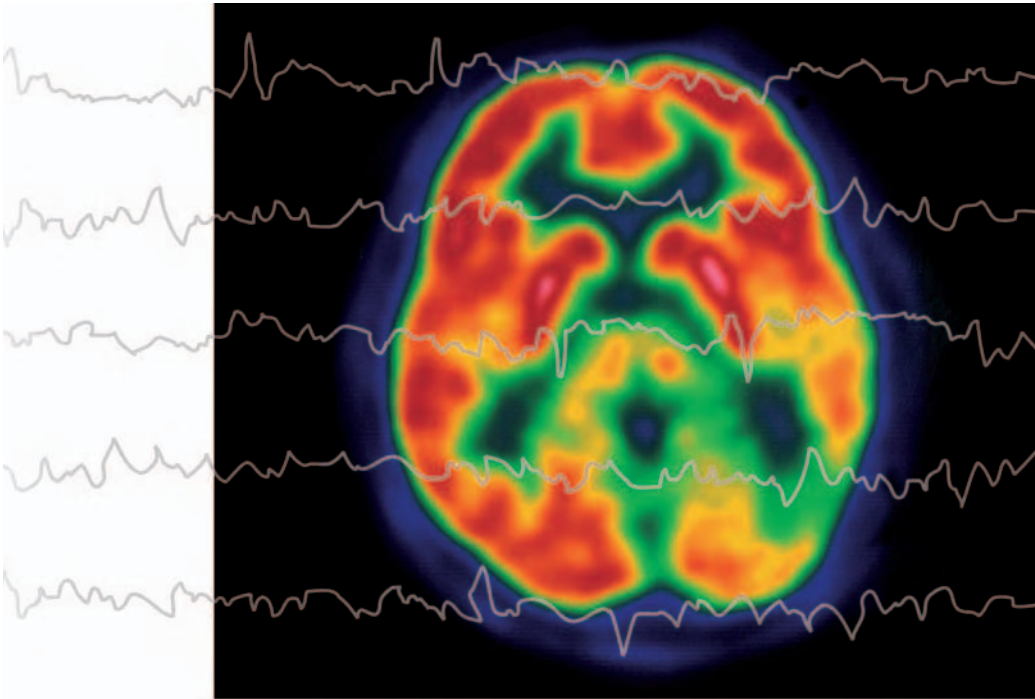


Fast Facts



# Fast Facts: Epilepsy

**Martin J Brodie, Steven C Schachter, Patrick Kwan**  
Fourth edition



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# Fast Facts: Epilepsy

Fourth edition



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**Declaration of Independence**

This book is as balanced and as practical as we can make it.  
Ideas for improvement are always welcome: [feedback@fastfacts.com](mailto:feedback@fastfacts.com)



Fast Facts: Epilepsy

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## Glossary of abbreviations

<b>ACTH:</b> adrenocorticotrophic hormone	<b>LEV:</b> levetiracetam
<b>AED:</b> antiepileptic drug	<b>LTG:</b> lamotrigine
<b>CBZ:</b> carbamazepine	<b>MRI:</b> magnetic resonance imaging
<b>CLB:</b> clobazam	<b>NTZ:</b> nitrazepam
<b>CNS:</b> central nervous system	<b>OXC:</b> oxcarbazepine
<b>CT:</b> computed tomography	<b>PB:</b> phenobarbital
<b>CYP:</b> cytochrome P450	<b>PGB:</b> pregabalin
<b>CZP:</b> clonazepam	<b>PHT:</b> phenytoin
<b>DEXA:</b> dual-energy X-ray absorptiometry	<b>PRM:</b> primidone
<b>EEG:</b> electroencephalogram	<b>RFN:</b> rufinamide
<b>ESL:</b> eslicarbazepine	<b>SE:</b> status epilepticus
<b>ESM:</b> ethosuximide	<b>SSRI:</b> selective serotonin reuptake inhibitor
<b>FBM:</b> felbamate	<b>STP:</b> stiripentol
<b>FDA:</b> Food and Drug Administration (USA)	<b>SUDEP:</b> sudden unexpected death in epilepsy
<b>fMRI:</b> functional magnetic resonance imaging	<b>TCA:</b> tricyclic antidepressant
<b>GABA:</b> gamma-aminobutyric acid	<b>TGB:</b> tiagabine
<b>GBP:</b> gabapentin	<b>TPM:</b> topiramate
<b>GTCS:</b> generalized tonic-clonic seizure	<b>VGB:</b> vigabatrin
<b>JME:</b> juvenile myoclonic epilepsy	<b>VNS:</b> vagus nerve stimulation
<b>LCM:</b> lacosamide	<b>VPA:</b> sodium valproate
	<b>ZNS:</b> zonisamide

## Glossary of terms

**Cryptogenic epilepsy:** epilepsy presumed to have an underlying anatomic cause that remains unidentified

**Cytochrome P450:** a family of isoenzymes responsible for the hepatic oxidation of a range of lipid-soluble drugs

**Dravet syndrome:** a severe myoclonic form of epilepsy that begins in infancy

**Enzyme inducer:** a drug that increases synthesis of drug-metabolizing enzymes

**Epilepsy:** a chronic disorder of the brain characterized by an enduring disposition toward recurrent unprovoked seizures

**Epilepsy syndrome:** a constellation of characteristic seizures, abnormalities on EEG and/or brain imaging, response to therapy, prognosis, and associated clinical history and/or examination findings

**Epileptogenesis:** a sequence of events that converts a normal neuronal network into a hyperexcitable one resulting in the development of epilepsy

**Generalized seizures:** seizures that initially involve both hemispheres, usually with impairment of consciousness at the outset

**Half-life (of drug):** time taken for the plasma concentration of a drug to drop by 50%

**Hypsarrhythmia:** EEG pattern associated with infantile spasms, characterized by diffuse high-voltage spike-and-slow-wave complexes, superimposed on a disorganized slow background

**Idiopathic epilepsy:** epilepsy that has a probable genetic basis

**Incidence:** the proportion of people developing a condition (new cases) in a given population within a specified time period

**Ictal:** relating to, or caused by, a seizure

**Lennox–Gastaut syndrome:** an encephalopathic syndrome that begins in early childhood involving multiple seizure types, major abnormalities on EEG and, usually, mental retardation

**Localization-related epilepsy:** epilepsy with partial-onset seizures (also called focal epilepsy)

**Non-epileptic seizure event:** an event that mimics a seizure without any identifiable neurophysiological abnormality (also called a pseudoseizure or psychogenic seizure)

**Partial seizure:** seizure arising from a particular part of the brain with ('complex partial') or without ('simple partial') impairment of consciousness

**Pharmacogenomics:** the study of the genetic determinants of drug response

**Prevalence:** the proportion of people in a given population with a diagnosed condition at any time

**Seizure:** transient symptoms and/or signs due to abnormal excessive or synchronous activity of a population of cortical neurons

**Status epilepticus:** continued or repeated seizure activity

**Steady state (of drug):** the concentration achieved when the rate of administration equals the rate of elimination; occurs after approximately five elimination half-lives

**Stevens–Johnson syndrome:** severe idiosyncratic reaction to an antiepileptic drug characterized by skin eruption and mucosal and endothelial damage

**Symptomatic epilepsy:** epilepsy with an identified underlying cause

**West syndrome:** a rare condition characterized by the triad of infantile spasms, a typical hypsarrhythmic EEG pattern and arrest of psychomotor development

## Introduction

There have been important advances in the field of epilepsy since the last edition of this book was published barely 4 years ago, and some of these developments are already having an impact on clinical practice. These include the use of genetic information in drug prescription, approval of four new antiepileptic drugs (AEDs) and completion of a pivotal trial of a new device for the treatment of refractory epilepsy.

Epilepsy – derived from the Greek word *epilambanein*, meaning ‘to seize’ or ‘to attack’ – was first recorded in the West in a Babylonian treatise discovered in southern Turkey. The disorder was later recognized in classical Chinese medical texts written from 770 to 221 BC. Around 400 BC, Hippocrates described epilepsy as ‘the sacred disease’, but most cultures placed a demoniac interpretation on its unique constellation of symptoms and signs. It was only in 1875 that the English neurologist John Hughlings Jackson recognized a seizure as being due to disordered brain electricity.

Epilepsy is the most common serious neurological disorder in the world. Although this distressing condition remits in some people, many have epilepsy throughout their lives. It affects all ages and crosses all geographic boundaries.

There have been a number of scientific and sociological revolutions surrounding this common yet previously much-neglected disorder. These have been fueled by:

- advances in genetics and molecular biology
- better understanding of the pathophysiology of seizure propagation and generation
- appreciation of a widening range of seizure types and epilepsy syndromes
- development of more precise and accurate brain-imaging techniques
- refinement of techniques for long-term EEG monitoring
- availability of many new AEDs with different mechanisms of action
- exploration of new methods for electrical brain stimulation
- better use of epilepsy surgery in patients with medically intractable seizures.

In addition to incorporating the latest developments described above, we have updated other chapters in this fourth edition of *Fast Facts: Epilepsy* where appropriate. We hope this handbook will continue to be a succinct, practical and up-to-date aid for clinicians to diagnose and successfully treat people with a wide range of seizure disorders.

## Incidence and prevalence

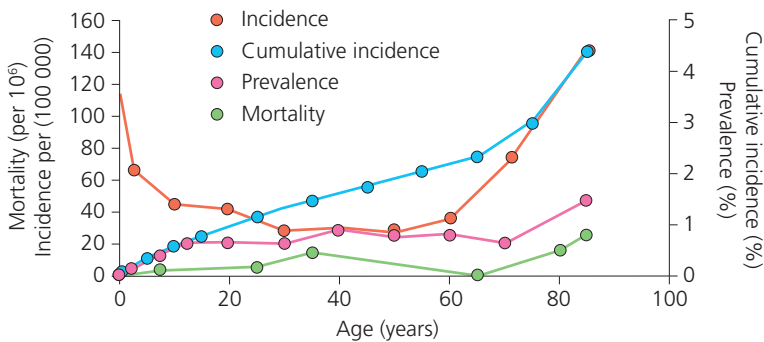
Around 50 million people in the world have epilepsy. It is the most common serious neurological condition, with an annual incidence in developed countries of 50–70 cases per 100 000 of the population (Figure 1.1).

In developing countries, the figure is higher as a consequence of more primitive obstetric services as well as the greater likelihood of cerebral infection and head trauma.

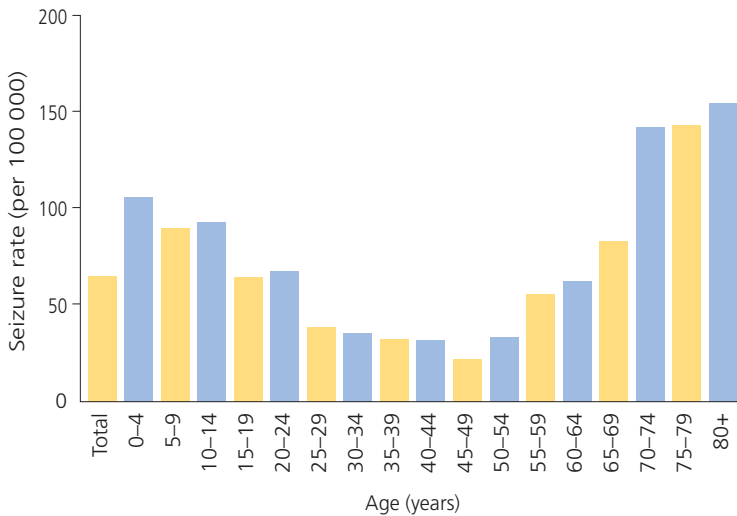
The point prevalence of epilepsy is around 1% in both developing and developed countries.

Incidence varies greatly with age, with high rates in early childhood, low levels in early adult life and a second peak in people aged over 65 years (Figure 1.2).

In recent years, there has been a fall in the number of children affected as well as a sharp rise in epilepsy in the elderly. Indeed, old age has now become the most common time in life to develop the condition.



**Figure 1.1** Incidence, cumulative incidence, prevalence and mortality for epilepsy in Rochester, Minnesota, 1935–1984. Reproduced with permission from Hauser WA et al. *Mayo Clin Proc* 1996;71:576–86.



**Figure 1.2** Incidence of epilepsy in relation to age. Reproduced with permission from Oxford University Press from Tallis et al. 1991.

## Prognosis

Most patients with epilepsy have a good prognosis. The prognosis is strongly influenced by the underlying cause. In many people – particularly children – the condition will remit, although a substantial proportion will have epilepsy all their lives. Overall, 60–70% of patients become seizure free after treatment with antiepileptic drugs (AEDs). Some of these patients become and remain seizure free on the initiation of the first AED, while in others the disorder appears to follow a more fluctuating course. Some patients can remain in remission after subsequent drug withdrawal, implying that the epileptogenic causes have truly remitted. The other 30–40% of patients continue to have seizures with varying degrees of frequency and severity. Factors that indicate a poor prognosis include:

- poor response to the initial AED treatment
- symptomatic cause
- high seizure frequency before AED treatment
- generalized tonic-clonic seizures
- generalized epileptiform activity on the EEG

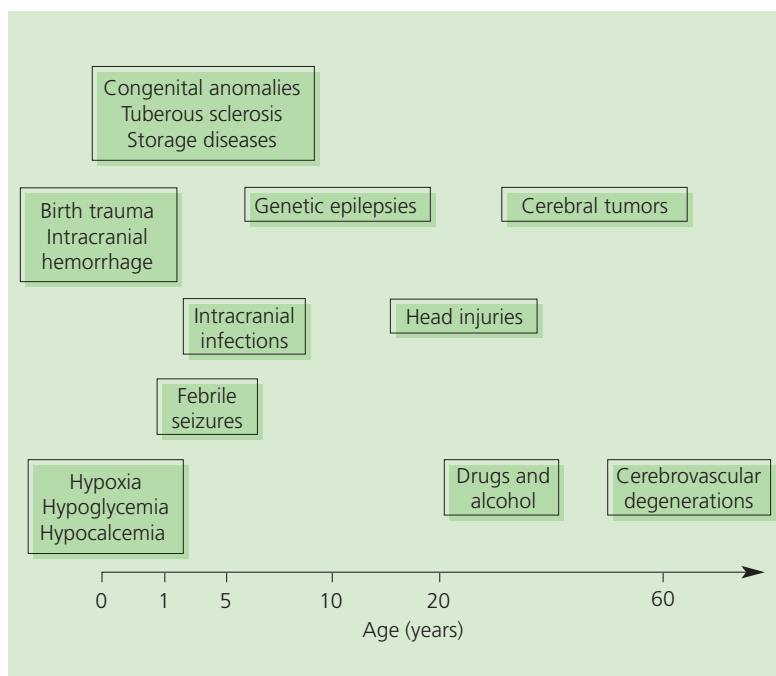
### 3 Diagnosis

The diagnosis of epilepsy relies on the correct classification of epileptic seizures and epilepsy syndromes (see Chapter 2) with consequent implications for prognosis and choice of therapy.

Epilepsy is not a single disease but an extensive collection of conditions with a wide range of underlying etiologies and pathologies, all sharing the common and fundamental characteristic of recurrent, usually unprovoked, seizures. Figure 3.1 shows some common etiologies in relation to age.

The diagnostic procedure aims to answer three key questions.

- Is the episode an epileptic seizure?
- What is (are) the seizure type(s)?
- What is the epilepsy syndrome?



**Figure 3.1** Etiology of epilepsy at different ages.

## Differential diagnosis

A wide range of conditions can mimic epileptic seizures and must be considered in the differential diagnosis (Table 3.1). For example, syncopal attacks, sometimes with clonic movements and incontinence, are commonly misdiagnosed as epileptic seizures. Furthermore, non-epileptic psychogenic seizures (also called pseudoseizures) are estimated to occur in up to 45% of patients referred to specialist centers with apparently refractory epilepsy. This misidentification of non-epileptic conditions as epilepsy can lead to unnecessary and potentially harmful treatments, and can delay the start of appropriate therapy. The temptation to attach a label of ‘epilepsy’ should be resisted if there is any doubt about the diagnosis despite a thorough evaluation. Both the physician and patient must simply await the passage of time before coming to a firm conclusion. Further challenges of diagnosis and management may arise in patients in whom non-epileptic events coexist with epileptic seizures or develop as a substitute for epileptic seizures once the epilepsy is controlled.

TABLE 3.1

### Common differential diagnoses of seizures

#### Neurological

- Transient ischemic attack
- Transient global amnesia
- Migraine
- Narcolepsy

#### Cardiac

- Vasovagal syncope
- Reflex anoxic seizure
- Sick sinus syndrome
- Arrhythmias
- Hypotension

REM, rapid eye movement.

#### Endocrine/metabolic

- Hypoglycemia
- Hyponatremia
- Hypocalcemia
- Hypomagnesemia

#### Sleep disorders

- Obstructive sleep apnea
- Hypnic jerks
- Benign neonatal sleep myoclonus
- REM sleep disorder

#### Psychological

- Non-epileptic psychogenic seizures