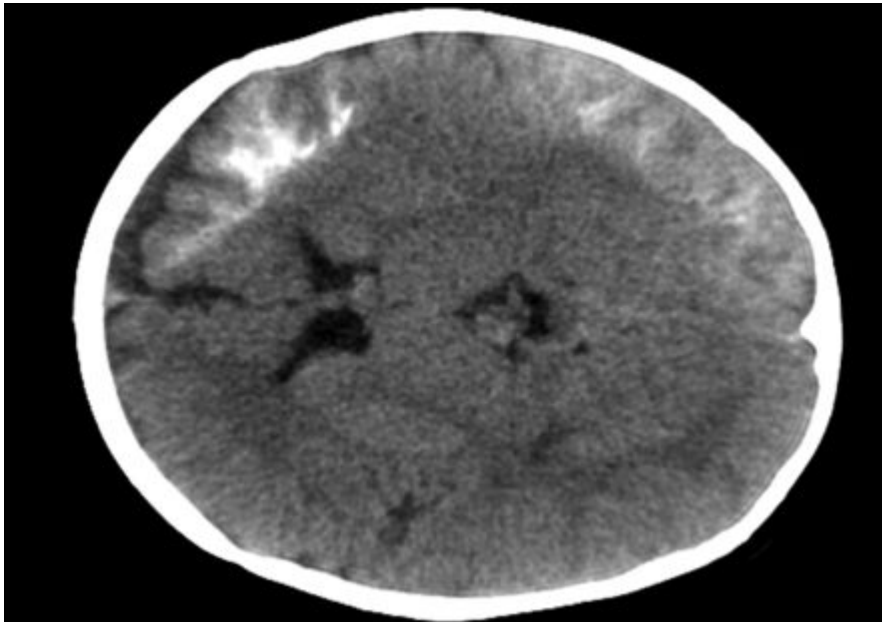


Childhood Epilepsy — Symptoms and Treatment

[See online here](#)

Seizures are the result of abnormal excessive neuronal discharge from the cerebral cortex that can lead to motor, sensory and autonomic manifestations. Seizures in children differ from adults in the etiology, presentation, treatment, and prognosis. The children have less brain threshold for seizure activity so they are more vulnerable to seizure episodes than adults. At least 1% of children will experience an afebrile pattern of seizure before the age of 14. EEG diagnosis is also different than adult seizures. Fortunately, childhood seizures can disappear with age without residual effects.



Important Definitions Related to Epilepsy

An epileptic seizure is a transient occurrence of signs and symptoms due to abnormal excessive or synchronous neuronal activity in the brain that clinically manifests as a sudden and transient alteration in consciousness, motor, sensory, or autonomic functions of the patient and is observed by the patient or an observer.

Status epilepticus is a single epileptic seizure of more than 30 minutes duration or a series of epileptic seizures without going back to baseline central nervous system functions interictally for a period more than 30 minutes.

Etiology of Childhood Epilepsy

History taking is helpful in identifying the etiology of seizures or epilepsy in children. The history should include questions about the description of the **nature of seizures**, **timing** during the day or at night, any **medications or herbals** that the child might be on, whether the child is **feverish** or not and whether the child is having **acute illness** that may provoke the seizure, e.g. **acute gastroenteritis**, **head injury** or **pneumonia**.

Genetic

This is where there is a **defect in ion channels or receptors** responsible for many genetic seizure disorders in children. The imaging studies will not show any abnormality. **Dravet syndrome** and **juvenile myoclonic epilepsy** are examples of genetic epilepsy disorders.

Metabolic

Metabolic disturbances can affect the **cortical brain function**, thus will lead to seizures, similar to metabolic abnormalities in adults. Common causes include **hyponatremia**, **hypocalcemia**, **hypoxia**, and **infections**.

Structural abnormality

This can also induce seizures in children. Examples for structural abnormalities are **hydrocephalus**, **neurovascular abnormality**, **concussion** or **space-occupying lesions**.

Neurodevelopmental causes

Dysplasias and **malformations** can also cause seizures. **Sturge-Weber syndrome** is an example of the common neurodevelopmental causes of seizures with **facial angiomas**. Structural abnormalities are common in neuroimaging, as well as other body systems. **Cognitive disability** and **developmental delay** are also present.

Hippocampal sclerosis

This is a common cause of **refractory seizures** among **teenagers and adolescents** due to the **loss of hippocampal neurons and replacement with glial tissue**.

Infantile Spasms

This is a **seizure disorder in the first year of life** that is associated with various causes including **tuberous sclerosis**, **cerebral palsy** and **Down syndrome**. Other structural or metabolic disorders can also lead to disease. The spasms can be either flexor spasms or extensor spasms.

Flexor spasms are characterized by flexion of the head towards the knee and flexion of the knees with the extension of the arms, while **extension spasms** are characterized by extension of the neck and back with leg extension. The spasms last for seconds but become longer and more frequent. The recurrent spasms result in exhaustion of the child development leading to **developmental delay**.

Diagnosis

EEG will show very high voltage disorganized waves best seen **during sleep** called **hypsarrhythmia** and **modified hypsarrhythmia**. Electrodecremental response is flattening of the EEG waves during spasms and is also a characteristic EEG finding for infantile spasms.

The 5-Axis Diagnosis of an Epilepsy Disorder

The use of a 5-axis diagnosis approach makes it possible for clinicians to decide the best treatment plan, deliver accurate information about the prognosis, and compare their results with other epilepsy-care centers in an objective manner.

Axis 1:

The semiology of the seizure should be described here using the recently published classification of seizure's semiology by the international league against epilepsy.

Axis 2:

Define whether the seizures are focal, nonfocal, or generalized. If focal seizures, attempt to define lateralization and localization in this axis.

Axis 3:

Syndromic diagnosis. This is very helpful in children as certain syndromes have certain electroencephalographic and clinical features. Moreover, a syndromic diagnosis is helpful in determining the treatment plan if needed. Two syndromic diagnosis examples will be discussed in this article.

Axis 4:

Etiological diagnosis should be mentioned here. The etiology might be genetic, structural, metabolic or unknown. A detailed description of why you think this is the etiological diagnosis should be provided.

Axis 5:

Patients with an epileptic disorder might or might not have associated deficits. Any associated deficits should be described and documented here.

Imaging in Children with an Epileptic Disorder

Imaging with brain MRI is generally advised except in the following situations:

1. Childhood absence epilepsy
2. Juvenile absence epilepsy
3. Juvenile myoclonic epilepsy
4. Benign epilepsy with centrotemporal spikes

Again, using a 5-axis diagnosis approach would be helpful in identifying these electroclinical syndromes who usually do not have a structural brain abnormality and do not require a brain MRI.

Treatment

Adrenocorticotrophic hormone (ACTH) is the first-line approved medication for the treatment of infantile spasms. It needs to be injected at least once a day for better control of the seizures. Common side effects for the medication include **high blood pressure**, **GI irritation**, **hypoglycemia** and **developmental delays**.

Vigabatrin is an FDA-approved drug against infantile spasms with promising results. Side effects include **peripheral visual field defect**, **flaccidity** and **sleep disorders**.

Prednisone can be used as a first-line drug with results comparable to ACTH.

Other antiepileptic drugs e.g. valproic acid, clonazepam, and lamotrigine have been tried.

Absence Seizures

Absence seizures (petit mal seizures) are common in the pediatric population and are characterized by a **cessation of all activities with a staring look**. The seizures are **common and recurrent** and can affect the **intellectual activity** of the child.

EEG diagnosis is characterized by **slow discharge and 3-Hertz spikes**. It can be associated with other seizure disorders and tonic/clonic seizures. Treatment with **ethosuximide**, **valproic acid** and **lamotrigine** constitutes the most effective therapy.

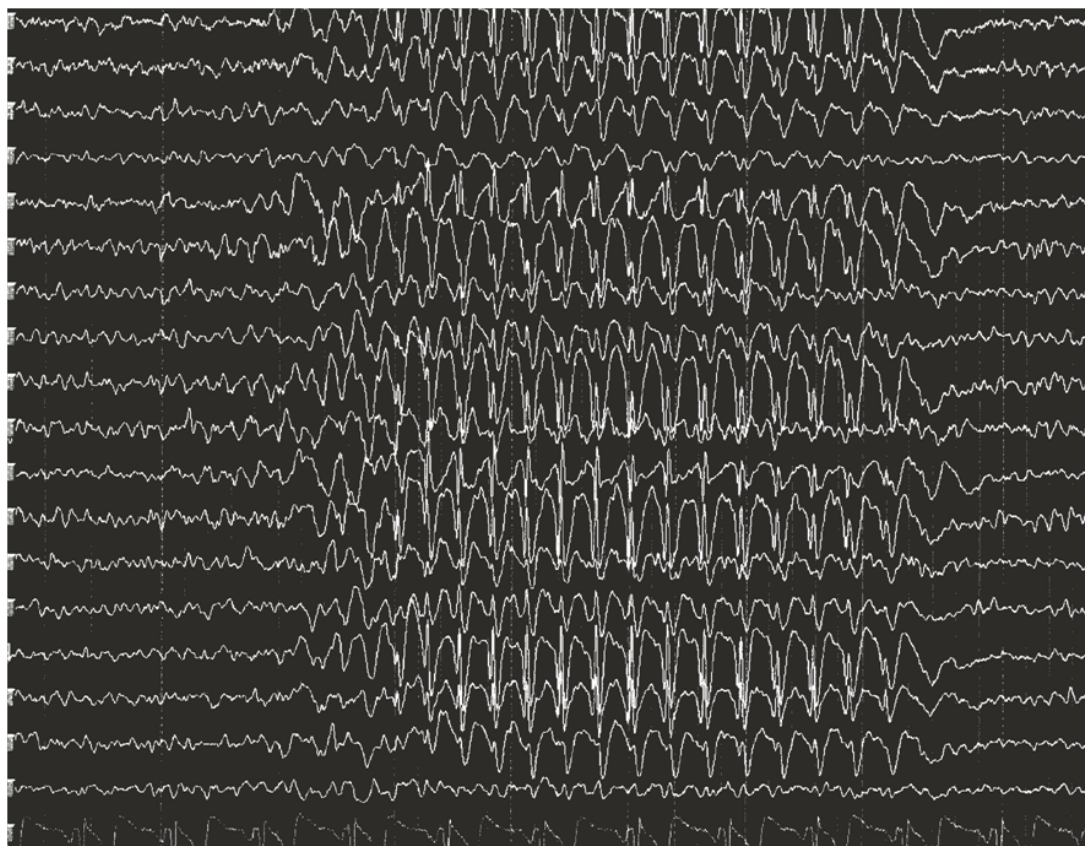


Image: The EEG signature of absence epilepsy is the generalized 3 Hz spike-wave discharge. From: An Introduction to Epilepsy [Internet]. Bromfield EB, Cavazos JE, Sirven JI, editors. West Hartford (CT): American Epilepsy Society; 2006. License: [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/)

Febrile Seizures

This constitutes the **most common childhood seizures disorder**. Febrile illness can lead to seizure episodes in children without being harmful to brain function or intelligence. Having febrile convulsions does not mean the child has epilepsy or will develop an epileptic disorder in the future.

It is most common **between 6 months and 5 years** and presents with **shaking, staring** or even **loss of consciousness** in the first day of febrile illness and lasts for less than 15 minutes.

Causes

Positive family history is a risk factor. No other brain disorder or to explain the episode. **Viral or bacterial infection** with associated fever predisposes to the febrile seizures, as well as **vaccination**. Common viral infection with **human herpesvirus 6** (roseola) and **vaccination with measles, mumps, rubella (MMR)** are strong predisposing factors.

Types

- **Simple febrile seizures:** the child presents with fever for up to 102° F, shaking or muscle twitches for up to 15 minutes. No residual weakness or loss of consciousness after the seizure.
- **Complex febrile seizure:** the same presentation but the shaking lasts more than 15 minutes with residual temporary limb weakness.

Prognosis

It is important to differentiate febrile seizures from other causes of convulsions in children, especially **meningitis**. **CSF analysis** is definitive in meningitis diagnosis. Most children will need **antiepileptic medication** after the first attack.

Risk factors for recurrent febrile seizures

- **Family history** of febrile seizures or epilepsy
- Febrile seizures in the **first year of life**
- Febrile seizures started **after a short-time fever**
- Febrile seizures started with a **low-grade fever**
- Frequent **fever episodes**

Management

Place the child on his side and watch the duration of the convulsions. Seizures of **more than 5 minutes** need **emergency** medical assistance. Treatment of fever requires **acetaminophen** or **ibuprofen**. **Cold fomentation** will also help. Parents of a child with recurrent attacks of febrile seizures can give **diazepam gel** rectally, especially for children with shaking for more than 5 minutes. **Prophylactic treatment** with antiepileptic drugs is **not indicated**.

Benign Rolandic Epilepsy of Childhood (BREC)

This is the **most common childhood seizure syndrome**. The origin of cortical electrical activity is around the **Rolandic fissure** or the **central sulcus** of the brain hence the name.

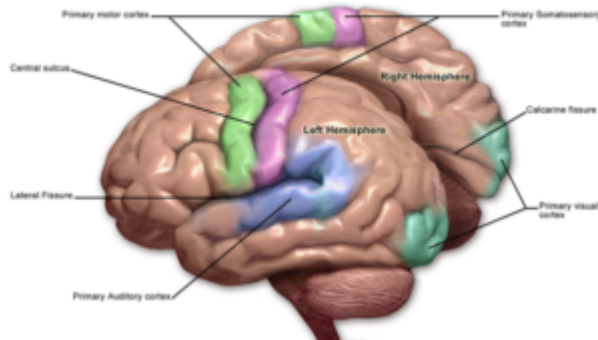


Image: "Motor and sensory regions of the cerebral cortex. Central sulcus = Rolandic fissure." by Blausen.com staff. "Blausen gallery 2014". Wikiversity Journal of Medicine. DOI:10.15347/wjm/2014.010. ISSN 20018762. - Own work. License: [CC BY 3.0](https://creativecommons.org/licenses/by/3.0/)

It is called benign as it **commonly disappears after puberty**. The seizures occur **between the age of 3 and 13**, usually **at night**, and lasts for **2 minutes** during which there is **no loss of consciousness**.

Positive family history is found in about 25% of affected children with autosomal dominant EEG pattern inheritance. The prevalence of BREC is underestimated since most of the episodes occur at night with the parents unaware of them.

Clinical picture

It usually consists of **unilateral motor and sensory symptoms of the face** which can be **twitches, tingling, numbness, and stiffness**. The seizures can be manifested as twitches of the tongue, jaw or side of the face. **Pharyngeal muscles** can be affected leading to the **drooling of saliva**. **Laryngeal muscles** when affected will lead to a **gurgling sound**. Tingling and numbness can take one side of the tongue, lips, face or one side of the body.

The seizures differ in frequency and nature among patients and sometimes they can be generalized with status epilepticus. Some patients may experience **developmental delay** or **mental delay**. The diagnosis is made with **a characteristic EEG pattern of high voltage spikes, followed by slow waves in the temporal lobe and motor area** of the brain.

Treatment

According to the clinical presentation, antiepileptic drugs e.g. **carbamazepine**, **gabapentin**, and **levetiracetam** are indicated for children with recurrent seizures, daytime seizures or mental delay. Antiepileptic medications may be given after puberty for **prophylaxis** and should be tapered off gradually to avoid a relapse.

References

[Infantile Spasms](#) via childneurologyfoundation.org

[Seizures and epilepsy in children](#) via uptodate.com

[Clinical and laboratory diagnosis of seizures in infants and children](#) via uptodate.com

[Benign Rolandic Epilepsy of Childhood \(BREC\)](#) via cedars-sinai.edu

[Diagnostic Approach of Epilepsy in Childhood and Adolescence](#) via ncbi.nlm.nih.gov

Legal Note: Unless otherwise stated, all rights reserved by Lecturio GmbH. For further legal regulations see our [legal information page](#).

Notes