

TABLE OF CONTENTS

I. EPILEPSY

- What is epilepsy?
- Facts about epilepsy
- Basic neuroanatomy overview
- Classification of epileptic seizures
- Diagnostic Tests

II. TREATMENT

- Medications
- Vagus Nerve Stimulation
- Ketogenic Diet
- Surgery

III. SAFETY

- First Aid

IV. SPECIAL CONCERNS

- MedicAlert
- Helmets
- Driving
- Employment and the law

V. EPILEPSY AT SCHOOL

- School epilepsy assessment tool
- Seizure record
- Teaching children about epilepsy lesson plan
- Creating your own individualized health care plan

VI. RESOURCES/SUPPORT GROUPS

VII. ACCESS TO HEALTHCARE

- CHOC Epilepsy Center After-Hours Care
- After Hours Health Care Advice
- Healthy Families
- California Kids
- MediCal
- CHOC Clinics
- Healthy Tomorrows

VIII. REFERENCES

EPILEPSY

WHAT IS EPILEPSY?

Epilepsy is a neurological disorder. The brain contains millions of nerve cells called neurons that send electrical charges to each other. A seizure occurs when there is a sudden and brief excess surge of electrical activity in the brain between nerve cells. This results in an alteration in sensation, behavior, and consciousness.

Seizures may be caused by developmental problems before birth, trauma at birth, head injury, tumor, structural problems, vascular problems (i.e. stroke, abnormal blood vessels), metabolic conditions (i.e. low blood sugar, low calcium), infections (i.e. meningitis, encephalitis) and idiopathic causes. Children who have idiopathic seizures are most likely to respond to medications and outgrow seizures.

FACTS ABOUT EPILEPSY

- About 1.5 million people in America have epilepsy
- 25 percent of new cases of epilepsy occur in children 14 years and younger
- Epilepsy refers to more than 20 different types of seizure activity
- The cause is unknown in 70 percent of all cases of epilepsy
- Epilepsy is a physical condition. It is not a mental illness or a sign of low intelligence
- Children with seizure disorders can live a normal, active life, play sports and enjoy life

BASIC NEUROANATOMY OVERVIEW

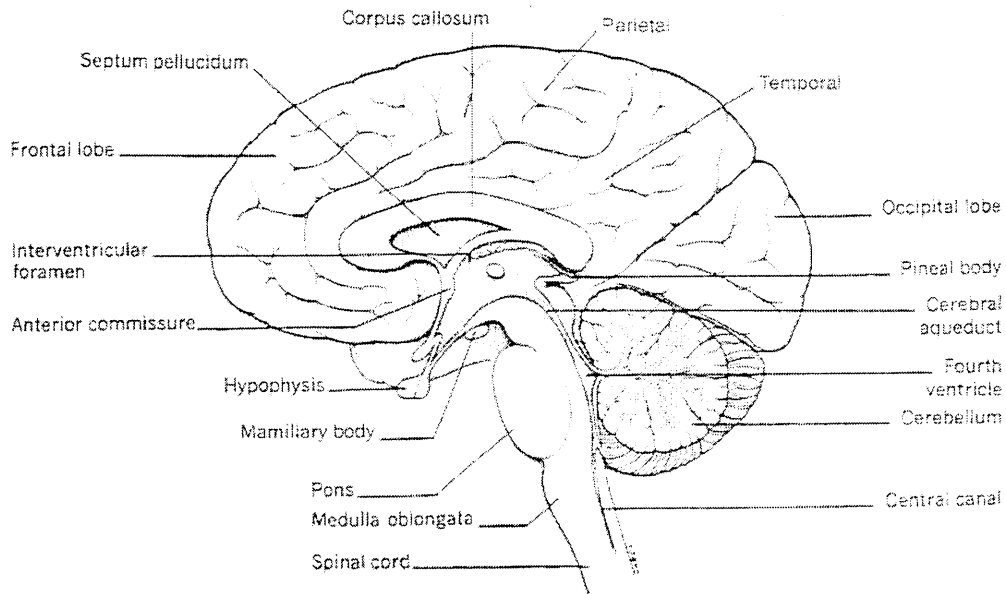


FIGURE 5-18
 Midsagittal section of the brain. (From Chaffec, E. E., and J. M. Lytle. [1980]. *Basic physiology and anatomy*. Philadelphia: J. B. Lippincott.)

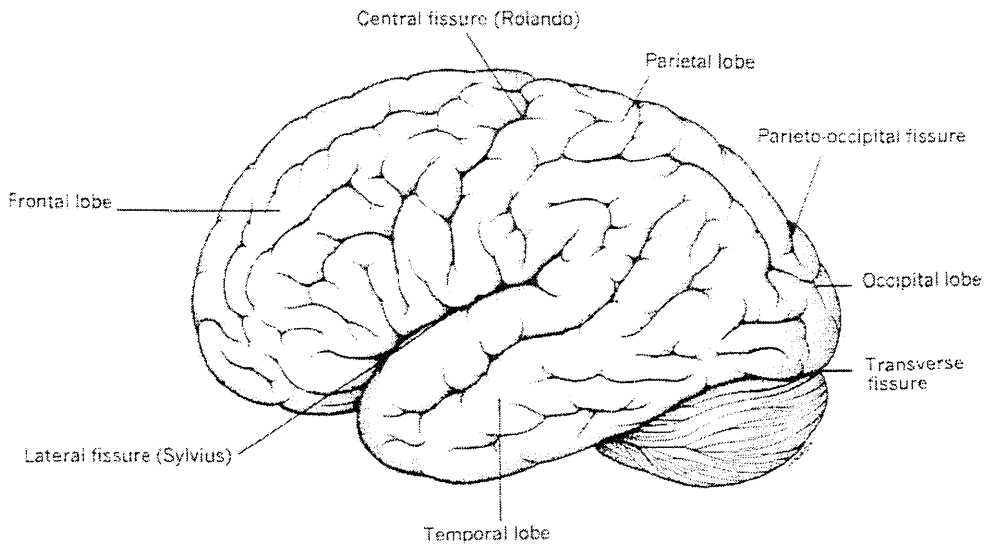


FIGURE 5-19
 Lateral aspect of the left cerebral and cerebellar hemispheres.

GENERAL FUNCTIONS OF THE CEREBRAL CORTEX ACCORDING TO LOBES

Frontal lobes: Responsible for high level cognitive function, personality, memory, anxiety, alertness, and awareness; frontal and temporal lobes are the most epileptogenic

Temporal Lobe: Responsible for receptive and expressive speech, epileptogenic

Parietal Lobe: Responsible for bringing all perception together; called the association cortex, rarely the source of seizures

Occipital Lobe: Responsible for vision, uncommon origin of seizures

CLASSIFICATION OF EPILEPTIC SEIZURES

PRIMARY GENERALIZED SEIZURES

- Absence Seizures (Formerly called petit mal)
 - Typical Brief episodes of staring, blinking, unaware of surroundings; usually lasts less than 10 seconds but may last up to 20 seconds
 - Atypical Staring spells lasting between 5 to 30 seconds, eye blinking or slight jerking movement of the lips may occur; partial reduction in responsiveness
- Myoclonic Brief jerks of a muscle or group of muscles; usually involving the neck, shoulders, and upper arms
- Atonic Sudden loss of muscle strength, eyelids may droop, head may nod, objects may be dropped, or the child may fall to the ground; usually lasts less than 15 seconds, injury is common; child typically needs to wear a helmet
- Clonic Rhythmic jerking movements of the arms and legs, may be generalized
- Tonic Sudden stiffening movements of the body, arms, or legs involving both sides of the body; usually last less than 20 seconds

- Tonic-Clonic (Formerly called grand mal)
Convulsive seizures, body briefly stiffens followed by a jerking motion of the arms and legs; loss of consciousness and falls frequently occur, excessive saliva production may be present, possible loss of bowel and bladder control; usually lasts a couple of minutes, the child is often tired or confused after the seizure and may want to go to sleep

PARTIAL SEIZURES (SEIZURES ORIGINATING IN SPECIFIC PARTS OF THE BRAIN)

- | | |
|--|---|
| <ul style="list-style-type: none"> ▪ Simple Partial (Focal seizures) <ul style="list-style-type: none"> ➤ With motor symptoms ➤ With somatosensory ➤ With autonomic symptoms ➤ With psychic symptoms ▪ Complex partial seizures | <p>Consciousness not impaired</p> <p>Jerking and stiffening</p> <p>Touch, smell, hearing, taste, and sight symptoms</p> <p>Heart rate change, internal sensations</p> <p>Dreamy state</p> <p>Consciousness impaired</p> <p>Movements of the mouth and face (e.g., lip smacking, chewing, and swallowing movements), the hands and arms (e.g., fumbling, picking, and tapping movements), vocalizations (e.g., grunts or repetition of words or phrases)</p> |
|--|---|

DIAGNOSTIC TESTS

The accurate diagnosis of seizure disorders is crucial in tailoring an optimal treatment plan. The following is a list of diagnostic tests that may be utilized:

- Electroencephalogram (EEG) – This is a machine used to measure brain waves. It helps the neurologist identify the location, severity and type of seizure disorder. In many instances, however, a person with epilepsy can have an EEG done with no sign of seizure activity detected. This may occur when no activity was happening at the time of the test, or the

seizure activity was so deep within the brain that the EEG machine was unable to detect it.

- Computed Tomography Scan (CT Scan) – This test helps identify blood clots, cysts, brain tumors, scar tissue or other problems that can cause seizures. The computer-generated view of the brain provides detail of the brain's structure, section by section.
- Magnetic Resonance Imaging (MRI) – This test is used to identify structure and abnormalities within the brain. This technique utilizes a magnet rather than x-rays to generate a detailed picture of the brain. The procedure takes longer than a CT scan and it is painless.
- Outpatient/Inpatient Long Term EEG Monitoring – During this procedure a patient is video taped for a period of time while he/she is connected to electrodes to monitor brain activity. This test is utilized to confirm and diagnosis a seizure disorder. In some groups of patients with seizure-type movements, their condition is not related to epilepsy and that is why they are not responding to the different epilepsy-based treatment options. This test enables the physician to look at the patients movements and correlate this with the results on the EEG, thus allowing the doctor to confirm or reject a seizure diagnosis. Long term EEG monitoring is also a critical component of the surgical treatment of epilepsy to pinpoint the area of the brain responsible for the seizures.

TREATMENT

MEDICATIONS See insert

VAGUS NERVE STIMULATION (VNS)

The VNS is a medical device that is surgically implanted under the skin on the chest wall. Two small wires from the device wrap around the vagus nerve. The stimulator provides intermittent, mild pulses of electrical energy through the vagus nerve to the brain. When a student senses the impending onset of a seizure, the student or school staff can activate the device through a hand-held magnet to deliver an additional dose of stimulation. The VNS is utilized in those students who fail to obtain seizure control with antiepileptic medications.

KETOGENIC DIET

The ketogenic diet consists of mostly fats with little or no carbohydrates and a minimal amount of protein. A student on the ketogenic diet is followed closely by a physician and a dietitian. The diet is labor intensive requiring careful weighing and measuring of food and strict compliance. When the body metabolizes its own fats and proteins, a chemical substance called ketone bodies is produced, thus the name ketogenic diet. This diet is most often utilized in children 18 months to 9 years of age whose seizure disorder is not controlled through the use of antiepileptic medications.

SURGERY

When medication is not effective surgery is considered as an option. A thorough evaluation will determine if the patient is a candidate for surgery. The primary objective of most epilepsy surgical procedures is to accurately localize and then completely remove the region of the brain responsible for the seizure without causing cognitive or neurological deficit.

Surgical options include:

- Lesionectomy – If the recurrent seizures are found to be caused by small lesions such as cavernous angiomas, lowgrade astrocytomas, cortical dysplasias and areas of focal atrophy, they may be successfully removed. Lesionectomy is associated with excellent results and success rates are generally better than those associated with surgery performed in patients without discrete lesions.

- Temporal resection – This procedure removes part of the temporal lobe of the brain where the epilepsy seizures originate. If patient selection is appropriate, surgery in the temporal lobe offers good to excellent results in 75% to 85% of the cases.
- Extra-Temporal resection – This is less commonly performed and the success rate is lower than temporal lobes resections.
- Intracranial Monitoring – Sometimes the seizure focus cannot be determined. In this instance, diagnostic surgical options may be recommended. This involves implanting electrodes into the brain, providing more precise EEG information due to the closer proximity to the seizure focus area.
- Hemispherectomy – This procedure is reserved for patients with severe epilepsy with widespread independent epileptic discharges in one hemisphere, often extending to the normal hemisphere. This procedure involves removing most or all of one of the brain's hemispheres. This procedure has grown in sophistication over the years and has yielded impressive results. But again, it is only reserved for a very select group of patients.
- Corpus Callostomy – This surgery has been offered as an alternative to hemispherectomy in epileptic patients, but is not as effective as hemispherectomy. This surgery involves removing the corpus callosum of the brain.

SAFETY

FIRST AID

- STANDARD FIRST AID
 - Stay calm
 - Protect student from injury but do not restrain movements
 - Help the student lie down and turn on one side if possible
 - Loosen all tight clothing
 - Do not put anything in the mouth
 - Do not give medicines or fluids until the child is completely awake
 - Stay with the student until he or she is fully alert and oriented
 - Provide reassurance and support after the seizure episode
 - CPR should not be given during a seizure
 - Record the duration and describe the seizure on the epilepsy log
 - Report the seizure to the appropriate person: parents, school nurse, and/or administrator

- EMERGENCY FIRST AID
 - Call 911 if:
 - First known seizure
 - Seizure lasts more than 5 minutes
 - Another seizure begins soon after the first
 - The student stops breathing or has difficulty breathing after the seizure
 - Student cannot be awakened after the seizure
 - There are specific orders to call 911 from the physician
 - The recovery is different than usual
 - The need for assistance is uncertain

SPECIAL CONCERNS

MEDICALERT

A person with epilepsy should wear a medical-alert bracelet or necklace that gives critical information in order to medically treat a student correctly. The MedicAlert emblem is engraved with important information such as: diagnosis, medications, telephone numbers of the doctor, and the person to call in case of an emergency. It can help avoid costly medical bills and unnecessary actions. The MedicAlert organization may be contacted at www.medicalert.org or (888) 633-4298. See insert provided

HELMETS

Some students with epilepsy need to wear a helmet to provide protection from falling due to seizures. Bicycle helmets do not provide the best protection for students with seizures. A helmet should be chosen by observation of seizure behaviors. A student who tends to fall forward during seizures will need a helmet with a face guard, face bar, or visor. A student that falls backward will need occipital protection. The helmet is most effective if it is secure on the head with a snug chin strap. Hockey helmets made by Cooper give good protection. Helmets are available through sporting good stores, medical supply companies, and the rehabilitation departments of some hospitals.

DRIVING

Medication compliance is crucial, especially for teenagers desiring to get their driving licenses. Typically, students must be seizure free for one year before they will be granted a driving license. In California a "mandatory reporting law" requires physicians to report people who have epilepsy to the DMV and their frequency of seizures. A student with epilepsy who has a motor vehicle accident may be civilly or criminally liable. In addition, doctors may be held responsible if they failed to notify the DMV of the medical condition.

EMPLOYMENT AND THE LAW

Gainful employment provides a powerful source of self esteem and can increase quality of life. Employers may discriminate against those with epilepsy for a variety of reasons. The Americans with Disabilities Act (ADA) passed in 1990 to help protect people with certain disabilities from discrimination when applying for a job or while on the job. Students with epilepsy who are considering a part time job should be encouraged to contact Epilepsy Foundation (www.efa.org). They can provide valuable information to those with epilepsy.