MODULES ON EPILEPSY

MODULE II

SEIZURES

CONTENT

INTRODUCTION

A seizure is a sudden, uncontrolled surge of electrical activity in the brain, leading to changes in behavior, movements, sensations, and levels of consciousness. Epilepsy is diagnosed when a person experiences two or more seizures at least 24 hours apart without a known cause.

Seizures come in many types, each with varying symptoms and degrees of severity. They are categorized based on their origin in the brain and how extensively they spread. Most seizures last between 30 seconds and two minutes, but any seizure lasting more than five minutes requires immediate medical attention.
Seizures can occur following a stroke or head injury, and they can also be triggered by infections like meningitis or other illnesses. Often, however, the cause remains unidentified.

Medication can control most seizures, although managing them can impact daily life. It is essential to work with a healthcare provider to find a balance between effective seizure control and the side effects of medication.

OVERVIEW OF THE NERVOUS SYSTEM

The nervous system has 2 distinct parts: the central nervous system (the brain and spinal cord) and the peripheral nervous system (the nerves outside the brain and spinal cord). The basic unit of the nervous system is the nerve cell (neuron). Nerve cells consist of a large cell body and 2 types of nerve fibers:

Axon: A long, slender nerve fiber that projects from a nerve cell and can send messages as electrical impulses to other nerve cells and muscles

Dendrites: Branches of nerve cells that receive electrical impulses Normally, nerves transmit impulses electrically in one direction—from the impulse-sending axon of one nerve cell to the impulse-receiving dendrites of the next nerve cell. At contact points between nerve cells (synapses), the axon secretes tiny amounts of chemical messengers (neurotransmitters). Neurotransmitters trigger the receptors on the dendrites of the next nerve cell to produce a new electrical current. Different types of nerves use different neurotransmitters to convey impulses across the synapses. Some of the impulses stimulate the next nerve cell. Others inhibit it.

The brain and spinal cord also contain support cells called glial cells. These cells are different from nerve cells and do not produce electrical impulses. There are several types, including the following:

Astrocytes: These cells provide nutrients to nerve cells and control the chemical composition of fluids around nerve cells, enabling them to thrive. They can regulate the neurotransmitters and the external chemical environment around nerve cells to influence how often nerve cells send impulses and thus regulate how active groups of nerve cells may be.

Ependymal cells: These cells form along open areas in the brain and spinal cord to create and release cerebrospinal fluid, The cerebrospinal fluid helps to cushion the brain and spinal cord against sudden jarring and minor injury and remove waste products from the brain.

Glial progenitor cells: These cells can produce new astrocytes and oligodendrocytes to replace those destroyed by injuries or disorders. Glial progenitor cells are present throughout the brain in adults.

Microglia: These cells help protect the brain against injury and help remove debris from dead cells. Microglia can move around in the nervous system and can multiply to protect the brain during an injury.

Oligodendrocytes: These cells form a coating around nerve cell axons and make a specialized membrane called myelin, a fatty substance that insulates nerve axons and speeds the conduction of impulses along nerve fibers.

Schwann cells are also glial cells. However, these cells are in the peripheral nervous system rather than in the brain and spinal cord. These cells are similar to oligodendrocytes and make myelin to insulate axons in the peripheral nervous system. The brain and spinal cord consist of gray and white matter. Gray matter consists of nerve cell bodies, dendrites and axons, glial cells, and capillaries (the smallest of the body's blood vessels).

White matter contains relatively very few neurons and consists mainly of axons that are wrapped with many layers of myelin and of the oligodendrocytes that make the myelin. Myelin is what makes the white matter white. (The myelin coating around the axon speeds the conduction of nerve impulses—see Nerves.)

Nerve cells routinely increase or decrease the number of connections they have with other nerve cells. This process may partly explain how people learn, adapt, and form memories. But the brain and spinal cord rarely produce new nerve cells. An exception is the hippocampus, an area of the brain involved in memory formation. The nervous system is an extraordinarily complex communication system that can send and receive voluminous amounts of information simultaneously. However, the system is vulnerable to diseases and injuries, as in the following examples:

Nerve cells can degenerate, causing Alzheimer disease, Huntington disease, or Parkinson disease. Oligodendrocytes (involved in the conduction of nerve impulses) may become inflamed and lost (disrupting communication between nerve cells), causing multiple sclerosis. Bacteria or viruses can infect the brain or spinal cord, causing encephalitis or meningitis. A blockage in the blood supply to the brain can cause a stroke. Injuries or tumors can cause structural damage to the brain or spinal cord.

The brain's functions are both mysterious and remarkable, relying on billions of nerve cells and the internal communication between them. All thoughts, beliefs, memories, behaviors, and moods arise within the brain. The brain is the site of thought and intelligence, and the control center for the entire body. The brain coordinates the abilities to move, touch, smell, taste, hear, and see. It enables people to form words, speak, and communicate, understand and manipulate numbers, compose and appreciate music, recognize and understand geometric shapes, plan ahead, and even to imagine and fantasize.

The brain reviews all stimuli—from the internal organs, surface of the body, eyes, ears, nose, and mouth. It then reacts to these stimuli by regulating the following:

- Position of the body
- Movement of limbs
- Rate at which the internal organs function
- Mood

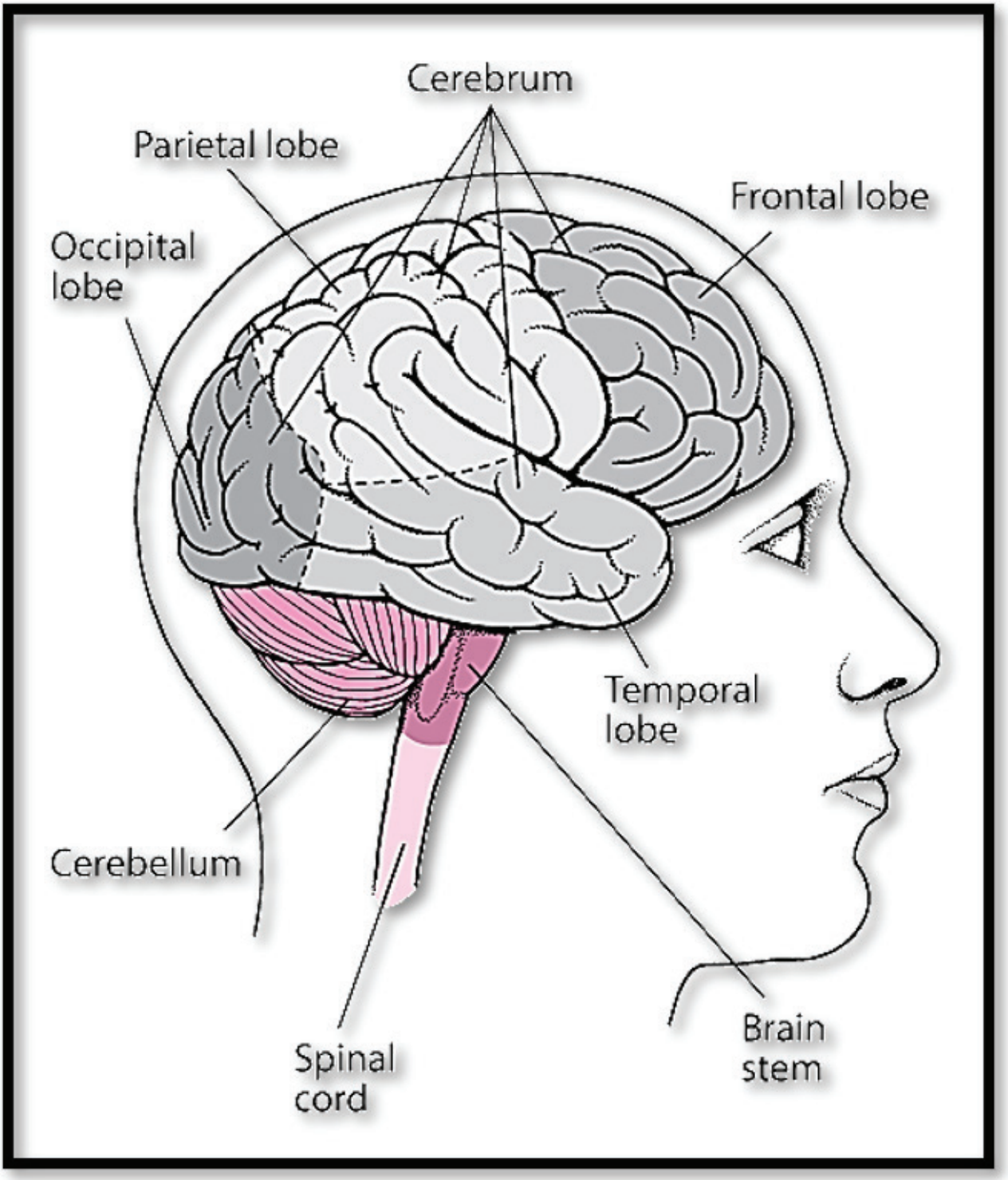

Figure 1The brain consists of the cerebrum, brain stem, and cerebellum

No computer has yet come close to matching the capabilities of the human brain. However, this sophistication comes with a price. The brain needs constant nourishment. It demands an extremely large amount and continuous flow of blood and oxygen—about 25% of the blood flow from the heart. The overall energy consumption of the brain does not change much over time, but certain areas of the brain use more energy during periods of increased activity (for example, when attempting to learn a new language or learning a new task such as ice skating). A loss of blood flow to the brain for more than about 10 seconds can cause a loss of consciousness.

Lack of oxygen or abnormally low sugar (glucose) levels in the blood can result in less energy for the brain and can seriously injure the brain within 4 minutes. However, the brain is defended by several mechanisms that can work to prevent these problems. For example, if blood flow to the brain decreases, the brain immediately signals the heart to beat faster and more forcefully, and thus to pump more blood. If the sugar level in the blood becomes too low, the brain signals the adrenal glands to release epinephrine (adrenaline), which stimulates the liver to release stored sugar.

The brain rarely produces new nerve cells (neurons) but can make new support cells (glial cells) throughout life.

About 25% of the blood pumped by the heart goes to the brain. The blood-brain barrier also protects the brain. It is made up of cells that line blood vessels of the brain. These cells allow some substances to reach the brain and block others. The blood-brain barrier is necessary because in the brain, unlike in most of the body, the cells that form the capillary walls are tightly sealed, for example, to protect it from harm caused by toxins and infections. (Capillaries, the smallest of the body's blood vessels, are where the exchange of nutrients and oxygen between the blood and tissues occurs.) Because the blood-brain barrier controls substances that can enter the brain, penicillin, many chemotherapy drugs, some toxic substances, and most proteins cannot pass into the brain. On the other hand, substances such as alcohol, caffeine, and nicotine can pass into the brain. Certain medications, such as antidepressants, are designed so that they can pass through the barrier. Some substances needed by the brain, such as sugar and amino acids, do not readily pass through the barrier. However, the blood-brain barrier has transport systems that move substances the brain needs across the barrier to brain tissue. When the brain is inflamed, as may occur when people have certain infections or tumors, the blood-brain barrier becomes leaky (permeable). When the blood-brain barrier is permeable, some substances (such as certain antibiotics) that normally are unable to pass into the brain are able to do so.

The activity of the brain results from electrical impulses generated by nerve cells (neurons), which process and store information. The impulses pass along the nerve fibers within the brain. How much and what type of brain activity occurs and where in the brain it is initiated depend on a person's level of consciousness and on the specific activity that the person is doing.

The brain has 3 main parts:

- Cerebrum
- Brain stem
- Cerebellum

Cerebrum- The cerebrum, the largest part of the brain, is responsible for higher brain functions such as thought, action, and sensory processing.

Brain stem- The brain stem controls vital involuntary functions such as breathing, heart rate, and blood pressure.

Cerebellum- The cerebellum coordinates voluntary movements, balance, and posture.

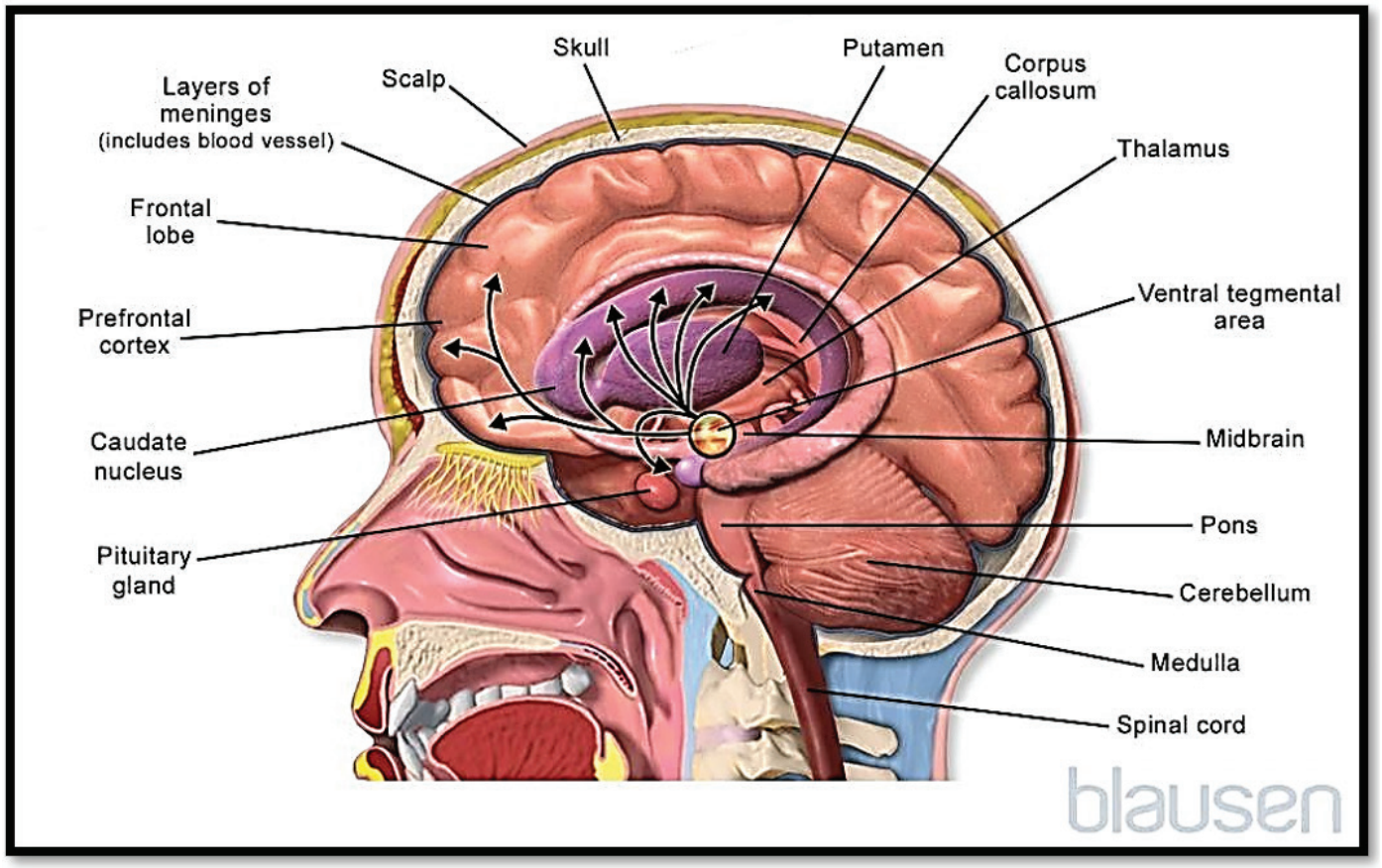

Figure 2 INSIDE THE BRAIN

Cerebrum The cerebrum, the largest part of the brain, contains the following:

The cerebral cortex: This convoluted layer of tissue forms the outer surface of the cerebrum. It consists of a thin layer of gray matter about one eighth of an inch (2 to 4 millimeters) thick. In adults, the cerebral cortex contains most of the nerve cells in the nervous system.

White matter: White matter consists mainly of nerve fibers (axons) that connect the nerve cells in the cortex with one another, as well as with other parts of the brain and spinal cord. It also contains the support cells (oligodendrocytes) that make the myelin for the nerve cell fibers (to speed the conduction of impulses along nerve fibers). The white matter is located under the cortex.

Subcortical structures: These structures are also located under ("sub-") the cortex—hence, their name. They include the basal ganglia, thalamus, hypothalamus, hippocampus, and the limbic system, which includes the amygdala, olfactory connections (structures that help transmit smell signals), and related structures.

The cerebrum is divided into 2 halves—the left and right cerebral hemispheres. The hemispheres are connected by nerve fibers that form a bridge of white matter (called the corpus callosum) through the middle of the brain. Each hemisphere is further divided into lobes:

- Frontal lobe
- Parietal lobe
- Occipital lobe
- Temporal lobe

Each lobe has specific functions, but for most activities, several areas of different lobes in both hemispheres must work together.

The Frontal Lobes have The Following Functions:

Initiating many voluntary actions, ranging from looking toward an object of interest, to crossing a street, to relaxing the bladder to urinate Controlling learned motor skills, such as writing, playing musical instruments, and tying shoelaces Controlling complex intellectual processes, such as speech, thought, concentration, problem-solving, judgment, and planning for the future Controlling facial expressions and hand and arm gestures .Coordinating expressions and gestures with mood and feelings .Particular areas of the frontal lobes control specific movements, typically of the opposite side of the body. In most people, the left frontal lobe controls most of the functions involved in using language.

The Parietal Lobes have The Following Functions:

Interpreting sensory information from the rest of the body ,Controlling body and limb position, Combining impressions of form, texture, and weight into general perceptions ,Influencing mathematical skills and language comprehension, as do adjacent areas of the temporal lobes, Storing spatial memories that enable people to orient themselves in space (know where they are) and to maintain a sense of direction (know where they are going)Processing information that helps people know the position of their body parts, The occipital lobes have the following functions: Processing and interpreting vision and identifying the shapes of objects Enabling people to form visual memories, Integrating visual perceptions with the spatial information provided by the adjacent parietal lobes.

The Temporal Lobes have The Following Functions:

Generating memory and emotions ,Processing immediate events into recent and long-term memory, Storing and retrieving long-term memories, Comprehending sounds and images, thus enabling people to recognize other people and objects and to integrate hearing and speech, Subcortical structures include large collections of nerve cells: The basal ganglia, which coordinate and smooth out movements.

The thalamus, which generally organizes sensory messages to and from the highest levels of the brain (cerebral cortex), providing an awareness of such sensations as pain, touch, and temperature. The hypothalamus, which coordinates some of the more automatic functions of the body, such as control of sleep and wakefulness, maintenance of body temperature, regulation of appetite and thirst, and control of hormonal activity of the adjacent pituitary gland.

TYPES OF SEIZURES

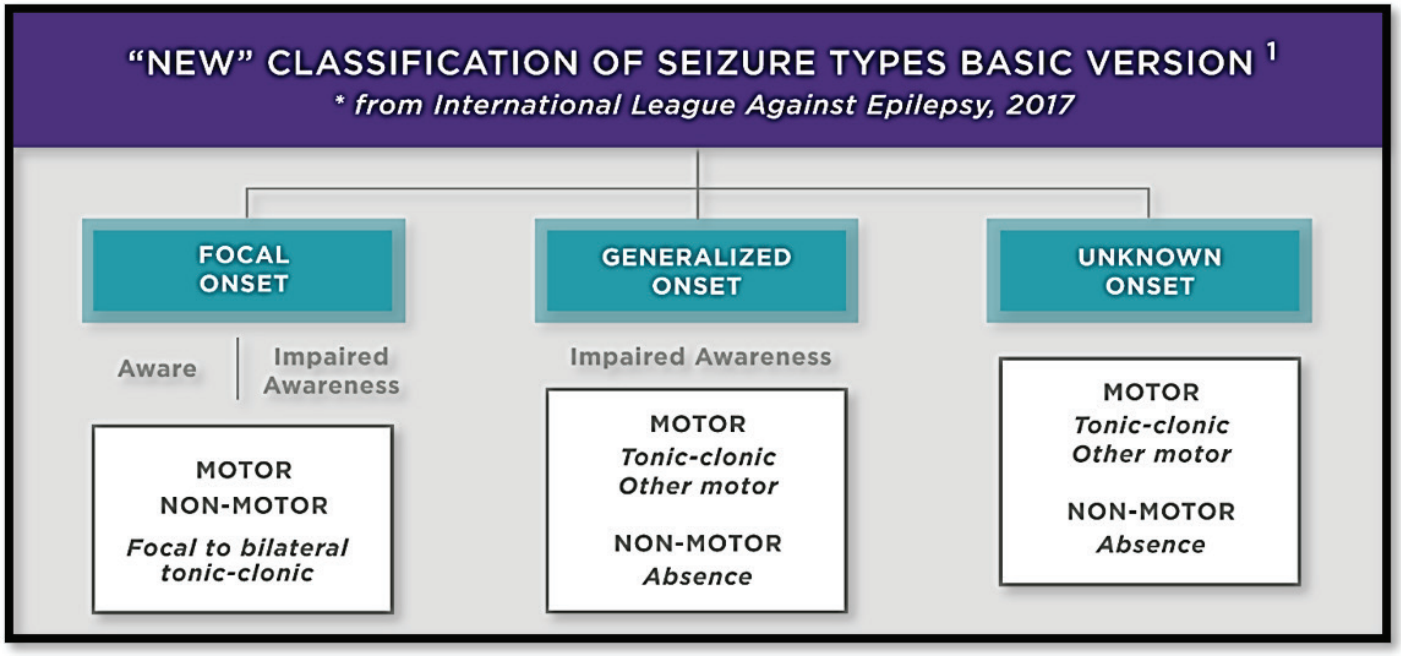

Figure 3 CLASSIFICATION OF SEIZURES

There are now 3 major groups of seizures.

Generalized Onset Seizures

These seizures affect both sides of the brain or groups of cells on both sides of the brain at the same time. This term was used before and still includes seizure types like generalized tonic-clonic, absence, or atonic to name a few.

Focal Onset Seizures

The term focal is used instead of partial to be more accurate when talking about where seizures begin. Focal seizures can start in one area or group of cells in one side of the brain.

Focal onset aware seizures: When a person is awake and aware during a seizure, it's called a focal aware seizure. This used to be called a simple partial seizure. Focal onset impaired awareness: When a person is confused or their awareness is affected in some way during a focal seizure, it's called a focal impaired awareness seizure. This used to be called a complex partial seizure.

A focal seizure can also spread to both sides of the brain and become tonic-clonic (focal to bilateral tonic-clonic). People with this seizure type usually have an aura before the tonic-clonic seizure.

Unknown Onset Seizures

When the beginning of a seizure is not known, it's now called an unknown onset seizure. A seizure could also be called an unknown onset if it's not witnessed or seen by anyone, for example when seizures happen at night or in a person who lives alone.

As more information is learned, an unknown onset seizure may later be diagnosed as a focal or generalized seizure.

Different symptoms during a seizure can be described in various ways. These symptoms might include physical movements such as jerking or stiffening of the limbs, sensory changes like tingling or unusual tastes, and alterations in behavior or consciousness, such as confusion or loss of awareness. Each type of seizure has its own characteristic signs, which can vary widely from one individual to another.

Many different symptoms happen during a seizure. This new classification separates them simply into groups that involve movement.

For generalized onset seizures:

Motor symptoms may include sustained rhythmical jerking movements (clonic), muscles becoming weak or limp (atonic), muscles becoming tense or rigid (tonic), brief muscle twitching (myoclonus), or epileptic spasms (body flexes and extends repeatedly).

Non-motor symptoms are usually called absence seizures. These can be typical or atypical absence seizures (staring spells). Absence seizures can also have brief twitches (myoclonus) that can affect a specific part of the body or just the eyelids.

For focal onset seizures:

Motor symptoms may also include jerking (clonic), muscles becoming limp or weak (atonic), tense or rigid muscles (tonic), brief muscle twitching (myoclonus), or epileptic spasms. There may also be automatisms or repeated automatic movements, like clapping or rubbing of hands, lipsmacking or chewing, or running.

Non-motor symptoms: Examples of symptoms that don't affect movement could be changes in sensation, emotions, thinking or cognition, autonomic functions (such as gastrointestinal sensations, waves of heat or cold, goosebumps, heart racing, etc.), or lack of movement (called behavior arrest).

For unknown onset seizures:

Motor seizures are described as either tonic-clonic or epileptic spasms.

Non-motor seizures usually include a behavior arrest. This means that movement stops – the person may just stare and not make any other movements.

An absence seizure

causes a short period of “blanking out” or staring into space. Like other kinds of seizures, they are caused by brief abnormal electrical activity in a person’s brain.

An absence seizure is a generalized onset seizure, which means it begins in both sides of the brain at the same time.

An older term is “petit mal” seizures. However, this term is not preferred as it is not specific for absence seizures and can also be used to describe focal seizures.
Absence seizures usually affect only a person’s awareness of what is going on during the actual seizure, with immediate recovery.

There are two types of absence seizures that may look a bit different. Both types of seizures are short, and people often don’t notice them at first. They may come and go so quickly that no one notices anything wrong. Or observers may mistake the symptoms for simple daydreaming or not paying attention.

Typical Absence Seizures

Typical absences are most common. The person suddenly stops all activity without any warning. It may look like he or she is staring off into space or just has a blank look. The eyes may turn upwards and eyelids flutter. The seizures usually last less than 10-20 seconds. The person may be momentarily confused for only a few seconds but then is back to normal.

Atypical Absence Seizures

These absence seizures are called atypical because they may be longer, have a slower onset and offset, and involve different symptoms. The seizure still starts with staring into space, usually with a blank look. There is usually a change in muscle tone and movement. You may see: Blinking over and over that may look like fluttering of the eyelids Smacking the lips or chewing movements, rubbing fingers together or making other hand motions, an atypical absence seizure lasts longer, up to 20 seconds or more.

Atonic Seizures

Muscle "tone" is the muscle's normal tension. "Atonic” means "without tone." So, in an atonic seizure, muscles suddenly become limp. Part or all of the body may become limp. The eyelids may droop, the head may nod or drop forward, and the person may drop things. If standing, the person often falls to the ground. These seizures typically last less than 15 seconds.

People may get injured when they fall. Head protection, such as a helmet or other protective gear, may be needed. These seizures are also called "drop attacks" or "drop seizures."

Atypical absence seizures

These seizures are a type of absence seizure that is atypical. This means it's different, unusual, or not typical compared to typical absence seizures, which were previously called petit mal seizures. They are a type of generalized onset seizure, which means they start in both sides of the brain.

The person will stare (just like in absence seizure) but they may be able to respond a bit. Eye blinking, chewing movements, lip smacking, or slight jerking movements of the lips may occur. There may be rubbing of the fingers or hands or other small hand movements.

Symptoms of absence seizures can be difficult to pick up in a person with other cognitive or behavioral problems. It may be hard to tell what is due to a seizure or from other behaviors. These seizures may begin and end gradually. This is different from the sudden start and stop of a typical absence seizure. Falling during the seizure is also more common than it is during typical absence seizures. Atypical absence seizures usually last 5 to 30 seconds, most often more than 10 seconds.

Clonic seizure

"Clonus" means fast stiffening and relaxing of a muscle that happens repeatedly. In other words, it is repeated jerking. The movements cannot be stopped by restraining or repositioning the arms or legs.

Clonic seizures are rare and most commonly occur in babies. Most often, clonic movements are seen as part of a tonic-clonic seizure. Jerking movements alone, as with a clonic seizure, may last a few seconds to a minute.

Jerking or clonic movements that follow stiffening of muscles, as in a tonic-clonic seizure, can last seconds to 1-2 minutes. A clonic seizure may sometimes be hard to distinguish from a myoclonic seizure. The jerking is more regular and sustained during a clonic seizure.

Febrile seizures

Children aged 3 months to 5 or 6 years may have seizures when they have a high fever. These are called febrile seizures (pronounced FEB-rile) and occur in 2% to 5% of all children (2 to 5 out of 100 children). There is a slight tendency for them to run in families. If a child's parents, brothers or sisters, or other close relatives have had febrile seizures, the child is a bit more likely to have them.

Sometimes the seizure comes "out of the blue" before it is recognized that the child is ill. A fever may begin silently in a previously healthy child. A seizure can be the first sign that alerts the family that the child is ill.

Febrile seizures have been divided two groups, simple or complex.

Febrile seizures are considered "simple" if they meet all of the following criteria: Generalized full body convulsions, Last less than 15 minutes, No more than one in a 24-hour period, Febrile seizures are considered "complex or complicated" if any of the following features are present: Start focally with one body part moving independently of others ,Last more than 15 minutes, Occur more than once in a 24-hour period.

Focal Bilateral Tonic Clonic Seizures (Secondarily Generalized Seizures)

These seizures are called focal to bilateral tonic-clonic, because they start in a limited area on one side of the brain and spread to involve both sides. This is different from a generalized onset tonic-clonic seizure, which starts on both sides of the brain.
Focal onset seizures have an abnormal region of brain leading to the electrical storm of a seizure. The place and cause of focal onset may not be detectable by testing. Generalized onset seizures are believed to result from neurochemical and genetic abnormalities widespread throughout brain, and no focal injured brain region is involved. Bilateral tonic-clonic seizures happen in more than 3 out of 10 people with focal epilepsy.

Sometimes the person does not recall the beginning of the seizure or the seizure spreads quickly so the first part is hard to see. This part usually lasts seconds to less than a minute. The bilateral tonic-clonic part of these seizures usually lasts less than 2 or 3 minutes.

Focal Aware Seizures (Simple Partial Seizures)

A focal seizure begins in one side of the brain. They were previously called partial seizures. Focal onset seizures are the most common type of seizures experienced by people with epilepsy. For short, the term focal seizure can be used.

When the seizure begins in one side of the brain and the person has no confusion or loss of awareness of their surroundings during it, it is called a focal aware seizure. This type of seizure was previously called a simple partial seizure.

Focal Impaired Awareness Seizures (Complex Partial Seizures)

When the seizure begins in one side of the brain and the person has confusion or a change in their level of awareness during some or all of it, it is called a focal impaired awareness seizure. This type of seizure was previously called a complex partial seizure.

Gelastic and Dacrystic Seizures

Gelastic and dacrystic seizures are focal (or partial) seizures that start in an area at the base of the brain called the hypothalamus.

Gelastic seizures is the term used to describe focal or partial seizures with bouts of uncontrolled laughing or giggling. They are often called laughing seizures. The person may look like they are smiling or smirking.

Dacrystic seizures are focal or partial seizures when a person makes a crying sound. They may also look like they are grimacing. The emotions (laughing or crying) are often forced and the person can't stop them from happening. Most people don't feel happy or a sense of well-being during a gelastic seizure. The opposite may happen - they may feel scared or a loss of control. Some people may feel anxious that they will laugh at a socially inappropriate time. Usually a person is aware of what's going on around them during these seizures.

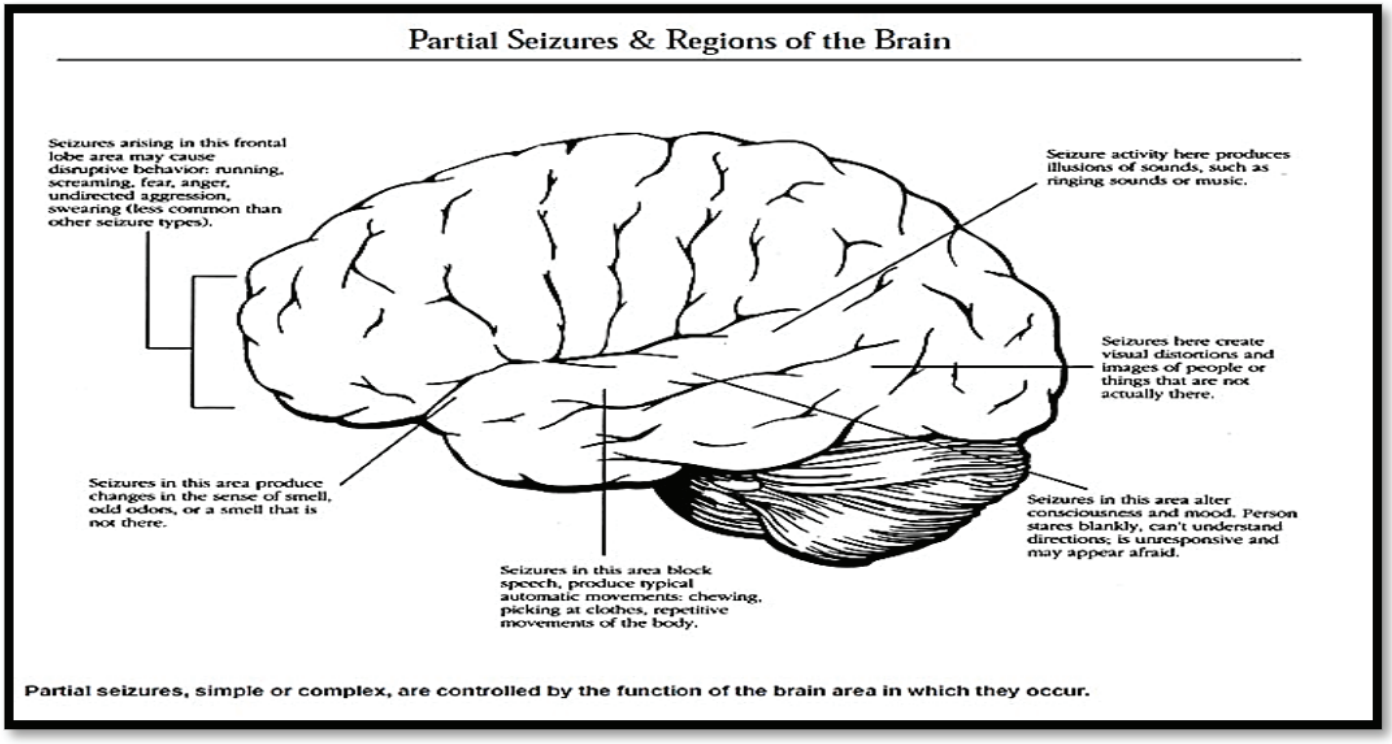

Figure 4 Partial Seizures & Regions of the Brain

Myoclonic seizure

Myoclonic seizures are brief, shock-like jerks of a muscle or a group of muscles. "Myo" means muscle and "clonus" means rapidly alternating contraction and relaxation—jerking or twitching—of a muscle. Usually, they don't last more than a second or two. There can be just one, but sometimes many will occur within a short time. Sometimes myoclonus can occur in people without epilepsy. An example would be a sudden jerk that may wake you up as you're just falling asleep.

The term "myoclonic seizure" is used if myoclonus results from abnormal brain activity. In epilepsy, myoclonic seizures usually cause quick jerking movements on both sides of the body at the same time. They occur in a variety of epilepsy syndromes that have different characteristics:

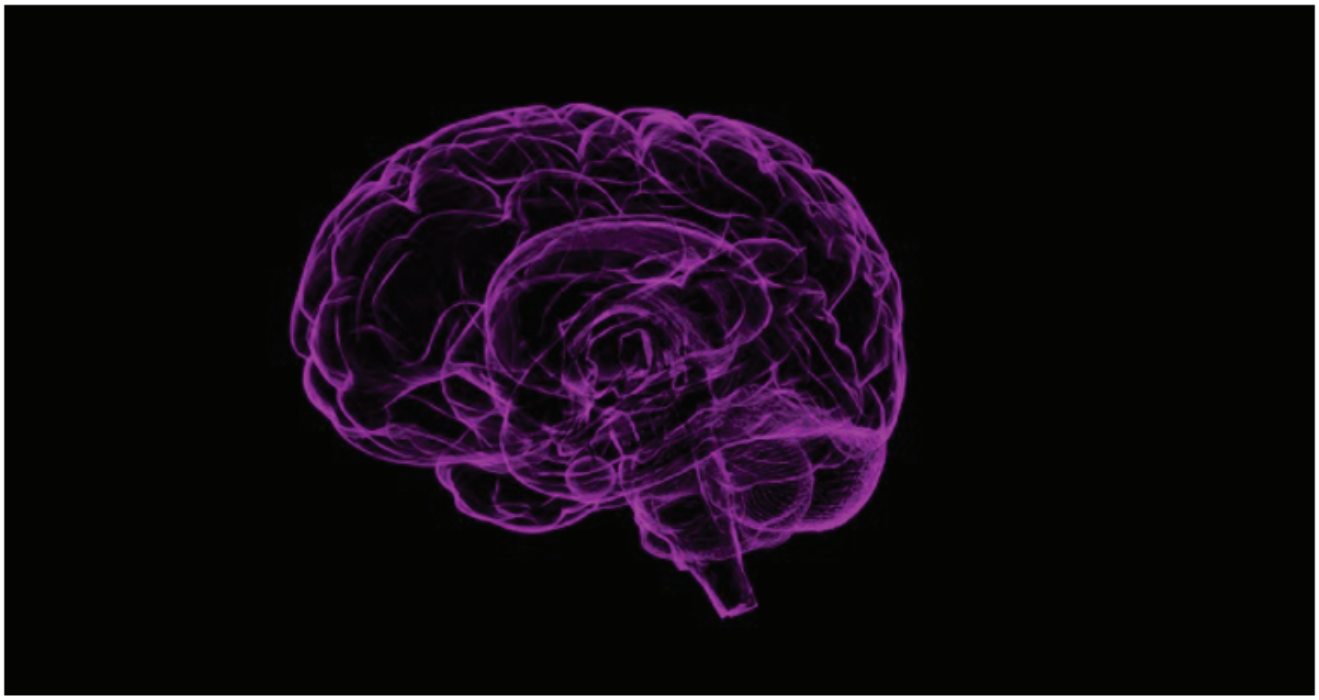

Figure 5 Myoclonic seizure

Juvenile Myoclonic Epilepsy

Juvenile myoclonic epilepsy (JME) seizures usually involve the neck, shoulders, and upper arms. In many patients the seizures most often occur soon after waking up. They usually begin around puberty or sometimes in early adulthood in people with a normal range of intelligence. In most cases, these seizures can be well controlled with medication, but it must be continued throughout life. Myoclonic seizures in juvenile myoclonic epilepsy may be triggered by being overtired or by flashing lights.

Lennox-Gastaut Syndrome

Lennox-Gastaut syndrome is an uncommon syndrome that usually includes other types of seizures as well. It begins in early childhood. The myoclonic seizures usually involve the neck, shoulders, upper arms, and often the face. They may be quite strong and are difficult to control.

Progressive Myoclonic Epilepsies

The rare syndromes in this category feature a combination of myoclonic seizures and tonic-clonic seizures. Treatment is usually not successful for very long for progressive myoclonic epilepsies (PME). Treatment is difficult as the patient deteriorates over time, and often develops other symptoms such as intellectual disability, coordination and walking problems.

Drug-resistant seizures

Seizures sometimes are not controlled with seizure medications. A number of different terms may be used to describe these including: "uncontrolled" or "drug-resistant." How often does this happen?

Studies suggest that epilepsy fails to come quickly under control with medicines in about one-third of cases, but the true frequency depends upon the definition of uncontrolled.

Most epilepsy specialists agree that drug-resistant epilepsy is epilepsy for which seizures are frequent and severe enough, or the required therapy for them troublesome enough, to seriously interfere with quality of life.

However, in more recent years, the epilepsy community has recognized the need to continue striving for 'no seizures' and the best control possible.

Drug-resistant epilepsy occurs when a person has failed to become (and stay) seizure free with adequate trials of two seizure medications (called ASMs).

These seizure medications must have been chosen appropriately for the person's seizure type, tolerated by the person, and tried alone or together with other seizure medications.

Reasons for uncontrolled seizures?

Seizures can be uncontrolled for four broad reasons.

The diagnosis is wrong.

The treatment is wrong.

Despite the best treatment, triggers or lifestyle factors may affect seizure control.

Properly diagnosed seizures do not respond to the best medical treatment.

Not all uncontrolled seizures are considered drug-resistant. For example:

If the diagnosis is corrected and seizures can be brought under control with a different treatment, then they would not be considered drug-resistant.

If triggers of lifestyle factors could be avoided or modified preventing breakthrough seizures, then medication therapy may work better. A person in this situation would not be considered drug-resistant, but different drug trials may be considered and non-drug treatments may be considered to help control seizures.

This type of seizure (also called a convulsion) is what most people think of when they hear the word "seizure." An older term for this type of seizure is "grand mal."

As implied by the name, they combine the characteristics of tonic and clonic seizures. Tonic means stiffening, and clonic means rhythmical jerking.

Tonic-clonic seizure

The tonic phase comes first:

All the muscles stiffen. Air being forced past the vocal cords causes a cry or groan. The person loses consciousness and falls to the floor. A person may bite their tongue or inside of their cheek. If this happens, saliva may look a bit bloody.

After the tonic phase comes the clonic phase: The arms and usually the legs begin to jerk rapidly and rhythmically, bending and relaxing at the elbows, hips, and knees.

After a few minutes, the jerking slows and stops. The person's face may look dusky or a bit blue if they are having trouble breathing or the seizure lasts too long. The person may lose control of their bladder or bowel as the body relaxes. Consciousness, or a person's awareness, returns slowly. These seizures generally last 1 to 3 minutes. Afterwards, the person may be sleepy, confused, irritable, or depressed.

A tonic-clonic seizure that lasts longer than 5 minutes needs immediate medical help. If rescue medicine is available, it should be given. If rescue medicine is not available or does not work, call 911 for emergency help. A seizure that lasts more than 5 minutes, or three seizures in a row without the person coming to between them, is a dangerous condition. This is called status epilepticus; emergency treatment in a hospital is needed unless the rescue medicine stops the seizure.

Tonic Seizure

Muscle "tone" is the muscle's normal tension at rest. In a tonic seizure, the tone is greatly increased: the body, arms, or legs become suddenly stiff or tense. A person may be aware or have only a small change in awareness during a tonic seizure.

They usually happen during sleep and usually involve all or most of the brain, affecting both sides of the body. They are short, usually less than 20 seconds. A person may fall if standing when a tonic seizure starts.

EPIDEMIOLOGY

Prevalence & Incidence

Studies about the prevalence of epilepsy were conducted in seven countries, with a total of 14 studies distributed as follows: seven studies in Egypt, two in Sudan, one in Saudi Arabia, one in Tunisia, one in Algeria, one in Iraq, and one in Libya. These studies were published between 1986 and 2019 and included sample sizes ranging from 121 to 40,927,512 subjects. Most of the studies referenced the ILAE recommendations for the definition of epilepsy. Five studies stated their own definition, and one study did not specify any definition. [27] All the 14 studies had cross-sectional setting. The sampling methods used were heterogeneous; most of the studies used door-to-door sampling. Other studies used cluster and multistage sampling, and few studies relied on hospital-based sampling. Study populations also varied widely among different studies, with some including all members of households and others limiting evaluations to those of a specific age group. Some of the studies reported the prevalence of multiple types of epilepsy, some provided gender prevalence, lifetime prevalence, and active prevalence as shown in Table and some provided prevalence with age stratification as shown in Table The lifetime prevalence ranged from 2.52 per 1000 to 12.67 per 1000. The median lifetime prevalence was estimated to be 6.9 (95% CI: 4–12.46), and the median active prevalence was 5.1 (95% CI: 2.3–9.3).

Incidence

Only three countries had incidence estimates (four in Egypt, one in Qatar, and one in Algeria), which might be due to the difficulty of conducting incidence studies compared to prevalence studies. The median incidence is 89.5 per 100,000. This is higher than the median of reported incidence rates worldwide (56.79 per 100,000), [14] and close to the incidence rates reported by other low-/middle-income countries. For example, in Latin America the incidence rates ranged from 77.7 to 190. [46] However, it is difficult to make a generalization regarding the other Arab countries as this estimated median reflects the incidence in only three countries.

Risk Factors

From the included studies, the most commonly reported risk factors for epilepsy in Arab countries are consanguinity, family history of epilepsy, abnormal perinatal history, CNS infections (like meningitis and encephalitis), and head trauma.

CONCLUSION

Epilepsy is a chronic neurological disorder characterized by abnormal neuronal activity. It can negatively affect a patient's quality of life due to its long-term sequelae. In addition, epilepsy can impact countries directly and indirectly by affecting the population's productivity. Hence, it is of a great importance to estimate the incidence and prevalence of such a disease to better deal with its consequences. In the Arab world, we identified a huge gap in the epidemiological studies focusing on epilepsy in many countries. Most of the studies emerging from the Arab world had a small sample size. The median of lifetime prevalence of epilepsy was 6.9 per 1000, whereas the median incidence was 89.5 per 100000. Moreover, although inconsistent between studies, the most common risk factors that were found to be associated with increased risk of epilepsy development include consanguinity, family history of epilepsy, and abnormal perinatal history. The lack of accurate estimation of epidemiological parameters in developing countries in the Arab world calls for more studies to bridge the gap, and to utilize the available resources in managing epileptic patients.

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