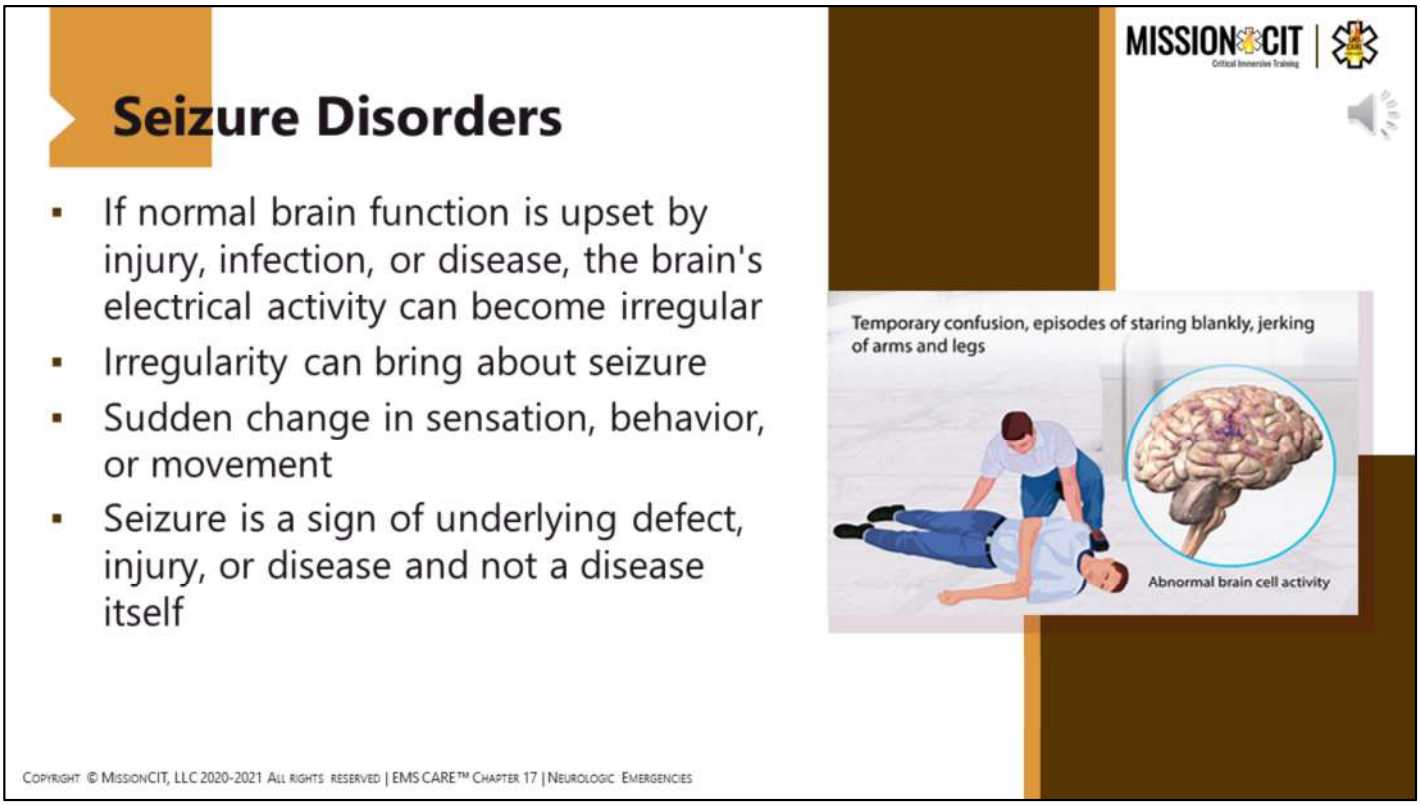


So, in this part of the lesson, we will discuss Seizures. Seizures are a very common disease process and it is estimated that approximately 10% of the population in the United States will experience a seizure during their lifetime, and these make up approximately 5-8% of all EMS calls. Let's discuss more in detail.

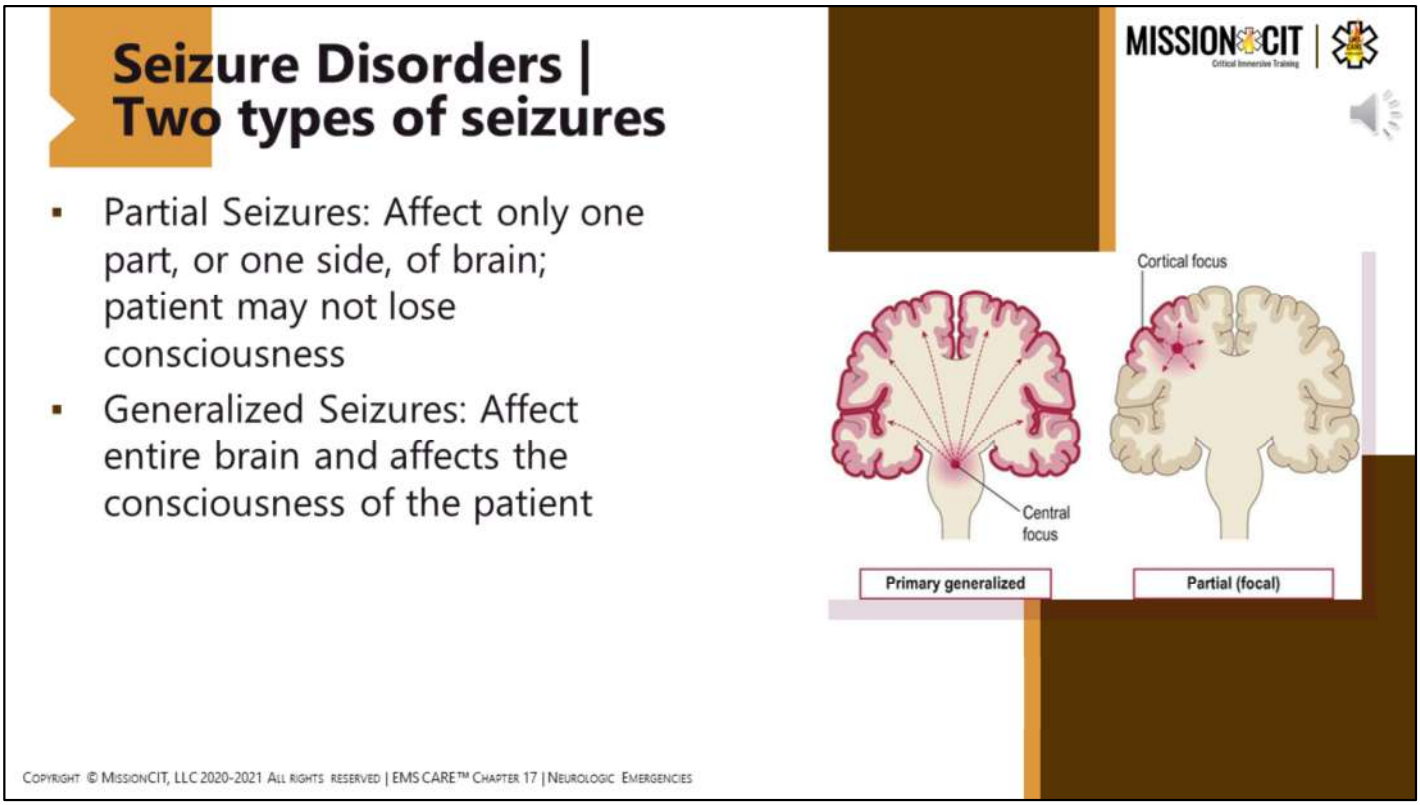


Seizures result from the disorganized firing of neurons in the brain. A seizure is not a disease, but rather a sign of some underlying defect, injury, or disease.

If normal brain function is upset by injury, infection, or disease, the brain's electrical activity can become irregular. Any Irregularity can bring about seizure. Additionally, a sudden change in sensation, behavior, or movement can be a trigger.

There are many types of seizures, which range in severity. Seizure types vary by where and how they begin in the brain. Most seizures last from 30 seconds to two minutes. A seizure that lasts longer than five minutes is a medical emergency.

Seizures are more common than most people think. Seizures can happen after a stroke, a closed head injury, an infection such as meningitis, or another illness. Many times, the cause of a seizure is unknown.



There are two main types of Seizures: Partial and Generalized.

Partial Seizures: Affect only one part, or one side of the brain. In this type, the patient may not lose consciousness. These are also called Focal seizures. And there are two types of Partial or Focal Seizures.

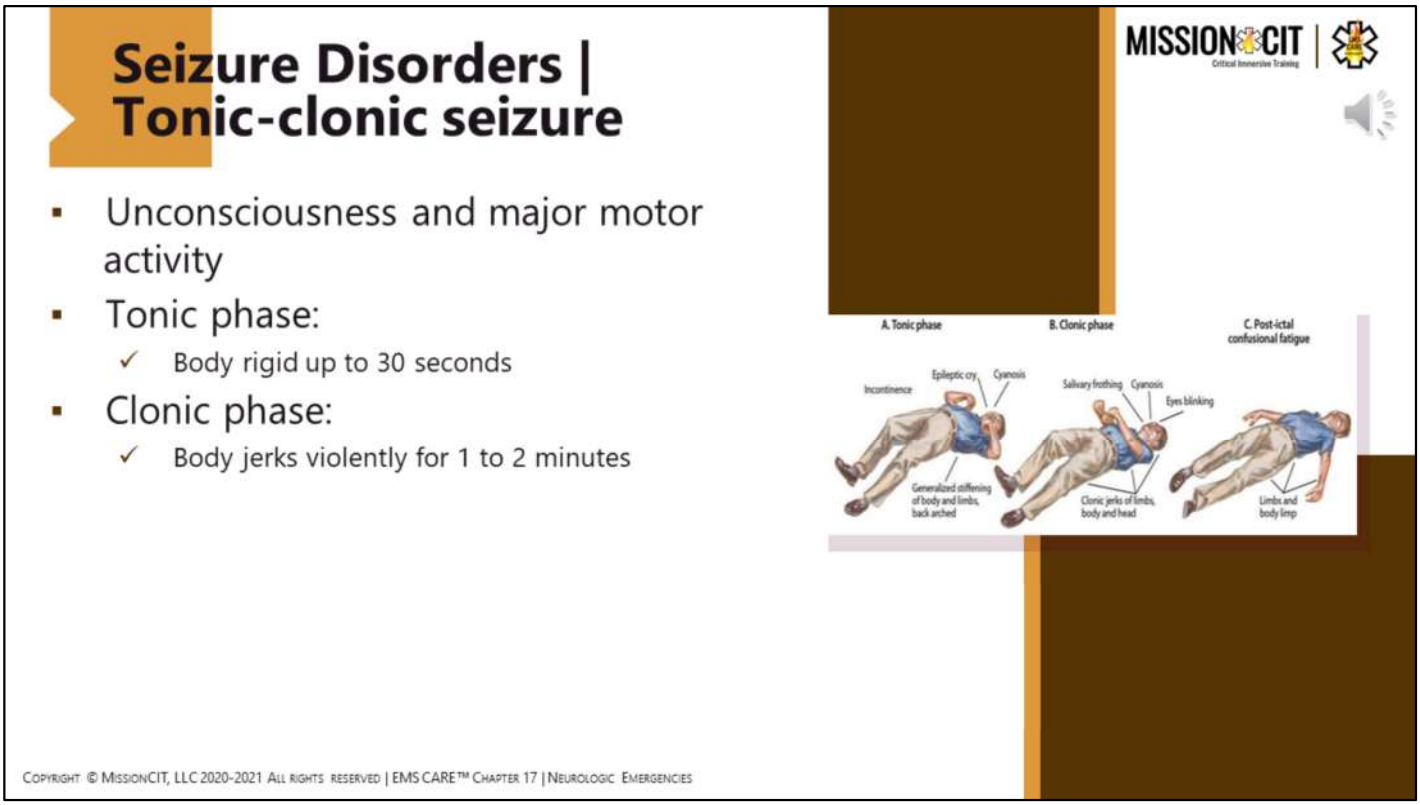
1. Partial with impaired awareness. These seizures involve a change or loss of consciousness or awareness. The patient may stare into space and not respond normally to the environment. Or, the patient may perform repetitive movements, such as hand rubbing, chewing, swallowing, or walking in circles.
2. Partial without loss of consciousness. These seizures may alter emotions or change the way things look, smell, feel, taste or sound, but the patient does not lose consciousness. These seizures may also result in the involuntary jerking of a body part, such as an arm or leg. In addition, the patient may experience spontaneous sensory symptoms such as tingling, dizziness, and flashing lights.

As compared to partial seizures, generalized Seizures affect the entire brain, and affects the consciousness of the patient. There are many types of generalized seizures. Here are 6 of the more common types:

1. Absence seizures, previously known as petit mal seizures, often occur in children and are characterized by staring into space or by subtle body movements, such as eye blinking or

lip smacking. These seizures may occur in clusters and cause a brief loss of awareness.

2. Tonic seizures, cause stiffening of the muscles. These seizures usually affect muscles in the patient's back, arms and legs, and may cause one to fall to the ground.
3. Atonic seizures, also known as drop seizures, cause a loss of muscle control, which may cause a patient to suddenly collapse or fall down.
4. Clonic seizures are associated with repeated, or rhythmic jerking muscle movements. These seizures usually affect the neck, face, and arms.
5. Myoclonic seizures usually appear as sudden brief jerks, or twitches of one's arms and legs.
6. Tonic-clonic seizures, previously known as grand mal seizures, are the most dramatic type of epileptic seizure and can cause an abrupt loss of consciousness, body stiffening and shaking, and sometimes loss of bladder control or biting your tongue.



A tonic-clonic 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.

The tonic phase comes first. And is sometimes called the Pre-Ictal Phase. In this phase:

- 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, and may be called the Ictal phase. In this phase:

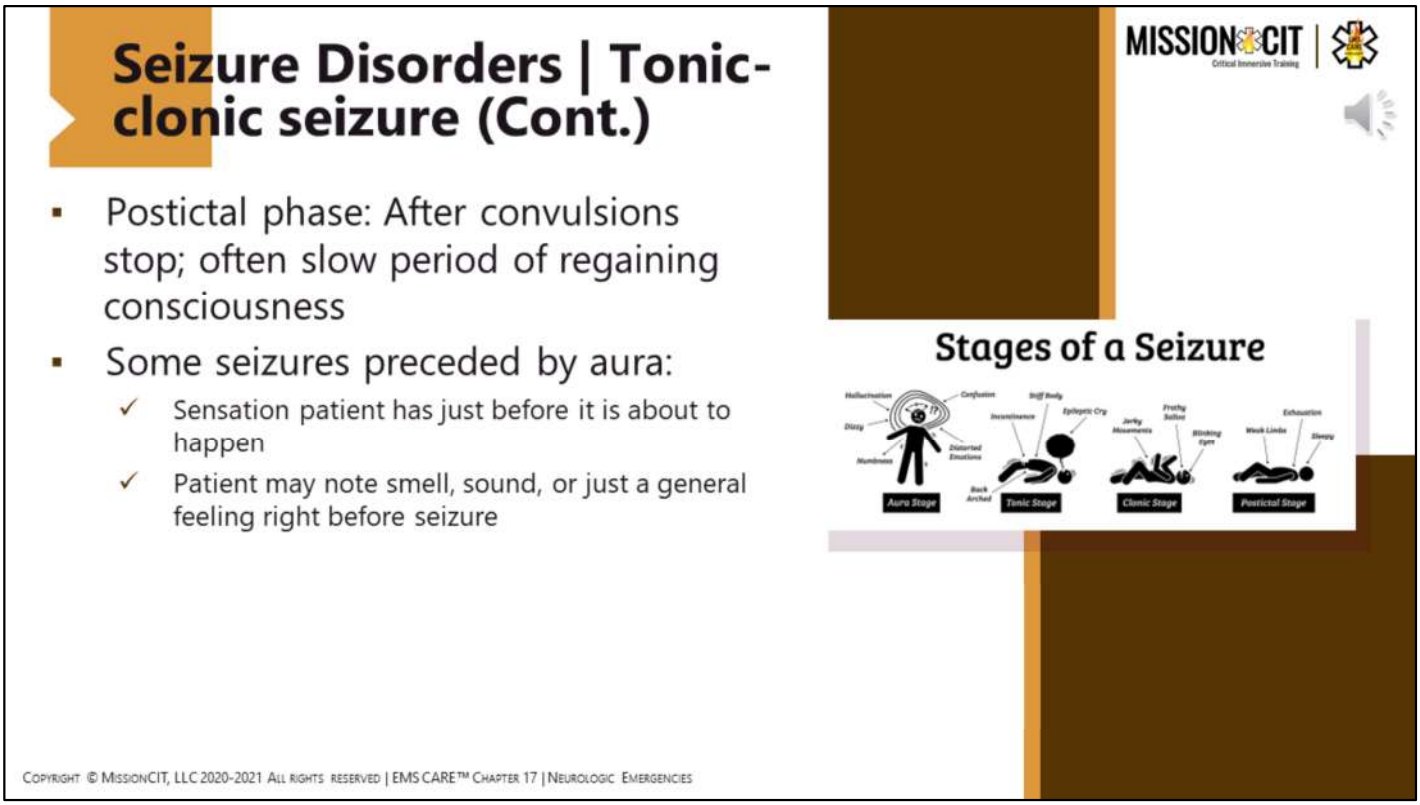
- The arms and usually the legs begin to jerk rapidly and rhythmically, bending and relaxing at the elbows, hips, and knees,
- After a few minutes, the jerking slows and stops.

After the clonic phase, which is called the Post-Ictal phase,

- The person’s face may look dusky, or a bit blue if they are having trouble breathing, or if the seizure lasts too long.
- Also, the person may lose control of their bladder or bowel as the body relaxes.
- And Consciousness, or a person’s awareness, returns slowly.

These seizures generally last 1 to 3 minutes. Afterward, the person may be sleepy, confused, irritable, or depressed. A tonic-clonic seizure that lasts longer than 5 minutes, needs immediate medical help.

A seizure that lasts more than 10 minutes, or three seizures in a row, is a dangerous condition. This is called status epilepticus; emergency treatment in a hospital is needed.



Some define seizures with three phases, as we discussed. Others advise that a seizure can be composed of four distinct phases. In this view, the first phase of the seizure is called the prodromal, Aura, or early ictal phase.

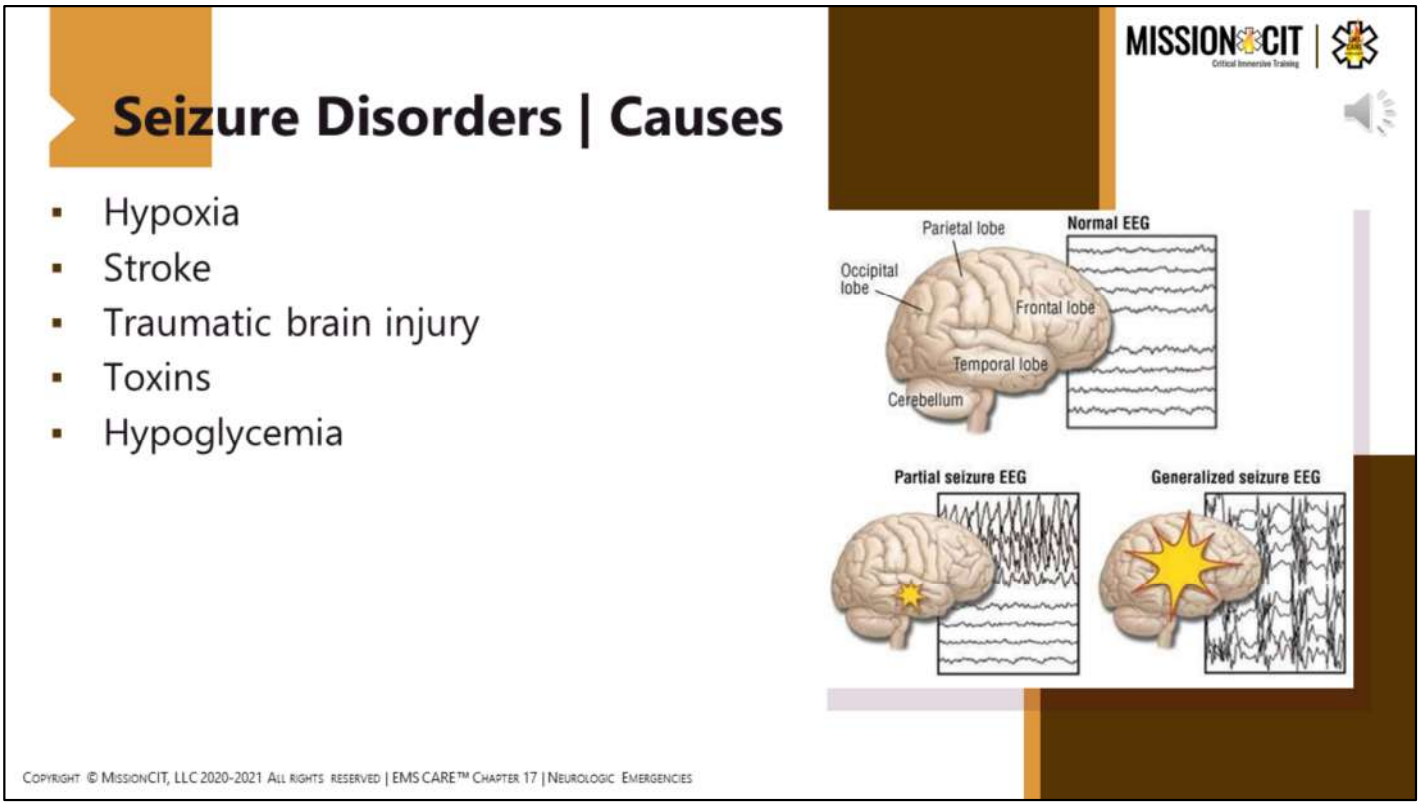
Patients with generalized tonic-clonic seizures may report having a prodrome, or Aura, which comprises symptoms occurring hours or days before a seizure. Common prodromes include mood changes, sleep disturbances, lightheadedness, anxiety, irritability, difficulty concentrating, and rarely, an ecstatic feeling.

Sometimes, the Aura is a Sensation the patient has, just before the seizure is about to happen. During the aura, a Patient may note smell, sound, or just a general different feeling, right before a seizure.

After the tonic and clonic phases, is the post-ictal phase which begins after convulsions stop. This is often a slow period of regaining consciousness.

The NIH advises, that it is easier to determine the end of the seizure, and the beginning of the postictal state for a generalized tonic-clonic, or a generalized tonic seizure. In absence seizures, focal seizures with impaired awareness, and in myoclonic seizures, it is harder to distinguish ictal from the postictal state.

The practical implication of the postictal state is when it is safe for the patient to return to activity without risking their own, or other's safety.



We discussed that Nerve cells in the brain create, send, and receive electrical impulses, which allow the brain's nerve cells to communicate. Anything that disrupts these communication pathways can lead to a seizure.

The most common cause of seizures is epilepsy. But not every person who has a seizure has epilepsy. Sometimes seizures happen because of:

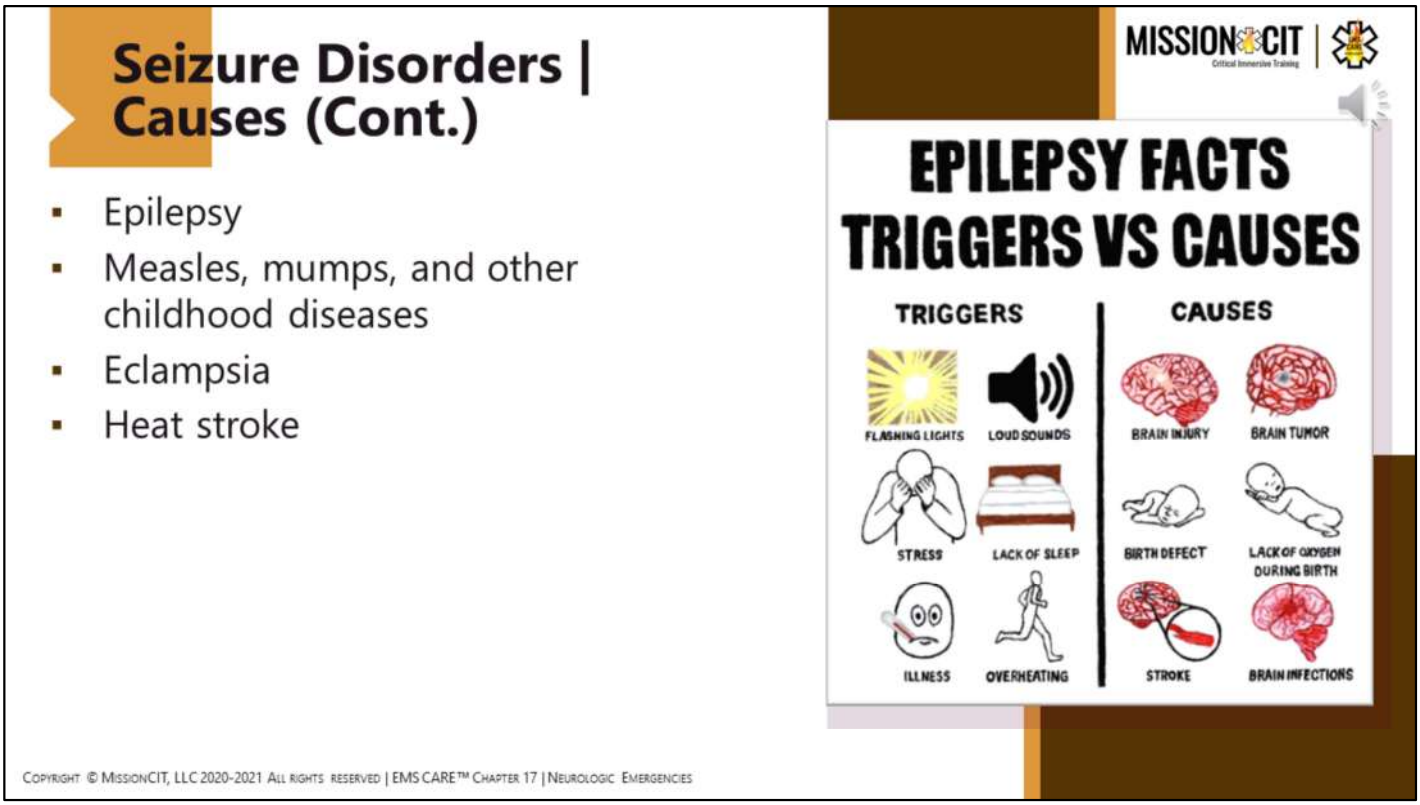
- Hypoxia: Cerebral hypoxia refers to a condition, in which there is a decrease of oxygen supply to the brain, even though there is adequate blood flow. When hypoxia lasts for longer periods of time, it can cause coma, seizures, and even brain death.
- Stroke: A stroke causes the brain to become injured. The injury to the brain results in the formation of scar tissue, which affects the electrical activity. Disrupting the electrical activity can cause the patient to have a seizure.
- Traumatic brain injury: Causes a seizure, usually where there is a scar in the brain as a consequence of the injury.
- Toxins: May cause seizures by altering the balance of excitation, and inhibition in the nervous system, or interfering with energy metabolism. Many therapeutic or illicit drugs, will cause seizures through similar mechanisms.
- Hypoglycemia: More severe hypoglycemia or low blood sugar symptoms, such as unclear thinking or seizure, may occur when the blood sugar is less than 40 milligrams per deciliter

or 2.2 millimoles per liter.



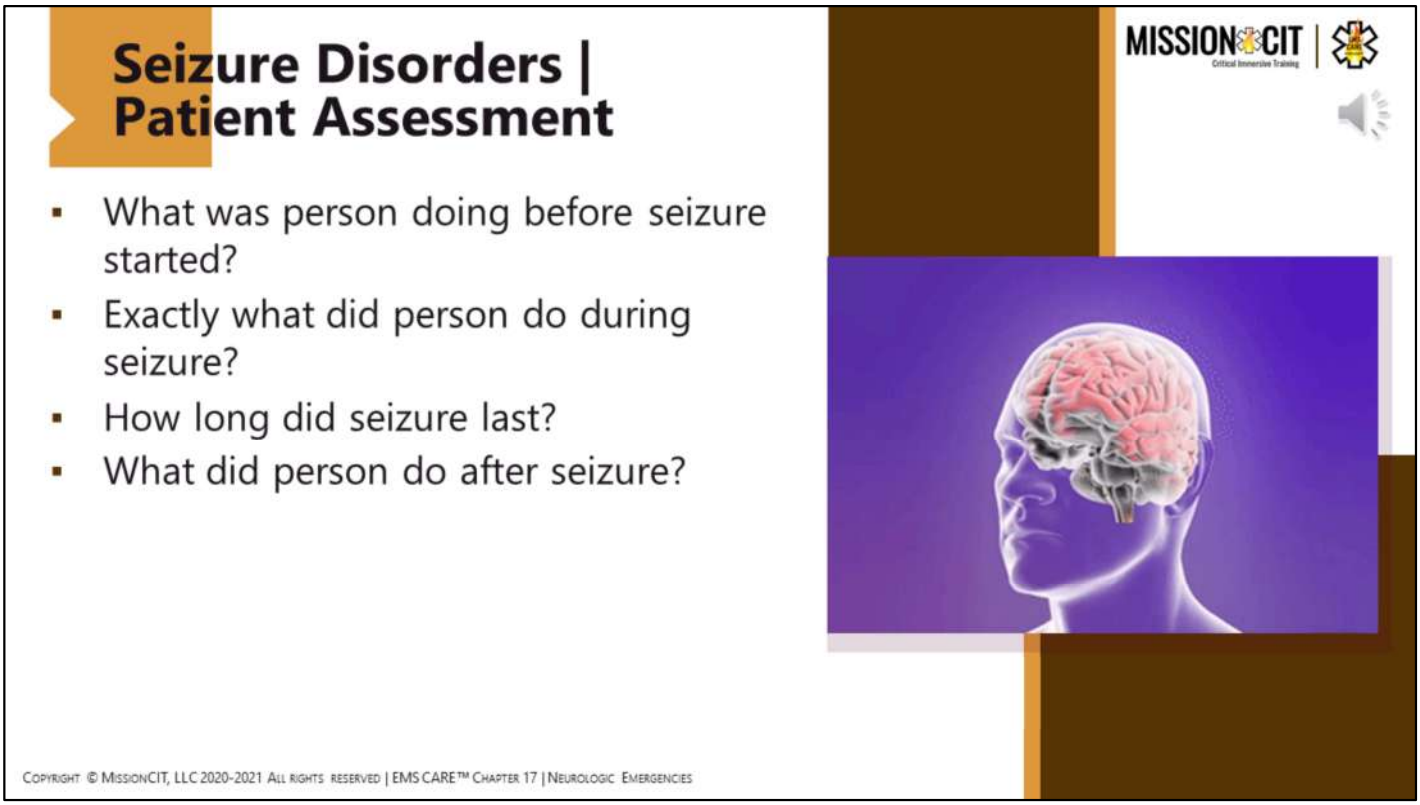
Some additional causes of Seizure Disorders include:

- Brain Tumor: An undiagnosed slow growing brain tumor can trigger a seizure. Low-grade gliomas are often the most epileptogenic.
- Congenital Brain Defects: Cortical dysplasia is a malformation that occurs during embryogenesis when normal brain cells migrate to incorrect locations. It is one of the most common forms of epilepsy in children. The presence of these abnormal cells irritates the surrounding brain and triggers seizures.
- Infection: Common infections of the central nervous system that may trigger seizures include: herpes simplex, cytomegalovirus, arbovirus, human immunodeficiency virus, neurocysticercosis, malaria, toxoplasmosis, bacterial meningitis and brain abscess.
- Metabolic: Many different metabolic disorders can cause seizures, some as a result of a metabolic disturbance such as hypoglycemia or acidosis.
- Idiopathic: Head trauma as a result of a car accident or other traumatic injury can cause epilepsy.



Continuing with more potential causes of Seizure Disorders, including:

- Epileptic seizures occur when a burst of electrical impulses in the brain escape their normal limits. They spread to neighboring areas and create an uncontrolled storm of electrical activity. The electrical impulses can be transmitted to the muscles, causing twitches or convulsions.
- Regarding Measles and mumps; there is a small increased risk for febrile seizures after MMR and MMRV vaccines. Studies have shown a small increased risk for febrile seizures during the 5 to 12 days after a child has received their first vaccination, with the measles, mumps, rubella vaccine.
- For patients with pre-eclampsia or eclampsia, the prevailing view is that convulsions are caused by cerebral vasospasm and cerebral edema.
- And heatstroke can be responsible for an altered mental state or behavior. Confusion, agitation, slurred speech, irritability, delirium, seizures, and coma can all result from heatstroke.



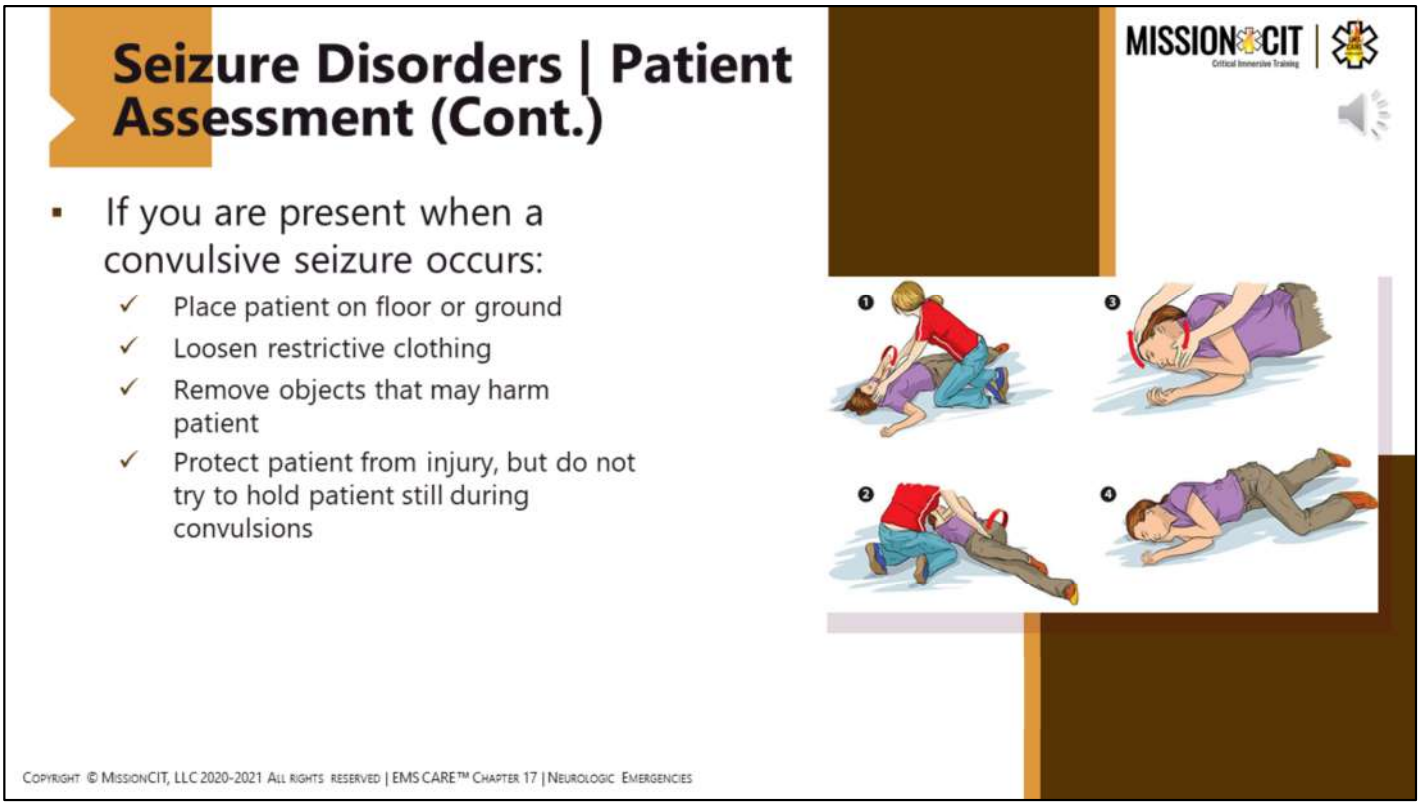
During a Seizure Disorder Patient Assessment, look for the underlying cause. Ask:

- What was the person doing before the seizure started.
- Exactly what did the person do during the seizure?
- How long did the seizure last?
- And what did the person do after the seizure?

The Epilepsy Foundation Guide for EMS personnel, advises the following 7 steps

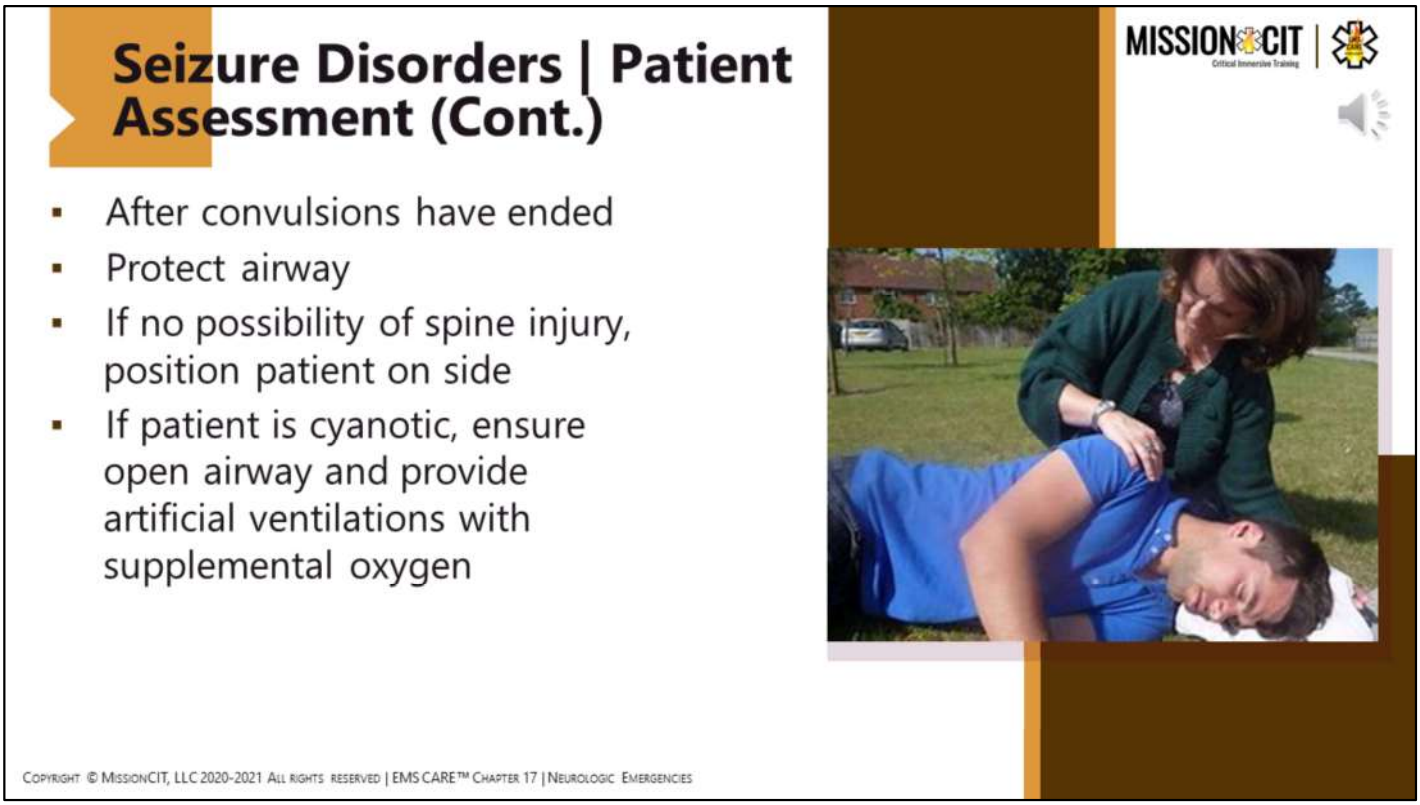
1. Establish safety and privacy – create a safe space. Make sure the physical area is safe by removing objects that could hurt the patient. Ensure the scene is safe for rescuers. Use appropriate body substance isolation (BSI) precautions. Then:
2. Check for obvious triggers – look around for obvious seizure triggers such as downed electrical wires or chemical spills.
3. Assess the patient – check the level of consciousness, responses, even look for a medical ID bracelet or necklace.
4. Question witnesses – attempt to find out what preceded the episode. Try to get specifics about the patient's behavior to help you understand the type of seizure the person is experiencing.

5. Establish a timeline – find out how long the person has been in seizure.
6. Conduct a head-to-toe examination – look for trauma, protect the person's head by placing something soft and flat under it but DO NOT restrain the person, and keep the airway clear.
7. Determine the next steps – decide if the person can be safely treated on the scene or requires further medical intervention. Pay attention to what happens in the postictal phase.



During a Seizure Disorder Patient Assessment; if you are present when a convulsive seizure occurs, never place anything in the mouth of a seizing patient. Many objects can be broken and obstruct the patient's airway.

- Place the patient on the floor or the ground.
- Loosen any restrictive clothing.
- Remove any objects that may harm the patient.
- Protect the patient from injury, but do not try to hold the patient still during convulsions.



During the assessment, and after convulsions have ended;

- Protect the patient's airway.
- If there is no possibility of spinal injury, position the patient on their side.
- If the patient is cyanotic, ensure an open airway, and provide artificial ventilation with supplemental oxygen.

Seizure Disorders | Patient Assessment (Cont.)

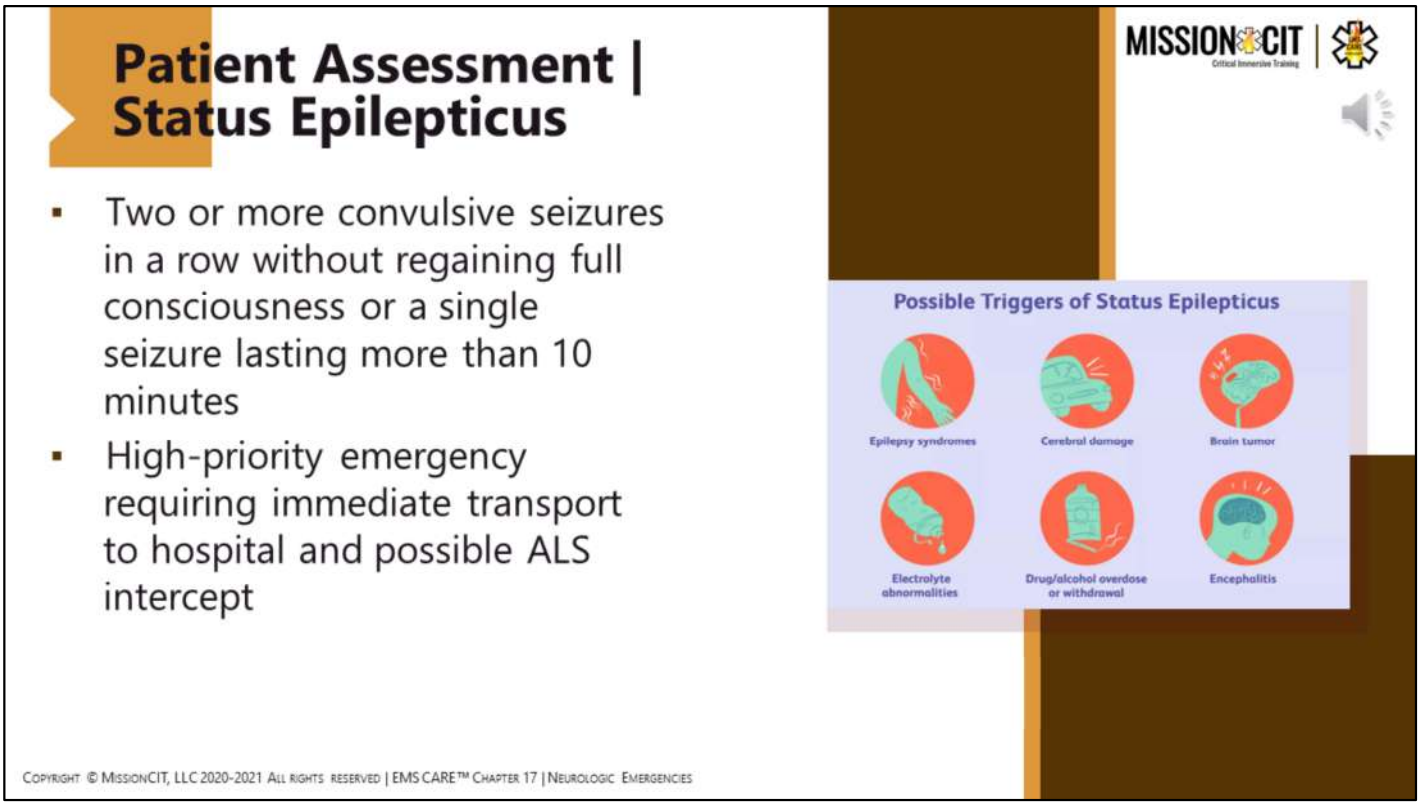
- After convulsions have ended:
  - ✓ Patient breathing adequately may be given oxygen by mask or nasal cannula
  - ✓ Treat injuries patient may have sustained during convulsions
  - ✓ Transport



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Continuing after the convulsions have ended;

- A Patient breathing adequately may be given oxygen by mask or nasal cannula.
- Then treat injuries the patient may have sustained during convulsions.
- And then transport as soon as you can.



Status epilepticus, occurs when two or more convulsive seizures happen in a row, without regaining full consciousness, or when the patient has a single seizure lasting more than 10 minutes.

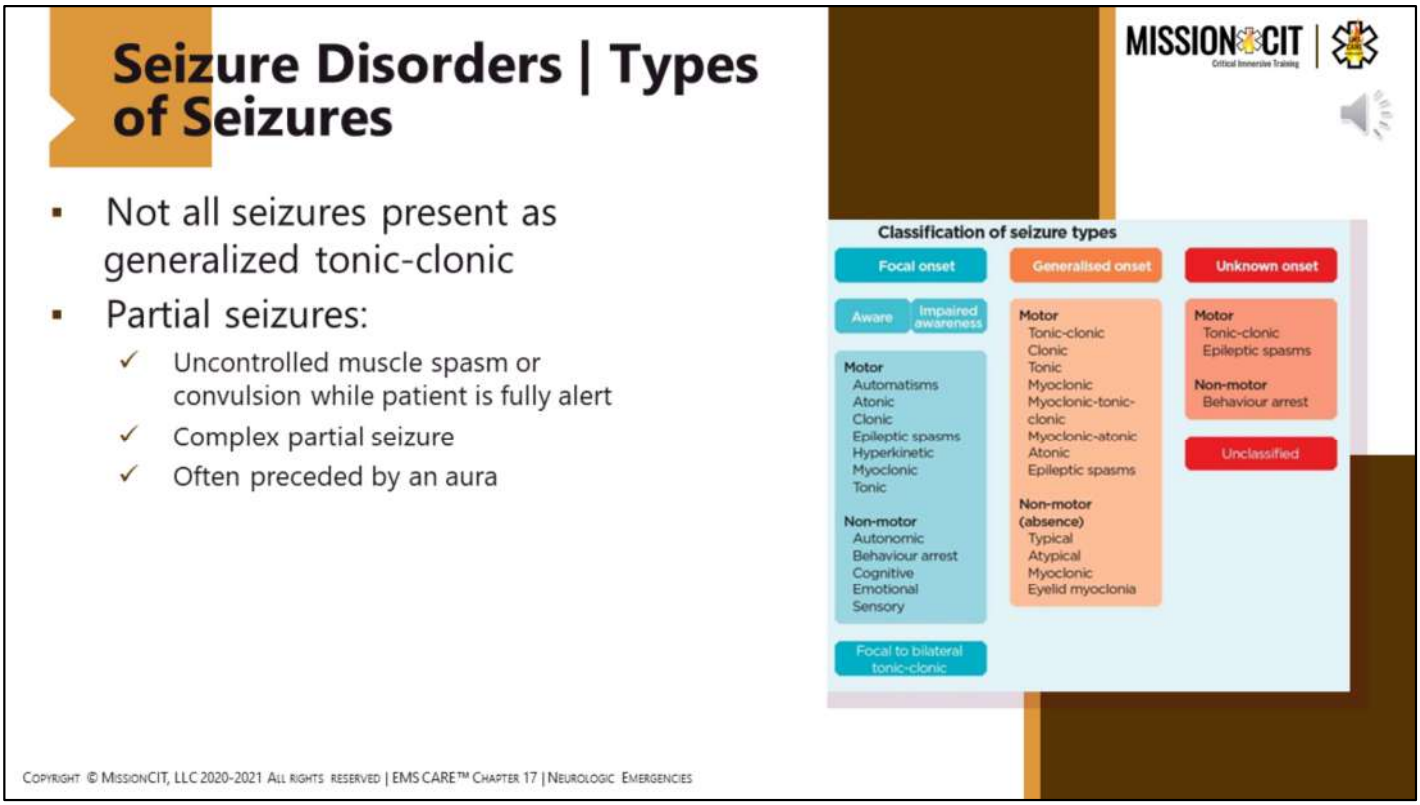
This is a high-priority emergency, requiring immediate transport to the hospital, and possible ALS intercept.

The epilepsy foundation recommends activating Advanced Life Support, or to rapidly transport the patient to an appropriate receiving facility, if the patient has one or more of the following 9 conditions:

- Patient continues to seize after 5 minutes,
- Patient experiences a second seizure shortly after the first,
- Patient remains unconscious,
- After 20 minutes, the Patient remains confused,
- The Patient is pregnant,
- The Patient has a co-morbid condition such as diabetes,
- The Patient experienced the seizure while in water,

- The Patient has been injured during or prior to the seizure or other event, and
- The Patient Is experiencing severe headache or other symptoms different from those usually associated with his or her seizures.

Keep this in mind. And follow your local protocol.



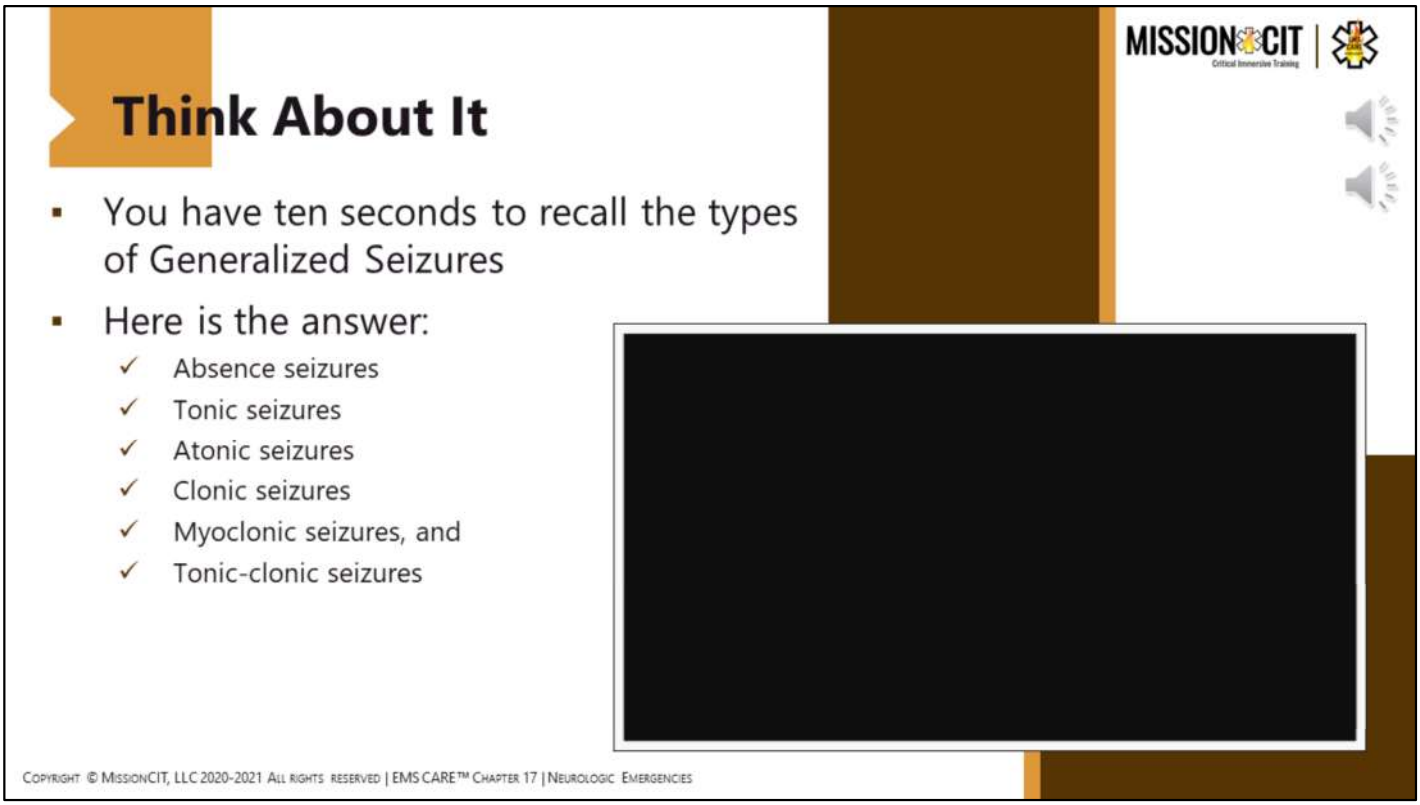
As we discussed earlier, there are various types of seizures. Not all seizures are generalized tonic-clonic. There are Partial or focal seizures characterized by:

- Uncontrolled muscle spasm or convulsion while the patient is fully alert,
- Or a complex partial seizure,
- And is often preceded by an aura.

Partial Seizures: Affect only one part, or one side, of the brain; and the patient may not lose consciousness. There are two types:

- Partial with impaired awareness. These seizures involve a change or loss of consciousness or awareness.
- Partial without loss of consciousness. These seizures may alter emotions or change the way things look, smell, feel, taste or sound, but you don't lose consciousness.

That’s it for the session on Seizures. Coming up next is a question.



You have ten seconds to recall the types of Generalized seizures.

Here is the answer.

- Absence seizures,
- Tonic seizures
- Atonic seizures
- Clonic seizures
- Myoclonic seizures, and
- Tonic-clonic seizures