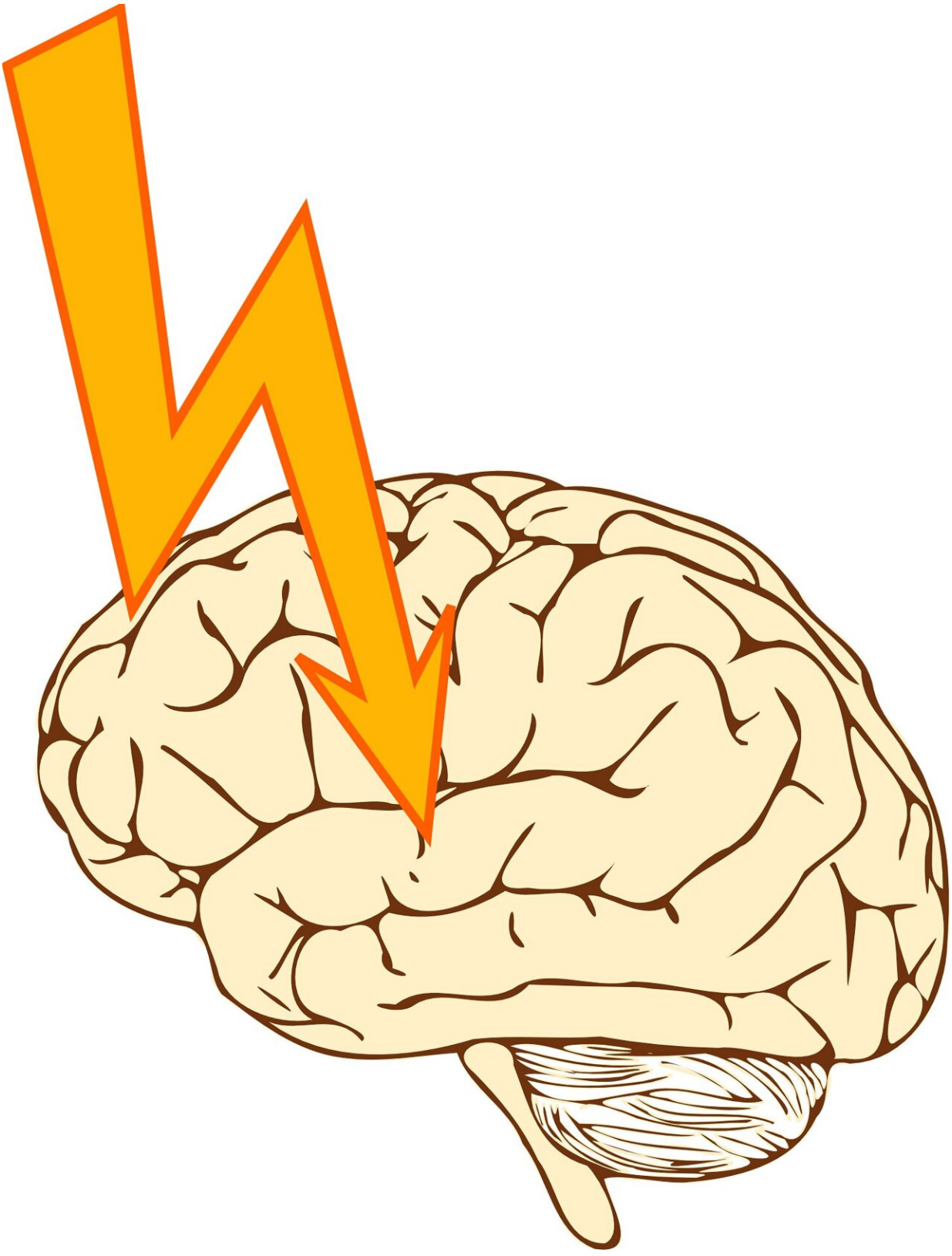
Brooke Shields had a grand mal seizure—here's what you need to know about the condition

November 6 2023, by Cian McCafferty



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Actress and model Brooke Shields has revealed she suffered a grand mal seizure in September. In an interview, Shields revealed that the seizure caused her to lose control of her movements, froth at the mouth and eventually lose consciousness. The actress doesn't have a history of seizures—and many people reading her story may be wondering if they're also at risk.

"Grand mal," which means "great sickness" in French, is actually the old term for what's now called a tonic-clonic seizure. These seizures involve both stiffening (tonic) and twitching (clonic) muscle movements. It's just one type of seizure a person can experience.

Seizures happen when the electrical activity in our brain becomes disrupted.

Normally, the electrical activity in our brains carries information inward from the sensory world around us, outward to our muscles, and also transmits our thoughts, feelings and intentions everywhere else in between. To carry all this information, the brain activity forms complex patterns—like how the pixels on your computer or phone's screen form complex patterns of color and shape to bring you the information you're reading now.

But during a seizure, the electrical activity in some or all of the brain instead enters a rhythmic sequence, alternating between high and low-intensity activity. This disrupts the information being sent and received in those parts of the brain. Think of it like your computer or phone screen suddenly being covered only in alternating black and white stripes. This on/off pattern is an extreme type of neural oscillation.

The symptoms a person experiences during a seizure depends on the brain region being affected.

Tonic-clonic seizures, which involve muscle stiffening and twitching, usually involve large parts of the cerebral cortex—the outer, wrinkly layers of the brain. Because of this, they are referred to as generalized seizures and they affect the motor cortex, which controls the body's voluntary muscle movements. This brain area would have been involved in Shields' seizure.

Other types of seizures include absence seizures (formerly known as petit mal, or "little sickness") and focal seizures.

Absence seizures also involve large parts of the cerebral cortex. These cause a person to suddenly stop all activity and stare ahead of them with a blank look. Their eyes may also turn upwards. Researchers aren't quite sure why absence seizures and tonic-clonic seizures have such different symptoms, but it might be down to the patterns of activity that make up the seizures.

Focal seizures, on the other hand, happen only in part of the cerebral cortex. Symptoms will depend on the function of the brain area affected by the seizure. If it's a motor region, some muscle twitches might be observed.

The affected brain regions usually go back to working as normal after the seizure ends—either straight away or after some minutes. In unusual cases, the post-seizure state can last for hours.

If a person has a seizure more than once, they might be diagnosed with epilepsy—a lifelong condition that causes frequent seizures. But some people—like Shields—can have a one-off seizure caused by temporary changes in their environment or body.

Disrupted brain patterns

Anything that sufficiently disrupts our brain's normal patterns of activity has the potential to cause seizures.

While such disruptions usually only happen as part of an epilepsy syndrome, they can also happen when the body (and therefore the brain) is put under extreme stress. Potential causes of this stress include a stroke, brain trauma, a fever and very low blood sugar.

Shields has said that her tonic-clonic seizure was caused by drinking too much water, resulting in low blood sodium levels. This condition, known as hyponatremia, has significant consequences for the brain—most notably a swelling of brain cells as their water content increases.

Because the brain is contained within the skull it doesn't have room to freely expand. As such, it has mechanisms in place to counteract increases in water content. Some of these mechanisms can throw off the delicate balance of the charged particles (ions) that allow the brain to be electrically active.

This could in turn alter the electrical activity in the brain and lead to the seizures that are sometimes observed in advanced cases of hyponatremia.

While hyponatremia is a very rare cause of tonic-clonic seizures, it's still worth being aware that it can sometimes cause them. This may particularly be a concern to older people and those staying in hospital long-term, as certain treatments and medications (such as diuretics) can disrupt sodium levels.

For most of us, this is not a significant risk. Our bodies normally tell us when we've had enough water, and we typically consume enough salt in our diet to maintain balance.

And, because our brains typically only become vulnerable to one-off seizures in extreme conditions—such as a very unusual diet, alcohol or drug overuse, extreme exhaustion, or trauma—they aren't something the majority of us will need to worry about.

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