Epilepsy is a complex neurological disorder that affects approximately 50 million people worldwide and which is characterized by abnormal bouts of brain activity called seizures. While results vary across studies, there is evidence that prolonged seizures (also called status epilepticus) may result in long-term cognitive deficits and learning disability in at least some patients. These seizures have also been associated with the development of chronic depression. Results from numerous studies have demonstrated changes in the central nervous system in patients with epilepsy, but less is known regarding those that might occur in the brain during or after prolonged seizures, and which may be related to alterations in patients’ function and behavior.

Results from a recent study have suggested that prolonged seizures may result in “rewiring” of networks in the brain that can lead to problems which might persist for the rest of the patient’s life. A study carried out using a rodent model of human epilepsy showed that a prolonged seizure results in a dramatic change in the function of a neurotransmitter called γ-aminobutyric acid GABA. This neurotransmitter is present in a large number of cells in many parts of the brain and its main function is to inhibit (slow or quiet) activity in neuronal networks. The study in rodents showed that a prolonged seizure may switch the function of GABA to speeding up rather than slowing down brain activity. This acceleration has the potential to create new and harmful connections in the brain. Importantly, this study also showed that blocking the activity of GABA or interfering with other mechanisms involved in growth of new connections by neurons can prevent the changes in neuronal networks associated with prolonged seizures. The demonstration that prolonged seizures can lead to potentially permanent adverse changes in the brain also underscores the importance of them as rapidly as possible with well-established rescue medications that have been developed for the management of these events.

References


