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Mechanism of Seizure and its Management

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Commentary

The electrical activity of the brain is out of sync. During a seizure, a group of neurons begins to fire in an abnormal, excessive, and synchronized manner due to brain problems. This results in a wave of depolarization known as a paroxysmal depolarization shift. Excitatory neurons are usually more resistant to firing for a period of time after firing. This is partly due to the actions of inhibitory neurons, electrical changes in excitatory neurons, and the adverse effects of adenosine. During this time, epilepsy reduces the resistance of excitatory neurons to firing. This can be caused by changes in ion channels or inhibitory neurons that are not functioning properly. Forty-four ion channel genes and over 1,600 ion channel mutations are involved in the development of epileptic seizures. These ion channel mutations tend to give neurons a depolarized resting state, causing pathological hyperexcitability. This long-term depolarization in individual neurons is based on the influx of Ca 2+ from outside the cell, leading to widespread opening of Na + channels and repetitive action potentials. The following hyperpolarizations are possible by gamma-aminobutyric acid (GABA) receptors or potassium (K +) channels, depending on the cell type. Equally important for the hyperexcitatory activity of epileptic neurons is the reduced activity of inhibitory GABAergic neurons, an effect known as disinhibition. Desuppression may result from loss of inhibitory neurons, dysregulation of axonal sprouting from inhibitory neurons in areas of neuronal damage, or abnormal GABAergic signaling within inhibitory neurons. Divine course excitement leads to specific areas where seizures can occur, known as the "focus of seizures". After brain injury, another mechanism of epilepsy may be upregulation of excitatory circles or downregulation of inhibitory circles. These secondary epilepsies occur through a process known as epilepsy. Disorders of the blood-brain barrier may also be the causative mechanism. Blood-brain barrier disorders alone appear to cause epileptigenicity, but correlate with increased seizure activity. In addition, it has been associated with chronic epileptic conditions through experiments that induce barrier permeability with compounds. Disorders can cause fluid from blood vessels to leak into the intercellular areas, causing seizures. Preliminary discovery of blood proteins in the brain after an attack supports this theory.

Focal epilepsy begins in one hemisphere of the brain, and systemic seizures begin in both hemispheres. Some types of seizures can alter the structure of the brain, but others appear to have little effect. Gliosis, loss of nerve cells, and atrophy of certain areas of the brain are associated with epilepsy, but it is unclear whether epilepsy causes these changes or whether these changes lead to epilepsy. Seizure activity can be transmitted through the intrinsic electric field of the brain. Proposed mechanisms that can cause neuronal enlargement and recruitment include extracellular increase in K + and increased Ca 2+ at the presynaptic end. These mechanisms not only release neurotransmitters, but also blunt hyperpolarization and depolarize adjacent neurons.

Management

To avoid injury, you need to remove sharp or dangerous objects from around the person who has the seizure. If you are not conscious and alert after a seizure, you should be in a stable lateral decubitus position. Seizures that last more than 5 minutes, or more than once within 5 minutes, are an emergency condition known as status epilepticus. Contrary to common misconceptions, bystanders should not try to push anything into the mouth of a person who has had a seizure. It can damage your teeth and gums.

Treatment of people with active seizures progresses from the initial response to first-line, second-line, and third-line treatment. The first response is to make sure that the person is protected from potential harm (such as nearby objects) and controls the airways, breathing, and circulation. [69] Airway management requires people to be placed on their side, known as the stable side position, to prevent choking. If something is blocking the airways and you cannot breathe, you may need treatment to open the airways.

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