National Institutes of Health

Fact Sheet — *Epilepsy*

Thirty Years Ago

- By the 1960s, scientists had made great strides in detecting patterns of abnormal electrical activity in the brain that cause seizures. A technology to measure brain activity, called electroencephalography (EEG), became a widespread tool to diagnose epilepsy.
- Treatment options for epilepsy were very limited. In the mid-1960s only a handful of drugs were available to treat epilepsy, and each had problematic side effects. In some people, EEG could be used to locate and surgically remove the epileptic focus, the source of seizure activity.

Today

- Today, about two-thirds of all people with epilepsy can successfully control their seizures with medication, surgery, vagal nerve stimulation, or some combination of these therapies.
- Over twenty antiepileptic drugs are now commonly used to treat epilepsy. Ten of these drugs were developed with the help of special programs sponsored by the NIH. These drugs have fewer side effects than older antiepileptics.
- Brain imaging technologies now help surgeons map critical areas of the brain prior to surgery. These sophisticated tools allow precise localization and removal of the seizure focus while sparing normal tissue. NIH-funded researchers studying functional MRI (fMRI), magnetic resonance spectroscopy (MRS), and single photon emission computed tomography (SPECT), along with traditional MRI and PET have helped to make these technical improvements possible.

Tomorrow

- Epilepsy treatment will become predictive, personalized, and preemptive. For individuals with epilepsy, better therapies will control seizures without causing undesirable side effects. Improved epilepsy detection and prevention techniques will stop epilepsy from developing in people who are at-risk for the disorder.
- Predictive genetic testing will help to identify those at risk of developing epilepsy, especially after trauma. The NIH is supporting a large gene sequencing project to detect mutations in human genes that predispose an individual to epilepsy.
- Pharmacogenetics will help to rapidly identify which antiepileptic therapies are most likely to be effective for an individual patient, avoiding a long trial-and-error period before the right medication is found. For example, an NIH-funded clinical trial is comparing best treatments for childhood seizures. This trial includes a search for markers of treatment response.
- Implantable devices will be capable of recording electrical brain activity, predicting the onset of a seizure, and administering electrical current or antiepileptic medications that can stop the abnormal activity even before a seizure starts. An international team of NIH researchers are working closely with industry partners to develop pattern-recognition algorithms and safe, effective implantable devices.
- Preventive therapy will halt the development of epilepsy in those at risk of the disease, preventing epilepsy before the onset of seizures. The NIH continues to support a number of clinical trials to test different methods to prevent epilepsy in those at-risk of developing the disorder after a head injury. The agency also funds a large portfolio of basic and translational research on the process by which epilepsy develops and how it can be halted to prevent epilepsy in those at risk, such as in individuals who have experienced stroke, febrile seizures, head injury, or brain tumor.