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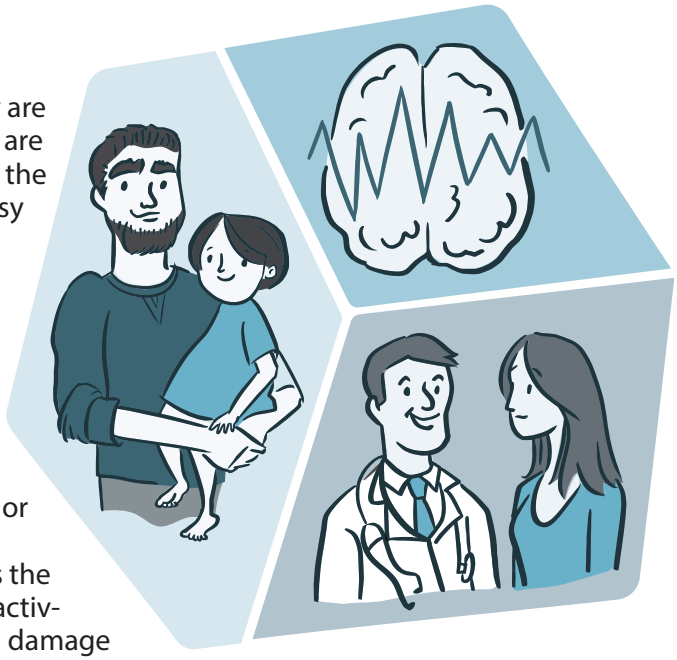
A Look at Epilepsy

Electrical Outbursts in the Brain

When you hear the word epilepsy, you might think of intense seizures with muscle spasms and loss of consciousness. But most epilepsy seizures are surprisingly subtle and may be hard to recognize. These little spells can be an early warning sign of epilepsy, a brain disorder that strikes an estimated 1 in 26 Americans at some point in their lives. The sooner epilepsy is recognized, the sooner it can be treated and seizures prevented.

Most people know surprisingly little about epilepsy, even though it's the nation's 4th most common **neurological disorder**, after migraine, stroke, and Alzheimer's disease. Epilepsy is marked by repeated, unpredictable seizures that may last for seconds or minutes. Seizures arise from abnormal bursts of electrical activity in the brain that trigger jerky movements, strange emotions or sensations, falls, or passing out.

"Epilepsy can strike people of all ages, from the moment of birth—even in the delivery room—up to older ages," says Dr. Jeffrey Noebels, an epilepsy expert at Baylor College of Medicine. The condition is most likely to first arise in children and in adults over age 60. "Most types of epilepsy last a lifetime, but some are self-limited, meaning they can go away on their own," Noebels adds.



The causes of epilepsy are varied. "Defects in genes are probably responsible for the largest fraction of epilepsy cases," Noebels says. Scientists so far have linked more than 150 genes to epilepsy. "Other types of epilepsy can be acquired through trauma (such as head injury or stroke), infections, brain tumors, or other factors."

Anything that disrupts the normal pattern of brain activity—from illness to brain damage to faulty brain development—can lead to seizures. But for up to half of people with epilepsy, the underlying cause is simply not known.

Types of seizures can also vary widely, which is why epilepsy is sometimes called a "spectrum disorder." In some people, seizures may appear only occasionally. At the other end of the spectrum, a person may have hundreds of seizures a day. The seizures can be severe, with convulsions, loss of consciousness, or even sudden death in rare cases. Or seizures may be barely noticeable.

Such subtle seizures—sometimes called partial or focal seizures—can cause feelings of déjà vu (feeling that something has happened before); hallucinations (seeing, smelling, or hearing things that aren't there); or other seemingly mild symptoms. During some seizures, a person may stop what they're doing and stare off into space for a few seconds without being aware of it.

"These little spells or seizures can sometimes occur for years before they're recognized as a problem and diagnosed as epilepsy," says Dr. Jacqueline French, who specializes in epilepsy treatment at the New York University Langone Medical Center. "They can be little spells of confusion, little spells of panic, or feeling like the world doesn't look real to you."

The symptoms of these small seizures generally depend on which brain regions are affected. Over time, these types of seizures can give rise to more severe seizures that affect the whole brain. That's why it's important to get diagnosed and begin epilepsy treatment as soon as possible. "If you notice a repeating pattern of unusual behaviors or strange sensations that last anywhere from a few

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Definitions

Neurological Disorder
A disease that affects the body's nervous system, which is made up of the brain, spinal cord, and nerves throughout the body.

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seconds to a few minutes, be sure to mention it to your doctor or pediatrician," French says.

Over the past few decades, NIH-funded scientists have been working to develop better approaches for diagnosing, treating, and understanding epilepsy. The condition can now be diagnosed through imaging tools like MRI or CT scans, by testing blood for defective genes, or by measuring the brain's electrical activity. Seizures can often be controlled with medications, special diets, surgery, or implanted devices. But there's still a need for improved care.

"Traditional medications for treating epilepsy are effective but problematic," says Dr. Ivan Soltesz, who studies epilepsy at Stanford University. "About 1 in 3 patients has drug-resistant epilepsy, meaning that available drugs can't control the seizures. In these cases, surgical removal of brain tissue may be the best option." When the drugs do work, he explains, they can also cause numerous side effects, including fatigue, abnormal liver function, and thinking problems.

One issue with today's medicines is they aren't targeted to the malfunctioning brain cells. Rather, they tend to affect the whole brain. "The drugs are also not specific in terms of the timing of treatment," Soltesz says. "The medications are always in the body, even when the seizures are not occurring."

He and other researchers are working to create highly targeted epilepsy therapies that are delivered only to malfunctioning brain regions and only when needed to block a seizure. So far, they've developed an experimental approach that can stop epilepsy-like seizures as they begin to occur in a mouse. The scientists hope to eventually translate those findings for use in people who have epilepsy.

In another line of NIH-funded research, a team of scientists is studying a deadly and poorly understood condition called SUDEP (for sudden unexpected death in epilepsy). "Most people with epilepsy live long and happy lives. But SUDEP is the most common cause of the shorter lifespan that can occur with epilepsy," says Noebels. "It's been a real mystery. We haven't known who's at greatest risk for this premature death. It can happen to different people who have epilepsy, from all walks of life."

Noebels and his colleagues have identified several mouse genes that seem related to both sudden-death seizures and heart rhythm problems. The researchers are now searching for similar human genes that may help predict who's most at risk for SUDEP. "We believe that SUDEP doesn't have to happen—that we can learn about it, predict it, and eventually find better ways to prevent it in every patient," Noebels says.

You can take steps to reduce some risk factors for epilepsy. Prevent head injuries by wearing seatbelts and bicycle helmets, and make sure kids are properly secured in car seats. Get proper treatment for disorders that can affect the brain as you age, such as cardiovascular disease or high blood pressure. And during pregnancy, good prenatal care can help prevent brain problems in the developing fetus that could lead to epilepsy and other problems later in life.

"We've made exciting advances to date in our understanding of epilepsy, its prevention, and treatment," says French. "But there's still much we have to learn, and much we're actively working to improve." ■

Wise Choices
If Someone's Having a Seizure

- Roll the person on his or her side to prevent choking.
- Cushion the person's head.
- Loosen tight clothing around the neck.
- Don't restrict the person from moving or wandering unless he or she is in danger.
- Do NOT put anything into the person's mouth. (People can't swallow their tongues during a seizure or any other time.)
- Remove dangerous objects the person might hit during the seizure.
- Note symptoms and how long the seizure lasts so you can tell a doctor or emergency personnel.

Call 911 if:

- The seizure lasts over 5 minutes.
- The person doesn't breathe normally or doesn't regain consciousness after the seizure ends.
- Another seizure starts before the person regains consciousness.
- The person injures himself or herself during the seizure.

Web Links

For more information about epilepsy, click the "Links" tab at:
http://newsinhealth.nih.gov/issue/Nov2015/Feature1

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Keep Your Skin Healthy

Protecting Your Outer Self

People say that beauty's only skin deep; it's what's on the "inside" that counts. Our insides are certainly important, but skin is your first layer of defense against the outside world. Skin can also give important clues to your overall health. Learn to take good care of your skin, so your skin can keep taking good care of you.

Skin protects your body in many ways. "The skin provides a barrier to protect the body from invasion by bacteria and other possible environmental hazards that can be dangerous for human health," says NIH dermatologist Dr. Heidi Kong.

Skin plays other roles, too. It contains nerve endings that let you feel when an object is too hot or sharp, so you can quickly pull away. Sweat glands and tiny blood vessels in your skin help to control your body temperature. And cells in your skin turn sunlight into vitamin D, which is important for healthy bones.

Skin can also alert you to a health problem. A red, itchy rash might signal allergies or infections, and a red "butterfly" rash on your face might be a sign of lupus. A yellow tint might indicate liver disease. And dark or unusual moles might be a warning sign of skin cancer. Be on the lookout for unexpected changes to your skin, and talk with your doctor if you have concerns.

Your skin can become too dry if you don't drink enough fluids or spend too much time in sunny or dry conditions. "While washing hands is important for good hygiene, washing your hands too much can also lead to dry skin," Kong says, especially if you wash with hot water and harsh soaps. To treat dry skin, use moisturizing creams or lotions, and use warm instead of hot water when you bathe and wash your hands. You can also try using a humidifier to make the air in your home less dry.

The sun can damage your skin as well. Sunlight contains ultraviolet (UV) light that causes sunburn and makes your skin age faster, leading to more wrinkles as you get older. "There's a strong link between UV exposure and skin cancer," Kong adds. So protect your skin from the sun. Wear hats and other protective clothing, use sunscreen with a sun protection factor (SPF) of at least 30, and restrict your time in the sun during the late morning and early afternoon hours, when sunlight is strongest.

Many skin researchers like Kong are studying the skin's microbiome—the bacteria and other microscopic organisms that live on your skin. Some of these microbes can be helpful. Evidence suggests that they boost the body's infection-fighting immune system and help keep you healthy. "But there are some skin diseases with known associations with certain microbes," says Kong. "We're trying to understand how those microbes differ between healthy people and people with skin diseases." In the long run, scientists would like to find ways to support healthy skin microbes while reducing harmful ones.

For tips to keep your skin healthy, see the "Wise Choices" box. ■

Wise Choices
Tips for Healthy Skin

- **Wash up.** Bathe in warm—not hot—water; use mild cleansers that don't irritate; and wash gently—don't scrub.
- **Block sun damage.** Avoid intense sun exposure, use sunscreen, and wear protective clothing.
- **Don't use tanning beds or sunlamps.** They emit the same harmful UV radiation as the sun.
- **Avoid dry skin.** Drink plenty of water, and use gentle moisturizers, lotions, or creams.
- **Reduce stress.** Stress can harm your skin and other body systems.
- **Get enough sleep.** Experts recommend about 9 hours a night for teens and 7-8 hours for adults.
- **Speak up.** Talk to your doctor if you notice any odd changes to your skin, like a rash or mole that changes size or color.

Definitions

Dermatologist
Physician with special training in conditions that affect the skin, hair, and nails.

Web Links

For more information about your skin, click the "Links" tab at:
http://newsinhealth.nih.gov/issue/Nov2015/Feature2

Health Capsules

For links to more information, see these stories online:
http://newsinhealth.nih.gov/issue/Nov2015/Capsule1

Tumor Test Helps Tailor Breast Cancer Treatments

A gene-based tumor test could identify women with a certain type of breast cancer who don't need to undergo chemotherapy. The finding suggests that gene testing can add to traditional clinical testing to help guide treatment choices.

Breast cancer is the second most common cancer in U.S. women. Many with early stage breast cancer are advised to have chemotherapy in addition to other therapies, such as hormonal therapy. But some breast cancers don't need to be treated with chemotherapy, which can be costly and have harsh side effects.

Researchers have been seeking ways to know which tumors would be most likely to respond to chemotherapy. One NIH-funded research team enrolled over 10,000 women in a clinical trial. The women had been recently diagnosed with a specific type of breast cancer (ER-positive HER2-negative cancer that hadn't yet spread to the lymph nodes).

Many women with this type of breast cancer can be treated with hormone therapy alone. But it's been difficult to distinguish these women from those who might benefit from chemotherapy as well.

The scientists tested how well a gene test could predict which women could safely avoid chemotherapy. The test analyzes tumor samples for the activity of 21 genes. Based on the results, tumors are graded on a scale of 0 to 100; higher scores represent a greater risk of cancer recurrence.

The team found that 16% of the women had a score of 0 to 10, indicating a very low risk of recurrence. These women received standard hormone therapy but didn't undergo chemotherapy. Five years later, their risk of breast cancer recurrence was less than 2%.

This shows that the test can clearly identify women with an early stage of this type of breast cancer who can safely avoid chemotherapy. Scientists are continuing to work on other diagnostic gene tests. ■

Sidestep the Flu: Get Vaccinated

Influenza, or flu, can knock you off your feet and leave you miserable for nearly a week. It can cause fever, aches and pains, coughing, and exhaustion. The best way to avoid this fate is to get a flu vaccine each year as early as possible, before or even during flu season, which usually lasts from October to as late as May. The vaccine is available as either a shot or a nasal spray.

Flu is highly contagious. When infected people cough or sneeze, the flu virus can spread to others up to 6 feet away. As many as 1 in 5 Americans come down with the flu each year, and kids are 2 to 3 times more likely than adults to get sick with the flu. Most cases are mild, but flu can also be serious, leading to hospitalization and even death.

Flu vaccines can reduce illness, doctors' visits, and missed work and school. Vaccines can also prevent flu-related hospitalizations and deaths. When more people get vaccinated, it's harder for the flu virus to spread.

Experts recommend that everyone 6 months and older get the annual flu vaccine, with rare exceptions. Talk to your doctor if you have questions about which vaccine options are best for you and your family. To learn more, visit www.flu.gov. ■

Featured Website
NIH Research Matters

www.nih.gov/researchmatters

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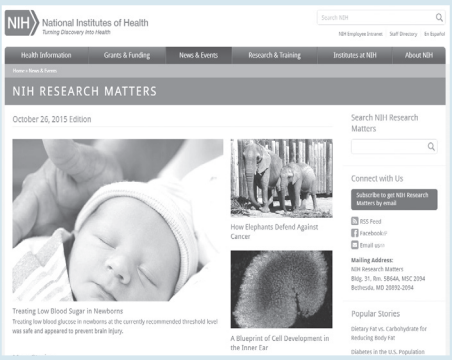

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