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Boosting Stroke Recovery

Advances in Rehabilitation Therapy

A stroke can change your life in an instant. Symptoms come on suddenly. Facial drooping, arm weakness, or slurred speech can all signal that a stroke is happening. A stroke can take away the ability to walk, talk, or do other daily activities. But survivors can often relearn skills affected by the stroke and overcome losses in ability.

Strokes happen when the brain doesn't get enough blood flow. This can be caused by blood vessels getting blocked or rupturing. Not enough blood flow means the brain doesn't get the oxygen it needs. And that can damage the brain.

Depending on how much damage there is, a stroke can lead to lifelong disabilities or even death. What problems it causes depends on where damage occurs in the brain. Survivors may have trouble using their arms or legs, talking, or thinking clearly. In more severe strokes, one side of the body may become weak or paralyzed.

Stroke rehabilitation, or "rehab," is designed to help stroke survivors return to their daily activities. It can help them recover and improve their quality of life. NIH-funded scientists are studying how to make rehab more effective for people recovering from a stroke.

Benefits of Rehab • Rehab can help survivors build back skills they have lost after a stroke. It uses exercises and other therapies to help restore physical function. It also provides strategies to handle remaining problems. For example, a stroke survivor may no longer be able to grasp things with one hand. Rehab can help them learn to use their other hand.

Rehab usually starts at the hospital within 48 hours of a stroke. It relies on a team of specialists who tailor rehab to specific needs. The rehab team may include nurses, physical therapists, and **speech-language pathologists.**

Skills are lost when brain cell connections become damaged. To regain those skills, brain cells need to form new connections. That process is called remapping. Studies suggest that stroke survivors get better results when they spend more time doing rehab.

"Rehab can boost remapping when tasks are repeated and specific," says Dr. Scott Janis, a neuroscientist at NIH who oversees clinical research on strokes.

Researchers are trying to find out how intense rehab needs to be to get the best results. They are also looking for ways to make rehab more engaging and easier to access. Ongoing studies are focused on restoring language and limb function.

Restoring Muscle Use • After a stroke, survivors can have trouble moving certain muscles. Muscles can become weak, uncontrollable, or paralyzed. Rehab programs can help address these issues. But some survivors have difficulty finding a provider in their area or getting to a clinic.

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Definitions

Speech-Language Pathologists
Health professionals trained to evaluate and treat people with speech and language disorders.

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Dr. Steven Cramer, a stroke neurologist at the University of California, Los Angeles, wants to make rehab easier to access. He's designed an in-home intensive rehab program for people who need to restore their arm function. All that's needed is a computer and an internet connection.

"We give participants 1,000 arm movements per session, six days a week, for six weeks," Cramer explains. "This is massively more than what the typical American patient gets in usual care."

By ramping up intensity and access, Cramer's team hopes to boost stroke survivors' recovery and make rehab more engaging.

"We're not doing typical stroke rehabilitation," Cramer explains. "Participants are playing video poker, Mahjong, and shooting ducks. They can also play Stroke Jeopardy to learn more about stroke."

But the "secret sauce is socialization," he adds. Every other day, a licensed therapist meets with the program participants online. They give new exercises, review previous ones, and answer questions.

Cramer's team compared their in-home rehab program to a traditional program conducted in the clinic. Both increased arm functioning and movement a similar amount. Now, they're testing the impact of adding the in-home program to usual care.

Restoring Language • Strokes can also damage the part of the brain that controls language. At least one out of every four stroke survivors have a condition called "aphasia." It affects speaking, reading, writing, and/or understanding language.

Not all stroke survivors recover from aphasia, even with speech-language therapy. They often have chronic (long-lasting) problems with language. Dr. Julius Fridriksson, a neuroscientist at the University of South Carolina, is testing a new approach for patients with chronic aphasia treatment. His group is trying intensive speech-language therapy with brain stimulation.

"We think that applying electrical currents to the brain areas that control language could stimulate the remaining brain cells," says Fridriksson. Activating those cells could help build back brain connections for language.

To stimulate the cells, the team uses a technique called transcranial direct current stimulation (tDCS). The team places patches that conduct electricity on the outside of the participants' scalp. It's used during speech-language therapy.

"Aphasia is a serious condition because people are unable to communicate," Fridriksson explains. "People with chronic aphasia need better therapy so they don't experience it the rest of their lives."

His team has been testing what parts of language therapy brain stimulation can enhance. They've found that it can help with remembering names of objects. Survivors with aphasia often have difficulty recalling names of objects they knew before their stroke. Now the team is testing if brain stimulation with language therapy is more effective than therapy alone.

See the Wise Choices box for tips on how rehab can help stroke survivors. ■

Wise Choices

How Rehab Can Help After a Stroke

Stroke survivors may experience changes with:

- **Muscle and nerve control.** Day-to-day activities can become difficult. Physical and occupational therapists can provide exercises to strengthen and stretch muscles. They can also help with strategies to relearn daily activities, such as getting dressed, eating, and bathing.
- **Bladder and bowel problems.** Feeling the need to urinate often, even without a full bladder, can be an issue for some survivors. Medicines and a bladder or bowel specialist can help with these problems.
- **Speaking or understanding language.** Some survivors have trouble communicating after a stroke. Problems with memory and thinking clearly can also arise. Speech-language therapists can help build new ways to communicate and improve language.
- **Swallowing and eating problems.** Trouble swallowing or eating normally after a stroke can also arise. A speech-language therapist can help with these problems. They may suggest changes to eating habits, such as chopping up food or drinking thick liquids.

Web Links

For more about stroke rehabilitation, see "Find More Information" in the online article: newsinhealth.nih.gov/2026/05/boosting-stroke-recovery

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Editor Harrison Wein, Ph.D.

Managing Editor Tianna Hicklin, Ph.D.

Graphics Erina He (illustrations) and Mariah Felipe-Velasquez (layout)

Contributors Mariah Felipe-Velasquez, Christine Lehmann, and Sarah Mann

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National Institutes of Health
NIH...Turning Discovery Into Health®

Office of Communications & Public Liaison
Building 31, MSC 2094
Bethesda, MD 20892-2094
email: nihnewsinhealth@od.nih.gov
phone: 301-451-8224

Healing Burns

Burn Injury Prevention Starts at Home

Burns can affect anyone. The consequences can range from mild skin damage to permanent scarring or even death. That's why it's important for everyone to know how to prevent burns.

Most burn injuries occur at home. Kitchen fires or other household accidents are common causes. For children, scalds are the leading cause of burn injury. These are caused by steam or boiling water.

Treatment depends on how serious the burn is. A first-degree burn affects only the outer layer of skin, called the epidermis. Sunburns are one example. You can usually treat them at home by cleaning the area and applying lotion to keep it moist.

Second-degree burns are deeper. They affect the second layer of skin, called the dermis. These burns may cause scars or change how the skin feels. Some can be treated with wound care only. This includes washing the wound and covering it with a bandage. Deep second-degree burns may require a surgery called skin grafting. This is where healthy skin is removed from one area of the body and used to cover the damaged area.

Third-degree burns are even deeper. They damage the entire skin down to the fat and nerves beneath the dermis. Fourth-degree burn cases are the most serious. Muscles, tendons, and bones can also be affected. These burns always require medical care. Treatment often includes skin grafting surgery.

Doctors determine how serious a burn is through visual examination. "Burn injuries often worsen after the initial injury, so it can take up to a week to get an accurate assessment," says Dr. Angela Gibson, a surgeon who specializes in burn care at the University of Wisconsin.

Gibson and her team are studying an imaging technology to help determine how deep a burn is. The tool uses fluorescent dyes to see into the skin. If successful, the tool may help doctors more accurately predict burn depth.

This could allow patients to get the right care sooner. It could also help doctors identify healthy tissue, so they remove only damaged tissue.

"We want to limit the amount of healthy skin we cut away," Gibson explains. "If you cut away tissue, you must replace it with the patient's skin. In those cases, we'd like to keep the area where the skin was taken for the skin graft, or donor site, as small as we can."

Gibson's lab is also studying bandages that generate tiny electrical signals. These signals tell cells to grow and move to the injured area. This helps new skin form and supports the growth of new blood vessels. The bandages copy the body's natural electrical activity, which helps burn injuries heal faster.

Traditional electrical stimulation therapy needs an external power source. But the bandages use the body's movements. Movement creates electricity to power the bandages. This technology is being studied for multiple uses, including wound healing. But it's still in the early stages and needs more research.

Scientists continue to study new treatment options. But Gibson says prevention is the best defense. She recommends burn prevention education for everyone. Learn ways to help prevent burns at home. See the Wise Choices box for tips.

"A burn injury can happen to anyone," Gibson says. "Prevention is just as important as knowing how to care for burns." ■

Wise Choices

Simple Burn Prevention

- Turn pot handles inward on the stove to prevent spills when cooking.
- Set your water heater to 120 degrees.
- Test bath water temperature before placing children in the tub.
- Keep matches and lighters out of children's reach.
- Install and maintain smoke detectors in your home.
- Unplug irons and other household appliances when not in use. Keep these out of reach of children.
- Use caution when handling household chemicals.
- Educate others about burn prevention.

Web Links

For more about healing burns, see "Find More Information" in the online article: newsinhealth.nih.gov/2026/05/healing-burns

Health Capsules

For links to more information, please visit our website and see these stories online.

Blood Test Predicts Age When Alzheimer's Symptoms Start

A new study showed that a blood test can estimate when someone will begin to show Alzheimer's symptoms. This could help researchers better design approaches to prevent or treat symptoms.

Alzheimer's disease is a brain disorder that slowly destroys memory and thinking skills. It's the most common form of dementia. There is no cure, but there are treatments.

People with Alzheimer's disease have high levels of a protein called p-tau217 in their blood. Researchers studied data from 603 people who had multiple p-tau217 blood tests over time. They used this data to create a "clock" model.

The model could identify individuals likely to develop Alzheimer's symptoms. For those who developed symptoms, it could estimate the age of symptom onset. The time between the first high test result and the first symptoms shrank with age. A person with high p-tau217 levels at age 60 would have symptoms about 20 years later. However, a person with high p-tau217 at age 80 would develop symptoms after about 11 years.

The findings suggest a single blood test might be used to estimate how long it will take for someone to show Alzheimer's symptoms. But more research is needed before the test could be used in the clinic. Researchers are still working to improve the model's predictions.

"Eventually, the goal is to estimate when individuals are likely to develop symptoms, which would help them and their doctors to create a plan to prevent or slow symptoms," says Dr. Suzanne Schindler at Washington University in St. Louis. ■

Bacteria Linked to Kidney Stone Formation

Researchers found that bacteria likely plays a key role in most kidney stones. Previous studies only linked bacteria with kidney stones that formed after an infection.

Kidney stones are hard, pebble-like pieces that form in your kidneys. They are made of minerals that build up in urine. Most are made of calcium oxalate. Others form after urinary tract infections (UTIs). This type is made of struvite. Struvite stones are linked to bacteria that cause UTIs.

Researchers used high-powered microscopes to look at kidney stones removed by surgery. They looked at both calcium oxalate and struvite stones.

The team found bacteria in stones from both people with and without UTIs. Bacteria were organized into biofilms inside the stones. Biofilms are communities of microbes that stick to each other and to surfaces. They appeared to release molecules that spur minerals to clump together and form stones.

Researchers are trying to learn more about the link between bacteria and kidney stones. The findings could lead to new ways to prevent or remove kidney stones.

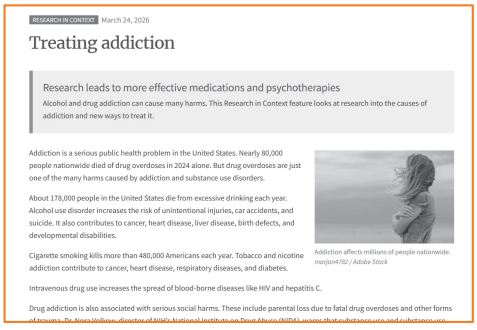
"This breakthrough challenges the long-held assumption that these stones develop solely through chemical and physical processes," says Dr. Kymora Scotland of the University of California, Los Angeles. "Instead, it shows that bacteria can reside inside stones and may actively contribute to their formation." ■

Featured Website

Research in Context
go.nih.gov/RiC

Find in-depth stories about NIH's cutting-edge biomedical research. Learn about the current state of research for many fields and where they may be heading.

Research in Context stories appear quarterly in *NIH Research Matters*. Read the latest story on treating addiction.


RESEARCH IN CONTEXT March 24, 2026

Treating addiction

Research leads to more effective medications and psychotherapies

Alcohol and drug addiction can cause many harms. This Research in Context feature looks at research into the causes of addiction and new ways to treat it.

Addiction is a serious public health problem in the United States. Nearly 80,000 people nationwide died of drug overdoses in 2024 alone. But drug overdoses are just one of the many harms caused by addiction and substance use disorders.

About 178,000 people in the United States die from excessive drinking each year. Alcohol use disorder increases the risk of unintentional injuries, car accidents, and suicide. It also contributes to cancer, heart disease, liver disease, birth defects, and developmental disabilities.

Addiction affects millions of people nationwide. marjan4782 / Adobe Stock

Cigarette smoking kills more than 480,000 Americans each year. Tobacco and nicotine addiction contribute to cancer, heart disease, respiratory diseases, and diabetes.

Intravenous drug use increases the spread of blood-borne diseases like HIV and hepatitis C.

Drug addiction is also associated with serious social harms. These include parental loss due to fatal drug overdoses and other forms

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