

Doctors work to help Giffords' brain rewire itself

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In this Jan. 5, 2011 file photo, Rep. Gabrielle Giffords, D-Ariz., takes part in a reenactment of her swearing-in, on Capitol Hill in Washington. Experts say recovery for Giffords will be a long, tough journey. Patients can make remarkable progress. But experts caution that they shouldn't expect to return to exactly the way they were before, and it's too early to know if Giffords might be able to return to Congress. (AP Photo/Susan Walsh, File)

(AP) -- Compared to a sleek new laptop, that three-pound mass of fatty tissue called the brain may not look like much. But when it's injured, it adapts and rewires its circuits in new ways.

That's the kind of flexibility that doctors and rehabilitation specialists hope to encourage in [Gabrielle Giffords](#), the brain-injured Arizona congresswoman.

Details about her recovery have been thin. But members of her staff say she recently began speaking for the first time since the Jan. 8 attack by a gunman in Tucson. [Brain injury](#) patients who regain speech typically begin to do that about four to six weeks after the injury, experts say.

Still, recovery for the 40-year-old Giffords will be a long, tough journey, as it is for anyone with a significant brain injury. Patients can make remarkable progress. But experts caution that they shouldn't expect to return to exactly the way they were before.

Too little has been revealed and it's too early to say if Giffords might be able to return to her job in Congress. One expert questioned whether that would be the best thing for her to do.

Most people with such injuries have some level of impairment for the rest of their lives.

Scientists are still unraveling just how the brain works to recover from [traumatic injury](#) and how to help it repair as much as possible.

They're dealing with an organ about the consistency of cold porridge. It contains maybe 100 billion densely packed [nerve cells](#), each of which is connected to 1,000 or so other nerve cells, called neurons. Those connections form circuits that are the foundation of the brain's activity.

Brain injuries can disrupt that in several ways. A car accident can smash a head, stretching and tearing [brain tissue](#) across a wide area. A penetrating injury like a bullet causes more localized damage, but the force of the impact can also damage neuron connections some distance away from the projectile's path.

Either way, brain injury produces an "utter quagmire" of specific disruptions in brain functioning that doctors have only blunt tools to fix,

said Dr. Jonathan Fellus, director of the brain injury program at the Kessler Institute for Rehabilitation in West Orange, N.J.

What all this disruption means to the patient depends on what brain circuits have been affected. People might have trouble reasoning, finding words, remembering things, organizing priorities, recognizing faces, understanding what's said to them, or doing multiple things at once. Or they could have problems walking, reaching, getting dressed or feeding themselves.

So how can the brain get better?

In some cases, brain cells that were impaired or stunned but not killed by the initial injury get back on track. Another surprising factor is that the brain's wiring is not fixed. In response to an injury, neurons can alter their patterns of connections.

For example, if the damaged part of the brain is small enough, new connections might bring in neighboring neurons to stand in for dead ones. Or existing connections can be strengthened, allowing neurons to work together more efficiently than they had to before.

Rewiring can bring in a whole different brain circuit to compensate for a damaged one.

So a person who used to find his way to work just by instinct may come to rely on memorizing the route more formally. Or somebody who struggles to find words may emphasize facial expressions more than before. A patient who has trouble remembering what he sees may compensate by telling himself what he's looking at, bringing in his verbal memory circuitry.

Patients may develop compensation strategies on their own, though more

typically they're guided by doctors and therapists, said Dr. Bruce Dobkin, director of the neurologic rehabilitation and research program at the University of California, Los Angeles.

Fellus compares brain rewiring after injury to taking back roads when an interstate highway is damaged. It's a less efficient way to get a job done, he said, and the added effort may help explain why brain injury patients often feel tired or simply fail to accomplish some tasks.

"They have to pace themselves, they have to do things in a more organized way," staying more focused on a task like memorizing a phone number than they had to before, he said.

That's certainly the case with Kim Towns, 47, of Chesapeake, Va., even 23 years after she was shot in the forehead.

"I can't really concentrate like I used to. I get tired really easily, I get depressed," she said. Rather than doing several things at once, "I have to really just sit down and concentrate on one particular subject."

In any case, brain rewiring - scientists call it plasticity - is driven by what a patient is learning and experiencing, said Jordan Grafman, director of the Traumatic Brain Injury Research Laboratory at the Kessler Foundation Research Center in West Orange.

That's why patients should get into rehabilitation as soon as possible, where "people are paid to stimulate you," providing skilled expertise as well as respite for exhausted caregivers, he said.

The time course of recovery can be long. It's most dramatic in the first year, with probably more than a third of patients who survive severe injuries showing improvement by the end of that time, said Dr. Alan Faden of the University of Maryland.

Grafman said progress often slows in the second six months of the first year, becoming perhaps not evident to those who see the patient every day, but noticeable to someone who drops by only every three months.

During the second year, gains are usually minimal but can sometimes be significant, said Grafman. After that, many people show no further improvement, but some do, he said.

The course of recovery depends on things like age - with patients from teens to 40 recovering better than those over 50 to 60 - and how motivated, young and healthy a patient is, the size and location of the injury and even a genetic predisposition to recovery.

But for the most part, brain injury patients will always have some degree of impairment, Grafman said.

That's not necessarily a recipe for misery; it just means people need to adjust, said Grafman, who has studied Vietnam veterans with brain injuries for 30 years.

"I'm always impressed ... at seeing how many of them have lived quite successful lives, having families and kids and working at jobs," he said. They "wind up living, in some sense, an ordinary life."

Giffords might have to make the same kind of adjustment.

Without knowing details of her progress it's impossible to say whether she could return to Congress, Grafman said. A supportive staff might make it possible, he said, but "would it be the best thing for her?"

Impairment can add stress for those who strive to return to a high-pressure job, Grafman said. And over a long period, that added stress could harm their mental abilities even more. Persistent stress kills

[neurons](#), he said, and can interfere with memory and decision-making beyond the long-term effects of the brain injury itself.

As it stands now, "Giffords will have strengths that remain. That's what you want to play into," he said, even if it leads to a productive life outside the halls of Congress.

More information: Brain injury information:
<http://www.ninds.nih.gov/disorders/tbi/tbi.htm>

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