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Can Brains Be Saved?

Medical breakthroughs are bringing new hope to people with traumatic brain injuries

by Lee Woodruff

September 6, 2008, was a clear-blue Indian summer day in Nebraska. Jennifer Ruth sat in the stands and watched her 12-year-old son, Derek, run with the football. She was unconcerned when he was tackled in a routine play. But as he fumbled the ball, she remembers seeing his right arm drop oddly, almost in slow motion. "He never does that" flickered through her mind. The coach noticed a glazed look on Derek's face in the team huddle. He pulled him aside and asked him for the date, score, and his brothers' names. Derek answered correctly. Then, minutes later, he screamed, "My head," pulled off his helmet, and collapsed.

Derek was taken to a trauma center and went into surgery. After several weeks in the ICU and months of therapy, he is regaining his physical and cognitive abilities. At first, he could only give a thumbs-up or thumbs-down response to questions; now he reads at a sixth-grade level and tackles algebra problems.

A decade ago, Derek's prognosis might not have been hopeful. But thanks to advances in the treatment of traumatic brain injury (TBI), the outlook for patients has dramatically improved. "Research points to the amazing regenerative powers locked in our brains," says Dr. Col. Rocco Armonda, senior Army neurosurgeon at Walter Reed Army Medical Center in Washington and at Bethesda Naval Hospital in Maryland. "The proper therapies can help with the unlocking."

Each year, 1.4 million people in our country sustain brain injuries, and 9% will end up with lifelong impairments. Causes of TBI include car accidents, playground accidents, falls by the elderly, and domestic violence. According to the U.S. Centers for Disease Control and Prevention, 3.2 million Americans are living with long-term disabilities from brain injuries. This figure does not include the estimated 320,000 veterans from the wars in Iraq and Afghanistan who have TBI, according to the latest statistics.

You may think you don't know anyone with a brain injury, but they're all around you. One could be the person you see lose his temper with the store clerk because sports-induced concussions left him short-fused. Another could be your neighbor who keeps locking her keys in the car or the man who looks healthy but needs a few tries to push a revolving door.

Despite its prevalence, brain injury bears a stigma. To many of the uninitiated, a person with TBI equals "slow" or "retarded."

I used to be one of the uninitiated. Then, in January 2006, my husband, Bob, was injured in Iraq by a roadside bomb while covering the war for ABC News. Hundreds of

pieces of rock shrapnel became embedded in his face, neck, and back, and his skull was shattered. Doctors were unsure whether he would ever be able to walk or talk again or regain much mental function. They also told me that if and when he regained consciousness, I could expect that his healing would be largely concluded by the end of two years.

Bob spent 36 long days in a coma. When he woke up, his abilities were severely limited. I watched, devastated, as he could not identify words like “scissors” or “helicopter.” But he was determined for the sake of our family to recover, and he devoted himself to rehabilitation. Today, apart from mild aphasia—difficulty in finding the appropriate word to use—he is back as a husband and father and on the air as a journalist at ABC News.

While each injury and recovery is as varied as the patient affected, scientists now know that the healing process in the brain can go on much longer than originally believed. For instance, even three-and-a-half years after the bomb blast, Bob’s speech continues to get more fluid.

Innovations in cognitive rehabilitation have played a key role in improving people’s outcomes. Twenty years ago, rehab consisted of rote memorization, repetition, and trying to get patients to meet certain benchmarks. “One of the advancements in rehabilitation is to make the therapy person-centered,” says Dr. Lori Terryberry-Spohr, brain-injury program manager at Madonna Rehabilitation Hospital in Lincoln, Neb. “We can tailor it to the individual’s goals, strengths, hobbies, interests, and occupations.”

Colin Smith, 22, is a Marine who was shot in the head in October 2006 by a sniper in Iraq. He lay in a coma for five weeks. When he awoke, he couldn’t talk, move his limbs, or track movements with his eyes. But thanks to the rigorous rehab regimen he is undergoing near his hometown in Ohio, he has regained those abilities. As part of therapy, animal-lover Colin walks dogs for a local shelter. This activity helps on many levels: It improves his mobility, uses his sense of direction, and helps him get re-accustomed to working amid the noise and interruptions of normal life.

In order to understand how cognitive rehabilitation works, you need to know how the brain functions. Neurons, or nerve cells, in our brains send impulses to one another to facilitate memory, thought, and speech and enable movement. When the brain is injured, the connections between neurons are temporarily or permanently disconnected or stunned.

One helpful analogy is to think of the brain’s neural pathways as highways. A brain injury is like a jackknifed tractor-trailer stopping traffic. With proper medical attention and therapy, the brain repairs itself. Neurons that ran from point A to point B can grow back in different ways and make new roads, and the brain rebuilds new paths to functions like speech and memory. They might not be exactly the same as before, but they’re still effective.

“The more sophisticated the function, like complex thought or writing, the longer it takes,” Dr. Armonda says. “But over 70% of our patients with the most severe injuries are now approaching functional independence after treatment, and that was unheard-of previously.”

The basic principle behind cognitive rehab is for patients to relearn their own abilities and develop specific strategies to make up for injury-related deficits or losses. So, someone who has trouble recalling complicated words may learn to remember them by associating them with something familiar. When Bob can't find the name he is looking for, I've watched in amazement as he quickly runs through the alphabet to trigger the word he wants. Devices like BlackBerrys and cellphones can also be used to compensate for a loss in a person's sense of time or organizational skills.

Cognitive therapy isn't only about improving the so-called executive functions—reading, writing, planning, sequencing. It's also being used to address the changes in personality that sometimes occur with TBI, such as difficulty in emotional control. Dr. Mary Hibbard, professor of rehabilitation medicine at New York University Langone Medical Center, says, "If someone's emotions overwhelm him when confronted with a problem, it reduces his executive-thinking abilities. They're all closely interconnected."

Robin DeVries, a 52-year-old nurse, slipped on the ice in a parking lot three years ago and struck her head. For months, she thought she was "going crazy" with symptoms like severe headaches, insomnia, memory lapses, and vomiting. She wrote checks for incorrect amounts and at times became completely overwhelmed with anger or sadness.

After seeing specialists, Robin was eventually diagnosed with TBI and went through cognitive rehab. She learned coping methods that she can use when she is feeling tearful or angry. "I've taught myself to take a personal time-out," Robin says. "I go for a walk or head into the bathroom. I practice deep-breathing exercises or even do something as simple as count to 10."

A recent analysis of several neurological studies found that early intervention resulted in better outcomes. "As soon as a patient can participate, it is recommended that therapy should begin," Dr. Hibbard says. "This is a critical period when damaged neurons begin to make new connections. And although younger brains have greater ability to regenerate, rehab has been found to be equally effective even for those 55 and older."

In a groundbreaking study released last December, researchers at the Defense and Veterans Brain Injury Center in Washington followed 360 injured veterans in a clinical trial. They found that cognitive treatment that taught people how to think through tasks enhanced their cognitive recovery. It also helped return them to work or school at a higher rate than those whose treatments focused on physically executing the tasks.

Quantifiable physical evidence that cognitive rehab works does not exist, but experts are confident that it soon will. "We now have MRIs that use neuro-imaging to show all kinds of detail in the brain, and these advancements will continue," says Dr. Steve Flanagan, chair of rehabilitation medicine at the Rusk Institute in New York. "Someday we'll be able to see how certain areas of the brain are wired and to map new growth."

Such hard evidence could be a huge help in making cognitive therapy more widely available. No figure exists of how many facilities offer it, because most health-insurance plans do not cover it. Only the state of Texas mandates insurance reimbursement for cognitive rehabilitation following brain injury.

“You’d never have a problem getting insurance to cover a broken bone or injured shoulder, but it is routinely denied for therapies that help brains heal,” says Susan H. Connors, president and CEO of the nonprofit Brain Injury Association of America. Her group is working with federal and state lawmakers to raise awareness of TBI and to improve reimbursement for therapy. “Brain injury is often invisible since changes are on the inside,” Connors adds. “Because of this, help and awareness are not as widespread as they should be.”

Families of people with TBI are often advised that their loved one’s recovery will be a “marathon and not a sprint.” Derek Ruth’s mother sees positive change occur in her son almost daily. Still, it’s difficult for her not to have definite answers to him about his future, to be unable to promise him that his life will be back to exactly what it was before his injury.

“Derek works so hard just to make it through one day, tying his shoes and getting dressed,” she says. “But brain injury is like no other injury. He can be doing his algebra and the same afternoon be unable to recognize a black spade from a red heart in a card game.”

Jen remains optimistic—along with her son’s doctors—as she watches his slow but incredible healing progress. “There isn’t a day that goes by where I don’t believe Derek is going to continue to improve.”

Lee Woodruff is the author of the recently published essay collection Perfectly Imperfect: A Life in Progress. To learn more about TBI, visit the Bob Woodruff Foundation at www.remind.org