

Edward Taub, PhD — Behavioral Neuroscientist

INTRODUCING NEW THERAPIES

Not long ago, health care providers believed that patients who had experienced a stroke or traumatic brain injury (TBI) and were left with a long-term impairment of movement could not improve any further no matter what treatment they were given. The motor impairment was generally believed to be permanent. Similarly, providers believed that when an adult was injured, the nervous system could not be repaired or reorganized. Thanks to psychologist Edward Taub, PhD, however, there is a new line of thinking and an emerging therapy that proves otherwise.

Taub and colleagues at the University of Alabama at Birmingham developed a new form of behavioral therapy that helps patients regain a significant amount of limb use. Called constraint-induced (CI) movement, this therapy involves restraining the less-affected limb for a period of two weeks during which the more-affected limb is trained and exercised intensively. The result is the development of new neural pathways in the brain, and the patients learn to use impaired limbs again.

APPLYING RESEARCH TO PRACTICE

After experiencing a brain injury like a stroke or TBI, patients typically compensate by relying more on their healthier limbs to accomplish day-to-day tasks such as dressing and feeding themselves. As a result, the part of the brain responsible for moving the weaker limbs shrinks. Taub's research explored whether it was possible to retrain the brain to use all its parts, and in turn, the impaired parts of the body.

His approach focuses specifically on two neurobehavioral processes:

- "Intensive operant behavioral training," also called "shaping," where clinicians train patients to use the impaired limb for daily tasks and resist using the healthier one.
- Massive brain neuronal reorganization, where forcing use of the weaker limb teaches the brain to rewire itself by assigning new neurons to move that limb.

While Taub's research began in monkeys, CI therapy is now used to help people recover from stroke or other types of brain injury. With human patients, CI therapy concentrates on repetitive tasks, like using an impaired arm to pick up a pencil over and over again and integrating the newly regained ability to use the limb into the activities of daily living. Eventually, the brain and the impaired limb work together again.

ACHIEVING RESULTS

Taub's research shows that, with CI therapy, stroke patients can increase their use of an impaired limb by approximately 50 percent. In neuroimaging and brain-mapping studies, Taub found that CI-therapy patients' brains look different from those of other stroke patients. These patients have more brain tissue and more brain activity when they use their impaired limbs.

Taub's research, along with other studies, has even shown that CI therapy has applications for young children with cerebral palsy and patients with a number of other central nervous system disorders.

"This research shows that not only does the central nervous system produce behavior, but behavior can have an equally profound reciprocal effect on the system," says Taub.



"Each year, hundreds of thousands of patients experience strokes in the U.S. alone. New behavioral interventions, like constraint-induced movement therapy, give patients with chronic stroke and traumatic brain injury hope that they can overcome their challenges."

REHABILITATION PSYCHOLOGY

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