

Severely impaired stroke survivors regain arm function after intensive physical therapy

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Micrograph showing cortical pseudolaminar necrosis, a finding seen in strokes on medical imaging and at autopsy. H&E-LFB stain. Credit: Nephron/Wikipedia

Time may heal all wounds, but in the case of stroke survivors, the key to better recovery is to spend more time in an intensive physical therapy program, according to a University of Florida Health study.

After a stroke, the brain and body can start recovering immediately and

can show improvement up to six months afterward, said UF Health researcher Janis Daly, Ph.D. But this study focused on people who had persistent disability even a year or more after completing standard care. The study found that extensive [physical therapy](#) helped them recover motor function, even though they began the study treatment a year or more after stroke.

'The recovery was meaningful to patients in terms of physical function. Each person's recovery was somewhat unique,' said Daly, the paper's lead author and a professor in the UF College of Medicine's department of neurology. 'Some had dramatic recovery, some had less. Some were able to perform functional tasks that they weren't able to do before; some recovered the ability to move their arm so they could actually place the arm for functional tasks, for example into the sleeve of a sweater.'

Daly said the average change in function for patients who had been severely affected by their stroke was clinically significant for arm movements and for performing complex tasks. For instance, a man who had been unable to lift a spoon to his mouth can now feed himself.

Inability to combine regular motions—for example, flexing the shoulder and simultaneously extending the elbow while reaching for an object—can be one result of a stroke. The patient may concentrate on the reaching movement of the arm, but the normal neural pathways are interrupted, and the patient's arm may flex inward toward the body instead of extending to reach for a glass of water or a fork, said Daly, also the director of the National Veterans Affairs Brain Rehabilitation Research Center of Excellence in Gainesville, Fla.

To help patients regain movements of the shoulders, arms and hands, which are crucial in many daily activities, researchers administered an intensive physical therapy program that included five hours of [rehabilitation](#) per day, five days per week, for 12 weeks to 39 study

participants.

The researchers tested three different modes of rehabilitation. The first was motor learning rehabilitation. Daly compared motor learning rehabilitation after stroke to learning a new sport move, such as a beginner learning a tennis serve. In this type of rehabilitation, patients must concentrate on performing a movement as deliberately as possible, with as much normal movement as possible, and must practice the task repetitively.

'Think about a child learning to walk or to ride a bicycle,' Daly said. 'They must practice over and over until they come close to perfection.'

The second and third modes of rehabilitation were electrical stimulation rehabilitation and robotics-assisted rehabilitation. In electrical stimulation rehabilitation, electrodes comfortably stimulated the muscles on a person's forearm and caused the hand to lift. Participants in the robotics-assisted rehabilitation group practiced the reach movement using robot software. The software guided them to attempt to reach targets displayed on a computer monitor. Their forearm and hand were cradled in a support so participants could concentrate on moving the shoulder and elbow.

One group received five hours per day of motor learning alone, while the other two groups received motor learning for 3.5 hours and electrical stimulation or robotics-assisted rehabilitation for the remaining 1.5 hours per day. All three groups received some [motor learning](#) rehabilitation. Each of the groups improved significantly, on average doubling or nearly doubling their scores on a scale that assesses coordination.

Daly says the recovery for all three groups was equal, with no statistically significant difference between the groups. The researchers named a small sample size as a potential limitation of the study, pointing

out that there might have been statistical differences in the results between groups if the group sizes had been larger. Because of the intensity of the program, one physical therapist worked with three patients; this ratio of therapist to patients was successful. Factoring in the salaries of the therapists and the cost of equipment used in rehabilitation, the researchers calculated that treatment for each patient cost between \$4,500 and \$5,600.

'Often after stroke, people can recover normal function without intensive treatment, in response to normal protective physiological processes. Some people recover quite well and can function normally. For this study, however, we enrolled people who had a stroke a year or more prior to their study participation, and who were still severely impaired,' Daly said. 'The magnitude of recovery we observed in our study is higher than any other studies that have been published so far, which supports the promise of longer treatment and more intensive treatment after [stroke](#), even for those who are more severely impaired.'

Provided by University of Florida

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