U.S. Department of Veterans Affairs
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# BRRC Headlines

*Newsletter of The Brain Rehabilitation Research Center ❖ Spring 2015*

BRRC

Reshaping Neuro - Rehabilitation Through Discovery and Treatment Innovation

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Send comments and news to the Newsletter Editor: *Lynn.Dirk@va.gov*

## First Evidence of Clinically Significant Recovery from Severe Arm and Hand Impairment More Than 6 Months After Stroke

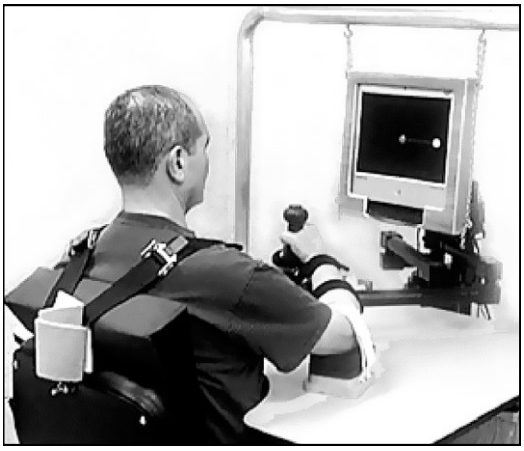
### *3 Different Treatments All Showed Significant Improvements*

A recent study conducted by a team under the direction of Dr. Janis J. Daly, the Director of the Brain Rehabilitation Research Center, showed that intensive delivery of treatment for severe arm and hand impairment, caused by stroke, significantly improves function – even if treatment began more than 6 months after the stroke when no further spontaneous recovery would occur. These ground-breaking results will be published by the *Archives of Physical Medicine and Rehabilitation.*

The study treatment involved progressing from the practice of small movements that were components of a complex task to skilled coordination of a complete task (*see figure on back*). Treatment was based on motor learning principles including: movement practice as close to normal movement as possible, movement repeated many times, attention focused on a specific task, and training specific to the task.

Three types of treatment were tested: Motor learning alone or motor learning combined with the technologies of either robotics or functional electrical stimulation. All three treatments resulted in clinically significant recovery of function, and there were no differences among the treatments.

That 35 of 39 persons who were enrolled in the study completed the challenging treatments emphasizes how important recovery is to those people who are affected by persistent disabilities after stroke. Unfortunately,



In research on innovative treatments for arm and hand impairments caused by stroke, robotics is being tested to see if it improves recovery or if it is more cost effective than other types of treatments. *(Figure reproduced from Daly JJ, Krebs I, Perepezko E, Rogers J, Dohring M, Goyal K, Hogan N, Ruff R . Response to Upper Limb Robotics and Functional Neuromuscular Stimulation Following Stroke. Journal of Rehabilitation Research and Development, Volume 42, pp 723-736.)*

usual rehabilitation care is not provided this intensively.

Results of this study and others, which show that function can be recovered with intensive therapy, support the need to change current clinical practice such that all persons who have had a stroke can receive intensive therapy for a longer time.

The study was funded by three grants from the Department of Veterans Affairs.

## Upper-Limb Training Protocol: Treatment Progression Hierarchy for Coordinated Movement Practice

A. Muscle activation in synergy

B. Single joint movement in synergy

C. Single joint movement, out of synergy
- * Coordination training
- * Speed of movement training

D. Multiple joint movement, out of synergy
- * Coordination training
- * Speed of movement training

E. Alternating joint movement (flexion and extension)
- * Coordination training
- * Speed of movement training

F. Task component practice
- * Coordination training
- * Speed of movement training

G. Full functional task practice
- * Coordination training
- * Speed of movement training

Strategy used in progressive therapy for hand and arm dysfunction caused by stroke.

*Figure reproduced from McCabe J, Monkiewicz M, Holcomb J, Pundik S, Daly JJ. Comparison of robotics, functional electrical stimulation, and motor learning methods for treatment of persistent upper extremity dysfunction after stroke: A randomized controlled trial. Archives of Physical Medicine & Rehabilitation 2015 Jun; 96(6):981-90.*

## Other Recent BRRC Publications

**Clark DJ**, **Rose DK**, Ring SA, Porges EC. Utilization of central nervous system resources for preparation and performance of complex walking tasks in older adults. *Frontiers in Aging Neuroscience*, 2014 Aug 25; 6:217.

**Williamson JB**, Porges EC, Lamb DG, Porges SW. Maladaptive autonomic regulation in PTSD accelerates physiological aging. *Frontiers of Psychology*, 2015 Jan 21; 5:1571.

Clark

Rose

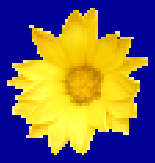
Williamson

*Special thanks to our supportive partners:*

University of Florida

**BROOKS** Rehabilitation

Our Study Participants



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