Merging Physical Therapy, Neuroscience, and Biomedical Engineering for Hand Rehabilitation

Alma S. Merians
Professor and Chair, Department of Rehabilitation and Movement Sciences

CURRENT RESEARCH

Studying mechanisms behind optimal hand recovery allows technological interventions to retrain people with neurological diseases

Although 75% of patients post stroke learn to walk again, only 25 – 45% demonstrate meaningful recovery of hand function, affecting their independence and requiring costly supportive care. Hand therapy in the early period of heightened neuroplasticity following stroke is not prioritized in medical care units, and there is therefore a vital need to develop effective interventions for hand rehabilitation. Dr. Alma S. Merians, Professor and Chair of Rehabilitation and Movement Sciences at Rutgers University, investigates the underlying mechanisms that account for optimal hand and arm recovery and the key relationship between types of rehabilitation training, timing, and dosage. Collaborating with other physical therapists, neuroscientists, and biomedical engineers, Dr. Merians utilizes technology-assisted hand rehabilitation to retrain people with neurological diseases like stroke or cerebral palsy.

A practicing physical therapist for more than 20 years, Dr. Merians has extensive clinical expertise in the rehabilitation of adults and children with neurological disorders. Throughout her practice, she has witnessed many challenges to recovery of neurological impairments, and developed a deep passion to help patients post-stroke improve the functions of their upper limbs. Her previous research background is in cortical level brain systems and basic mechanisms underlying neuromuscular control of human movement and sensorimotor learning, and her team was one of the pioneering groups to use interactive, adaptive robotics and functional and gaming virtual reality simulations to rehabilitate the hand and arm after stroke. Using these systems, Dr. Merians and team have trained over 60 patients in the chronic phase post-...

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AFFILIATION

Rutgers University

EDUCATION

- Ph.D. in Pathokinesiology 1984, New York University
- B.S.in Program in Physical Therapy 1960, Columbia University

AWARDS

- Best Paper at ICDVRAT 2010 Conference in Vina del Mar, Chile, 2010
- Best Paper at IEEE/ICME Proceedings International Conference on Complex Medical Engineering, Beijing, China, 2007
- Outstanding Service Award New Jersey American Physical Therapy Association, 1995
- Foundation of UMDNJ Excellence in Teaching Award, 1987

RESEARCH AREAS

Life Science, Neurological / Cognitive, Robotics, Neurological / Cognitive

FUNDING REQUEST

Your contributions will support Dr. Alma Merians at Rutgers University as she continues to develop games and simulations to help post-stroke patients recover hand functions. Donations will help fund $300-350K/year required to make necessary modifications to the research system, support therapists to train patients to use these simulations, and enrich hospital-based research data that will help further develop the home-based robotics systems and new games.