October 8th, 2024

STROKE SPECIAL INTEREST GROUP

Academy of Neurologic Physical Therapy

In this newsletter...

STROKE SIG PODCAST

NEW Stroke SIG Podcast Episode Released!

Check out our latest podcast episode, found on the ANPT podcast website and podcast streaming platforms (search ANPT Stroke Special Interest Group)!

In this episode, host Marissa Moran, PT, DPT is joined by Dr. Carey Holleran, MPT, DHS to discuss her article **"Improvement in the Capacity for Activity Versus Improvement in Performance of Activity in Daily Life During Outpatient Rehabilitation."** This article was published within the JNPT in January 2023. Activity capacity is what a person is capable of doing, and activity performance is what a person does in their daily life. Dr. Holleran discusses the implications of assessments of capacity vs. performance, and how these measurements can be used for decision-making for physical therapy plans of care.

Article citation: Lang, Catherine E. PT, PhD, FAPTA; Holleran, Carey L. PT, DPT, DHS; Strube, Michael J PhD; Ellis, Terry D. PT, PhD, FAPTA; Newman, Caitlin A. OTR/L; Fahey, Meghan PT, DPT; DeAngelis, Tamara R. PT, DPT; Nordahl, Timothy J. PT, DPT; Reisman, Darcy S. PT, PhD, FAPTA; Earhart, Gammon M. PT, PhD, FAPTA; Lohse, Keith R. PhD; Bland, Marghuretta D. PT, DPT, MSCI. Improvement in the Capacity for Activity Versus Improvement in Performance of Activity in Daily Life During Outpatient Rehabilitation. Journal of Neurologic Physical Therapy 47(1):p 16-25, January 2023. | DOI: 10.1097/NPT.0000000000000413

Check out the ANPT Podcast site by clicking here!

Completed by: Arasavalli Karuna Kumari, PT
Thank you Arasavalli!!

Overseen by: Daniel Dray, PT, DPT, NCS

Summary topic title: Motor imagery therapy improved upper limb motor function in stroke patients with hemiplegia by increasing functional connectivity of sensorimotor and cognitive networks

Article reference: Liu W, Cheng X, Rao J, et al. Motor imagery therapy improved upper limb motor function in stroke patients with hemiplegia by increasing functional connectivity of sensorimotor and cognitive networks. *Front Hum Neurosci*. 2024;18:1295859. Published 2024 Feb 19. doi:10.3389/fnhum.2024.1295859

Link to full article: https://doi.org/10.3389/fnhum.2024.1295859

Definition: Conventional Rehabilitation (CRT): CRT includes joint activity training, muscle strength training, fine motor training, activities of daily living training, task-oriented gross motor and dexterity exercises, electrical stimulation, and Chinese acupuncture.

Embodied motor imagery training (MIT): MIT includes motor schema training, perceptual integration training, and body intentionality training to establish procedural and memorization of action patterns.

Training sequence used in MIT: full body relaxation (2min) → sensory perception training (5-10s) → attention training (10s) → watch movement imagery video of movement (5-10s) → patient closed eyes and imagined movement according to instructions (5-10s) → relaxation (10s) → movement repeated 5 times → start new movement

Resting-state functional magnetic resonance imaging (rs-fMRI): an imaging technique used to evaluate brain activity by measuring changes in blood flow while the subject is at rest, not engaged in any particular task.

Intra-network functional connectivity (Intra-FC): the strength of functional connectivity within a specific brain network, such as the Sensorimotor network. Higher intra-FC suggests stronger communication and coordination among regions within that network.

Inter-network functional connectivity (Inter-FC): measures the connectivity strength between different brain networks. Increased inter-FC between the Sensorimotor network and other brain regions indicates enhanced communication and integration between motor-related areas and other brain networks involved in various cognitive and sensory functions.

Purpose of the article: The purpose of this article was to evaluate the efficacy of embodied motor imagery training (MIT) in improving upper limb motor function in

stroke patients. The study aimed to explore the underlying neural mechanisms of MIT by investigating changes in functional connectivity (FC) within the sensorimotor network (SMN) and between the SMN and other brain regions. The research seeks to provide a comprehensive understanding of how MIT influences brain activity and motor function, potentially leading to optimized rehabilitation strategies for stroke survivors.

Methods of Interest: This single-blinded randomized controlled trial study design included twenty individuals with first-time stroke, who were divided into two groups: the conventional rehabilitation group (CRT Group; n=8) and the embodied motor imagery training group (MI Group; n=8). The CRT group underwent 2 hours of therapy per day, 5 days per week, for 4 weeks, along with conventional medication. The MIT group received 30 minutes of motor imagery training along with CRT. Outcome measures, including the Fugl-Meyer Assessment Upper Extremity Scale (FMA-UL) and the Modified Barthel Index were collected before and after each treatment.

Each patient also underwent rs-fMRI before and after the clinical intervention to assess connectivity changes in 14 selected subcortical and cortical sensory- and motor-related brain regions. These regions included the bilateral primary motor cortex (M1), bilateral supplementary motor area (SMA), bilateral primary somatosensory cortex (S1), bilateral secondary somatosensory cortex (S2), bilateral basal ganglia (BG), bilateral dorsolateral premotor cortex (dlPM), and bilateral ventrolateral premotor cortex (vlPM). To further investigate the functional connectivity (FC) of the sensorimotor network (SMN) and the whole brain, seed-based whole-brain voxel-wise FC analysis was employed.

Results of interest: The study revealed that combining MIT with CRT resulted in superior improvements in upper limb function and daily activities compared to CRT alone in stroke patients with hemiplegia. CRT primarily increased intra-FC within the sensorimotor network (SMN), while decreasing inter-FC between the SMN and other brain regions. In contrast, MIT combined with CRT decreased intra-FC within the SMN but increased inter-FC between the SMN and other brain regions, indicating enhanced interaction between sensorimotor and cognitive networks. Correlation analyses further supported these findings, showing that differences in abnormal FCs between the SMN and other brain regions positively correlated with improvements in Fugl-Meyer Assessment (FMA) and Modified Barthel Index (MBI) scores. This suggests that MIT facilitates upper limb motor function recovery by fostering interactions between cognitive networks and the SMN.

Discussion: CRT appears to enhance motor function primarily through reorganizing intra-FC within the sensorimotor network (SMN). This is consistent with previous longitudinal studies indicating an initial decrease followed by an increase in SMN FC post-stroke, suggesting a compensatory recovery mechanism. Conversely, MIT combined with CRT resulted in reduced intra-FC within the SMN and increased inter-FC between the SMN and cognitive networks such as the hippocampus, middle frontal gyrus, and anterior cingulate cortex. This suggests that MIT enhances motor recovery by promoting interactions between sensorimotor and cognitive networks, crucial for procedural memory and motor learning. The involvement of these cognitive regions underscores MIT's role not only in sensorimotor integration but also in cognitive training, potentially offering a comprehensive approach to stroke rehabilitation. Correlation analyses further supported these findings, indicating that stronger FC between the SMN and cognitive networks correlates with greater improvements in motor function, highlighting the therapeutic potential of targeting both sensorimotor and cognitive pathways in stroke rehabilitation strategies.

Additional Resources:

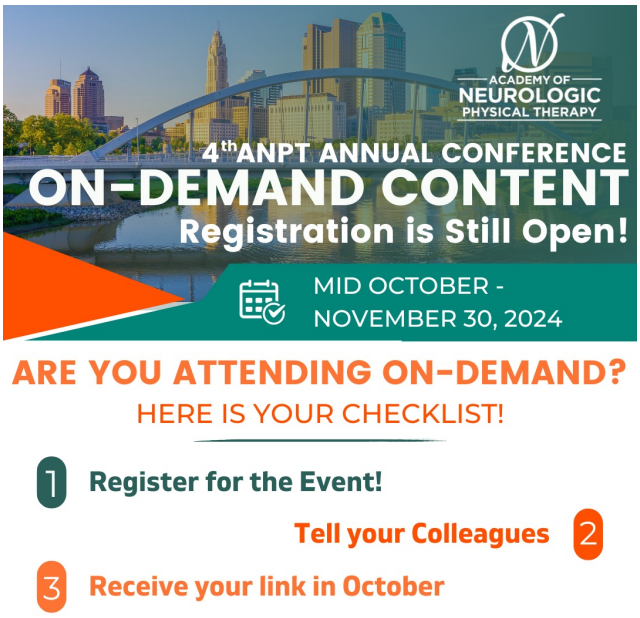
López, N. D., Pereira, E. M., Centeno, E. J., & Page, J. C. M. (2019). Motor imagery as a complementary technique for functional recovery after stroke: a systematic review. Topics in Stroke Rehabilitation, 26(8), 576–587. https://doi.org/10.1080/10749357.2019.1640000

Check Out the Stroke SIG Student Corner!

STROKE SIG STUDENT CORNER
Academy of Neurologic Physical Therapy

The Stroke SIG Student Corner is an excellent platform for students to ask questions related to all things stroke! We have a dedicated team excited to answer questions and create content!

If you are a student who has a question we could address, or a clinician with an idea of content we could create targeted to students, we would love to help! Click here to access the Stroke SIG Student Corner, where you will find previously developed content and example exam questions, and scroll to the bottom of the page to **ask a question**!



Thank you to those who attended the 2024 ANPT Annual Conference in Columbus, OH! We enjoyed meeting with our membership!

Good news! You can enjoy continued on-demand content if you attended in person, and you can still sign up for On-Demand content if you did not have a

chance to make it to Ohio!

Click here for more information and to register!

Congratulations to our Stroke SIG ANPT Trivia Night Winners!

First Prize Winner: Arco Paul - BLAZEPOD Set!

Second Prize Winner: Brookelyn Wright - Neuroanatomy through Clinical Cases book by Hal Blumenfeld

Third Prize Winner: Jigna Patel - Human Brain Model Cube

Join Us for our Next Stroke SIG All Members Meeting

Thursday October 10, 2024 from 7:30-8:30 pm EST

Come learn about our current initiatives and how you can get involved!

Zoom link: https://us06web.zoom.us/j/81922921004?pwd=RkFkUHVBYWZ5ZTYyNXdlYkwyQ054QT09

VISIT THE STROKE SIG ONLINE!

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info@neuropt.org | www.neuropt.org

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