

July 31, 2023



STROKE SPECIAL INTEREST GROUP

Academy of Neurologic Physical Therapy

In this newsletter...

- ****NEW Article Review!!**
- Register NOW for the ANPT Conference!
- All Members Meeting Thurs. August 10th 7:30 pm EST



You can either read below, or listen to the audio version with this [LINK](#)

Completed by: Dylan Singletary, SPT
Thank you Dylan!

Summary topic title: A Systematic Review on the Effects of Acute Aerobic Exercise on Neurophysiological, Molecular, and Behavioral Measures in Chronic Stroke

Article reference: Sivaramakrishnan A, Subramanian SK. A Systematic Review on the Effects of Acute Aerobic Exercise on Neurophysiological, Molecular, and Behavioral Measures in Chronic Stroke. *Neurorehabil Neural Repair.* 2023;37(2-3):151-164. doi:10.1177/15459683221146996

Link to the full article if available: <https://pubmed.ncbi.nlm.nih.gov/36703562>

Definitions: Motor Priming - A process where a stimulus facilitates a change in movement behavior. This may occur in conjunction with an alteration in corticomotor excitability (CME) and can be measured by transcranial magnetic stimulation (TMS).

Cortical Motor Excitability (CME) - the ability of the motor cortex and descending spinal tracts to elicit a skeletal muscle contraction.

Moderate Intensity Aerobic Exercise - 64%-76% HR Max.

Vigorous Intensity Aerobic Exercise - 77%-95% HR Max

Vigorous Intensity Aerobic Exercise in Stroke Rehabilitation

Purpose of the article: Aerobic Exercise (AE) has been explored as a rehabilitation adjunct to enhance neuroplasticity and motor learning. Recent studies demonstrate that AE improves functional connectivity and neuroplasticity in cortical regions involved in working memory tasks. Acute AE increases circulating neurotrophins, such as brain-derived neurotrophic factor (BDNF), critical for motor learning and memory formation, and other neurotransmitters. AE can act as a "priming" approach, potentially benefiting stroke rehabilitation by creating a therapeutic window for improving neuroplasticity and motor relearning. The objective of this review was to synthesize evidence on exercise priming's effects on neuroplasticity outcomes in stroke.

Methods of interest: For this systematic review, a literature search was completed using various databases. 16 studies were chosen, both randomized and non-randomized, all of which incorporated acute aerobic exercises in stroke intervention.

Results of interest: This review analyzed 16 pertinent studies on the impact of acute aerobic exercise (AE), revealing diverse findings. The effects of AE on cortical motor excitability (CME) yielded mixed results, while intracortical inhibition and facilitation showed limited or negligible effects. However, compelling evidence suggests that AE can influence BDNF levels, positively affecting motor learning and cortical activation. Notably, exercise intensities in the moderate to vigorous range demonstrated a tendency to produce more favorable neuroplasticity outcomes.

Discussion, take-home message: According to the completed systematic review, moderate to vigorous intensity acute aerobic exercise (AE) for 20 to 30 minutes could potentially induce changes in certain biological mediators of neuroplasticity and behavioral endpoints among individuals with stroke. The evidence concerning AE's effects on cortical motor excitability (CME) presents mixed results, while intracortical inhibition and facilitation show limited to no discernible effects. On the other hand, some evidence suggests that AE might influence brain-derived neurotrophic factor (BDNF) levels, motor learning measures, and cortical activation. Worth noting, the studies examined in this review mostly involved small sample sizes.

Among the evaluated neurotrophic factors, BDNF was the most investigated.

Findings indicate that moderate to vigorous intensity exercise may potentially elevate serum BDNF levels. Post-stroke rehabilitation has increasingly focused on high-intensity interval training (HIIT) exercise due to its capacity to stimulate the release of BDNF, potentially priming the motor system. HIIT protocols, surpassing moderate intensity, challenge the cardiovascular and metabolic systems more significantly, suggesting potential improvements in motor skill retention and other neuroplasticity indices. Incorporating at least 20 minutes of vigorous interval-based exercise on a treadmill or stepper may prove beneficial for stroke survivors, providing active recovery periods and possibly inducing neurophysiological changes and enhancing ipsilesional excitability while managing fatigue.

The evidence is encouraging for utilizing moderate to vigorous intensity exercise paradigms to elicit possible neuroplasticity effects. To increase

efficacy, quality, and gain more comprehensive insights, larger controlled studies are imperative to assess the impact of exercise priming, leading to its potential integration as a post-stroke rehabilitation adjunct.

Additional references:

[Clinical Tools and Resources \(neuropt.org\)](#) (hyperlink)

- From the Locomotion CPG & Intensity matters campaign. Provides various tools for tracking intensity.

The image is a promotional graphic for the 3rd Annual Conference of the Academy of Neurologic Physical Therapy. It features a blue and orange color scheme with a city skyline background. The text reads: "ACADEMY OF NEUROLOGIC PHYSICAL THERAPY", "3rd ANNUAL CONFERENCE", "Registration is Open!", "SEPTEMBER 28-30, 2023 MINNEAPOLIS, MINNESOTA", "IN-PERSON (INCLUDES ON-DEMAND CONTENT)", "MID OCTOBER - NOVEMBER 30, 2023", and "ON-DEMAND".



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Save the Date:
Aug. 10th 7:30-8:30 pm EST
ALL MEMBERSHIP Meeting

<https://us06web.zoom.us/j/81922921004?pwd=RkFkUHVBWZ5ZTYyNXdlYkwyQ054QT09>

In this meeting, we will chat about our initiatives, what we are working on, and more to get involved! We would also love some

working on, and ways to get involved! We would also love some ideas for new future content.

Thank you to Lane S for volunteering time to review articles for the Stroke SIG!



VISIT THE STROKE SIG ONLINE!



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