



# STROKE SPECIAL INTEREST GROUP

Academy of Neurologic Physical Therapy

## In this newsletter...

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- **Student Corner** has great content. 2 new videos posted!
- **Virtual Town Hall** event for educators - If you missed it, recording available



## STROKE SIG ARTICLE REVIEW

Academy of Neurologic Physical Therapy



Thank you Dana Kahl, PT, DPT, NCS, EdD

**Summary topic title:** Individuals with Higher Levels of Physical Activity after Stroke Show Comparable Patterns of Myelin to Healthy Older Adults

**Article reference:** Greeley, B., Rubino, C., Denyer, R., Chau, B., Larssen, B., Lakhani, B., & Boyd, L. (2022). Individuals with Higher Levels of Physical Activity after Stroke Show Comparable Patterns of Myelin to Healthy Older Adults. *Neurorehabilitation and Neural Repair*, 36(6), 381-389.

**Link to full article:**

<https://journals.sagepub.com/doi/pdf/10.1177/15459683221100497>

### Definition(s)

**Myelin:** Myelin is a sheath of fat and protein that forms around nerves that allows action potentials to transmit quickly along nerve axons. Myelin plays a critical role in determining the speed of action potentials. When myelin integrity is compromised, brain function is affected. Magnetic resonance (MR) imaging techniques have been developed for imaging myelination.

**Myelin water fraction (MWF):** Myelin water imaging can provide quantitative information about myelin content non-invasively in vivo from T2-relaxation imaging. The MWF is defined as the ratio of the area in the T2 distribution arising from myelin water to the entire T2 distribution. In healthy adults, white matter has a substantially larger MWF than gray matter.

**Myelin asymmetry ratios (MARs):** Myelin asymmetry ratios (MARs) are a calculated ratio of contralateral to ipsilateral myelin water fraction. Studies have found that a higher MWF asymmetry exists in individuals post-stroke with greater

upper extremity impairments compared to a group of individuals post-stroke with less upper extremity impairments (Lakhani, et al, 2017). Additionally, MARs in individuals who have had stroke are greater (e.g., >1 and therefore less symmetrical) compared with older adults (Boric, 2013).

### **Purpose of article:**

Following a stroke, a loss of myelin occurs in both the contra- and ipsilateral hemispheres of the brain, which contributes to sensorimotor deficits. MARs are inversely related to motor impairment, meaning that the greater the ratio (e.g., > 1 and therefore less symmetrical) the lower the level of motor function. Therapies that target and reduce MAR may also improve function after stroke. Physical activity (PA) induces white matter plasticity. PA appears to be a promising, cost-effective approach to promoting white matter plasticity in older adults. The authors hypothesized that individuals with stroke would display greater MAR (i.e. >1) relative to older adults.

### **Methods of interest:**

Thirty individuals with chronic stroke (>6 months) and 27 healthy controls underwent MRI, and individuals with stroke completed the upper-extremity portion of the Fugl-Meyer (UE-FM). Participants wore accelerometers on their wrists for 72 hours. Statistical analysis included 22 stroke participants and 26 older adults due to incomplete accelerometry data or other issues. Participants were categorized as having either higher or lower PA levels. A mixed repeated measures ANOVA was performed as a 2 (Group: older adults and stroke) by 2 (Activity level: high and low) by 5 (brain motor regions of interest).

### **Results of interest:**

The authors found that MAR was similar regardless of PA level within the older adults, but MAR was different in the stroke group, depending on the level of PA. In the lower PA group, individuals with stroke showed greater MAR (i.e., less symmetrical) than individuals with stroke in the higher PA group. Additionally, when comparing lower PA groups, individuals with stroke showed greater MAR compared to older adults.

### **Discussion, take-home message:**

Stroke damages white matter, which has a negative impact on motor recovery and contributes to motor impairments. In this study, individuals post-stroke but with high PA had comparable MAR to older adults who had not sustained a stroke. Individuals post-stroke with low PA showed greater MAR (i.e., less symmetrical) relative to older adults without stroke. These results suggest that PA can mitigate MAR and that maintaining high levels of PA is associated with a normative range of MAR after stroke. **This supports the idea that engaging in high levels of PA can mitigate the negative impact of stroke on myelin, and engaging in high levels of PA may be neuroprotective.** Individuals who are more physically active have less myelin asymmetric in brain regions known to support movement. This data supports the beneficial role of PA for brain health, especially following stroke.

### **Additional References:**

Lakhani, B., Hayward, K. S., & Boyd, L. A. (2017). Hemispheric asymmetry in myelin after stroke is related to motor impairment and function. *NeuroImage: Clinical*, 14, 344–353. <https://doi.org/10.1016/j.nicl.2017.01.009>

Borich, M. R., Mackay, A. L., Vavasour, I. M., Rauscher, A., & Boyd, L. A. (2013). Evaluation of white matter myelin water fraction in chronic stroke. *NeuroImage: Clinical*, 2, 569-580. <https://doi.org/10.1016/j.nicl.2013.04.006>



**STROKE SIG**



**STUDENT CORNER**

Academy of Neurologic Physical Therapy

## **NEW STUDENT CORNER VIDEOS!**

**2 part series**

**Student Corner Question:**

**“Is there evidence for or against the use of hemi-walkers for gait training acutely post stroke?”**

Hemi Walkers Acutely Post-Stroke-Part 1:

<https://www.youtube.com/watch?v=BFeEiQ2QkvY>

Hemi Walkers Post-Stroke Case Conclusion:

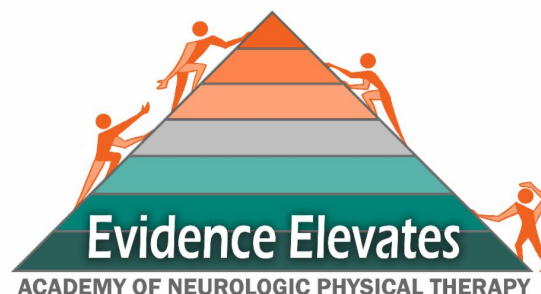
<https://www.youtube.com/watch?v=ZO1Yr-siYHg>

Anyone can ask a question (anonymously). The stroke SIG will answer.

<https://www.neuropt.org/special-interest-groups/stroke/student-corner>

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Virtual town hall event for  
Educators



In case you missed this great conversation, you can still [listen](#)

[here.](#)



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