



“What Can High-Intensity Gait Training Do for Me?”

A Fact Sheet for Patients Considering HIGT in Physical Therapy

What is High-Intensity Gait Training (HIGT)?

HIGT is walking and stepping practice that is vigorous enough to keep your heart rate over a certain target level. That level is specific to you and will be determined by your physical therapist using your resting and maximal heart rate to calculate your *maximum heart rate* or *heart rate reserve*. Your physical therapist will assign walking exercises that keep your heart rate at or above 60-80% of that heart rate.

What can HIGT do for me?

In people who have experienced a stroke, HIGT has been found to improve walking-related outcomes such as speed, walking quality, walking symmetry, as well as balance, and transfers.^{1,2,3,4,5,6,7,8,9} HIGT is also an effective way to improve your cardiovascular fitness and endurance and decrease your risk of having another stroke.^{10,11}

Outcome ^{5,12}	Conventional PT	HIGT
Number of steps in PT	<900 steps per session	~4,000 steps per session *Evidence has shown that 2000-6000 steps are required for neuroplasticity
Physical activity following discharge	0.5% increase in step per day *No significant change	25% increase in steps per day

What will HIGT sessions look and feel like?

HIGT sessions will consist primarily of walking!

In order to keep your heart rate in the target zone your physical therapist may include challenges such as:

- Adding weight to your legs
- Increasing speed
- Ascending and descending stairs
- Changing directions
- Adding obstacles

During these activities, your physical therapist will keep a close watch over your heart rate and make sure you are responding to the treatment the way you should. Your physical therapist is specially trained to monitor your response to exercise and make sure all treatment sessions are safe. HIGT may cause you to breathe hard or sweat, but these are normal responses to exercise and are often signs that you are working hard enough!

Where can I learn more about HIGT?

If you are interested in pursuing HIGT, please contact your physician or physical therapist to see if this treatment is appropriate for you. Several references are included on the back side of this handout. Also, all the research that has been conducted on HIGT is available online. You can go to www.neuropt.org/locomotor to learn more.

References

1. Macko RF, Ivey FM, Forrester LW, et al. Treadmill exercise rehabilitation improves ambulatory function and cardiovascular fitness in patients with chronic stroke: a randomized, controlled trial . *Stroke*. 2005;36(10):2206-2211. doi:10.1161/01.STR.0000181076.91805.89
2. Moore JL, Nordvik JE, Erichsen A, Rosseland I, Bo E, Hornby G. Implementation of high-intensity stepping training during inpatient stroke rehabilitation improves functional outcomes . *Stroke* . February 2020. doi:10.1161/STROKEAHA.119.027450.
3. Ardestani, M., Kinnaird, C., Henderson, C., & Hornby, T. Compensation or recovery? Altered kinetics and neuromuscular synergies following high-intensity stepping training poststroke. *Neurorehabilitation and Neural Repair*, 2019;33(1), 47-58. doi:10.1177/1545968318817825.
4. Moore JL, Roth EJ, Killian C, Hornby TG. Locomotor training improves daily stepping activity and gait efficiency in individuals poststroke who have reached a "plateau" in recovery . *Stroke*. 2010;41(1):129-135. doi: 10.1161/STROKEAHA.109.563247
5. Hornby TG, Holleran CL, Leddy AL, Hennessy P, Leech KA, Connolly M, Moore JL, Straube D, Lovell L, Roth E. Feasibility of Focused Stepping Practice During Inpatient Rehabilitation Poststroke and Potential Contributions to Mobility Outcomes. *Neurorehab and Neural Repair*.2015, 29(10): 923-932.
6. Hornby, T., Henderson, C., Plawewski, A., Lucas, E., Lotter, J., Holthus, M., ... Roth, E.. Contributions of stepping intensity and variability to mobility in individuals poststroke. *Journal of Stroke*, 2019;50(9), 2492-2499. doi:10.1161/STROKEAHA
7. Hornby G, Reisman DS, Ward IG, et al. Clinical Practice Guideline to Improve Locomotor Function Following Chronic Stroke, Spinal Cord Injury, and Brain Injury . *Journal of Neurologic Physical Therapy* . 2020;44(2):49-100.
8. Globas C, Becker C, Cerny J, et al. Chronic stroke survivors benefit from high-intensity aerobic treadmill exercise: a randomized control trial . *Neurorehabilitation and Neural Repair*. 2011;26(1):85-95. doi: 10.1177/1545968311418675
9. Luo, L., Zhu, S., Shi, L., Wang, P., Li, M., & Yuan, S.. High intensity exercise for walking competency in individuals with stroke: A systematic review and meta-analysis. *Journal of Stroke and Cerebrovascular Disease*. 2019. doi:10.1016/j.jstrokecerebrovasdis.2019.104414
9. Ada L, Dean CM, Morris ME, Simpson JM, Katrak P. Randomized Trial of Treadmill Walking with Body Weight Support to Establish Walking in Subacute Stroke . *Stroke* . 2010;41(6). doi:doi.org/10.1161/STROKEAHA.109.569483.
10. Luo, L., Meng, H., Wang, Z., Zhu, S., Yuan, S., Wang, Y., & Wang, Q. Effect of high-intensity exercise on cardiorespiratory fitness in stroke survivors: A systematic review and meta-analysis. *Annals of Physical Rehabilitation and Medicine*. 2019. doi: 10.1016/j.rehab.2019.07.006.
11. Han P, Zhang W, Kang L, et al. Clinical Evidence of Exercise Benefits for Stroke . *Advances in Experimental Medicine and Biology*. 2017. doi: 10.1007/978-981-10-4304-8_9.
12. Hornby TG, Straube DS, Kinnaird CR, et al. Importance of Specificity, Amount, and Intensity of Locomotor Training to Improve Ambulatory Function in Patients Poststroke. *Topics in Stroke Rehabilitation*. 2011;18(4):293-307. doi:10.1310/tsr1804-293.