

The Physiology Behind Compression Clothes

By Tim Mickleborough, PhD
[Triathlete magazine](#)

Dear Speed Lab,



While competing in the 2008

Hawaii [Ironman](#)

[World](#)

[Championship](#), I

was surprised to

see so many

athletes wearing compression socks or tights

while training and competing in the race.



I was given a pair of Skinz tights eight weeks ago and wear them after I train for recovery. I'm not sure if they reduce muscle fatigue, or if other factors are involved, such as proper nutrition, hydration and sleep. I was wondering what the physiology is behind compression socks, tights, arm warmers, etc. There seemed to be a lot of hype at the Ford Ironman Expo regarding compression socks.

Wendy Mader

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2008 Overall Female Age-Group Ironman World Champion

Dear Wendy,

I was also in Hawaii and noticed that many triathletes were wearing compression stockings before, during and after the race. Claims from companies that manufacture compression stockings range from reduced delayed onset muscle soreness (DOMS) following a race, prevention of excess muscular vibration and hence reduced fatigue, improved return of blood to the heart, and reduction of [foot and leg](#)

Elastic compression stockings have been used medically in preventing and treating aching, tired, heavy legs, leg and ankle swelling (edema), varicose veins and spider veins. Additionally, these medical garments are used as a compression therapy for post-sclerotherapy, lymphedema, chronic vein insufficiency (CVI), deep vein thrombosis, and other vein disorders and diseases.

Research supports wearing compression garments for these diseases, and has shown that they can help prevent or slow the progression of vein problems. However, the question remains: Do compression stockings improve exercise performance, and is there any rationale for wearing them before and after exercise in healthy individuals?

Compression and Performance

There is a plethora of studies looking at the effects of a variety of compression garments (shorts, tights and full body suits) on muscular performance, vertical jump performance, muscle fatigue, repeated-sprint performance, post-exercise response, post-exercise blood lactate and DOMS in healthy subjects, all with mixed results.

However, the majority of these studies have focused on compression stockings in unhealthy individuals. Many of the studies involving unhealthy populations have focused on assessing compression stockings on exercise performance or vascular function in patients with thrombosis or varicose veins, and again the results are mixed.

Zajkowski, et al.¹ showed that compression stockings are more effective in controlling the backward flow of blood in varicose veins than in improving calf muscle pump function for activities of daily living in subjects with varicose veins and deep vein thrombosis.

However, Ibegbuna, et al.² indeed showed improved venous blood return in patients with chronic venous insufficiency at a variety of walking speeds. In contrast, Jones, et al.³ found that compression stockings did not have any benefit on vascular function in healthy subjects. Similarly, Kahn, et al.⁴ found that compression stockings did not improve exercise capacity while running or walking in patients with

thrombosis.

A literature search revealed only three studies that have assessed the impact of compression stockings on physiological function in healthy individuals. Berry and McMurray⁵ showed that compression stockings resulted in no change in VO₂ max recovery, VO₂ or plasma volume shifts, but did result in lower post-exercise blood lactate levels compared to subjects wearing no stockings.

Ali, et al.⁶ demonstrated that after a fast-paced, continuous 10-kilometer road run, stocking-wearers exhibited a reduction in DOMS 24 hours after exercise compared to controls (no stockings) but no change in venous blood return. In addition, no performance or physiological differences were observed between conditions (stocking use versus no stockings) during intermittent shuttle running. Recently, Perrey, et al.⁷ found that subjects who wore compression stockings for five hours per day had reduced DOMS, but their data demonstrated no benefit for the treatment of strength and functional declines.

It is apparent that the findings from the studies cited above assessing the effects of compression stockings on physiological function in unhealthy and healthy individuals are diverse. It is clear that more studies are needed to assess the impact of compression stockings on venous return, exercise performance, muscle fatigue and DOMS before any firm conclusions can be drawn regarding their usefulness.

It should be noted that the benefits of compression stockings seen in unhealthy individuals may not be the same as those that are ultimately confirmed (if any) for healthy individuals.

The pressures that are used mostly in scientific research are between 30 and 40 mmHg. What is not clear is whether this pressure range is suitable for runners and triathletes. Many of the manufacturers give no indication of the pressure of their garments.

Manufacturers claim that wearing compression stockings can optimize blood flow, reduce leg fatigue, reduce muscle soreness, prevent injury, help remove metabolic byproducts, dampen muscle vibration, and thereby increase endurance and improve running performance.

More research needs to be conducted to substantiate or refute these claims and determine whether it is worthwhile to use these garments before, during and after exercise. For now, all we can do is rely on reports from athletes wearing them in the running and triathlon communities.

References

1. Zajkowski, P.J., M.C. Proctor, T.W. Wakefield, J. Bloom, B. Blessing and L. Greenfield. "Compression Stockings and Venous Return." *Archives of Surgery* 137.9 (2002): 1064-1068.
2. Ibegbuna, V., D.T. Konstantinos, D.N. Nicolaidis and O. Aina, "Effect of Elastic Compression Stockings on Venous Hemodynamics during Walking." *Journal of Vascular Surgery* 37.2 (2003): 420-425.
3. Jones, N.A., P.J. Webb, R.I. Rees and V.V. Kakkar. "A Physiological Study of Elastic Compression Stockings in Venous Disorders of the Leg." *British Journal of Surgery* 67.8 (1980): 569-572.
4. Kahn, S.R., L. Azoulay, A. Hirsch, M. Haber, C. Strulovitch and I. Shrier, "Effect of Graduated Elastic Compression Stockings on Leg Symptoms and Signs during Exercise in Patients with Deep Venous Thrombosis: a Randomized Cross-Over Trial." *Journal of Thrombosis and Haemostasis* 1.3 (2003): 494-499.
5. Berry, M.J. and R.G. McMurray. "Effects of Graduated Compression Stockings on Blood Lactate Following an Exhaustive Bout of Exercise." *American Journal of Physical Medicine* 61.3 (1987): 121-132.
6. Ali, A., M.P. Caine and B.G. Snow. "Graduated Compression Stockings: Physiological and Perceptual Responses during and after Exercise." *Journal of Sports Sciences* 25.4 (2007): 413-419.
7. Perrey, S., A. Bringard, S. Racinais, K. Puchaux and N. Belluye. "Graduated Compression Stockings and Delayed Onset Muscle Soreness (P105)." *The Engineering of Sport* 7.1 (2008): 547-554.

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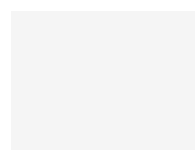
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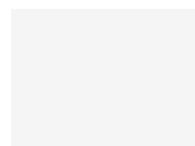
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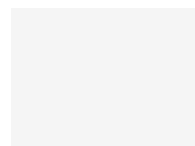
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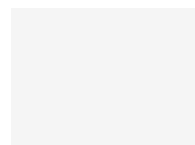
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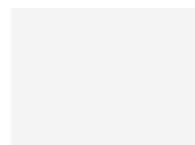
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