

9 min

Veins and the Athlete

Compression Therapy for Athletes

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Hawaii 2019

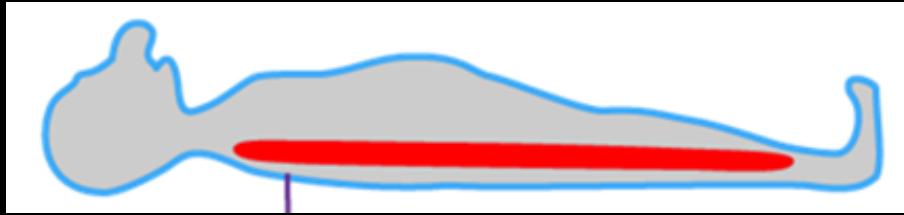
DISCLOSURE

Thom Rooke, MD

No Relevant Financial
Relationship Reported

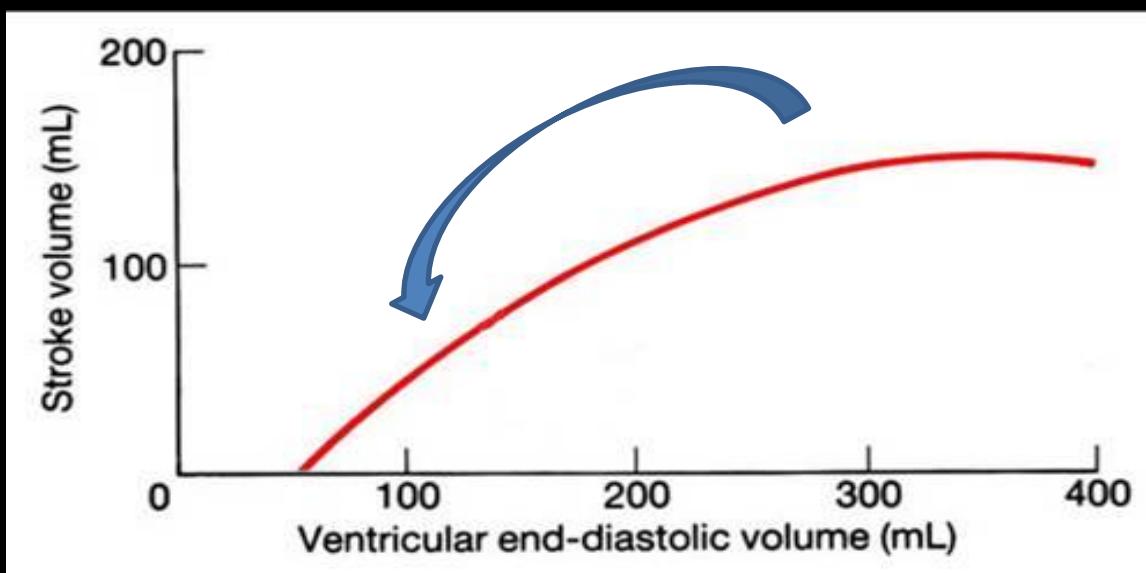
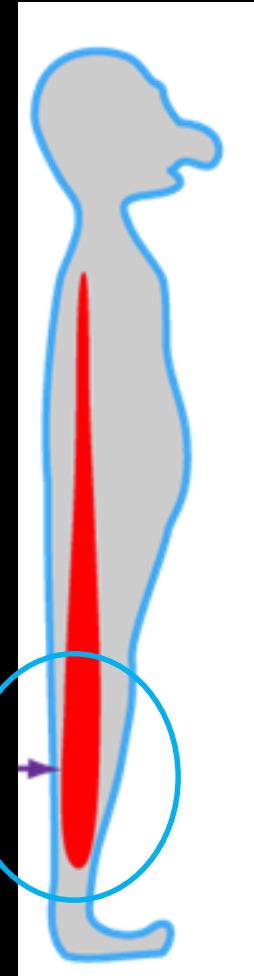
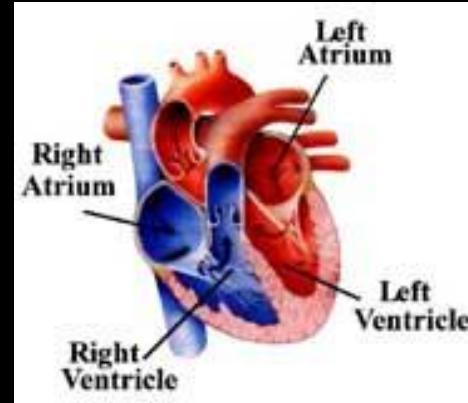


A physiology lesson ...



400-750 ml blood displaced
into legs with standing.

If no compensation, this would
lead to a **60% reduction** in
cardiac output.



The consequences
are predictable ...

... and potentially
avoidable.



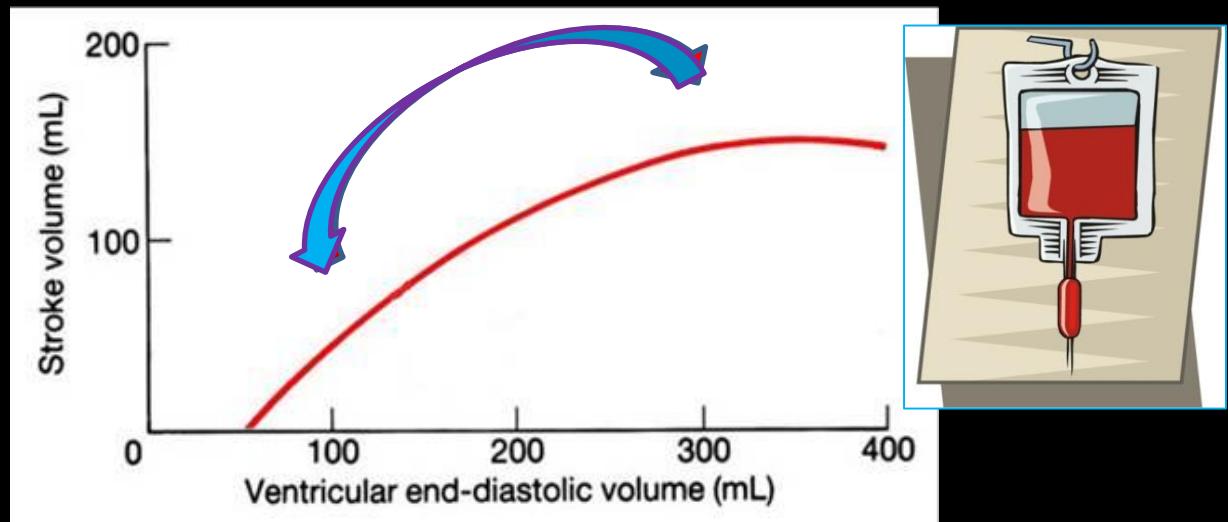
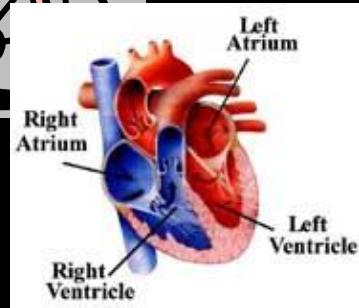
Probably
help

?



Daily Telegraph



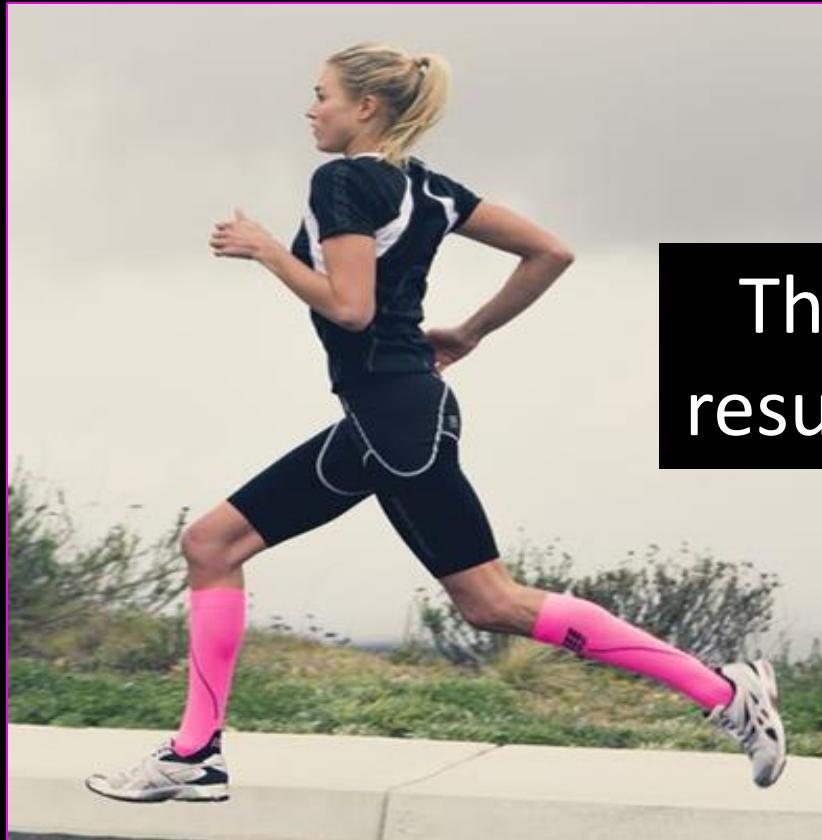
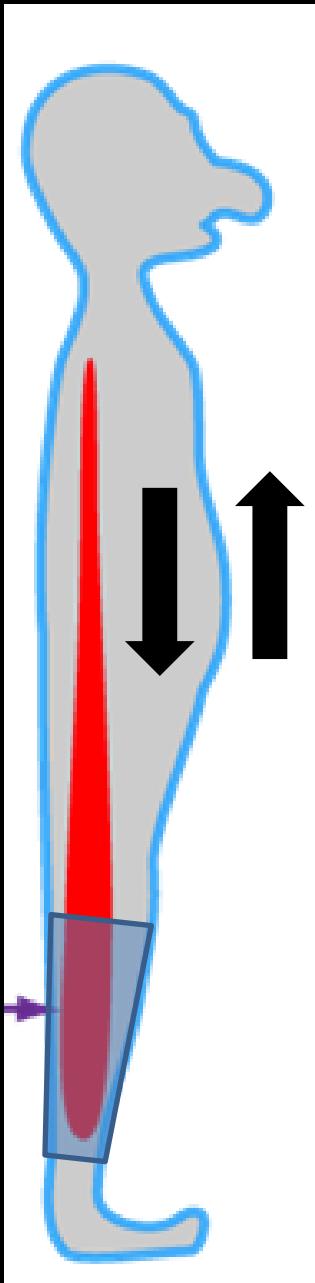


But there's a problem ...

Dangerous: Italian cyclist ... admitted today that a *blood transfusion* led to his hospitalisation.

Illegal: It ... will likely lead to ... a 5-year ban.

<http://www.cyclingweekly.co.uk/news/latest-news/ricco-admits-blood-transfusion-caused-hospitalisation-54416#p3ZeuPEpZrCmWMt0.99>



Idea: What if athletes could give themselves a safe, legal
“autotransfusion?”



Boston Marathon 2013 Champions

2019 "... The idea behind compression, which essentially squeezes your legs in all the right places ... while you run, is to *improve your circulation* ..." can

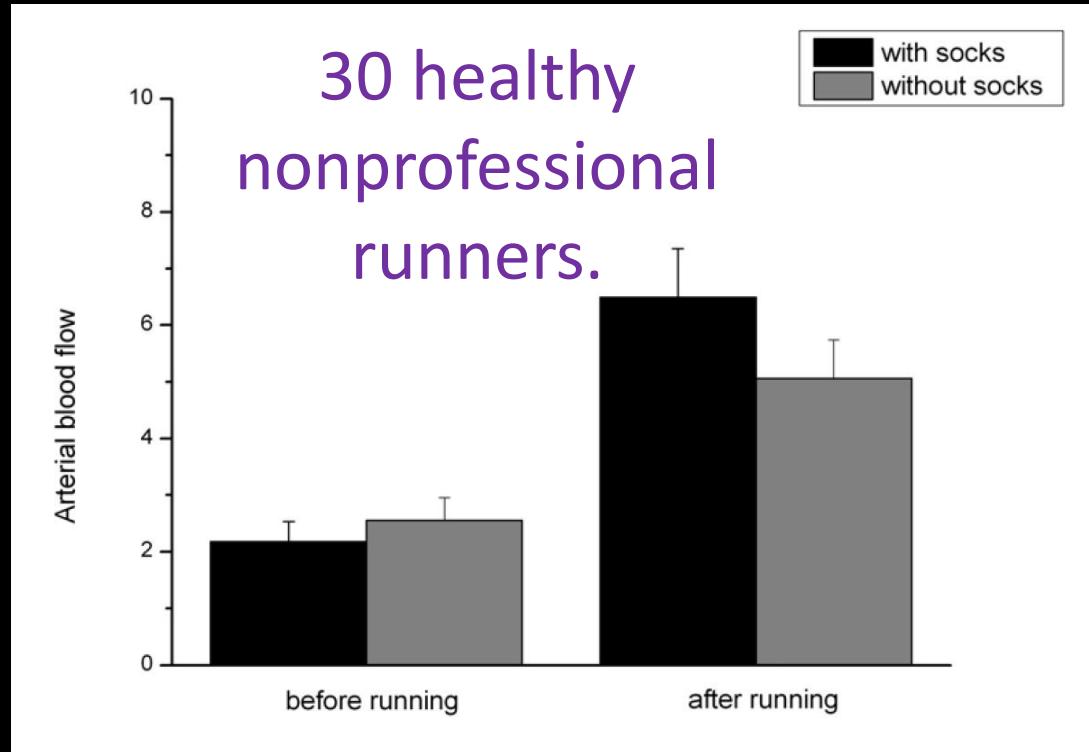
The Effects of Compression Socks on Arterial Blood Flow and Arterial Reserves in Amateur Sportsmen

Stefan Mann*, Dominique Ultsch , Melanie Dietl & Petra Jansen

Clinic for Vascular- Surgery Medicine, Castra-Regina-Center, Regensburg, Germany

Institute of Sport Science, U of Regensburg, Germany (Development in Sports Science, Volume 1)

Plethysmography



Socks increased blood flow by 28% !!

“CEP Running Sport socks” (Medi)
5-17 mm Hg up to 20-30 mmHg

Effect of Compression Stockings on Running Performance in Men Runners *Journal of Strength & Conditioning Research*. 23(1):101-105, January 2009.

Institute of Medical Physics, University of Erlangen-Nürnberg, Nürnberg, Germany.

21 moderately trained athletes ... randomly assigned ... stepwise treadmill test ... with and without below-knee compressive stockings



Total work on T-mill run increased by 5%
with compression

If you were 5% better ... at a marathon time of four hours, this would equal twelve minutes gained.

An area of interest for me ...

Journal of Strength & Conditioning Research
2009-2017

20+ articles dealing with effects of elastic
compression on athletic performance
(200+ articles in literature)



Running



Performance

Positive Studies

Effects of Compression on Muscle Tissue Oxygenation at the Onset of Exercise *Journal of Strength & Conditioning Research*, 26(6):1631-1637, June 2012.

... Assuming that increased muscle oxygen availability positively influences performance, compression of muscles may enhance performance especially in sports that require repeated short bouts of exercise.

Cycling



Positive Effect of Lower Body Compression Garments on Subsequent 40-kM Cycling Time Trial Performance

Journal of Strength & Conditioning Research, 26(2):480-486, February 2012.

Performance time ... was substantially improved with compression compared with placebo garments ($1.2 \pm 0.4\%$...)

J Strength Cond Res. 2012
Nov;26(11):2975-82.

Effect of compression garments on ... recovery of repeated sprint and 3-km running performance in **rugby ... players.**



... 22 ... players ... wearing the compressive garment decreased time to complete the 3 km by 2.0% ... average sprint times improved (1.2%) and fatigue was diminished ... muscle soreness (48 hours) was substantially lower ...

Used an animal model



Running

Performance

Negative Studies

Effect of Lower-Limb Compression Clothing on 400-m Sprint

Performance *Journal of Strength & Conditioning Research*. 27(3):669-676, March 2013.

... no differences ... in ... 400m performance,
100m ... times, or blood lactate concentration ...

Cycling

The Effects of Ionized and Nonionized Compression
Garments on Sprint and Endurance Cycling

Journal of Strength & Conditioning Research. 26(10):2837-2843, October 2012.



... compression tights had (no) significant effect
on sprint or endurance cycling performance.

Positive and Negative Studies

Effect of Compression ... on Physiological Responses and
Running Performance ... During a Maximal Treadmill Test
Journal of Strength & Conditioning Research. 28(6):1732-1738, June 2014.



... randomized, crossover design ... maximal treadmill test ... Heart rate ... maximal oxygen consumption ... respiratory exchange ratio ...

perceived exertion ... time to fatigue ... *no significant difference*

... Blood lactate was lower while wearing compression stockings ... during recovery at ... 1 minute ...

... *CS may not improve running performance, but could lend credence to certain manufacturers' claims of improved recovery ... after exercise.*

The scientific jury is still out on how much different types of compression garments actually boost your performance. 2019



Is There Evidence that Runners can Benefit from Wearing Compression Clothing?

Engel, F.A., Holmberg, H.C. & Sperlich, B. Sports Med (2016) 46: 1939.
<https://doi.org/10.1007/s40279-016-0546-5>

CONCLUSION:

... by wearing compression clothing, runners may improve variables related to endurance performance (i.e., time to exhaustion) *slightly* ...

<https://www.runnersworld.com/gear/a20862608/best-compression-tights/>

The scientific jury is still out on how much different types of compression garments actually boost your performance. 2019



Association of Lower Limb Compression Garments During High-Intensity Exercise with Performance and Physiological Responses: A Systematic Review and Meta-analysis.

da Silva, C.A., Helal, L., da Silva, R.P. et al. Sports Med (2018) 48: 1859.

<https://doi.org/10.1007/s40279-018-0927-z>

CONCLUSIONS:

LLCGs were *not* associated with improved performance ... during high-intensity exercise.

<https://www.runnersworld.com/gear/a20862608/best-compression-tights/>

Myth-busting sports and exercise products

BMJ 2012;345:e4848 doi

“There is *no consistent evidence* that compression garments improve sporting performance.

Muscle soreness seems to be *reduced* ... but objective measures ... are less consistent, and *compression garments seem to work no better than other recovery strategies* ...



... But ...

But many questions remain ...

- Amount of compression?
 - Length of compression (knee-high? thigh-high? Whole body?)
 - Strength of compression (is 5-17 mmHg enough? Would more be better?)
- Type of activity (marathon? sprinting? cycling?)
- Others

The End