

1. What is compression wear, and what is the general idea behind it and its technology? I.e. How does it work?

Compression wear was first introduced around 60 years ago where they were mainly used as a medical stocking to create pressure around the muscle, bone and connective tissue. These medical compression stockings are usually worn over the leg and foot to create a controlled, gradient compressive force on the leg. Typically, the compressive force is greatest at the ankle and diminishes over the length of the stocking to a minimum at the top. The compressive effects of these stockings are used to improve recovery in hospitals by improving venous blood flow, decreasing venous stasis and preventing thrombosis in post-operative patients.

With initial studies focusing on the post-operative improvements in venous blood flow in the lower extremities, scientists began looking into the effect of compression garments on athletic performance. In the late '80s, researchers began investigating whether athletes could benefit from compression for the same circulatory reasons. In 1987, a study published in the American Journal of Physical Medicine showed that after an intense exercise, athletes who wore compression socks exhibited lower blood lactate levels. It was suggested that the compression socks helped to transport more blood deeper down to the venous calf muscle pumps, which decreased the incidence of swelling and pooling, thus reducing blood lactate level (Berry & McMurray, 1987). Subsequently, the use of compression garments grew in popularity in sport and exercise settings, where they are believed that the compressive properties of the compression wear will enhance performance and speed up recovery following strenuous training and competition.

Although the exact mechanisms behind the physiological and biochemical responses of wearing compression garments have yet to be established in relation to enhancing performance and recovery, these are the potential mechanisms suggested by current research findings:

- Enhancing blood circulation to peripheral limbs
- Increasing deeper tissue oxygenation
- Reducing blood lactate level during maximal exercise/training bouts
- Enhancing warm-up effect via increases in skin temperature
- Reducing muscle oscillation upon ground contact
- Improving proprioception (the awareness of position of joints in space)

2. What compression wear will do and will not do for you in the different aspects of power, endurance, acceleration and so on? For example, Under Armor claims it delivers increased power and stamina, but is this true or just a marketing gimmick? According to some research I've seen it doesn't actually deliver increased strength and power. Is this the case?

Manufacturers claim that wearing compression garments can optimise blood flow, reduce leg fatigue, reduce muscle soreness, prevent injury, facilitate removal of metabolic by-products, dampen muscle vibration, and thereby improve strength, power and endurance performance. Indeed, a recent systematic review (Born et al., 2013), to a certain extent, agrees with some of the claims made by the compression garment manufacturers. In this review, the results revealed a small positive effect of compression garment on single and repeated sprint performance, vertical jump height, time-to-exhaustion and time-trial performance. These ergogenic benefits are possibly due to increased proprioception, reduced muscle oscillation, improved venous return, enhanced arterial inflow and altered muscle fibre recruitment patterns. However, endurance exercise such as submaximal running seems to be unaffected, although compression garments have been shown to

improve venous hemodynamics and increase deeper-tissue oxygenation and the clearance of metabolites.

3. Research however seems to suggest that muscle recovery does improve while wearing compression wear. Again, have you seen this to be the case? How does it work?

Indeed, several studies in the literature showed a small to moderate positive effect in the recovery of maximal strength and power, reductions in muscle swelling, perceived muscle soreness and blood lactate removal when individuals and athletes wore compression garments after exercise. The application of compression garments was suggested to improve recovery after muscle-damaging exercise by promoting lymphatic drainage, thus reducing post exercise muscle swelling and pain. Furthermore, increased blood flow and venous return were associated with increased clearance of cellular waste products, potentially enhancing the cellular repair processes. Of note, the benefits of compression garments seem to be most pronounced when it is applied for recovery purposes 12-48 hours after significant amounts of muscle-damaging inducing exercise.

It is also important to note that improving performance and/or recovery sometimes goes beyond time- and physiological-related measures. The overall sensation, perception of effort and recovery play crucial roles in exercise performance – any changes in perceived exertion or recovery may also serve as an ergogenic aid for improving performance regardless of potential physiological effects. Anecdotally, some people like the feel provided by the compression garment – the feel of the material and the pressure on the skin, as well as the supported feeling and reduced ‘wobble.’ Similarly, for those who have experienced injury or lower-limb issues, compression may act as a security blanket while engaging in physical activity by giving the individuals the reassurance that their joints remain aligned and are held in place. This reassurance can be a powerful mental component of compression that may contribute to a performance boost. Nevertheless, we should not write off compression garment as a marketing gimmick. What is certain is that it is worth digging deeper into the science and burgeoning trend of using compression wear in enhancing sporting performance.

Take Home Message

While performance outcomes are often the central focus for any athlete or sport scientist, compression wear may have greater advantages to improve recovery following an exercise bout. The rationale for wearing compression garment is strong but it is still in its infancy and research to date is limited. While some studies find physiological benefits, such as increased blood flow, increased muscle oxygenation, decreased blood lactate build-up and decreased muscle oscillations, these benefits may not directly translate to noticeable performance benefits. Thus, compression garments appear to be a better likelihood in facilitating with the recovery process rather than with performance. However, as no studies have reported negative effects of the use of compression garment on exercise performance, its use may provide a useful training tool for athletes across a wide variety of sports. If wearing compression garments put individuals and athletes in a sporting frame of mind and they feel good, then why not?