EFFECTS OF COMPRESSION GARMENTS ON PULMONARY AND MUSCLE OXYGENATION DURING EXERCISE AND REST

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Although external compression is the main treatment of vascular diseases, the effect of wearing compression pants (CP) and stockings (CS) has been evaluated recently on sportsmen. Kraemer et al. (1996) were the first to suggest that particular compressive pants may improve short, explosive types of athletic performance. Chatard et al. (2004) reported that wearing CS during passive recovery between 2 maximal exercises increased subsequent performance and Shiroishi et al. (2004) reported improved muscle oxygenation by the use of CS at rest, assessed by near-infrared spectroscopy (NIRS). Yet the data are limited as to whether CP have any influence on metabolic efficiency during endurance sports and how this CP may acts at the peripheral level.

The purposes of this project were to evaluate the effects of compression level on (i) systemic metabolism during high intensity aerobic exercise and (ii) peripheral oxygenation. During testing session subjects wore either compression pants (CT, Decathlon), elastic pants (ET), or conventional short (S) in a random order. In the first protocol (P1) 6 male trained runners performed a 15 min constant heavy run (80% VO2max) on an indoor 200-m track. Pulmonary gas exchanges were recorded continuously with a portable system (K4b2, Cosmed, Italy). The slow component of VO2 (VO2sc) was calculated as the increase of VO2 between the 2nd and last min of exercise (Hill et al., 2003). In the 2nd protocol (P2), 12 healthy male kept quiet standing for 5 minutes wearing either ET, CT or S. A tissue oxygenation index (TOI) of the right gastrocnemius medialis muscle were recorded continuously using a NIRS device (NIRO-300, Hammamatsu, Japan). Furthermore, pressure exerted by clothing over the right calf muscle was assessed using a pressure transducer. A repeated-measures ANOVA test was used to assess difference between the conditions. Significance was set at P<0.05.

VO2sc was significantly decreased with CT compared to ET and S (P<0.05). Since it has been suggested that VO2sc is an index of exercise tolerance (Gaesser et Poole, 1996), the lower VO2sc with CT represents an increase in exercise tolerance. Indeed, VO2sc during heavy exercise represents a slow increase in O2 consumption to perform at a constant intensity. Hence, the lower VO2sc with CT means that this garment can restrain decrease in efficiency during fatiguing exercise.

TOI was significantly higher during quiet standing with CT compared to ET and S (P<0.001). The mean pressures were 5.5 and 23.5 mmHg for ET and CT, respectively. NIRS-derived oxygenation signal represents a balance between oxygen delivery and uptake by the muscle of changes in intramuscular oxygenation and O2 extraction (Ferrari et al., 1997). Hence, the increase in TOI meant that CT improved oxygen delivery to the muscle and/or decreased muscle consumption. These modifications could be in favour of a better muscle recovery after fatiguing exercise. More detailed studies are required to determine the impact of CT on muscular oxidative metabolism during and after exercise.

Shiroishi et al. (2004). Proceedings of the 9th annual congress of the European College of Sport Science, 49
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