

The assessment of pressure profiles in made to measure compression garments

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Compression garments are increasingly used as an ergogenic aid for exercise performance and recovery. However, previous research has generally used commercially available garments and has failed to quantify the pressures and pressure gradients elicited by a garment. Therefore, the aim of the current study was to produce made-to-measure compression garments, which provided prescribed pressures and pressure gradients. With institutional ethical approval, 10 male recreational runners (age 24.3 ± 4.6 years, stature 181.5 ± 1.84 cm, body mass 75.7 ± 3.8 kg) (mean \pm SD) volunteered to participate. Using 3D scans of the participant's lower body, two types of made-to-measure garments were manufactured: control and bilateral. Input parameters were used to define garment peak pressures at the ankle and the amount of graduation along the participant's leg. Thus, individual participants should achieve equivalent pressures along the line of the leg. Garment pressures were assessed posteriorly, from the malleolus with increments up the limb to the gluteal fold, using a pressure-monitoring device and a 3D motion capture system. Pressure measurement location was defined relative to the leg length by projecting the measurement site perpendicularly on to a line between the lateral malleolus and greater trochanter. A root mean squared error (RMSE) approach was used to calculate the in-vivo (worn) linear graduation parameters of peak pressure

and graduation. The error between predicted and actual pressures for the control garment was 2.1 mmHg for the left leg and 2.1 mmHg for the right leg. The corresponding values for the bilateral garment were 2.1 mmHg and 2.1 mmHg. The inter-individual differences in RMSE ranged from 1.5 mmHg to 3.5 mmHg in the control garment trials and from 1.5 to 4.4 mmHg in the bilateral garment trials. The outcomes of the linear regression showed that for the control garment trials, the optimum pressure at the ankle was 14 mmHg and 13 mmHg in the left and right leg respectively and the pressure reduction was 10 mmHg and 7 mmHg. For the bilateral garment trials, the optimum pressure at the ankle was 27 mmHg and 28 mmHg in the left and right leg respectively and the pressure reduction was 24 mmHg and 23 mmHg. The results suggest that made-to-measure compression garments can elicit equivalent closely prescribed pressures and pressure gradients between all participants for two, different garment conditions.