

Microcirculation in the foot is augmented by neuromuscular stimulation via the common peroneal nerve in different lower limb postures: a potential treatment for leg ulcers

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Abstract

Aim

Aim of the study was to examine the effects of the geko™ device (a portable electrical nerve stimulator) on microcirculatory flow on the dorsum of the foot, and whether this is influenced by lower limb postures and application of a plaster cast.

Methods

This was a cross-sectional, healthy cohort, open label, physiological response study. In 10 healthy volunteers, aged 19 to 24 years, laser Doppler fluxmetry measurements were made on the dorsum of the foot in four postures: standing (weight bearing and non-weight bearing) and supine lying (with the lower limb horizontal and then elevated). Measurements of flux were made both at rest and during stimulation with the geko™ device applied over the common peroneal nerve, at 1 Hz for 5 minutes in each posture. Repeat measurement were made after the application of a below knee plaster cast. Measures of flux were compared to basal levels assumed to be in supine with limb horizontal, with no cast and an inactive geko™ device.

Results

The geko™ device was effective in increasing microcirculation on the dorsum of the foot in all four postures (mean difference =141%, 95% CI 70%-212%, P=0.001). This effect was more pronounced than that of using a plaster alone (Mean increase in flux of 73%, 95% CI 22%-125%, P=0.01) or variances due to the hydrostatic effects of different postures (mean difference 17-27.6%, P>0.05). There was a 2 to 3 fold increase in flux when stimulation was delivered in combination with the plaster cast.

Conclusion

Stimulation using the geko™ device augments microcirculation in the foot. The response is greater in lying and non-weight bearing than weight bearing standing but the most striking effect is when stimulation is combined with a plaster cast. The geko™ offers a potential means of promoting conditions favourable for wound healing, where treatment using compression may be contraindicated, such as arterial/mixed aetiology ulcers.