

Integrity of Venoarteriolar Reflex Determines Level of Microvascular Skin Flow Enhancement with Intermittent Pneumatic Compression

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Objective: To investigate whether intermittent pneumatic compression (IPC) augments skin blood flow through transient suspension of local vasoregulation, the veno-arteriolar response (VAR), in healthy controls and in patients with peripheral arterial disease (PAD).

Methods: Nineteen healthy limbs and twenty-two limbs with PAD were examined. To assess VAR, skin blood flow (SBF) was measured using laser Doppler fluxmetry in the horizontal and sitting positions and was defined as percentage change with postural alteration [(horizontal SBF- sitting SBF)/horizontal SBF x 100]. On IPC application to the foot, the calf, or both, SBF was measured with laser Doppler fluxmetry, the probe being attached to the pulp of the big toe.

Results: Baseline VAR was higher in the controls $63.8 \pm 6.4\%$ than in patients with PAD ($31.7 \pm 13.4\%$, $P = .0162$). In both groups SBF was significantly higher with IPC than at rest ($P < .0001$). A higher percentage increase with IPC was demonstrated in the controls ($242 \pm 85\%$ to $788 \pm 318\%$) than in subjects with PAD, for each one of the three different IPC modes investigated ($98 \pm 33\%$ to $275 \pm 72\%$) with IPC was demonstrated. The SBF enhancement with IPC correlated with VAR, for all three compression modes ($r = 0.58$, $P = .002$ for calf compression, $r = 0.65$, $P < .0001$ for foot compression alone, and $r = 0.64$, $P = .0002$ for combined foot and calf compression).

Conclusion: The integrity of the veno-arteriolar response correlates with the level of skin blood flow augmentation generated with the intermittent pneumatic compression, indicating that this may be associated with a transient suspension of the autoregulatory vasoconstriction both in healthy controls and in patients with PAD.