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Electrical foot stimulation and implications for the prevention of venous thromboembolic disease.

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Background:

Venous stasis caused by immobility is an important risk factor for deep vein thrombosis following surgery and lower limb trauma, in bed-ridden medical patients, and in high-risk long distance air travelers. A safe and convenient method for reducing venous stasis would be useful in patients while in hospital and after discharge during their rehabilitation.

Subjects and Methods:

49 healthy subjects aged 51-76 were seated for 4 hours during which they received mild electrical stimulation of the calf, or sole of the foot (plantar muscles). Popliteal and femoral venous blood flow velocities were measured via doppler ultrasound. The non-stimulated lower extremity served as the simultaneous control. Subjects completed a questionnaire regarding their acceptance and tolerance of the electrical stimulation.

Results:

There was a significant increase in venous femoral and popliteal blood flow for both calf ($p < 0.035$, $p < 0.003$), and plantar muscles ($p < 0.0001$, $p < 0.009$) on the stimulated side compared to the unstimulated side. The magnitude of the effect was similar for calf and plantar muscle stimulation. Subjects did not find the experience uncomfortable, and would use an electrical stimulator if told by their physician that they were at risk for developing blood clots.

Conclusions:

Mild electrical stimulation of the feet, as well as the calf, is a safe effective and convenient method for counteracting venous stasis and therefore has the potential to reduce the risk of deep vein thrombosis and pulmonary embolism for subjects who are immobilized.

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