Effects of electrical stimulation on skin blood flow in controls and in and around stage III and IV wounds in hairy and non hairy skin.

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Abstract

BACKGROUND:
While wounds heal more quickly when electrical stimulation (ES) is applied, few studies have examined blood flow (BF) in and around wounds during ES in controls with no wounds compared to wounds in diabetic and non diabetic subjects.

MATERIAL/METHODS:
Ten subjects with stage III and IV wounds and 8 controls were subjected to 5 minutes of biphasic ES (20 milliamps, pulse width 250 usec). Before, during, and after, BF were measured by a Laser Doppler Imager.

RESULTS:
For the control subjects, in the fingers, BF increased from 307 flux to 687 after 5 min of ES to one finger but BF also increased to other fingers indicating a reflex increase in flow mediated by the sympathetic nervous system. For hairy skin, there was a 12% increase in BF with ES and only in the line directly between the stimulating electrodes. For the patients (either with or without Type 2 diabetes), stimulation in the hand, leg and foot all caused a large increase in BF during and for 5 minutes after stimulation. In patients, BF was high in the wound area before ES and increased by 53% during, and remained high after stimulation was over.

CONCLUSIONS:
The results show that in wounds, where BF is high due to bradykinin and cytokine release, the vasoconstrictor tone is not present and electrical stimulation causes a large increase in circulation which lasts after stimulation is over.