

The Effect of Mist Ultra-Sound Transport Technology on Cutaneous Microcirculatory Blood Flow

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Abstract: Chronic wounds may be treated with many adjunctive therapies including traditional contact ultrasound. Traditional ultrasound therapy requires a contact media such as gel or water bath for acoustic transmission. The Mist Ultra-Sound Transport (MUST™) device is a non-contact delivery system that transfers ultrasonic energy through an atomized vapor mist. The goal is to identify and evaluate changes in microcirculatory blood flow in cutaneous tissue when treated with MUST™ therapy. Laser Doppler flowmetry, both scanning image and single point modalities, was used to measure cutaneous microcirculatory blood flow. Baseline laser Doppler flowmetry measurements were obtained. MUST™ of five-minute duration was accomplished to the forearm and readings at one, five and ten minute intervals were recorded. The identical process was repeated with the use of traditional contact ultrasound with gel as the medium. The comparison of MUST™ and contact ultrasound on cutaneous blood flow is reported.

Introduction: Contact ultrasound through a contact medium, usually water or gel, is an adjunct modality currently used for wound healing. A new technology, MUST™ technology is a non-contact low frequency (40 kHz) ultrasound that transmits ultrasonic energy through mist particles. Our goal is to evaluate the effects of the MUST™ technology on the microcirculatory blood flow using laser Doppler flowmetry.

Materials and Methods: The forearm of three healthy individuals were used to identify and evaluate changes on microcirculatory blood flow. A baseline image and single point laser Doppler measurements were obtained. The forearm was then treated for five minutes with a 1 mHz ultrasound device with a gel as the medium. Repeat laser Doppler measurements were taken at one, five, and ten minutes post treatment. The same procedure was repeated on the opposite forearm using the MUST™ device. Two patients referred to the Vascular Wound Healing Center for chronic wound management underwent laser Doppler flowmetry before and after MUST™ therapy.

Discussion: The MUST™ device demonstrates the ability to increase microcirculatory blood flow in the local wound area. This increase in blood flow/"inflammation" is seen in healing wounds. Additional studies with MUST™ Technology would assist in determining the efficacy on the microcirculation in chronic wounds.

Conclusions: Two ultrasonic modalities were utilized to study cutaneous microcirculatory blood flow. Laser Doppler flowmetry was used to measure the response. We observed the following effects pertaining to the two ultrasound modalities: 1) immediately following treatment with both modalities, vasoconstriction/dampening of the laser Doppler waveform is present, 2) the blood flow response after treatment of the two modalities tested on healthy cutaneous forearm were similar. When evaluating the laser Doppler flowmetry measurements on the two patients tested with the MUST™ device, an increase in waveform amplitude and change in baseline blood flow is observed.

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