

# *The Effect of Mist Ultra-Sound Transport Technology on Common Bacterial Wound Pathogens*

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**Abstract:** Mist Ultra-Sound Transport Technology (MUST™) has been delivered to wounds through a vapor mist medium. It appears to be a synergistic modality that stimulates granulation tissue and decreases bacterial counts in the treatment of chronic wounds. It is not uncommon to have a bacterial infection present in the wound at initial presentation or at various stages of the wound healing process. MUST™ was used to evaluate the effect on *in vitro* common wound pathogens. Bacterial suspensions of common wound pathogens (i.e. *Staphylococcus aureus*, *Pseudomonas aeruginosa*) were serially diluted and inoculated onto trypticase soy agar (TSA) plates. The ultra-sound mist treatment, utilizing sterile saline, was applied to the TSA plate for 2.5 minutes to simulate an *in vivo* treatment of an infected wound. TSA plates were incubated overnight and the percent reduction in colony forming units was compared to a control TSA plate. Colony count reduction was observed in the ultra-sound mist treated TSA plates versus the control TSA plates. Electron micrographs of treated and control bacteria will be performed to determine the cellular effect of the organisms treated with ultra-sound mist therapy.

**Introduction:** The use of ultrasound waves is one of the newest technologies being utilized to treat patients with wound infections. The Mist Ultra-Sound Transport Technology (MUST™) machine designed by Celleration™ (formerly Advanced Medical Applications, Inc., Eden Prairie, MN) delivers ultrasound waves via a saline mist. By using a saline mist, ultrasonic wave energy is not lost as would be the case if the ultrasonic waves were simply emitted into the environment with no liquid medium. By the time the waves reached the patient, most of the energy would be lost. This new technology also can be used as a substitute for antibiotics in cases where the patients may not have responded to conventional therapy or are unable to take antibiotics due to a medical condition such as chronic renal or hepatic failure.

**Materials and Methods:** Broth cultures of *Staphylococcus aureus* ATCC 29213 and *Pseudomonas aeruginosa* ATCC 27853 were grown overnight in a 35°C shaker incubator at 125 rpm. A 0.1 ml aliquot of each broth culture was inoculated onto each of 2 tryptic soy agar plates and incubated at 35°C for 5 hours. After incubation, one *S. aureus* plate and one *P. aeruginosa* plate were subjected to 30 ml of sterile saline mist delivered at approximately a 90° angle by the MUST™ technology instrument. The runoff from each plate was collected in a sterile container, transferred to a 50 ml polypropylene tube, and centrifuged at 4500 rpm for 5 minutes. The supernatant was removed, and the pellet was resuspended in 1 ml of TRUMPS solution to preserve the organism for scanning and transmission electron micrograph slides. The second set of *S. aureus* and *P. aeruginosa* plates were gently washed with 30 ml of sterile saline delivered at approximately a 90° angle using a sterile pipette to serve as the control. The runoff was collected and processed in the same manner as the experimental set to make electron micrograph slides.

**Conclusions:** Damage to the cell wall of *Staphylococcus aureus* and *Pseudomonas aeruginosa* following *in vitro* "treatment" with MUST™ technology can be demonstrated using scanning and transmission electron micrographs.

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