



Presentation Abstract Title: *In Vitro* Activity of the Arobella Acoustic Curette against Planktonic and Biofilm Bacteria

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Abstract: **Background:** The Quoustic Wound Therapy System™ (Arobella Medical, LLC) uses an ultrasound acoustic curette to help heal wounds. We hypothesized that this technology would kill planktonic bacteria and decrease biofilm bacteria.

Methods: Planktonic studies were performed in triplicate. An inoculum of 10^6 of *Pseudomonas aeruginosa*, *Staphylococcus epidermidis*, or *Staphylococcus aureus* was suspended in 2 ml sterile saline and exposed to no treatment or the curette with ultrasound for 0.5, 1, 1.5, 2, 3, or 4 minutes. The \log_{10} decrease in cfu/ml compared to no treatment was reported. For biofilm studies, *P. aeruginosa*, *S. epidermidis* or *S. aureus* biofilms were grown on teflon coupons in a CDC biofilm reactor (BioSurface Technologies, Bozeman, MT). Coupons were treated with the acoustic curette with the ultrasound "on" or "off". The acoustic curette was held ~1 mm from the biofilm surface and the surface treated for 5 minutes per side with 22 ml of saline delivered per minute. After treatment, coupons were placed in 1 ml of sterile saline, vortexed for an additional 30 seconds, bath sonicated at 40 kHz and 0.33 W/cm² for 5 minutes, and vortexed for an additional 30 seconds. Quantitative cultures of the resultant fluid were performed and expressed as mean \log_{10} cfu per coupon surface (cm²) for each triplicate set of coupons. One coupon per organism type from each treatment group was subjected to scanning electron microscopy (SEM) and live dead staining with laser confocal microscopy.

Results: After 4 minutes of ultrasonic treatment, planktonic *P. aeruginosa*, *S. epidermidis*, and *S. aureus* cells decreased by 5.10, 4.99, and 5.22 \log_{10} cfu/ml, respectively, versus no treatment. After ten minutes of ultrasound treatment, *P. aeruginosa*, *S. epidermidis*, and *S. aureus* biofilms decreased by 1.34, 1.46 and 1.02 \log_{10} cfu/cm², respectively, versus treatment with saline alone. The SEMs and confocal microscopy showed fewer cells after ultrasound treatment of *P. aeruginosa* and *S. epidermidis* biofilms compared to treatment without ultrasound.

Conclusions: The Arobella Acoustic Curette kills planktonic bacteria and reduces bacterial biofilms *in vitro*.