

**O1131 *In vitro* efficacy of antibiotic-loaded calcium sulfate beads against pre-formed biofilms in a CDC Biofilm Reactor model**Craig Delury<sup>\*1</sup>, Sean Aiken<sup>1</sup>, Hannah Thomas<sup>2</sup>, Liam Purcell<sup>2</sup>, Cate Winstanley<sup>2</sup>, Samantha Westgate<sup>2</sup><sup>1</sup> Biocomposites, <sup>2</sup> Perfectus Biomed

**Background:** Once a biofilm has been established in a periprosthetic joint it is difficult to diagnose and eradicate. Successful treatment of periprosthetic joint infection requires the optimal surgical procedure combined with long-term antimicrobial therapy directed against surface-adhering microorganisms. Given the limited efficacy of traditional antibiotics in implant-associated infections, strategies such as releasing antibiotics directly to the site of infection are a promising future option for biofilm prevention and eradication. The objective of the study was to assess the ability of a synthetic recrystallised calcium sulfate, Stimulan® Rapid Cure beads, containing a mixture of vancomycin and gentamicin or vancomycin and tobramycin to release a combination of antibiotics and effectively eradicate pre-formed biofilms *in vitro*.

**Materials/methods:** Single species *Pseudomonas aeruginosa* and *Staphylococcus aureus* biofilms were established on polycarbonate coupons within a CDC biofilm reactor®. Biofilms were exposed to a challenge plate containing suspended Stimulan® Rapid Cure beads containing a mixture of vancomycin and gentamicin or vancomycin and tobramycin at concentrations of 500mg/240mg per 10cc and 1g/240mg per 10cc respectively. Positive and negative controls were tested concurrently. All testing was performed in triplicate. The challenge plate was incubated for 24 hours at 37°C ± 2°C. Students T-Tests were performed on the raw data to determine the significant effect of the test items.

**Results:** An average of 6.78 ± 0.23 Log<sub>10</sub>CFU mL<sup>-1</sup> and of 6.60 ± 0.23 Log<sub>10</sub>CFU mL<sup>-1</sup> were recovered from negative control *Pseudomonas aeruginosa* and *Staphylococcus aureus* biofilms respectively. No viable organisms were recovered from biofilms exposed to the positive control or those exposed to Stimulan® beads containing a mixture of vancomycin and gentamicin or vancomycin and tobramycin within detection limits. This equated to an average log reduction in *P. aeruginosa* of >5.78 Log<sub>10</sub>CFU mL<sup>-1</sup> and an average log reduction in *S. aureus* of >5.60 Log<sub>10</sub>CFU mL<sup>-1</sup> (p < 0.001).

**Conclusions:** Exposure of the biofilm to Stimulan® beads containing a mixture of vancomycin and gentamicin or vancomycin and tobramycin resulted in eradication of pre-formed biofilms in the test method described. Further assessment is required to confirm clinical performance.