

Rapid Fire Papers 2

[O46] VARYING DEGREES OF BIOFILM INHIBITION BY GENTAMICIN, VANCOMYCIN AND DAPTOMYCIN LOADED ACRYLIC LOADED CEMENT: AN IN VITRO MODEL OF CEMENT PERIPROSTHETIC INFECTION

Herbert Gbejuade¹, Aida Hidalgo-Arroy², Adrian Sayers¹, John Leeming², Andrew Lovering³, Ashley Blom¹, Jason Webb²

¹University of Bristol, Senate House, Bristol, United Kingdom

²Southmead Hospital, Bristol, United Kingdom

³North Bristol NHS Trust, Bristol, United Kingdom

Aim: To evaluate the ability of different combinations of antibiotic loaded cement to inhibit bacteria growth and biofilm formation.

Method: Cement beads were aseptically prepared using Palacos R (plain 40g PMMA cement) or Palacos R+G (40g PMMA cement containing industrially added 0.5g of gentamicin), with or without supplementary antibiotics as follows: Palacos R; Palacos R+G; Palacos R *plus* 1g / 2g daptomycin; Palacos R+G *plus* 1g / 2g of daptomycin; Palacos R *plus* 1g / 2g vancomycin; and Palacos R+G *plus* 1g / 2g vancomycin. After production, each antibiotic loaded acrylic cement (ALAC) combination was allocated into two groups (group 1 and 2).

The group 2 cement beads were initially eluted in broth at 37° C for 72hours then transferred to fresh broth containing a known concentration of bacteria. The group 1 samples were not eluted but directly immerse in culture broth containing bacteria. All samples were thereafter incubated at 37°C for 24 hours. After incubation, group 1 samples were visually assessed for bacterial growth, while for the group 2 samples, biofilm formation were quantified using ultrasonication and viable bacteria counting technique. Three proficient biofilm forming *Staphylococcus epidermidis* bacterial strains (1457, 1585-RA and 5179-R1) were used for all experiments and the bacteria counts were expressed as colony forming units / ml (CFU/ml).

Results: In the group 1 samples, all the ALAC combinations were able to inhibit growth of all the three biofilm bacteria strains assessed except the gentamicin only samples in which biofilm growth were observed within 24hours. Meanwhile, in group 2, bacterial growth and biofilm formation by all three bacterial strains were observed on all the ALAC combinations, with the least biofilm formation being on the Palacos R+G *plus* 2g daptomycin combinations (mean CFU/ml: 1.04E +06) and the greatest on the gentamicin only cement (mean CFU/ml: 2.3E +07).

Conclusions: Our study demonstrates that the highest antimicrobial activity of ALAC is seen in the first 24 hours. However, after 72 hours of antibiotic release, fresh bacterial exposure in fresh broth resulted in varying degrees of biofilm colonisation of all ALAC surfaces. Nonetheless, the overall biofilm formation was least on the gentamicin / daptomycin combinations and the results were statistically significant when compared to plain cement ($p < 0.05$, two tail t-test).