



[O108] ACTIVITY OF A GENTAMICIN-LOADED BONE GRAFT SUBSTITUTE AGAINST DIFFERENT BACTERIAL BIOFILM BY MICROCALORIMETRY

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Aim: To investigate the antimicrobial activity of a gentamicin-loaded bone graft substitute (GLBGS) in the prevention and eradication of bacterial biofilms associated with prosthetic joint infections (PJI).

Method: The GLBGS (17,5 mg gentamicin/ml paste) with 40% hydroxyapatite/60% calcium sulfate¹ was tested against biofilms of methicillin-resistant *Staphylococcus aureus* (MRSA) ATCC 43300, methicillin-susceptible *S. aureus* (MSSA) ATCC 29213, *Escherichia coli* Bj HDE-1, *S. epidermidis* ATCC 12228 and *Enterococcus faecalis* ATCC 19433. For prevention studies, glass beads and different combinations of GLBGS were co-incubated for 24h at 37°C in CAMH broth with 1-5 x 10⁶ CFU/mL of bacteria. For eradication, biofilms were formed on glass beads for 24h at 37°C in CAMH broth. Then, beads were incubated with different combinations of GLBGS in medium at 37°C for 24h. For microcalorimetric measurements, beads were placed in ampoules and heat flow (μ W) and total heat (J) were measured at 37°C for 24h. The minimal heat inhibitory concentration (MHIC) was defined as the lowest gentamicin concentration reducing the heat flow peak by \geq 90% at 24h.

Results: The GLBGS showed a good activity against all tested strains in both biofilm prevention and eradication. All MHIC values are reported in Table 1. Lower MHICs were observed when GLBGS was tested against *E. coli* (9.6 μ g/mL prevention and 19.2 μ g/mL eradication) and *S. epidermidis* (86 μ g/mL and 38.8 μ g/mL, respectively). For both prevention and eradication of MSSA, GLBGS MHIC was 631 μ g/mL. *E. faecalis* biofilm formation was prevented with 631 μ g/mL and eradicated with double concentration. MRSA showed a higher resistance to GLBGS up to 2516 μ g/mL, both in biofilm prevention and eradication.

Conclusions: This GLBGS is a valid composite for the prophylaxis and treatment of PJI. Further studies will be performed to evaluate the activity of higher concentrations of GLBGS against MRSA.

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Table 1. Minimal heat inhibitory concentrations (MHIC) of gentamicin in gentamicin-loaded ceramic bone graft substitutes for prevention and eradication of bacterial biofilms.

	PREVENTION MHIC ($\mu\text{g}/\text{mL}$)	ERADICATION MHIC ($\mu\text{g}/\text{mL}$)
<i>E. faecalis</i> ATCC 19433	631	1236
<i>E. coli</i> Bj HDE-1	9.6	19.2
MRSA ATCC 43300	>2516	>2516
MSSA ATCC 29213	631	631
<i>S. epidermidis</i> ATCC 12228	86	38.8