

Evaluation of *Pseudomonas aeruginosa* Strain Specific Antimicrobial Activity of Gallium-Doped Phosphate Based Glasses

Wenqing Hu¹, Jo Fothergill², Sabeel P Valappil³

¹ School of Life Sciences, University of Liverpool, United Kingdom

² Department of Clinical Infection, Microbiology and Immunology, University of Liverpool, United Kingdom

² Department of Health Services Research and School of Dentistry, University of Liverpool, United Kingdom

Pseudomonas aeruginosa infections are increasingly complex to treat in hospitalized patients due to increasing antibiotic resistance. Hence development of alternative strategies such as the use of gallium doped phosphate-based glasses (Ga-PBGs) is of considerable interest. In this study, the antibacterial effect of Ga-PBGs on 64 well-characterised isolates of *P. aeruginosa* from an international panel. In addition, the synergistic effect of Ga-PBGs and tobramycin on a subset of strains was evaluated. A modified disc diffusion assay was used to examine the antibacterial effect of Ga-PBGs with gallium free PBGs as controls. Subinhibitory tobramycin was used in combination with Ga-PBG to determine the synergistic effect.

Ga-PBGs showed strain specific *P.aeruginosa* growth inhibition, with the largest zone of inhibition > 20 mm (STDEV= 0.816) and smallest < 10 mm (STDEV = 0.767). There was no significant difference in the activity of Ga-PBG against antibiotic susceptible isolates and multidrug resistant isolates (resistant to at least 8 different antibiotics). The inhibitory effects of Ga-PBGs were enhanced in the presence of tobramycin for PAO1 and PA14. Ga-PBGs displayed activity against all 64 *P. aeruginosa* isolates and were effective against highly antibiotic resistant isolates thus highlighting its potential use as a novel therapeutic agent.