

Case Study

TREATING POLYMICROBIAL BIOFILMS

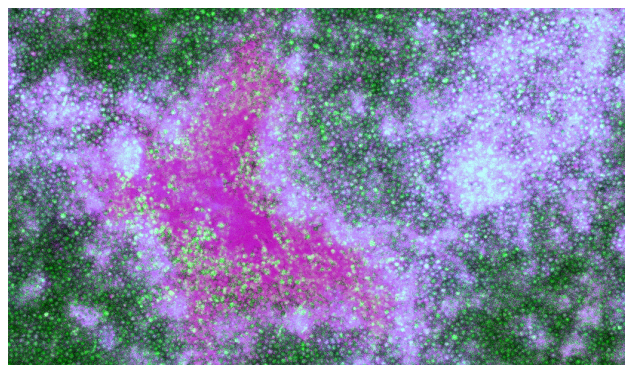
Assisting the academic community to find the right industrial partner

Deep bone biofilm-mediated infections from trauma or surgery are difficult to treat and can be life threatening, affecting up to 100 per 100,000 people per year with up to 64% of long bone fracture patients treated for infection. *Pseudomonas aeruginosa* and *Staphylococcus aureus* are commonly found in the nosocomial environment and they are responsible for causing severe bone infection (osteomyelitis) which can result in months of hospitalisation due to poor effectiveness of antibiotics.

In 2020, Anirban Jyoti returned to research following a career break with the support of the Daphne Jackson Trust. He was awarded a fellowship funded by The University of Nottingham and is now part of a Nottingham research group focused on addressing these issues by investigating the synergistic effectiveness of Quorum Sensing Inhibitors (QSI) with antibiotics, in the treatment of polymicrobial biofilms, through their delivery from a ceramic bone graft.

Before submitting his fellowship application, Anirban contacted Prof. Rose and NBIC Co-Director Prof Miguel Camara at the University of Nottingham to discuss the idea for this research project. NBIC connected Anirban and the team with Ceramisys Ltd who came on board as an industrial partner, providing the bone graft materials for the project and co-funding for his fellowship. Anirban said,

“The NBIC platform provides excellent support for career development in science and industry, and has been critical in securing industrial collaboration for this fellowship”.



Polymicrobial biofilm of Staphylococcus aureus (magenta) and Pseudomonas aeruginosa (cyan).

The first 6 months of this project has involved establishing microbial biofilms and their characterization and obtaining biological data - such as cytocompatibility of the bone graft material and the inclusion and release of antibiotic from the material. Anirban said,

“Being co-hosted by the NBIC laboratory at Nottingham under the guidance of Prof Camara and the NBIC Innovation Research Fellows network has given me access to state-of-the-art technologies, and is an opportunity to regain practical skills following my career break on the study of polymicrobial biofilms and bacterial quorum sensing signalling”.

By the end of the 2-year fellowship the group aim to have established if the inclusion of QSI inhibitors can potentiate the action of antibiotics released from the ceramic, which will be assessed using a 3D osteomyelitis in vitro model, also to be developed by the team. A successful outcome of this project would translate to the reduction in the costs of hospitalisation, time for treatment and prolonged antibiotic usage, and ultimately in a better quality of life for patients.



Md Anirban Jyoti

Md Anirban Jyoti has a PhD in Medicine from Soonchunhyang University, South Korea. His broader research interests are on drug development, drug delivery, intelligent design of biomaterials, mode of action of antimicrobials and finding efficacious, cost effective, environmentally friendly treatments.