

# Case Study

## NATURE VS AMR

### Supporting the next generation of scientific leaders

Multi-Drug-Resistance bacterial infections pose a serious threat to global health due to increasing bacterial resistance against currently used antibiotics and the lack of new classes of antibiotics to combat resistant bacterial pathogens. In 2019, nearly five million people lost their lives due to antibiotic resistance-associated infections and millions more live with poor quality of life due to treatment failures.

Currently, most antibiotics used or under development for treatment suffer from resistance issues leading to treatment failure. Moreover, the development pipeline of innovative antimicrobials is nearly dry. Together with their research group at the University of Liverpool, Dr Anish Parmar and Dr Ishwar Singh “aspire to bring new hope to improve and save lives currently lost due to AMR”. They aim to achieve this by refreshing the antimicrobial pipeline with innovative molecules.

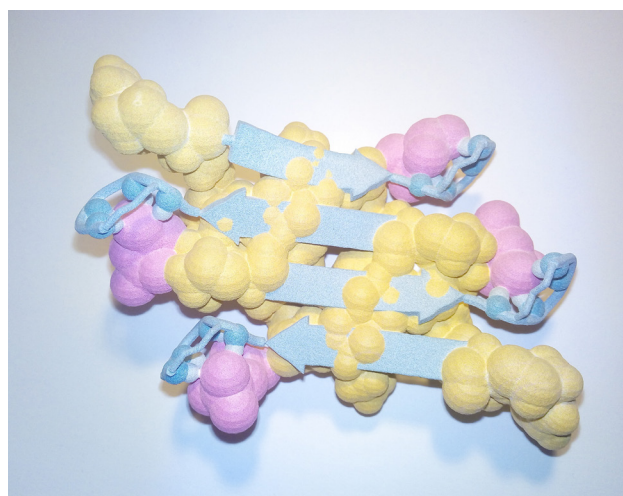
Natural products are usually complex molecules. The team simplify these molecules to develop a library of simpler molecules and use this process to select desirable drug-like qualities to maximise their therapeutic potential, an important aspect of drug development. The team have applied this process to a natural antibiotic, teixobactin, to address its developmental challenges, such as safety and scalability. This has successfully treated MRSA infections in several *in vivo* preclinical models and the team are now moving this forward in preclinical testing, and hope to treat patients in the clinic within five years.

Dr Parmar recently participated in the NBIC-funded SETsquared Biofilms ICURE Sprint, seeking market validation for their technology. The project received positive feedback during the options roundabout panel, leading to a successful pitch. The panel

recommended advancing with a spinout and pursuing Innovate UK follow-on funding. During the ICURE stage, the focus was to understand and undertake market validation for the product and also map the Intellectual Property landscape to ensure a robust pitch to attract investment. This was achieved, as the team received strong interest from multiple stakeholders, including investors. Dr Parmar said,

“NBIC offered valuable advice and helped us identify the most appropriate pathway to pursue. The extensive network available through NBIC facilitated effective outreach and connections”.

The team have now secured follow-on funding from Innovate UK to establish a spinout. At present, they are on the verge of spinning out and actively pursuing further funding and collaboration opportunities.



*Mechanism of action of antibiotic forming antiparallel  $\beta$ -sheets (blue) bound to bacterial Lipid II (yellow and pink). Image courtesy of Professor Markus Weingarth.*



**Dr Anish Parmar**

Early Career, University of Liverpool, researcher and PDRA with 10 years expertise in synthetic peptides and 8 years with antimicrobial teixobactins. Received the sole award “Excellency in research” for the work done on Teixobactin.



**Dr Ishwar Singh**

Reader in Antimicrobial Drug Discovery and Development at the Departments of Pharmacology and Chemistry, University of Liverpool. He has 24 years of experience in Medicinal Chemistry, focusing on drug design and development and antimicrobials.