Innovate UK

Results of Competition: Antimicrobial Resistance
Competition Code: 1609_DH_AMRCAP

Total available funding is £4m from DH and £17,054 from Innovate UK

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Liverpool	Centre for Antimicrobial Pharmacodynamics	£629,548	£629,548

Project description - provided by applicants

This investment will enable the formation of a Centre for Antimicrobial Pharmacodynamics that will directly facilitate and accelerate new drug development for AMR. The Centre will be aligned with newly funded accelerators (CARB-X). Antimicrobial pharmacokinetics and pharmacodynamics (PK-PD) is a mandatory regulatory requirement for all anti-infective drug development yet there are few organisations with the experience and insight to undertake these studies. Thus, a Centre will provide a facility for drug development in the UK that is currently missing. The investment will capitalise on existing infrastructure and expertise to a build a state-of-the-art facility for imaging new molecules in tissues, extending in vitro PK-PD models such as hollow fibre infection models, and consolidate advanced PK-PD modelling expertise with parallel computing. The Centre will help develop new drugs for AMR by providing PK-PD packages for new molecules being supported by accelerators in the UK and USA.

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Absynth Biologics Limited	Equipment to Support Prophylactic Antibacterial Vaccine Development	£95,000	£47,500

Project description - provided by applicants

Absynth is developing vaccines to prevent bacterial infections to address the challenge of antimicrobial resistance (AMR). Vaccines are important as prevention of infections will directly reduce the need for antibiotics. Also such prophylactic vaccines have never been shown to induce resistance. Absynth's R&D focuses on vaccines against the infectious bacteria Staphylococcus aureus and Clostridium difficile - important to public health because of the damage and death caused by these pathogens. Absynth is able to compete against the competition because it has a suite of novel protein vaccine antigens that differ from and potentially offer benefits over competitor products. Absynth is seeking a grant to purchase equipment costing £95,000, for use in its R&D programmes. Originally Absynth leased second-hand equipment but after three years key pieces of equipment are increasingly unreliable, impacting Absynth's ability to carry out its work. The investment is good value for money for Absynth and the taxpayer as using the new equipment the company will advance the S. aureus vaccine to the stage where the partner it has already secured, will fund preclinical safety studies and clinical trials through to market.

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University of Dundee	An Antibacterial Drug Discovery Accelerator	£876,791	£876,791
Project description - provided by applicants			
Drug resistant bacterial infections are a major problem across the world; in some cases there are no drugs available to treat these infections. If we do not work out ways to tackle these drug resistant bacteria, the situation will become much worse, leading to many millions of people dying of diseases that are treatable today. In addition, common procedures such as hip-replacements and Caesaren sections will become very risky procedures, due to the risk of untreatable infections. There is a critical need for new drugs to tackle these drug-resistant bacterial infections. This application is for funding to refurbish some laboratory space to create an Antibacterial Drug Discovery Accelerator within our Drug Discovery Unit at the University of Dundee. While many millions are spent every year on excellent discovery science by expert microbiologists in our leading UK universities, almost none of this currently leads to new therapeutics. The University of Dundee team will collaborate with these leading research microbiologists to help them convert their innovative discoveries into prototype medicines suitable for development by the pharmaceutical industry to reach patients.			

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University of Cambridge	An imaging/genomic platform for the analysis of antibiotic action and resistance	£773,255	£773,255
Project description - provided by applicants			
We will establish a novel high-throughput screening platform that will be able to observe small communities of bacteria as they grow in the presence of antibiotics or new compounds with potential antibiotic activity. This will enable us to observe how ARMs are killed or resist the action of antibiotics (old or new) in real time. We will also be able to do this at scale. We will use common bacteria that are evolving to become highly resistant to antibiotics and present clinical challenges as well as members of the helpful microbial communities found on our bodies. We will test exactly how such bacteria manage antibiotics in real time and learn the details of (a) how they respond to them and (b) how they resist their action. The linking of high quality imaging to the genomic response to antibiotics treatment represents a new integrated approach. We will be able to study resistance to existing antibiotics but importantly we will be able to screen new molecules with potential antibiotic activity and to predict if they can become resistant to these compounds. The platform will be housed in a safe high containment area but will be fully available to outside groups in academia or industry who have compounds that they might want to test in great depth.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
St George's University Hospitals NHS Foundation Trust	Creation of Networked store of specimens and bacterial isolates for industry and academia	£86,341	£86,341

Project description - provided by applicants

The study of antibiotic resistance the development of new devices to diagnose requires access to specimens and isolates from clinical samples. Without studying these isolates there is only a selective knowledge of resistance mechanisms slow development of prototypes for novel diagnostic devices. Southwest London Pathology microbiology laboratory is a large centralised routine diagnostic laboratory that serves over 6 hospitals and over 200 GP surgeries. It processes around 1.5 million specimens a year and is the ideal place to locate such a facilty. With the creaton of a large (2.5 x 3m) walk in -20°C freezer we will storage of over 200,000 isolates. We will integrate a large and easily accessible collection of bacterial isolates and samples that can be used by researchers and industry into this large networked routine NHS laboratory. This will supplement national collections and greatly help UK academics and industry develop new methods to detect and fight antibiotic resistance. The ability to have anonymised samples with attached to data and resistance patterns will greatly improve research and development to combat antimicrobial resistance in the UK.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Public Health England	New Drugs for MDR-TB	£261,073	£261,073
Project description - provided by applicants			
Tuberculosis is one of the most serious bacterial infections, infecting 7-8 million people world-wide and causing 1.4 million deaths a year. There is an urgent need for more effective interventions for the disease, including new vaccines, better diagnostics, and improved antibiotics. Standard antibiotic therapy for tuberculosis is lengthy and includes 4 or more drugs. Mutli-drug resistant TB (MDR-TB) is a serious problem not only globally but also in the UK. Unless we find new drugs to treat MDR-TB this problem will continue to rise. Drugs are expensive, toxic and the course of treatment takes two years. Globally half the people who are treated for MDR-TB die, so treatment needs to be improved. We have ideal facilities at Public Health England Porton and extensive expertise in TB drug research. We have an existing pipeline of preclinical tools, which are unique to us. We aim to further improve upon this suite of tools by maximising our fluorescence method by using a higher throughput screener; this will have an impact on finding new drugs for MDR-TB by more rapid and appropriate screening of novel compounds to target MDR-TB.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Newcastle	Tools for Natural Product Antibiotic Discovery	£209,042	£209,042
Project description - provided by applicants			
The world is facing an impending catastrophe in relation to the emergence of antibiotic resistance across a wide range of infectious diseases. We urgently need to develop new classes of antibiotics, which work in different ways to the old drugs and so are not susceptible to existing resistance mechanisms. Newcastle University's Centre for Bacterial Cell Biology has world leading researchers studying how bacterial cells work, enabling them to identify weaknesses in their defence mechanisms. Many antibiotics are made by bacteria as part of a natural biological warfare in the soil. Although we have developed very sophisticated ways to identify natural products that act in new ways, they are often made in tiny amounts and mixed in with many unwanted inactive molecules. The equipment requested will enable us to grow the producer organisms on a large scale, to purify the active molecules and identify their chemical structure, dramatically enhancing the chances of finding important new antibiotics and accelerating the rate of progressing them into drugs			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Ingenza Ltd University of Plymouth	A high-throughput discovery-manufacturing platform for new pipelines of antimicrobial biologics.	£201,491	£142,665
Project description - provided by applicants			
The advance of antimicrobial resistance (AMR) is relentless. A succession of WHO reports on AMR reveal that the problem is no longer a future or developing threat, but that it is already challenging our ability to treat common infections. To reverse this alarming trend, we need not just powerful compounds, but also powerful discovery and development paradigms. Novel antibiotics must have potent activity, but they must also serve as scaffolds for structural diversification for the sustainability of long-term functional efficacy. As with first generation antibiotics like penicillin, our goal should not just be to discover individual antibiotics but rather provide new antibiotic pipelines for a sustainable defence against AMR. This project will provide a discovery-manufacturing platform using state of the art equipment to accelerate the much-needed introduction of an exciting new class of potent antibiotics based on bacteriocins that rapidly kill bacteria, including drug-resistant Gram-negative pathogens and MRSA. The platform will deploy scalable systems for peptide antibiotic production and diversify their functional potential through rational design and discovery from novel samples, adapting their medicinal properties; thus providing a new pipeline of effective antibiotics.			

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University of Sheffield	Sheffield Centre for Antimicrobial Resistance and Biofilms (SCARAB)	£691,343	£691,343
Project description - provided by applicants			
Harmful bacteria form complex communities, called biofilms, as a normal part of the infection process. If these form in human tissues, it can lead to long-term (chronic) infection, with increasing levels of resistance to normal antibiotics. In skin ulcers, for example, biofilm formation is very hard to treat and can lead to permanent open sores in the elderly and diabetic patients. Chronic, unhealed, wounds are unpleasant for the patient and are very expensive to treat. There is currently nowhere in the UK that has the expertise and equipment to study long-term biofilm formation in models of different human tissues. We would like to create a centre (SCARAB) that brings doctors, scientists and engineers together to find new ways of fighting biofilm formation. Pharmaceutical companies and NHS researchers will be invited to contribute new ways of testing their therapies in infected tissues, leading to the faster development of the urgently needed therapies for chronic infections in the growing numbers of elderly and diabetic patients now living in the UK.			

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Public Health England	Modernising resistance testing for an era of antimicrobial resistance	£299,496	£299,496
Project description - provided by applicants			
We seek to revolutionise high quality AMR testing in Public Health England (PHE) with cutting-edge new robotics for antimicrobial susceptibility testing (AST). The improved data reproducibility will set a new international standard, better support patient management with faster and more accurate results, and improve the information gained via surveillance programs. This supports PHE's priority of providing robust laboratory-based surveillance of AMR (one of the goals of the UK 5-year AMR strategy). A new rapid AST platform will be installed in two PHE labs to provide new dimensions to AST data from healthcare-associated, high containment and biothreat organisms. Triangulation of automated high quality AST, genetic (Whole Genome Sequence based) AST results and the new data dimensions (above) will build a peerless understanding and knowledge base of AMR and create a showcase, next-generation AMR pheno- and genotyping facility that will be unparalleled globally. It will be a new gold-standard in AST that will encourage further collaboration with PHE from the academic, public and industrial sectors and benefit the UK's reputation as a world leader for AMR detection and surveillance.			

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