Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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 College London	Evolving the bionic bladder: supporting a sustainable transition to a next generation neurotechnology to restore bladder control following spinal cord injury	£106,233	£106,233
FINETECH MEDICAL LIMITED		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Injury or disease affecting the spinal cord or brain significantly affects how the bladder functions. It can destroy the ability to empty the bladder, cause unwanted contractions that lead to incontinence, and alter or remove the sensation that the bladder needs emptying. These dysfunctions require the use of catheters, can lead to frequent urinary tract infections and in the long-term may cause damage to the kidneys, extending the effects beyond the day-to-day impact of regular incontinence. Finetech Medical has manufactured an implant that restores control over the bladder for people with spinal cord injuries for over 30 years. The implant requires updating to meet the changing needs of patient (due to improved care after injury), and new regulatory requirements.This project will involve a scientist from University College London working in Finetech Medical to assist in redesigning the therapy, to reflect the latest science and technology, and to be sustainable for the future. We expect that this will provide an improved therapy for people living with bladder disorders, that will be available to a greater number of patients.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Central Lancashire	Advancing analytical innovation and education for integrated continuous manufacturing of therapeutic biomolecules	£135,591	£135,591
FUJIFILM DIOSYNTH BIOTECHNOLOGIES UK LIMITED		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
The vast majority of vaccines and biological drugs are manufactured in a batch process as a one off and then divided into smaller units of the supplied medicine. Because there can be differences between batches, and to lower production costs and enhance quality, there is much interest from the drug approval agencies and the drug manufacturers to produce drugs in a continuous production line manner. This new approach requires the development of modified processes, new monitoring tools, and new control systems to ensure high performance so that it can be widely adopted. The project allows a university-industry team to evaluate pioneering technology, and, in the exchange of ideas and knowledge, help a university to be better able to educate of the next generation of medicines manufactucting scientists.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University College London	The Use of A Combined Clinical Symptom and Biomarker-Based Model to Predict Risk of Developing Reproductive Conditions and Fertility Potential.	£458,498	£366,798
PURA DIAGNOSTICS LIMITED		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
Achieving a successful pregnancy requires a complex calculus of ovulation and menstrual cycles, lifestyle factors and stable hormone levels. A healthy reproductive cycle is reliant on precise synchronisation of all these variables. However, in almost 30% of all women, there is some varying degree of instability in the harmonisation of these factors that can cause a disruption to their reproductive cycle and lead to subsequent infertility. Much of the data concerning the multifactorial variables involved in pregnancy, has predominantly been generated from small scale studies on a clinically diagnosed subfertile population. Consequently, there is a paucity of data available from females who are yet to attempt conception or who present with atypical symptomology. These symptoms often overlap with those of other common conditions (e.g., heavy periods, irritable bowel syndrome or interstitial cystitis), making a differential diagnosis challenging in primary care. Moreover, current NICE guidelines for routine gynaecological evaluation in primary care limits laboratory tests and female hormone testing (biomarkers) and as a consequence of the current diagnostic framework diagnosis is often delayed, on average 6--12 years after initially presenting with symptoms. A patient-completed, symptom-based care questionnaire designed to allow women to self-identify their own symptoms in combination with a more comprehensive biomarker panel could facilitate the initial discussions between patients and physicians, with the potential to reduce diagnostic delay and encourage earlier treatment. The aim of this program of research is to develop a model of clinical prediction, based on both patient self-identified symptoms together with biometric information (hormones, reproductive and medical history). By applying this model to the wider population, we hope that each woman's own symptoms and biology can be used to indicate the potential risk to her fertility and reproductive health.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University College London	Vagus nerve stimulator and recorder for epilepsy treatment	£213,195	£213,195
ELECTRONRX LIMITED		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants

The global Vagus Nerve Stimulation (VNS) market was $505.2 million USD in 2018, it is expected to have a compound annual growth rate of 11.4% till 2026, reaching $1,195 million. VNS is part of the larger neurostimulation market, which incorporates many different stimulation techniques to combat a range of different conditions.

The first VNS for refractory epilepsy, where the patient is not suitable for resective surgery, was FDA-approved in 1997\. In early devices, stimulation was started by moving a magnet over the implant which then delivered a fixed dose. The aim of the stimulation was to reduce the frequency, severity or length of seizures. The standard VNS device has been the subject of many clinical trials which have successfully demonstrated its safety. However, individual response to VNS is variable. Mertens et al. \[2019, [https://doi.org/10.2217/bem-2019-0004][0]\] defined a responder rate as the proportion of patients with ?50% seizure frequency reduction. This rate was found to be 20-40% one year after implantation, and 63% after approximately five years.

More recent devices have tried to improve efficacy by introducing an autostimulation feature (LivaNova, AspireSR(r) and SenTiva(r), FDA approved in 2015 and 2017). The autostimulation works alongside the magnetic switch, providing extra stimulation if the heart rate increases beyond a specified threshold. Clinical trials have shown a responder rate of 30-59%, greater than or equal to the standard stimulator. Additionally, of 63 patients who upgraded their existing VNS stimulator to the AspireSR, 71% experienced an additional \>50% reduction in seizures. The SenTiva(tm) device includes autostimulation and also wirelessly connects to the clinician for remote control of device stimulation.

ElectronRx aims to build the next generation of intelligent VNS devices that can detect seizures with a higher accuracy than is currently possible. This requires two new sensors to be incorporated into the VNS. One sensor is currently not implantable while the other requires a specialised biosignal amplifier. The device will use the data gathered from the sensors to predict and prevent seizures before they occur, thereby allowing the treatment regime to be patient-specific for optimal alleviation of symptoms.

The long term goal is to bring to market a universal Vagus Nerve neuro-modulator that adapts the applied therapeutic intervention based on physiological inputs. The device would potentially be used in the treatment of several conditions related to Vagal Nerve function in addition to epilepsy.

[0]: https://doi.org/10.2217/bem-2019-0004

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
The University of Manchester	Innovation Scholar Secondment for the Development of Therapeutic Biosensor Technologies (University of Manchester and CC Biotech Ltd.)	£72,067	£72,067
CC BIOTECH LTD.		£69,775	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
This project will support a partnership between the University of Manchester and a start-up company called CC-Bio Ltd. Due to antimicrobial resistance the antibiotics which are currently available are becoming less and less effective at treating bacterial infections. Additionally, because many antibiotics are not highly specific in the selecting which bacteria they target, it is common for antibiotics to cause long term side effects as they lead to an imbalance in the microbial ecosystem contained within our bodies. Indeed this imbalance can be caused by many things besides antibiotics. This lack of harmony in the microbial ecosystem has been implicated in a wide array of diseases. We aim to develop strains of probiotic bacteria which can sense when imbalanced bacterial populations start to cause disease. This signals the probiotic bacteria to become activated. Once activated the probiotic bacteria release therapeutics to specifically target the disease causing bacteria in the required location. Once the payload has been delivered by the probiotic and a healthy balance is restored the signal that activates the payload delivery will also fade. This restoration of balance changes the chemical make up of the infection site. By using smart probiotic cells which can sense this healthy chemical environment and the absence of the disease signal, we can trigger the self-destruction of the probiotic cells and their DNA so that they are safely cleared from the body and any GMO material is broken down. The development of live-cell therapeutics provide a novel and promising alternative to antibiotics, making this techonology and powerful prospective tool in the fight against antibiotic resistance and the side effects of antibiotic usage.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Durham University	The Application of Flow Chemistry to Advanced Pharmaceutical Manufacturing	£152,961	£152,961
STERLING PHARMA SOLUTIONS LIMITED		£168,319	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Improving working practices by adopting the latest technologies and best approaches into a commercial organisation benefits the company by providing it with a series of competitive edges. In the areas of pharmaceutical, agrochemical and neuroceuticals synthesis, Flow Chemistry based process manufacturing is a new approach that boosts both efficiency and productivity. Instead of working in large bulky reactors, flow reactors can be engineered as miniaturised high performance units that enable a continuous feed of chemicals to be converted in real-time producing a constant product output stream. Indeed, several reactors can be integrated together to allow multi-step transformations to prepare complex products. This approach also allows rapid scaling of the output by simply leaving the reactor running longer and can facilitate just in time manufacture through rapid start-up and shut down. Conceptually this transition from old Batch based chemical synthesis to modern Flow Chemistry (a form of continuous manufacturing) can be likened to the evolution in making coffee. Historically, coffee was prepared using a stove heated percolator (Classical batch based chemical synthesis) however, modern expresso coffee machines can now, at the press of a few buttons, make coffee on-demand, even extending the process adding flavours, milk and sweeteners (Flow based synthesis). From a pharmaceutical synthesis perspective adopting Flow Chemistry also provides gains with regards saving on space, energy and much improved worker safety. Another aspect which offers considerable value is the small dimension reactors which facilitate easy application of higher pressures and temperatures which can be used to drastically accelerate the reaction to completion allowing much greater throughput of material, higher yields and improved purity of the product. This then can shorten the production sequence by reducing purification work streams. Currently much of the practical knowledge of Flow Chemistry techniques and its associated technologies are resident in Universities. In this proposal we intend to take this experience directly into a corporate environment where it will be applied to design and streamline a series of selected chemical manufacturing processes. This will enable the company to test and embed the technology into its commercial offerings. The experiences and data generated can also be used to spring board this technology to other organisations through the generation of 'best practices'.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Cambridge	Machine learning assisted construct design to accelerate protein production.	£28,421	£28,421
ASTRAZENECA PLC		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
Drug discovery and biomedical research in academia relies heavily on the production of proteins for example in bioassays, high-throughput screening for novel active compounds and the determination of protein crystal structures. _However, producing and delivering a specific protein to partners in sufficient quality and quantity is often the first and rate-limiting step in the initiation of drug discovery projects._ Protein constructs are currently being designed manually based on the expertise of experienced scientists and require repeated rounds of trial and error optimisations, making this a labour-intensive process. Therefore, the focus of this project will be to accurately predict protein production yield from its constituent amino acid sequences. To achieve this goal Dr. Dilrini De Silva, a bioinformatician with extensive experience in genomic research will be seconded to AstraZeneca for a period of six months. She will be operating at the intersection of Quantitative Biology (a data science department) and Protein Production teams within AstraZeneca.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Glasgow	OsteoMiR -- a novel disease-modifying drug for the treatment of osteoarthritis.	£169,565	£169,565
CAUSEWAY THERAPEUTICS LIMITED		£253,845	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
Osteoarthritis (OA) is the leading cause of disability in older adults with 1 in 8 being affected. Around 75% of people with OA report constant pain, with approximately 30% giving up work or reducing the number of hours they work due to the condition. The cost of OA in the USA and Europe has been estimated at 1-2.5% of GDP. Currently, there are no Disease-Modifying OA Drugs (DMOAD). Loss of cartilage is believed to be a major cause of osteoarthritis symptoms and therefore, therapies that limit or reverse this damage are likely to reduce symptoms and benefit patients. Causeway Therapeutics is developing a treatment that uniquely targets the cellular pathways that drive the development of OA stopping disease progression, restoring function and reducing pain.

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University College London	Commercialising next-generation AI models for ultra-efficient analysis of neurological clinical trials	£225,531	£225,531
QUEEN SQUARE ANALYTICS LIMITED		£43,000	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
Prior to appearing on the pharmacy's shelf, drugs undergo careful research in clinical trials. These clinical trials assess biological changes in the human body to determine whether or not a given drug is effective. In neurological clinical trials, brain MRI scans are used to test whether a treatment has any effect on the brain or not. However, the way in which these brain MRIs are analysed is becoming increasingly complex in order to extract often subtle information of interest, increasingly falling out of the reach of human experts. Current computational tools are time-consuming to deal with thousands of scans that are typical of large-scale clinical trials and checking the quality of results requires substantial manual human intervention. In the analysis of brain scans, where conventional tools lag behind in speed and, more recently, in precision, artificial intelligence (AI) excels; now more than ever AI is able to perform tasks inconceivable for automation a few years ago. Such tasks include identifying similar patterns of disease in dissimilar brain images and millisecond quantification of brain structures. This brings ultra-efficiency to image analysis and will expedite neurological clinical trials. Here we propose to second Dr Raví from a world-leading academic group at the UCL Department of Computer Science to a UCL spin-out called Queen Square Analytics (QSA) to adapt openly available AI tools from previous academic research and develop new commercial tools to expedite MRI analysis in commercial clinical trials. To validate and refine these AI tools, he will collaborate with the UCL Institute of Neurology to apply AI tools on brain images from multiple sclerosis (MS) clinical trials. This secondment will provide Dr Ravì with resources to expand his skill set and his career in commercial research and application of AI. This will have global impact, as AI tools will ultimately be applied to phase 2 and phase 3 clinical trials in MS from international pharmaceutical companies. The knowledge exchange between academic and industrial sectors through this secondment will expedite the translation of public investment at the UCL Department of Computer Science into real-world impact at QSA. QSA will be able to access talent and develop IP for its initial growth. By the end of this secondment, Dr Ravì will become a highly-skilled scientist at the intersection of academia and industry and his tools will be serviced to pharmaceutical companies, promoting the UK economy by creating jobs and attracting investments.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
King's College London	Hypervision Surgical	£150,441	£150,441
HYPERVISION SURGICAL LTD		£259,500	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
Physical illnesses of the brain, including brain cancers and blood vessel abnormalities, have a significant and devastating impact on the lives of many UK citizens. Neurosurgical procedures play a vital role in treatment for many cases. Each year in the UK, over 70,000 patients are diagnosed with a brain tumour, of which 5,000 undergo surgery. A further 1,000 patients undergo blood vessel surgery. However, despite the importance of surgical intervention as a mainstay of treatment, many of these procedures lack surgical precision and suffer from complications, with tragic outcomes for both patients and healthcare services. There is an acute need to improve surgical outcomes for affected brain tumour patients. Crucially for these patients, significantly improved outcomes and a corresponding increased life expectancy do occur in cases where complete tumour removal is achieved. However, in almost 30% of cases this is not achieved, and patients are left with residual tumour tissue after surgery. Successful surgery mandates maximal _safe_ tumour removal: surgeons need to avoid damaging sensitive areas that undertake vital functions and preserve crucial nerves and blood vessels. Unfortunately, even with the most advanced current techniques, it is not possible to reliably identify tumour and critical structures during surgery. Advanced optical imaging techniques provide a promising solution for computer-assisted tissue recognition and understanding of blood supply and oxygenation levels during surgery. Optical methods are non-contact, non-invasive, do not require x-rays, and do not require patients to be given medicines. Hyperspectral imaging (HSI) is one such optical imaging technique that exploits the ability to split light into multiple narrow colour bands far beyond the conventional red/green/blue. It enables the acquisition of much richer information than can be seen with the naked eye and can provide crucial, but currently invisible, information about critical biological structures during surgery. However, HSI data is complex and requires computer-assisted analysis to be interpretable and of use to surgeons. In this secondment, we will progress computer-assisted analysis of HSI data to achieve real-time tissue recognition and oxygenation level estimation during brain surgery. We will develop advanced light-tissue interaction models to enable automated surgical guidance as part of an intraoperative HSI medical device that builds on novel state-of-the-art imaging hardware to guide clinicians during neurosurgical procedures. Together with a team of scientists, engineers, and neurosurgeons, we will demonstrate the clinical benefit our device offers for individual patients and the cost-savings opportunities for healthcare services.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Kent	Establishment of mammalian cell expression systems for the production of essential low cost protein reagents for development of rapid diagnostics	£254,948	£254,948
MOLOGIC LTD.		£261,017	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
The current SARS-CoV-2 pandemic has highlighted the need for access to rapidly produced, reliable diagnostics with the required sensitivity and specificity at a cost that makes these widely accessible to lower and middle income (LMICs) as well as higher income countries. Protein based diagnostic development and manufacture is reliant upon the availability of key protein based reagents that are critical components of these tests. Such tests may need to be manufactured in their millions to billions a year and thus a secure and sufficient supply of authentic and low cost protein reagents is required. For example, for a simple Malaria lateral flow test, 3 different protein reagents are required in 10-500 mg quantities per million tests with an anticipated need of 400 million tests per annum. Some of these reagent proteins must be made in cultured mammalian cell systems to be correctly folded, assembled and modified in order to ensure they can function with the highest possible specificity and sensitivity in diagnostics. Although there are some protein reagent expression systems for production of recombinant proteins from mammalian cells commercially available, these have been refined and developed largely for the expression of high-value proteins to use as drugs to treat a range of diseases and conditions. Access to such systems involves prohibitively high costs that in turn make the use of these essential reagent proteins to manufacture diagnostics in the necessary high volume problematic. There is thus a massively unmet need in terms of access to mammalian cell recombinant protein reagents at a cost that allows their application into commercially viable diagnostics. The project described here will establish technologies, knowhow and systems within a leading UK diagnostics company, Mologic, for the rapid production of recombinant protein reagents in cultured mammalian cell systems, at sufficient amounts, quality and cost to be viable for application into low cost rapid diagnostics for distribution in both developed and developing countries. This will secure reagent provision for development and manufacture of diagnostics and also provide the ability to generate new essential protein reagents swiftly in response to current and emerging needs at a cost that allows their application into diagnostics.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
GE HEALTHCARE LIMITED	Informing patient management through real-world clinical data analytics	£262,702	£131,351
University of Sheffield		£9,709	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
The rise of artificial intelligence (AI) has given us unprecedented opportunities to analyse big data sets and to derive insights from them. One such area is healthcare; the UK NHS have internationally unique quantity and quality of patient data by way of digital medical records. The retrospective analysis of those records in specific clinical settings gives us the potential to develop clinical decision support tools that significantly change the way in which patients will be diagnosed and managed in the future. However, there are significant challenges to realising this vision: Data are mostly stored in NHS-based systems that are not accessible to industry. Businesses may have the skills and resources to develop new products but are not connected to real-world patient care. Meaningful innovation will therefore require close partnership between NHS, academia and industry. This innovation scholar secondment will enable a joint programme by GE Healthcare, the University of Sheffield and the Sheffield Teaching Hospitals NHS Foundation Trust by allowing Dr Jan Wolber from GE Healthcare to be seconded to the University of Sheffield part-time for a duration of three years to be strategically involved in joint research and development in several disease areas. The expected outcome of this secondment is the delivery of several proof-of-concept analytics applications that can assist clinical decision making in the areas of cardiology, respiratory medicine and neurology. These applications would then be formally developed into products by GE Healthcare for deployment into clinical practice in the UK, hence benefitting patients across the nation and beyond. The applications may deliver benefits in the quality and consistency of care delivery across the NHS as well as enabling early diagnosis and stratification of patients into appropriate care pathways, which in turn can improve outcomes and quality of life, as well as possibly contributing to the reduction of healthcare costs over the life of a patient by making the right treatment decisions at the right time.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Surrey	Improving the productivity of topical drug delivery through in situ academic entrepreneurship	£68,071	£68,071
BIOX SYSTEMS LIMITED		£34,017	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
This secondment will enable the applicant to closely collaborate with Biox Systems Ltd in assessing the feasibility of a new measurement technology. The technology will be used to measure skin absorption of pharmaceuticals. Such measurement is critical to support the development of topical drugs in, for example, dermatology, pain relief, skin infection treatment, wound healing, and vaccination. The technology could also be used for the development of consumer skin care products, and for risk assessment of skin exposure to occupational and environmental pollutants. Topical drug delivery has a vast market with global sales of USD93.2 bn in 2019\. In this space, the UK is host to many biomedical businesses specialising in drug development, delivery devices, contract research and manufacturing, innovative instruments, etc., further underpinned by a vibrant research base supported by public and private funding. Topical drug development relies on measurement of drug delivery into the skin in both preclinical research and clinical trials. However, there is a lack of low-cost, non-invasive instruments for such measurement. Existing invasive and non-invasive approaches are time-consuming, expensive and labour-intensive. This gap in measurement capability is a major contributor to the low efficiency associated with topical drug development, and thus a major cause of the high cost to patients. The secondment will exploit the applicant's expertise in skin penetration research, computational modelling and engineering skills, supported by Biox's 20 years' innovation in skin measurement. The basis for innovation will be the principle of dielectric permittivity of skin as modified by absorbed drug ingredients. The project will use computer modelling and experimental methods to improve understanding of the measurement process and evaluate the technical and commercial feasibility of this technology. The project will deliver results, IP, know-how and tools that could be used in the next-stage of R&D towards a viable product and service. The applicant will participate in Biox's commercial activities to learn the necessary steps required to translate innovative technologies into successful commercial products and services. The secondment will be a critical enabler for the applicant to develop further as a leading industry-orientated scientist and academic entrepreneur. Biox will benefit from the secondee's expertise in topical drug delivery to accelerate their R&D with much reduced risk. The project will have the potential to produce technologies that can help improve the efficiency and productivity of the pharmaceutical industry, ultimately benefiting the society in terms of new, more effective and inexpensive medicines.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University of Bristol	SMART Healthcare: Self-healing Materials for Advanced Repairable Technologies in Healthcare	£160,965	£160,965
QINETIQ LIMITED		£100,592	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Project description - provided by applicants
Self-healing materials are of great advantage in everyday life as they allow for reduced repair costs, more economical use of resources, and increased product lifetimes. In the medical sector, they could allow users who are highly reliant on their devices to live without the inconvenience and discomfort of having to repair or replace these. Biology has evolved highly developed mechanisms for self-healing, e.g. to close a wound, however current man-made materials do not compare. This project aims to use recent advances in synthetic biology to combine biological mechanisms with man-made materials. This will create medical devices such as physiological sensors and prostheses that are self-healing, leading to a higher quality of life for the user.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
King's College London	Accelerating the development of biotherapeutics for subcutaneous delivery	£110,352	£110,352
ASTRAZENECA UK LIMITED		£0	£0

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Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Injection under the skin (termed 'subcutaneous' injection) is a well-established and well-tolerated route of administration of certain drugs that cannot be swallowed as tablets or capsules. These include highly effective drugs based on large and fragile molecules, such as peptides and proteins (termed 'biotherapeutics'), including insulin. These drugs are extensively degraded by the acid and enzymes present in the gut, in addition to being very poorly absorbed across the gut wall. Subcutaneous injection offers important advantages over intravenous (directly into the vein) administration of biotherapeutics, including the convenience of self-administration, improved patient experience and safety profile. Although subcutaneous injection of biotherapeutics is well-established, there remain important gaps in knowledge, which are hindering progress in the field. This is particularly the case with biotherapeutic drugs that are designed to be released slowly after subcutaneous injection; such 'slow release' injections are designed to reduce the frequency of drug administration, improving patient convenience. These gaps in knowledge could be addressed effectively by the creation of a laboratory model enabling the study of subcutaneous injection and prediction of its efficacy in humans. Such a model would significantly facilitate the development of highly effective slow-release biotherapeutics for subcutaneous injection for a range of diseases. Astra Zeneca possess a portfolio of novel slow-release biotherapeutics for subcutaneous injection. These are in early phase development and require extensive testing and optimisation in order to progress into further development and eventually into marketed drugs. However, this process is made difficult due to the absence of a suitable laboratory model to study subcutaneous injection. This project will initially develop a laboratory model of injection site, which is designed to predict the efficacy of new drugs (biotherapeutics) for subcutaneous injection. We will validate the newly developed model by comparing with data in humans, ensuring its reliability in predicting outcomes in humans. The model will then be used to study a large number of products in development, helping us to identify key product attributes which result in desirable performance in humans. Identification of these key product attributes will in turn help us improve products in development. The project will therefore facilitate rapid and cost-effective development of new drugs, namely biotherapeutics for subcutaneous injection.

Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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
FOLIUM FOOD SCIENCE LIMITED	CRISPR-Cas control solutions for Gram positive bacterial pathogens	£59,889	£59,889
University of Cambridge		£189,867	£189,867

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Agriculture faces many major and diverse challenges including the need to meet the demand for (i) increased productivity in the face of a growing world population, (ii) decreased pressure on the world's resources by being highly sustainable, (iii) reduced environmental harm and (iv) in the case of farmed animal production, increased health and welfare with concomitant reduction of antibiotic use. To tackle these complex and interlinked issues within the context of farmed animal production and disease control, there is a need for veterinary/scientific specialists with not only detailed skills sets in molecular microbiology but also a detailed understanding in each of these interlinked areas. This secondment will develop a highly skilled molecular microbiologist gain the breadth of skills to provide holistic solutions to meet these challenges. The purpose of this proposal is to contribute to developing novel, disruptive technologies that can be used to understand the role of the total microbial populations associated with animal production, be it the gut or the environment, and then to alter it proactively. As an example, animal production is blighted by endemic diseases that are re-emerging on farm due to attempts to meet 'no antibiotics ever' or least 'prudent use'. Using the bacterial immune system, CRISPR-Cas, described herein to remove unwanted pathogens as a start towards this greater goal. To date, Folium Science has demonstrated the ability to selectively kill Salmonella by redirecting the bacterial immune system to 'self-destruct'. This proof of concept is now being developed for commercial release as part of control measures on farm to reduce the burden of this pathogen. The challenge that remains is to take this technology and demonstrate that it can be completely redesigned to target a distinct group of bacteria, the Gram-positive firmicutes such as Clostridiales perfringens and difficile that are major pathogens in animal production and humans as well. The scholar will be expected to develop these novel solutions over the three year period of this programme informed by direct interfacing with (i) end users on farm to understand the scope of the problems and farm management practices, (ii) commercial concerns who manufacture interventions to understand limitations and constraints, (iii) the animal feed industry to understand how in-feed delivery of interventions may be achieved, (iv) legislators for product approval to understand routes to market and appropriate safety and efficacy issues and (v) explore academic links to gain insights into novel technical solutions.

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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 College London	Computational methods to predict stable biologics formulations	£451,385	£180,103
IPSEN BIOINNOVATION LIMITED		£12,000	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Engineered therapeutic proteins (biologics) are the fastest growing class of medicines and vaccines. However, it remains challenging to obtain protein designs that meet all requirements for their manufacturability, stability and pharmacological efficacy. A particularly acute challenge is their marginal stability and high sensitivity to subtle changes in pH, temperature, ionic strength, and mechanical agitation. Molecular lead identification selects for candidates that bind best to the disease target, but does not ensure manufacturability and stability in drug dosage forms. Subsequent optimisation by protein engineering or formulation uses highly labour- and time-intensive automated high-throughput experiments, yet with no guarantee of success. This secondment will undertake fundamental research to transform and embed techniques developed at UCL into an industrial setting, with immediate impact on biologic development pipelines. It will establish a computational framework to efficiently predict promising biologics formulations, based on experimental performance in carefully selected formulations, thus saving considerable time and resource. The small set of formulations (varying excipients, pH and ionic strength), best represent features of a much wider range of potential formulations. Computational molecular dynamics simulations across the pH and ionic strength range, identify the major protein conformations accessed. Simulated excipient binding (docking) to these conformations, evaluates the extent and strength of their interactions within each solution condition. At UCL, based on antibody-derived therapeutics, these tools have already measured how pH, temperature, ionic strength and excipients impact surface polarity, charge, protein dynamics, protein-excipient interactions, and preferential exclusion of excipients, and ultimately protein stability. Neural network (NN) methods at UCL have shown significant potential for predicting protein stability from spectroscopic measurements of native protein formulations. Such NN methods are transforming our daily life, enabling us to extract predictions from complex data. This secondment will apply these tools to a new class of therapeutic proteins developed by IPSEN, based on engineered botulinum neurotoxins (BoNTs). It will use NN approaches on the combined experimental, simulation and docking data, to explore the relative balance of the factors above and build a powerful predictive framework for improved formulations. These will be validated at IPSEN in their manufacturing processes. This will have immediate value and impact for BoNT-derived protein therapies, and address issues specific to this exciting class of molecules. The predictive framework generated will also have wider utility across different classes of protein therapeutics for their rapid and more successful formulation. The methods will be described in publications and transferred into industry through training.

Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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
Imperial College London	High-throughput approach for improving RNA nanoparticles as drug delivery agents	£232,839	£232,839
SIXFOLD BIOSCIENCE LTD.		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
The ability of RNA to assemble into nanoparticles of different sizes and shapes has been exploited by academic and industrial research groups for drug delivery. In this project, the expertise of the candidate will be **combined** with **Sixfold Bioscience PODS and the robotic platforms in ROAR to develop a customised self-assembled RNA nanoparticle for cancer treatment.** Different RNA strands will be designed with personalised nucleotides attached. The research will focus on the **modification with clickable group**s compatible with the RNA synthesis. These will not interfere in the natural folding of the RNA structure, so its bioactivity will be preserved. In all cases, a HT approach will be followed. The moieties will be attached following sequential procedure after the PODS assembly; like how one would assemble LEGO(r) pieces. The project will focus on **three aspects**: **Study the cell internalization of the therapeutic agents**. Often PODS get trapped in liposomes after cell internalization. Multiple endosomal escape compounds will be tested for their release in the inner cells. **Click-chemistry functionalization**: Different click chemistry reactions and conditions will be tested. The development will be done using HT. This methodology allows testing multiple variables in parallel using a minimum amount of reagents. **PODS multi-functionalization**: Once the reaction conditions are optimized, multiple therapeutic functionalities will be introduced into the PODS structure. Using ROAR facilities and Sixfold know-how, the candidate will be able to perform high-quality research that will lead to a breakthrough in the field of genetic therapies. The results obtained will not only open the door to a new therapeutic approach, but it will also give insight into how these systems operate in vivo.

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Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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
Queen's University of Belfast	Feasibility of developing an algorithm to diagnose clonality in lymphoid proliferations using next generation sequencing.	£106,643	£106,643
UNIV8 GENOMICS LTD		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
One of the main areas of growth in the biomedical sciences sector is the generation and analysis of large-scale clinical and pathological datasets. Such analyses require skilled individuals with deep knowledge of the biology and clinical questions posed in the healthcare industry and the needs of the patient population. Univ8 Genomics Ltd (Univ8) is developing a range of next-generation sequencing (NGS) tests and associated bioinformatics pipelines for analysis of DNA from multiple tumour types. This project aims to second a talented post-doctoral research fellow from QUB to develop deep-learning algorithms to perform high-quality analysis of clinical NGS data in a wide range of cancers. Additionally, the seconded scientist will have access to data from collaborations between Univ8 and academic/clinical institutions across Europe to further refine the algorithms and create new diagnostic classification tools for multiple cancer types, based on the data generated with Univ8's range of NGS assays. The project will provide unique access to clinical and biological datasets to the seconded researcher, with support from Univ8's bioinformaticians and collaborators to develop new bioinformatic skills, which can significantly help the future career of the researcher as it will complement his existing biological and laboratory skills. This in turn will result in high impact publications and potentially REF impact cases for the seconded researcher and QUB.

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Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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 Leeds	Laser-Assisted 3D Printing and Additive Manufacturing of Infection Resistant Dental Implants (3D-PIRAMIDAL)	£137,503	£137,503
ATTENBOROUGH DENTAL LABORATORIES LTD		£41,023	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
The proposed secondment is a collaboration between the University of Leeds and Attenborough Dental in Nottingham, which aims to demonstrate a novel 3D-printing and additive manufacturing process for new generations of dental implants. These implants are targeted to minimise the risk of infection, which causes the peri-implantitis. Peri-implantitis is often observed in 10-15% of patients who have implants. In the case of peri-implantitis, the implants fail due to loosening. The symptom also occurs in combination with the prevalent bacterial infection around the implant surface where the acidic fluid slowly resorbs healthy bone. The process of bone resorption may accelerate under the chewing and mastication. Currently, there is no long-term solution for early detection of the onset of bacterial infection until the pain starts, which implies that the infection has spread and surgical intervention might be necessary, depending on the acuteness of peri-implantitis. The number of cases of peri-implantitis is rising at 6% per annum in the 50+ years age group. This implies that the solution must be found which must be able to at least minimise the risk of peri-implantitis by improving the implant design which eliminates the risk of mechanical loosening and bacterial infection. The industrial secondment at Attenborough Dental (ATT) in Nottingham aims to demonstrate a new paradigm in implant manufacturing by transferring the knowledge from the University of Leeds and by building a co-creation approach for manufacturing via research in the following areas: a) by providing implant design which will be porous instead of solid metal and offer a much better opportunity for implant-tissue integration; b) by designing biomechanically robust implant which under the oral acid condition does not fail and curtails bacterial infection; and c) by forming a material which protects the implants against infection and allows blood vessels to grow inside and around the porous implant for reducing the risk of infection. The combination of good blood circulation and implant-bone integration will provide intrinsic antibacterial property which is needed for improving implant longevity. ATT will benefit from the knowledge expertise from the secondment scheme. A successful secondment will help in creating a trained person who will be aware of the challenges in industry for launching new products and services in the health sector, where the regulations are strictly observed for patient safety. ATT in the long-term will benefit from new types of implants for patient care.

Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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 College London	Identification of new Parkinson's genes playing a role in mitochondrial quality control	£234,815	£234,815
GLAXOSMITHKLINE PLC		£448,017	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Currently, there are no disease-modifying treatments that can prevent or slow down PD. PD, like other neurodegenerative conditions, is a disorder involving both genetic (e.g. _PINK1_ and _Parkin_ genes) and environmental factors (e.g. age, pesticides). Recently, multiple regions of PD patient's DNA were found to be different to those not having the disease, suggesting these differences may be involved in increasing the chances of developing PD. However, these DNA regions contain multiple genes, therefore we must specifically determine which gene(s) is responsible for increased disease risk so that we can ascertain why and how PD develops, thus allowing us to develop new therapies. From previous studies we know that a significant number of PD genes play a role in the maintenance of mitochondria health, thus various genetic changes can lead to mitochondrial dysfunction, causing cell death leading to PD. Mitochondria are important to the cell, especially in brain cells (called neurons) as they are the "power stations" of the cell, producing energy that is required for them to function and survive. Cells have developed a sophisticated mechanism to remove these dysfunctional mitochondria from the cell so that they do not cause cell death. This process is termed mitophagy. This is orchestrated by _PINK1_ and _Parkin_, however, this only happens in some PD patients, therefore there is likely to be several other genes that contribute to PD risk. The HPF lab, in collaboration with the AR-UK UCL DDI, has developed techniques to identify which genes play a role in mitophagy. In collaboration with GSK, we will generate iPSC dopaminergic neurons (cells that die in PD) and utilise advanced genetic screening techniques to determine which of these PD risk genes regulate mitophagy. The unique convergence of expertise will allow a powerful multidisciplinary approach to accelerate a deep understanding of the role of mitophagy in PD driving forward the design of novel treatments for PD.

Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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
manchester university nhs foundation trust	The use of salivary cortisone in the diagnosis and management of adrenal disease	£131,454	£131,454
DIURNAL LIMITED		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
This project aims to develop, validate and introduce new salivary tests into the NHS (and worldwide) to simplify the diagnosis and treatment of patients with adrenal insufficiency. The adrenal produces the essential stress hormone cortisol without which patients die from circulatory collapse in what is called an adrenal crisis. Adrenal insufficiency may be caused by prolonged steroid treatment which is commonly used in inflammatory disorders such as asthma, rheumatoid arthritis and most recently Covid-19\. Currently, diagnosis of adrenal insufficiency requires a day case visit to hospital, however Professor Brian Keevil, at the Manchester University NHS Foundation Trust, has developed a salivary test that will greatly simplify the diagnosis and treatment of adrenal insufficiency. Salivary testing will save lives through early diagnosis, reduce the need for unnecessary clinician-patient contact, reduce the burden to patients and reduce cost through home sampling and remote testing in hospital laboratories. The secondment of Professor Keevil to Diurnal, a UK Company with world-leading expertise in developing hormone pharmaceutical products, through the Innovation Scholars award the Manchester University NHS Foundation Trust will allow the project to examine the validation of the specific salivary steroid (cortisone and cortisol) assays and their introduction in to the everyday care of patients. It is critical that good ideas that will benefit patients find a way to move through to clinical practice in the shortest timeframe possible. Without the correct infrastructure and support many projects fail to reach completion. The key to introducing medical innovation to healthcare is collaboration and early involvement with industry. The Innovation Scholars secondment is the ideal vehicle to develop Professor Keevil's innovation at **Manchester University NHS Foundation Trust,** providing a pathway to accelerate the new salivary diagnostic tests directly into clinical practice with the appropriate industry forethought and backing.

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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
Imperial College London	Investigating the mechanistic pathways of augmented volatile organic compounds related to the oesophagogastric cancer microbiome	£52,340	£52,340
INGENZA LIMITED		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Oesophagogastric cancer (cancer of the food pipe and stomach) is the fifth most common cancer in England and Wales with 16,000 new cases diagnosed every year. Currently only 15 out of every 100 patients diagnosed with this type of cancer live beyond 5 years. When oesophagogastric cancer is detected it is often in an advanced late stage. This is because symptoms associated with early disease are typically vague and common to a number of benign (non-cancer). It is not possible for GPs to send all patients who present with such symptoms for endoscopy, a 'camera test' to confirm the diagnosis of cancer, as this test is expensive and uncomfortable for patients. It is therefore important to develop new acceptable, accurate and affordable tests to help detect oesophagogastric cancer at an early stage. To address this problem, we are developing a non-invasive breath test for oesophagogastric cancer. The test is based on the detection of small molecules in exhaled breath called volatile organic compounds (VOCs). Our research has suggested that bacteria within the stomach of patients with oesophagogastric cancer are at least partly responsible for increased production of VOCs. This study intends to investigate the role of stomach bacteria in VOC production in oesophagogastric cancer. We will grow bacteria collected from cancer patients and measure their production of VOCs using mass spectrometry. We will conduct further experiments exploring what factors affect the production of VOCs from bacteria including the effects of growing bacteria and cancer cells together. Studying VOC production in this way will help us to understand how they are produced. This research is important because it can explain the underlying science behind a potentially innovative, non-invasive and cost-effective breath test to detect patients at risk of oesophagogastric cancer. Early diagnosis and treatment will lead to improved survival rates with global economic and societal benefits.

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Competition Code: 2001_MRC_ISS_S3

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
The University of Manchester	Developing a resource for investigations into the penetrance of disease-causing genomic variants	£80,538	£80,538
Sano Genetics Limited		£72,806	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
'How severely will my disease develop?' 'How long will I have my sight for?' 'My brother and father lost their sight at 20, will I as well?' Genetic testing has revolutionised the way that individuals with rare and inherited diseases can be diagnosed and managed, but these important questions are frequently asked by patients in eye genetic clinics across the world and will become more frequent as the availability and accessibility to genetic testing increases. However, as a scientific community we have very few robust answers as to why despite inheriting the same disease-causing spelling mistakes in their DNA - mutations - a son/daughter may develop disease less severely than their father, or in some cases not at all. Through partnership with Sano Genetics, we will develop a resource which is rich in appropriate clinical information and biological samples to help our investigations in this regard. We anticipate that this work will accelerate our knowledge of the way that additional genetic changes impact the presentation and severity of disease, and develop information which is immediately useful for the clinical management of individuals with genetic eye conditions. The project will develop a framework for the resources required to ask these types of complex scientific questions across different clinical specialities.

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Participant organisation names	Project title	Proposed project costs	Proposed project grant
King's College London	Remote Monitoring of RA Disease Activity	£22,703	£22,703
ARTHRONICA LTD		£21,620	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
The focus of the 'Remote Monitoring of RA Disease Activity' project is the secondment of Dr Benjamin Clarke from Kings College London to Arthronica Ltd. As specialist rheumatologist registrar, the objective of the 'Remote Monitoring of RA Disease Activity' secondment is to employ Dr Clarke's skills in remote diagnose management to evaluate effectiveness of the Arthronica platform in remote monitoring of disease activity status for patients with rheumatoid arthritis (RA). The company will integrate Dr Clarke into their technical and commercialisation team; extending his knowledge regarding the integration of innovation technologies from development to full clinical adoption. RA is a chronic, long-term disabling autoimmune condition in which the body attacks the cells that line the joints, making the joints swollen, stiff and painful; over time this can also damage the cartilage and nearby bone. There is growing evidence to suggest that treatment within 12 weeks is associated with improved response to treatment and patient outcomes. This is further supported by a number of studies that have shown that the best clinical outcomes are achieved through a treat-to-target approach. This requires patients to receive bi-monthly follow-ups in order to determine if their disease is active or the treatment has successfully dampened disease activity (a state of remission). The leading metric to assess disease activity in RA is the Disease Activity Score using 28 joints (DAS-28). The DAS-28 is routinely measured in clinic visits for patients with RA. It involves four domains: a clinician-reported swollen joint count, a clinician-reported tender joint count, a patient global measure of symptoms, a biomarker of inflammation from a blood test (the CRP level). In the era of the coronavirus pandemic, it is overtly apparent that we need innovative solutions that enable measurement of disease activity remotely in a more reliable manner. Biomarker levels can still be obtained, as home CRP testing kits are available. Patient symptom severity scores are easily captured. Joint tenderness can be learnt through patient self-assessment. What is needed is a mechanism for remotely recording how many joints are swollen. To address these needs, Arthronica is engaged in a cross-sectional diagnostic accuracy study with the Rheumatology Department at King's College Hospital to record images of the joints and measure swollen joint. However, the company is lacking in-depth expertise in clinical knowledge that can drive the design and implementation of the Arthronica platform within a clinical setting.

Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
University College London	Miniaturisation Techniques for Dose Optimisation of Chemotherapeutic Agents (miniDOC)	£148,509	£148,509
VESYNTA LIMITED		£103,372	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
As an Innovation Scholar, **Anand Pallipurath Radhakrishnan (APR)**, would swiftly transition from University College London (UCL) Electrochemical Innovations Lab (EIL) to work with the host company, **Vesynta Ltd.**, marking a new knowledge exchange partnership. **The miniDOC project**, led by UCL, will be partnered by Vesynta with additional input from multi-institutional academic partners and NHS clinicians, all **with a common goal of developing a point-of-care drug monitoring device with a pressing need in breast cancer therapy**. In pursuit of developing a dose optimising blood test device, APR will broaden his technical skills to advance smart engineering solutions **from a laboratory to the patient bedside in a healthcare setting**, satisfying a long-term career aspiration in the process. Rigorous device prototyping, scalable manufacturing techniques, _in vitro_ diagnostic regulatory requirements, robotic automation, and clinical trial design, are but a few skills APR would be equipped with through the miniDOC project. Additionally, Vesynta's core strengths, such as personalised medicine and monitoring, device manufacturing and prototyping, access to patient samples and a strong network of clinical and academic partners, will be exploited to significantly enhance APR's professional profile. **Career mobility is envisioned as APR will be considered for a Research and Development Technical Lead role within Vesynta** by the end of the secondment period. This further strengthens the implementation of a successful product development pipeline and truly supports the deployment of the device at the point-of-care. **Guidance and mentorship will be sought from UCL Institute of Healthcare Engineering** to ensure monitoring of the program objectives and to manage the associated risks. Simultaneously, this partnership shall leverage APR's skills in microfluidic engineering, advanced computational image analysis and biotechnology innovation, to solve challenges faced by Vesynta. During the secondment, **APR will facilitate cross-pollination of innovative ideas between UCL and Vesynta, seeking new avenues of research into bioanalytical sensing** furthering EIL's expertise in electrochemical analysis. Specific, measurable and achievable objectives have been drawn out to elicit APR's technical potential and to exploit Vesynta's core strengths, whilst accelerating the development of a platform that supports the practice of personalised medicine. **The successful delivery of the miniDOC project has the potential for a high impact on the treatment outcomes of cancer patients.** Through the adoption of safe and effective personalised drug monitoring practices with precision dosing aimed at adults with breast cancer, **the miniDOC project will make a direct impact on not only the healthcare sector but also on the economy**.

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Competition Code: 2001_MRC_ISS_S3

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Newcastle University	Establishing a translational leader in precision medicine through knowledge transfer to develop point-of-care drug monitoring technologies	£74,024	£74,024
VESYNTA LIMITED		£43,711	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
This bi-directional collaboration, offers a secondee from Newcastle University an opportunity to work with an innovative biomedical start-up, Vesynta Ltd, for the development of a novel companion monitoring tool, enabling doctors to accurately monitor anti-cancer drug-exposure in children. It will provide an immediate, simple to use, bedside measurement of medicine concentration in the blood: an essential improvement in care. Cancer is the leading cause of death in children aged 0-14 years. Giving the safest and most effective dose of anti-cancer drugs to children is a clinical challenge for doctors. They currently calculate the amount of anti-cancer drugs the patient will have using their height and weight as a guide. However, as children's bodies all process medicines very differently, this method is not accurate and leads to marked differences in drug exposure between patients. As a result, ~40% of children suffer from medicine related side-effects which reduces their quality of life and costs healthcare providers. To give the correct amount of treatment, doctors need technologies which provide real-time and accurate patient drug exposure data; yet, this information is rarely available and challenging tto obtain. Vesynta has developed a technology with promises to meet these criteria, however, it requires quality assurance over its technology, further design considerations to ensure it is suited for the end-user, and an expansion of the technology to co-medicines which are also given to children, to ensure maximum patient benefit. This project will leverage the secondee's skills in drug testing development, clinical pharmacology and problem-solving using analytical instruments, to validate the platform technology. In return, the secondee shall become a 'Translation and Innovation Lead' at Newcastle University, with skills exposure to human factors design, medical device regulation and health economics. The project shall build on the voiced needs of patients, parents and doctors, as captured from stakeholder engagement workshops designed by the secondee, who shall also support follow-up research plans through clinical trial design. This carefully planned research, will provide benefit to both secondee and host organisation, in terms of skills, knowledge and career porosity. The successful delivery of this project will propel the secondee in his professional ambitions and support Vesynta in accelerating their research and development activity. Crucially, facilitation of biomedical innovation will fast-track the implementation of personalised medicine in paediatric oncology, for the benefit to children and the wider healthcare sector.

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
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Results of Competition: Innovation Scholars Secondments: Biomedical Sciences Strand 3

Competition Code: 2001_MRC_ISS_S3

Total available funding is £10,000,000 (for Streams 2 and 3)

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 Oxford	Development of human tissue processing facilities to support research into composite biomarkers for disease detection	£126,665	£126,665
PERSPECTUM LTD		£0	£0

Note: you can see all Innovate UK-funded projects here: https://www.gov.uk/government/publications/innovate-uk-funded-projects
Use the Competition Code given above to search for this competition's results

Project description - provided by applicants
Collaboration between the academic and commercial sectors will be vital for the future of healthcare. Increasingly we are moving towards using software tools that combine the results of many different measurements and tests. This creates a comprehensive, overall picture of disease in an individual patient. These sophisticated tools provide valuable support and information for healthcare professionals to make clinical and treatment decisions. Collaboration between the academic and commercial sectors is necessary to develop these tools as they rely on both cutting-edge academic research in the understanding of disease, and their translation to the clinic as regulated products. We will second the manager of the Live Tissue Facility (LTF) in the Department of Oncology, University of Oxford to Perspectum Ltd. The LTF is a dedicated laboratory facility for processing and analysing human tissue samples (e.g. blood samples, tumour biopsy specimens) to support research. Perspectum are world leaders in using sophisticated magnetic resonance imaging (MRI) techniques to detect markers of disease. The work that we do will develop and adapt the LTF to make it accessible to Perspectum and suitable for their research needs. This will mostly involve changes in procedures and processes and so we will be able to use existing LTF funds to achieve this. The result will be a facility that is suitable and accessible for both institutions. Using this facility Perspectum will work towards combining human tissue data with their cutting-edge imaging technology, genetic information and pathology data to create sophisticated and innovative new software tools. The secondee will bring knowledge to Perspectum of how to process and analyse human tissue and how to equip a laboratory so that it is suitable for this work. They will also gain valuable experience of doing research in the commercial sector and take this knowledge back to the University. Here, they will use the knowledge to improve the LTF so that it is more attractive to other companies that may want to use it. The secondee will also learn to identify opportunities to commercialise the services provided by the LTF. This will generate income for the LTF and allow it to grow and expand into bigger and more impactful research projects. This will help generate more collaborations between the academic and commercial sectors and lead to faster advances in health care research.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
The University of Manchester	Sugars, Enzymes And Diagnostics (SEAD)	£108,972	£108,972
ICENI DIAGNOSTICS LIMITED		£73,023	£0

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Project description - provided by applicants
In any infectious disease outbreak, the rapid triage of potential carriers of infection is essential to control the spread of infection and to allocate resources efficiently. Iceni Diagnostics is repurposing the technology most famously used in the home pregnancy test kit to create a new generation of rapid, point-of-care diagnostics. These studies are being carried out in close collaboration with clinical laboratories from the NHS, to ensure rapid feedback on ease of use, sensitivity and specificity with real-life samples. The scientific basis of these new tests relies on the exploitation of the carbohydrates that viruses and bacteria attach to on human cells, which we will immobilise in our devices. The key advantage of this technology is that is easy to produce and can be scaled up, using established manufacture and distribution chains, to meet the substantial demands for immediate and recurrent infectious diseases testing. Specific products under development include devices to detect equine influenza in stables, norovirus in hospital wards, and Covid-19, the latter to support the NHS, homes and individuals wanting to self-test before returning to work, associating with neighbours and family etc. An immediate goal for Iceni Diagnostics is to devise rapid, flexible and scalable ways to make the bespoke carbohydrates required for diagnostics applications. To this end, partnership with Manchester Institute of Biotechnology (MIB) provides access to state-of-the-art knowledge in green ways to make sugars. The secondment to Iceni Diagnostics of an MIB researcher provides an ideal way to build the academic-industry relationships and to provide an individual with a strong University background with experience of how their skills and expertise may be deployed in a biotech/medtech SME setting.

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