Innovate UK

Results of Competition: Biomedical Catalyst Round 3 - Feasibility Studies Award

Competition Code: 1707_FS_HEAL_BMC2017_R3

Total available funding is £2m

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
VIATEM LIMITED	VIATEM; Targeting inflammation to ensure effective resolution of disease	£198,346	£138,842

Project description - provided by applicants
It is extremely rare that a completely new human disease response regulatory pathway is discovered, peer reviewed and published in a periodical of the stature of 'Nature Medicine'. Professor Ed Rainger's team at the University of Birmingham (UOB) have generated compelling evidence to support the existence of just such a pathway. In this new pathway a small peptide (PEPITEM) controls inflammation. The therapeutic restoration of the PEPITEM pathway (by peptide dosing) in diverse pre-clinical models of disease demonstrates strong curative potential across a broad spectrum of affected organs and tissues. In turn, this provides broad market applicability of PEPITEM based pharmaceuticals. The team have 5 years' of research experience in this respect and the intellectual property for the therapeutic use of the pathway is currently protected by 3 patents held by University of Birmingham. Thus the commercialisation of this technology represents an almost unique opportunity. Viatem Ltd is an asset-centric biopharmaceutical spinout company with a vision to develop a novel class of immuno-modulators that inhibit exaggerated inflammatory responses and accelerate resolution of inflammation. The core competence is know-how and IPR on therapeutic molecules, diagnostic assays, and medical use of PEPITEM and analogues thereof, either as monotherapy, or in combination with clinical standard of care. Investor feedback from a sampling of major VC Funds shows a strong appetite for Series A investment once seed funding delivers a lead compound for development. Thus Innovate UK funding will generate: 1) a lead, peptide based compound of proven stability and pharmacological efficacy, that will have utility across a broad range of indications; 2) a broad and dominant IP position which will provide freedom to operate; 3) an opportunity to develop agents for monotherapy and/or combination therapy; 4) a link between concept and pre-clinical testing and Series A funding for a drug development programme

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PROCARTA BIOSYSTEMS LIMITED	Treating exacerbations in Crohn's disease: Developing a selective antimicrobial agent for microbiome engineering	£199,971	£139,980

Project description - provided by applicants

Procarta is an antimicrobial drug discovery and development organisation with a unique platform that is developing a new type of antimicrobial: opening up bacterial transcription as a novel target. The proprietary antimicrobials are short fragments of DNA that invade the bacterial cell and kill by blocking gene expression through a novel mechanism of interfering with transcription factors. By changing the sequence of the DNA fragment used different bacteria can be targeted, meaning that the first demonstration of the technology may lead to multiple new antimicrobials. Procarta's drugs are defined by a rapid and rational process, such as examination of genomic sequence, and can be made to be broad- or narrow-spectrum, meaning they can be used for new applications. One such is microbiome engineering. The gut microbiome is a complex mixture of varied bacteria that is thought to have a profound effect on numerous diseases, most notably inflammatory bowel disorders such as Crohn's Disease. In this case overgrowth of a family of bacteria, called the Enterobacteriaceae, is associated with increased inflammation in the intestine and severity of disease. Procarta has developed an antimicrobial, PRO-202, that can selectively kill these bacteria. By doing so it opens up a new therapeutic opportunity to improve treatment of this challenging disease.

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IMHOTEP DIAGNOSTICS & THERAPEUTICS LIMITED University of Bradford	Retrospective evaluation of serum RAS related nuclear protein (RAN) as a novel, predictive metastasis biomarker for breast cancer	£81,676 £52,145	£49,006 £52,145

Project description - provided by applicants

An estimated 1.7 million new cases of breast cancer (BC) are diagnosed globally each year and in developed countries around 20-30% of patients will develop metastasis within 10 years, representing considerable disease burden. Metastasis is the spread of BC to other parts of the body and is the most common cause of death of BC sufferers. Currently, it is not possible to reliably predict whether early BC will spread. The problem is that there are no reliable diagnostic tests to predict at an early stage those patients at high risk of developing metastasis. Although metastatic BC cannot be cured this does not mean it cannot be treated. Treatment focuses on length and quality of life. The outcomes of the project will be enable metastatic risk in BC to be reliably predicted and patients stratified into low- and high-risk groups, enabling clinicians to plan at a very early stage a cost effective therapeutic approach for the patient that will improve their quality of life. In addition patients initially with a low risk of metastasis can be readily monitored to identify changes in their predicted risk. Our innovative approach is to develop an easy to use and affordable diagnostic kit that can quantify the level of a novel biomarker called Ran protein in blood samples. Ran protein is overexpressed in cancer cell lines and tumour tissues compared with normal counterparts and recent research has shown that Ran protein overexpression plays a role in the metastatic development of BC.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Vitamica Ltd	Development of a novel, rapid method for antimicrobial susceptibility testing in a hospital setting	£195,228	£136,660
Project description - provided by applicants			
Prescribing the correct antimicrobial drug at an appropriate dosage at the right time leads to better patient outcomes and slows the spread of antimicrobial resistance (AMR). The current clinical diagnostic techniques are too slow to allow this information to guide initial therapy. In sepsis cases, every 1 hour delay in initiating effective therapy increases mortality by 6-7%. This combination of slow detection systems and clinical urgency therefore means that most suspected infections are treated empirically with broad-spectrum antibiotics, with potentially poor patient outcomes and negative consequences on antimicrobial resistance. There exists a clear market need for a technology which can provide an antimicrobial susceptibility test for infection-causing bacteria within the timeframe of the initial patient evaluation both in primary and secondary care. We have developed a rapid susceptibility test that does not require the time-consuming culturing of bacteria and is therefore much faster than standard susceptibility tests. Our preliminary studies have confirmed the ability to perform an antimicrobial susceptibility test within 20 minutes. If these results can be confirmed on a wider range of bacterial pathogens and a greater number of antimicrobial agents in a laboratory setting we will have uncovered a new tool to combat the spread of AMR.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MORGAN INNOVATION & TECHNOLOGY LTD	MISTRAL - An innovative system for high-precision delivery of gas/air mixture in eye surgery	£138,761	£97,133
BRONKHORST (UK) LIMITED		£38,642	£27,050
S D HEALTHCARE LIMITED		£16,583	£11,608
SURGICALEDGE SYSTEMS LIMITED		£5,937	£4,156

Project description - provided by applicants

We aim to create an innovative device for use in vitreoretinal surgery (operations to treat sight-threatening eye disorders involving the retina, macula, and vitreous fluid). The opportunity is that the mixing and introduction of a gas/air mix during vitreoretinal surgery using current devices is imprecise, subject to human error, and its critical parameters cannot be measured or recorded for audit and risk control. Current practice relies on manual gas/air mixing operations and is subject to human error in terms of accuracy and homogeneity of the % mix, and inaccuracy and instability of pressure when the gas mix is introduced into the eye during the operation. Inaccuracy and inhomogeneity of the gas mix, and inaccuracy and instability of pressure, are potentially dangerous, and may lead to surgical failure or complication, and consequent sight loss. Mistral - our innovative system - will overcome the limitations inherent in current techniques through the use of calibrated, precise, and reliable gas mixing and delivery; it will also support recording of all clinically-relevant parameters, ensuring traceability. The successful outcome of the project will mean safer operations that are quicker and less expensive, and better surgical outcomes.

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CAMBRIDGE COGNITION LIMITED	Evaluating a digital stratified medicine approach to psychotic disorders	£197,934	£118,761

Project description - provided by applicants

Schizophrenia affects about 1% of the population and is associated with enormous health and societal costs and personal suffering. The drugs that are available to treat schizophrenia don't work for many patients and can produce unpleasant side effects. They also don't help with some of the symptoms that trouble patients most, such as problems concentrating, and lack of energy. In this project we will investigate whether it is possible to use a non-invasive computer test to better predict who will benefit from a new type of medication, which has previously been trialled for use in schizophrenia. Because individuals vary widely in their symptoms and history, it is thought that schizophrenia may be a term that is used to describe people with several different underlying disorders. If we can use a computer test to measure one particular aspect of brain function, it should be easier to find patients who will benefit from a drug that targets that aspect of brain function. If in this feasibility study we develop more evidence to support this approach, we will then go on, beyond this grant, to test the hypothesis in patients in a clinical trial.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BICYCLE THERAPEUTICS LIMITED	Identification of new classes of antibiotics based on bicyclic peptides (Bicycles)	£199,415	£119,649

Project description - provided by applicants
Resistance to antibiotics is a major public health threat that could have huge impact on medicine and indeed our way of life. Reports have suggested that without substantial interventions, 100 million people could die from infection from antibiotic-resistant bacteria by 2050\. The issue is not just deaths from untreatable infection but the inability to carry out other medical procedures such as elective surgery, transplantation and cancer chemotherapy without effective antibiotics. It has been estimated that the economic cost could be $100 trillion or 2.5% of World GDP. Development of new antibiotics has stalled partly for economic reasons in that antibiotic development in recent years has not provided a sufficient return on investment, but partly also for technical reasons in that it has proved extremely difficult to develop new antibiotics. Some success has been achieved in developing new members of existing classes of antibiotics, but only three new classes of antibiotics have been introduced in the last 40 years. Bicycle Therapeutics has developed a game-changing new lead discovery technology which has proven extremely productive in the oncology field and is also being exploited in collaboration with major pharmaceutical companies in ophthalmology, respiratory, cardiovascular and metabolic diseases. This platform has tremendous potential for application to development of new antibiotics. Development of new antibiotics has been extremely difficult because the compound collections of pharmaceutical companies are not well-suited to antibacterial applications. Furthermore, the ideal targets for development of new antibacterials are complex and recalcitrant to traditional drug discovery approaches. Only natural molecules optimised over millions of years by evolution have tended to be successful, but new ones are proving harder and harder to find. The Bicycle technology employs bacteriophage (viruses of bacteria) to generate and present drug-like molecules in huge numbers, many orders of magnitude greater than could be achieved by synthetic chemistry, and test them for target binding while still attached to the bacteriophage. The population can therefore be enriched for promising leads through multiple evolutionary cycles. The power of the approach is similar to natural selection in evolution, but conducted over months rather than millennia. Our goal is to generate proof-of-principle data for this approach against antibacterial targets and, if successful, to establish a spin-off company to utilize the technology against a broad range of antibacterial targets. We believe that this innovative technology, new to the antibacterial field but proven elsewhere, could have a major impact on the antimicrobial resistance problem.

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BELFRY THERAPEUTICS LIMITED	Infiltrating MDR Gram-negative bacteria using an innovative antibiotic-assisted translocation approach	£55,723	£39,006

Project description - provided by applicants
Drug-resistant infections are already responsible for a significant number of deaths globally each year. Of these, those caused by MDR Gram-negative pathogens such as Enterobacteriaceae, Acinetobacter, Pseudomonas and _Klebsiella_ are amongst the most serious health threats. Gram-negative bacteria, in general, are intrinsically resistant to a significant number of antibiotics and can cause infections that are difficult to treat. A major drawback that has stalled progress on nearly all new classes with potential for activity against Gram-negative bacteria has been achieving whole-cell activity. Gram-negative bacteria have built-in defence mechanisms, including an outer and inner cell membrane that is not easily penetrated by drugs and/or antibiotics, and multiple cell-surface efflux pumps that can expel drugs that do manage to cross the cell membrane, out of the cell before it has the chance to kill the bacteria. Enhancing the antibacterial activity of current or new antibiotics against MDR Gram-negative pathogens would provide considerable value to these otherwise effective and beneficial antibiotics. Therefore there exists a need for strategies which will overcome the defence mechanisms of bacteria to allow these antibiotics to have a sustained therapeutic effect and the present project aims to provide a means by which to bypass these bacterial defence mechanisms in MDR Gram-negative pathogens. An innovative non-siderophore-based approach to mediate fast facilitated delivery of an antibacterial agent into the cytoplasm of bacteria, thereby bypassing the outer membrane and efflux mechanism(s) has been discovered. It employs an essential and non-redundant uptake pathway that is highly conserved and constitutively expressed across Gram-negative bacteria (and Gram-positive) and is highly selective for a specific carbohydrate that is essential for bacterial growth and survival. Selective enzymatic cleavage within the cytoplasm results in the release of the active anti-bacterial agent. The project will aim to demonstrate that combinations of this antibiotic-assisted translocation platform technology with drugs against two novel but validated bacterial targets that have been terminated due to poor whole-cell activity caused by bacterial defence mechanisms, will provide an effective solution in significantly lowering the dose and MIC (minimum inhibitory concentration) that is required to inhibit bacterial growth of multiple types of MDR bacteria with these novel inhibitors. These targets include LPxC, the enzyme responsible for the first committed step in the biosynthesis of lipid A, a key component of the outer membrane, as well as MurC, the first of four amino-acid adding enzymes involved in the biosynthesis of the peptidoglycan,

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METRION BIOSCIENCES LTD	Kv1.3 inhibitors as innovative disease modifying drugs for Progressive Multiple Sclerosis	£199,984	£139,989

Project description - provided by applicants
Metrion Bioscience Ltd (Metrion) is a specialist ion channel contract research organisation (CRO) and drug discovery company. Ion channels are proteins located in cell membranes that are responsible for controlling nerve impulses, muscle contractions, beating of the heart, function of the senses and the physiological activity of many other cells and tissues. Based at Granta Park, Cambridge, Metrion is an international leader in methods of measuring the function of ion channels in health and disease. As part of its proprietary research, Metrion has identified small molecule inhibitors of a particular potassium channel known as Kv1.3 involved in auto-immune conditions such as psoriasis and atopic dermatitis. Recent research suggests that potent and selective inhibitors of this channel may also be effective in the treatment of Multiple Sclerosis (MS) The grant will enable Metrion to explore the potential of its Kv1.3 inhibitors to treat MS using human T-cell models of the disease and to develop improved compounds that can be administered orally and are optimised to penetrate into brain and nerve tissues affected by MS. If successful, this grant funded project will enable Metrion to pioneer the development of oral medicines with the potential to change the underlying causes of progressive MS. Current treatments for MS predominantly provide symptomatic relief of the relapsing/remitting phase of the disease but do not alter the progressive, debilitating nature of MS. Nevertheless, current approved medicines for MS have annual sales of approximately $22bn. Metrion's approach has the potential to fulfil an unmet need and improve treatment by radically modifying and slowing the progression of disability and cognitive decline, making MS more manageable for the patient and carer and cost effective to treat. Metrion's management team and advisors have extensive experience in ion channel research, neuroscience drug discovery and medicinal chemistry, and have a successful track record in delivering new drug molecules to the clinic. Through this grant Metrion will exploit its drug discovery expertise to identify small molecule inhibitors of potassium channels which have been linked to neurodegeneration. Further modification of these lead molecules will allow the generation of orally active disease modifying agents for the treatment of neurodegenerative diseases, with a particular focus on progressive MS. There are currently no effective disease modifying agents available for the progressive form of the disease and MS remains a debilitating diseases for many thousands of patients.

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MIRONID LIMITED	Small molecule activators of cAMP PDE4 long isoforms for immuno-oncology	£192,952	£135,066

Project description - provided by applicants

According to the World Health Organisation 8.8 million people died of cancer in 2015: 1 in 6 of all global deaths. Tumours are able to hide from the immune system, avoiding detection and removal by the body's natural defences. The ability to reveal tumours to the immune system by overcoming cloaking processes, the core of immuno-oncology, is showing great promise in the treatment of cancer. Mironid is applying its unique understanding of cAMP signalling to develop a pioneering approach to immuno-oncology. cAMP signalling within cells is compartmentalised and its elevation in a compartment controlled by cAMP phosphodiesterase-4 (PDE4), which degrades cAMP, and attenuates immune system function. cAMP is a key molecule involved in cell signalling and excessive levels of cAMP can prevent the immune system from attacking tumour cells. Mironid have developed, for the first time, compounds that activate PDE4\. This enhances cAMP degradation in this key compartment removing the brake that holds the immune system back from attacking tumours. We will evaluate PDE4 activators as novel agents for stimulating the immune system to attack tumours. This innovative programme provides an excellent opportunity to improve the effectiveness of cancer treatment and save lives. Sustainable economic impact will be achieved by establishing Mironid as a leading UK pharma company with long term growth prospects and employment benefits.

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MR SOLUTIONS LIMITED Imperial College London	Angle Sensitive MRI for Musculoskeletal Diagnostics	£99,913 £99,870	£59,948 £99,870

Project description - provided by applicants

Tissues including ligaments and tendons usually produce little or no signal in normal Magnetic Resonance Imaging (MRI). Consequently they usually appear black, while any bright areas are possible artefacts or possible signs of disease. It is largely this anomaly that leads to further investigation using surgical procedures. Researchers at Imperial College have developed an entirely new type of MRI scanner, which offers the potential to obtain new information which may be important clinically and to provide new methods for diagnosing disease or injury in joints, which are non-invasive and safe, while providing information that cannot be easily obtained by other means. This scanner is also much cheaper, very compact and easier to install than those normally found in hospitals. In the proposed project we aim to demonstrate the feasibility of this approach and to provide the evidence needed to facilitate further medical research. We will upgrade the existing prototype MRI in our laboratory with professional electronics and software so that it is suitable for clinical use. Various detailed improvements in the scanner hardware and image processing software will be carried out. Imaging studies will involve the use of phantoms, representative animal tissue samples available in our laboratories, as well as healthy volunteers. The MRI images will be analysed in collaboration with medical specialists in order to establish how best to use the new MRI capabilities and demonstrate its clinical value.

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NANOPTIMA LIMITED	Improving ophthalmic drug delivery by novel formulations: peptidic hydrogels and nanoparticles	£98,657	£69,060
PEPTIGELDESIGN TECHNOLOGIES LIMITED		£44,194	£30,936
TECREA LIMITED		£40,029	£28,020

Project description - provided by applicants
NanOptima has a mission to improve efficacy and safety of ophthalmic medications by improving delivery of APIs. As populations grow older, more and more people need treatment for sight-threatening eye conditions. The lifetime risk, of sight loss or blindness requiring intervention or treatment, is estimated to be: nearly **1 in 5 people for permanent sight loss or blindness**; and over 1 in 3 people for any sight loss or blindness. More than two million people in the UK live with sight loss that is severe enough to have a significant impact on their daily lives. £28.1 billion was the cost to the UK of sight loss in the adult population in 2013\. This includes a direct healthcare cost estimated to be £3 billion each year (RNIB, 2017). Current treatment methods either carry significant risk, or do not work effectively. Eye drops are the most common way of delivering medications for glaucoma and inflammation, but lose effectiveness because \>90% of the drops are washed away upon blinking, and there is a 30% non-compliance rate, which can lead to blindness. NanOptima is developing advanced soft, transparent gels to retain medicines on the eye surface for longer, and nanoparticles to increase penetration of medications into the eye. Conditions near the back of the eye, especially macular degeneration and the complications of diabetes (two of the leading causes of blindness, impacting 570,000 people in the UK), must be treated with injections, which are expensive, risky, and very unpleasant for patients. NanOptima will use our novel gel technology to create depots that can be injected via a very fine needle, and deliver treatments for months at a time, so that current injection regimes can be made less frequent and invasive. We will also explore whether nanotechnology eye drops can extend the intervals between injections. NanOptima, PeptigelDesign Technologies, and Tecrea, are three small UK research companies joining their complementary forces to improve the experiences of patients with eye problems, and to build the UK science base in pharmaceuticals for treating eye diseases. Our work will be in close collaboration with leading academic and clinical ophthalmic experts at Ulster University, with senior industry advisors.

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MEDIDESIGN LIMITED	Allergy Learning: Early Review/Testing & Efficient Diagnosis (ALERTED)	£140,624	£98,437
Project description - provided by applicants			
Feasibility study into innovative technology and related processes for allergy diagnostics, leading to earlier diagnosis, incorporating the design of systems for early identification and targeted testing of 'at risk' groups, and supporting implementation of effective allergy prevention strategies.			

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OXULAR LIMITED	Novel Treatments of Uveal Melanoma	£200,000	£140,000

Project description - provided by applicants
The aim of this project is to evaluate the commercial potential of novel treatments for uveal melanoma. Uveal melanoma is the most prevalent form of ocular cancer and diagnosis rates are rising as populations age and are exposed to more UV light. Ocular cancers affect tens of thousands of lives globally and often result in loss of vision and spreading of life threatening cancers from the eye to vital organs of the body. Visual impairment and blindness resulting from the only current treatment option causes considerable quality of life and economic burdens for affected persons, caregivers and the healthcare system. The mortality rate for uveal melanoma patients whose cancer has spread to other parts of the body from the eye is 50% and this rate has not changed in thirty years. Oxular, a UK-based retinal therapeutics company, was encouraged by leading ocular oncologists to use its technology to develop treatments to improve the standard of care for uveal melanoma patients. Under this project, Oxular will evaluate agents that have demonstrated a potent effect on these types of ocular cancers in very relevant experiments and will deliver these drugs locally directly to the site of the tumour in the eye in a minimally invasive manner using a highly specialized instrument. The treatments are formulated to release the drug over sustained periods with the aim of killing the tumour and reducing the spread of cancers to other parts of the body. These innovative treatments may also allow patients to minimize or avoid radiation therapy, which causes significant trauma to the eye and can lead to blindness. Once developed, these new treatments will become part of the standard of care for patients with significant unmet needs. These treatments will therefore contribute to government cancer policy in the following defined areas: improving treatment, improving access to cancer services, helping survivors live more comfortably.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
DOMAINEX LIMITED	Development of a novel fragment screening platform for G protein-Coupled Receptors	£169,024	£118,317

Project description - provided by applicants
G-protein coupled receptors (GPCRs) are proteins found on the surface of cells: they detect molecules outside the cell and consequently activate internal signalling pathways that mediate cellular responses. GPCRs are one of the most important human drug target classes, and are addressed by 25-30% of marketed drugs. Many GPCRs that are known to have disease relevance remain undrugged, highlighting the ongoing importance of this target group in the search for new medicines. Historically, methods of studying GPCRs have been very successful at identifying and profiling chemicals that modulate their function. However, these empirical approaches have tended to find compounds that are only partially selective for the desired target, because they give insufficiently precise information to drive rational drug design towards highly-specific agents. Recently it has been shown that making mutated forms of some GPCRs makes them stable enough to use structural and biophysical methods that can allow the design of more selective drugs, and unlock traditionally undruggable targets of this class. But this is a difficult and lengthy task requiring extensive method development for each individual target. Domainex has embraced a new method for starting drug discovery projects using a biophysical technique called MicroScale Thermophoresis (MST). This proposal will test the feasibility of using this approach on GPCRs, in order to establish a generic platform that would enable work any purified GPCR without the need for stabilising mutations. We will use a new method developed in a UK university to stabilise the GPCR. If successful, this project will lead to a new service that Domainex can offer to prospective clients. This will provide the Company with new revenues, and facilitate our clients' research projects meaning that better drugs will get to patients, faster.

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KYMIRA LTD.	Intelligent Foetal Health Monitoring via Wearable e-Textile Sensor Platform	£114,714	£80,300
Project description - provided by applicants			
KYMIRA was founded to disrupt the traditional model of medical innovation. Using a sportswear brand, KYMIRA has created a vessel through which it can commercialise and validate future medical technologies on the Health and Fitness market. Revenue from which is then invested in medical validation and further R&D. KYMIRA's current activities include the development, manufacture and sale of their internationally acclaimed infrared sportswear brand KYMIRA Sport, and developing wearable platform technologies including energy harvesting and e-textiles for primary use within the medical and domestic healthcare markets. This project will explore the feasibility of integrating their current wearables R&D into foetal movement monitoring, a vital indicator of wellbeing in the last trimester of pregnancy.			

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Innovate UK

Results of Competition: Biomedical Catalyst Round 3 - Feasibility Studies Award

Competition Code: 1707_FS_HEAL_BMC2017_R3

Total available funding is £2m

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
E-BREATHE LTD.	E-Breather, Electronic Inhaled Drug Delivery Device	£199,598	£139,719

Project description - provided by applicants

E-breather: Electronic inhalation device for drug delivery that improves effectiveness of delivery and patient compliance for respiratory conditions. The development of an inhalation device aims to reduce healthcare costs and enhance patient outcomes via a combination of: 1. Enhancing real-world effectiveness of drug delivery to the patient: The device senses airflow and only releases the drug into the airstream when the inhalation parameters are suitable to optimise drug absorption thereby maximising the actual delivery of the drug during use. The device provides easy-to-understand real-time feedback to the patient on every use, indicating successful or unsuccessful drug administration. Thereby providing a continuous source of training in correct usage. 2\. Providing information and analytical tools to the healthcare provider to better manage individual patients. The device intelligently collects patient data on how effectively they used the device and how frequently through the day. This can be used by clinicians and carers in personalising therapy, addressing non-adherence and understanding the outcomes of the medicine with individual patients. Addressing the quality, adherence and outcomes can then lead to reduced A&E attendance, better self-management and improved health for the patient. Furthermore, it creates a data set (which is not available today) which could introduce machine learning to adapt and personalise care for patients. Initially this will focus on the specific condition data but can be extended to the patient's comorbidity data and environmental data (eg air pollution level) which have an impact on exacerbations of the condition across patient groups. 3\. Providing a large source of data to generate linkages between environmental factors (e.g. air quality data) and optimal preventative drug levels to manage chronic respiratory diseases.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
RENEPHRA LIMITED Central Manchester University Hospitals NHS Foundation Trust	Transdermal Fluid Removal - a novel community-based and patient self-administered treatment for fluid overload in heart failure	£102,435 £18,432	£71,705 £18,432
Project description - provided by applicants			
Many heart-failure patients suffer from excessive fluid accumulation, causing swelling and breathing problems. Some of these patients do not respond to treatment with water pills (diuretics). Such patients need frequent admission to hospital for intravenous diuretics and in extreme cases, dialysis. This is inconvenient for patients, sometimes has little effect and is very expensive. This project aims to further develop a concept of a new medical device for the relief of fluid accumulation. The device will remove fluid directly from underneath the skin. The skin is pierced with tiny (micro) needles and a vacuum is used to draw-up the fluid into a drainage bag. The device will be used at home by patients and carers; therefore reducing the need for hospitalisation. It has been shown to be safe and does not cause pain. The project aims to show the device is economically viable to be developed as treatment option for heart failure patients with excessive fluid accumulation. To deliver this project successfully, we have a team with a very strong track record, expertise and credibility in all areas: patient and public engagement, clinical science, product design and development, regulatory and commercial.			

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