

Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months
Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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
ADAPTIX LIMITED	Enhanced identification of lung cancer nodules without CT by quantifying tissue elasticity	£71,439	£50,007

Project description - provided by applicants

Almost everyone you know will have had an X-ray or scan (whether CT, MRI or ultrasound) at some point. The data collected by these different examinations is very useful in enabling creation of an image of the internal body to help medical professionals make informed decisions about diagnoses and treatments. However, some functional data is hard to obtain using imaging examinations, for example, analysing how stretchy or stiff areas of tissue are, which can help in the identification and assessment of tumours and diseased tissue. Instead, this can require an invasive procedure to obtain a tissue sample that can be analysed (biopsy). Adaptix intends to create a new method of using 3D X-ray data, which can be collected by using its innovative Flat Panel X-ray Source, to compare how stretchy different areas of tissue are in relation to surrounding tissue. Where an area of tissue is 'stiffer' it may indicate disease or tumours, and along with the other information from the X-ray exam, will assist a medical practitioner in making an earlier diagnosis and starting patients on the relevant treatment sooner. Adaptix's vision is to provide medical professionals with a portable X-ray device, which involves low-doses of radiation, and can be used in multiple ways to image areas of concern, to provide them with not only detailed 3D X-ray images of the area but also vital information about the elasticity of the tissue being viewed. Enabling Adaptix to bring this healthcare technology to the UK, will support the NHS by removing burdens on the system and reducing the cost of healthcare, as well as equipping our world-class healthcare professionals to make earlier more accurate diagnoses. As a result of an ageing population, the number of urgent GP referrals to hospital for suspected cancer has increase by 90% since 2009-10, but 9 out of 10 patients who are referred are not diagnosed with cancer. Screening with Adaptix's X-ray source, enhanced by detailed information on tissue hardness, could prevent unnecessary referrals and the inherent stress for those patients. Adaptix is a UK company, looking to establish UK manufacturing, creating jobs in the UK. Supporting Adaptix will enable its UK technology to be brought to market, which will benefit the UK, as well as healthcare worldwide.

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CHELSEA TECHNOLOGIES GROUP LTD	Optimisation of imaging fluorometer and food safe tracer for crop spray deposit quantification	£69,922	£45,449
National Inst of Agricultural Botany		£28,594	£28,594
Project description - provided by applicants			
<p>Spray application of agrochemicals is essential to agriculture and it is vital that it is performed accurately and safely yet hitherto spray operators have had no means of rapidly quantifying spray deposits and coverage in the field. In Innovate UK project 101820, which ended on 30 Sept 2017, we developed a new prototype technology that enables spray operators, for the first time, to quantify spray deposit coverage and variability on different parts of the target crop. We used the device to evaluate commercial spray applications in a diverse range of crops, commonly identifying deficiencies for correction by sprayer adjustment. A number of successful case studies were generated that demonstrated the potential of the new technology with immediate benefits to growers. However, the project also identified a number of outstanding technical issues that needed to be resolved before commercialization could be considered. The aim of this project will be to resolve these issues and thus de-risk the future development of a commercial product. As part of the project IP will developed and protected and an internationally focussed exploitation plan will be refined, which, based on experience to date, is likely to provide significant sales over the coming years. Keywords: crops, spray deposits</p>			

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STERLING SUFFOLK LIMITED	Air Monitor - Protected Crops - Tomatoes	£10,119	£7,083
CELLULAR SYSTEMS (GRANTHAM) LIMITED		£13,644	£9,551
ROBOSCIENTIFIC LIMITED		£55,227	£38,659
STOCKBRIDGE TECHNOLOGY CENTRE LIMITED		£19,815	£19,815

Project description - provided by applicants

Tomato growers in the UK need to detect Botrytis cinerea/grey mould early in its development to avoid economic loss. Botrytis impacts both productivity and profitability of the industry year long, with backgrounds of 1- 10% of plants infected throughout the year, reaching 30% at the year end. The aim of this project is to investigate the feasibility of engineering a collection & detection system based on an instrument that samples and analyses the atmosphere close to the plant for a mix of Volatile Organic Compounds (VOCs) whose composition has been well proven to be an indicator of the biochemistry of the plant. Any change in the biochemistry, and hence the mix of VOCs, will provide an early warning system to the growers, enabling them to catch the specified diseases early and reduce their impact, use fewer chemical interventions, rely more often on biological protection products, have better control of energy costs and improve the UK tomato industry's profitability, environmental status and consumer confidence. Success here will open up UK/international markets in other protected crops (e.g. cucumbers, peppers and ornamentals), for the early detection of other important glasshouse diseases (e.g. powdery mildew) and the detection of disease in other areas.

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NEUDRIVE LIMITED	Electrical Detection of Small Molecule Binding to Biological Receptors using Organic Thin Film Transistors : A new approach for label free assays	£99,119	£69,383

Project description - provided by applicants

Despite continual advances in our knowledge of human biology, with the attendant opportunity for therapeutic interventions in newly discovered biological pathways, the pharmaceutical industry faces a number of significant challenges. Foremost amongst these is a need to improve the efficiency of drug discovery, reducing the time to market for new medicines and lowering attrition in the later stages of drug development. Optimisation of methods for the measurement of the interaction between drug 'candidate' compounds and their desired or undesired biological targets have a critical role to play in this. Label free analysis approaches remain enduringly popular, as they can provide a direct measure of these interactions; at the current time these approaches involve optical detection using precision instrumentation. Drawbacks of the current state of the art include high instrumentation and operating costs and limited sample throughput (the number of 'candidate' compounds that can be measured in a day). Non-optical detection approaches can also be considered. This project aims to introduce a disruptive technology approach for label free analysis, based on the use of organic thin film transistor (OTFT) biosensors, where the detection is electrical in nature. OTFT offers a route to low cost fabrication of biosensor arrays, inspired by low temperature, additive fabrication methods originally designed for the consumer electronics industries. Electrical detection using OTFT promises to disrupt the label free analysis market by dispensing with optical instrumentation and will enable massive parallelisation compared to current technologies, resulting in lowered costs and a step change in productivity for end users within the pharmaceutical industry. The project will demonstrate the feasibility of using OTFT biosensors for label free analysis, using exemplifying systems selected for their relevance to the drug discovery process.

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ROBOSCIENTIFIC LIMITED	Early Detection of paraTB on the Farm	£98,054	£68,638

Project description - provided by applicants

Dairy Farmers need to detect Johnne's Disease (JD) or ParaTuberculosis (pTB), more efficiently and reliably to reduce economic loss. JD is a bacterial infection affecting both dairy and beef cattle and impacts upon productivity and profitability; its incidence is cited at between 30-80% in some literature. The impact on the UK industry is between £5 and £20m pa. Internationally, taking the USA as a baseline, the impact is £130m. The aim of this project is to develop a detector that is specific to JD to give the farmer and the veterinarian rapid, easy diagnosis. This system is based on an instrument that samples the air and analyses the atmosphere on farm for a unique mix of Volatile Organic Compounds (VOCs) which indicates the biochemistry of the JD organism. Any change in the VOC mixture to include these VOCs, will provide a diagnosis to JD upon which the Farmer and Veterinarian can make informed decisions. It is envisioned that air samples of faecal matter will be taken from cows about to calf -- allowing the farmer to separate out infected; uninfected and carrier cows and then keeping the uninfected new born calves with the uninfected animals. The reduction in JD would have an impact of herd animal welfare and productivity (milk and meat) and contribute to a more sustainable UK diary industry. This project will include experimental work showing that the concept works and will comprise the selection of JD specific sensors from existing arrays of sensors at Robo and then to carry out 4 months of testing (5 data points) on two farms. This work is expected to substantiate the results of an earlier privately funded look/see" short project. The second phase will involve evaluating the market for this type of instrument -- identifying the actual need and format of what is needed and evaluating the market in the UK and globally."

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PROCESS SYSTEMS ENTERPRISE LIMITED	Systems-based Bioprocess Development	£99,643	£59,786

Project description - provided by applicants

Advanced therapies are playing an increasingly important role in healthcare, and have huge potential to improve the health outcomes and wellbeing in society amidst the growing requirements of aging populations. However, their growing application and importance is limited by their complexity, long times to market, high development costs and large regulatory burden which contribute to substantial costs to individuals and society which limits access to these medicines. To address these issues, a key direction for the industry is to move from experiment-hungry Quality by Testing (QbT) to predictive science-driven Quality by Design (QbD) for manufacturing process development (which is strongly supported by the regulators). This is exemplified by the need to understand the whole bioprocess Design Space; i.e. the region of critical process parameters (CPPs) that will result in satisfactory values of the critical quality attributes (CQAs) subject to expected biological variability, as well as the sensitivity of these relationships. Currently, data hungry statistical techniques are used to design and analyse costly iterative experimental programmes in order to establish the bioprocess design space. This approach is time-consuming and requires a substantial amount of material. Developing unit operations in isolation often results in multiple iterations between upstream and downstream manufacturing process design, and can push the whole bioprocess design towards inefficient pathways, driving up manufacturing costs. This project's objectives are to develop a prototype bioprocess mechanistic modelling platform to integrate, organise and guide a process systems engineering approach to the digital design of whole bioprocesses for the production of advanced therapies products. The approach allows a comprehensive holistic exploration of the design space through predictive simulation, optimisation and sensitivity analysis, leading to accelerated development, increased productivity and reduced production costs. The outcome of the project will be a first of its kind, state-of-the art in silico toolset, alongside the development of know-how and demonstrator case studies, available within a commercially available package, bringing a step change in the ability for industry to deploy process systems approaches to bioprocess design.

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EXPERIOR MICRO TECHNOLOGIES LTD	Low-Cost Precision Optical Micro-Spectrometer for Agricultural and Food Security Applications	£63,964	£44,775
University of Derby		£24,980	£24,980
Project description - provided by applicants			
This is 12-month project will see a UK SME, two Universities and a UK academic organisation undertake the development of a unique, low-cost high performance optical sensor that allows the analysis of the spectrum of light reflected by plants and soils in order that chemical and physical properties be better understood and aid the improvement of crop and soil health as part of the optimisation of the food supply chain process. This highly cost effective and robust smart 'micro-spectrometer' represents a step-change in the way the properties of light are used to understand and optimise agricultural and food production processes with resulting efficiency improvement and substantial benefits in terms of food security and environmental protection.			

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ONSITE DIAGNOSTICS LIMITED	On-Farm Campylobacter LFD test for Poultry	£96,555	£67,589
SOMA BIOSCIENCE LIMITED		£2,999	£2,099
Project description - provided by applicants			
<p>_Campylobacter_ is the most common cause of bacterial food poisoning in the UK. Previous estimates attribute >100 deaths pa, costing the UK economy ~£900 million. To help reduce the levels of infection in poultry at the farm and then to stop the bacteria spreading during slaughter and processing, a diagnostic test is needed that can identify which chickens, environments or sheds of chickens' are infected and how badly. To work on a farm, a test needs to be simple, quick, and cheap, while of course being effective in detecting low levels of infection and not giving false results. Good quality lab tests area available, but they are expensive and take too long to get results. There are on-farm tests available, but they are not specific or sensitive enough. We have developed a prototype test for poultry _Campylobacter_ and demonstrated that it has higher sensitivity than the existing on-farm test. In this project, we will confirm that our test is effective on lots of different strains of _Campylobacter_, to make sure we can detect all the different variants that might occur. We will also conduct a field study to determine the simplest most effective ways to instruct and use it in real life on-farm usage.</p>			

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TALISMAN THERAPEUTICS LIMITED	Development of a fully human ex vivo model of neuroinflammation	£99,722	£69,805

Project description - provided by applicants

Alzheimer's disease is becoming ever more prevalent and there remains very significant unmet medical need. Currently, there are no disease-modifying therapies. High profile clinical trial failures of potential Alzheimer's therapies have led scientists to seek alternative therapeutic strategies and to question the suitability of existing research models (experimental systems used to test new medicines) in predicting outcomes in patients. One area attracting considerable attention in the scientific community is 'neuroinflammation', as links emerge between immune-related proteins and Alzheimer's disease. Neuroinflammation describes the processes of inflammation in the brain that in an acute setting may be beneficial, but when chronically active may contribute to neurodegenerative disease progression. There is therefore significant interest in the potential to target this inflammation therapeutically to slow the progression of neurodegenerative diseases such as Alzheimer's. Our objective is to use Innovate UK funding to develop a novel fully human _in vitro_ model of neuroinflammation that will be commercialised in collaboration with pharmaceutical and other co-development partners. The model we propose to develop will support the development of new medicines targeting this exciting area of biology. Microglia are resident cells in the brain that can mediate an immune response that contributes to neurodegeneration. We are now in a position to begin development of a model of neuroinflammation based on human neuron-microglial co-cultures to enable the complex interactions between these two cell types to be investigated. No such co-culture models have been described in the scientific literature as yet.? We will explore different combinations of co-cultures and conditions in order to generate a neuroinflammatory environment with both microglial and neurons present. We routinely work with human neuronal models of neurodegeneration as well as with microglia so are uniquely placed to successfully deliver this project.

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PEPTINNOVATE LIMITED	Establishment of Novel Assay Systems to Develop Innovative Disease-Modifying Medicines for Asthma	£99,877	£69,914
Project description - provided by applicants			
<p>Peptinnovate is a clinical stage biotechnology company based at the Stevenage Bioscience Catalyst. The company's core research is based on molecules derived from Mycobacterium tuberculosis proteins, as innovative immunomodulatory agents for the treatment of chronic inflammatory diseases. The lead molecule PIN201104 is a safe, low molecular weight peptide identified by phenotypic drug discovery in collaboration with a number of leading UK academic groups. PIN201104 has progressed into a Phase I clinical study as a first in class, broad spectrum, disease modifying agent for the treatment of asthma and other chronic inflammatory conditions. The receptor target for PIN201104 has recently been identified and is novel in the area of inflammation. As such, this target represents an exciting and innovative area of research for future asthma medicines. This funding opportunity will allow for the establishment of new assays to characterise this potentially novel target for asthma and thus inform on the down stream signalling pathway and also deliver assays for follow-on compound profiling.</p>			

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CLARITY BIOSOLUTIONS LIMITED	Development of a panel of reproduction diagnostics for the dairy cattle industry to improve productivity and herd health	£264,306	£185,014
RAFT SOLUTIONS LIMITED		£184,366	£129,056
Project description - provided by applicants			
This collaborative project will develop powerful new tests and portable reading technology for farmers in the dairy industry to improve productivity for UK farmers, improve herd health and to deliver significant environmental benefits through the reduction in methane and ammonia emissions.			

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ICEROBOTICS LTD	Detection of Johne's Disease in Cattle	£74,182	£51,927
Harper Adams University		£19,198	£19,198

Project description - provided by applicants

Ruminants worldwide are affected by Johne's Disease (JD), or paratuberculosis, a fatal and highly infectious disease. JD severely impacts cattle welfare due to inflammation of their intestines, resulting in a profuse diarrhoea and emaciation. JD causes large economic losses due to decreased milk production estimated at over 4000 kg less milk produced in a lifetime, increased wastage of adult animals, increased susceptibility to other diseases: five times as likely to become lame and twice as likely to get mastitis, increased infertility and cost of diagnosis, monitoring and control programmes. Calves are usually infected via ingestion of the causal bacterium, referred to as MAP, present in colostrum or faeces of infected animals. JD is very hard to diagnose due to the long incubation period during which time clinical signs are absent. Furthermore, MAP is not completely killed by pasteurisation and can be present in retail milk and with some evidence it may be associated with Crohn's disease in humans. IceRobotics (ICE), an Agri-Tech producing SME company will lead the project, with Harper Adams University (HAU) as its scientific partner, together with the Dairy Research Centre of Scotland's Rural College (SRUC) and Moredun Research Institute (MRI) as sub-contractors. A study undertaken by HAU using ICE sensor technology already demonstrated that daily lying time is significantly reduced in JD positive cows compared to JD negative cows around peak lactation. ICE will lead the analysis to detect JD from changes in animal behaviour, supported by MRI's world-leading Johne's expertise. Historic high-quality data will be utilised from HAU and SRUC research herds, alongside further new data from the HAU herd. The behaviour of uninfected and infected animals will be characterised and compared using measurements obtained from existing precision livestock technologies providing second-by-second monitoring individual animal behaviour. The novel output from this project will be a new Johne's Detection module to the CowAlert system, enabling ICE to improve its business performance in the UK and internationally. Additionally it will satisfy a market need for more timely detection of a severe and costly disease, at an economic cost. As a result of this project, farmers will benefit from early detection of JD, consequently improved control of JD, higher production efficiency and profitability. Cows will benefit from improved animal health and welfare. Milk retailers and consumers will benefit from less MAP in milk, consequently better food safety and quality. The environment will benefit from less greenhouse gas emission.

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TROPIC BIOSCIENCES UK LIMITED	AgroTrop-RNP	£99,883	£69,918
Project description - provided by applicants			
<p>GMO crops incorporate foreign DNA into the genome to create specific improvements such as yield increases or disease tolerance. However, this methodology require extensive development processes, strict regulatory approval pathways and strong public stigmatization. There is a new toolkit (CRISPR-Cas9) which has revolutionised non-GM breeding since its adoption in 2012\). It allows for low cost, highly targeted edits of cells, without incorporating foreign DNA. In fact, the mutations it creates could arise naturally, it just allows for focused efforts and removes random chance. However, there is a significant technological barrier which is preventing CRISPR-Cas9 from being employed in many crops. This is what Agro-Trop-RNP addresses. We are developing a unique and highly innovative approach to enable the whole CRISPR-Cas9 toolkit to be applied to all agricultural crops. This will allow us to address some of agriculture's greatest remaining challenges (eg. Black Sigatoka Disease in bananas causes 50% yield losses, obliging fungicide application 20-70 times/yr: increasing production costs by 25%) and increase food security on a global scale.</p>			

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M-SQUARED LASERS LIMITED	Fast 3D High Throughput Screening with Airy Beam Light Sheet Microscopy	£99,438	£59,663

Project description - provided by applicants

High-throughput screening (HTS) is a pre-clinical method used in drug design, drug discovery and biological research able to quickly conduct millions of chemical, genetic, or pharmacological tests. Through this process active compounds, antibodies, or genes that modulate a particular biomolecular pathway can be rapidly identified. Scientist have now accepted that 2D cell populations do not behave in the same way 3D cell populations behave and therefore it is intrinsically important to image them as they would exist in mammalian systems. As a result, drug discovery rates are dropping and there is a clear unmet clinical need for accurate 3D volumetric imaging. The aim of this project is to develop a technology that is able to rapidly image organoids and spheroids in 3D for the HTS industry standard multiwell plate to help high throughput screening better identify new drugs. The advent of spheroid and organoid models show promise for identification of new drugs and medicines however current imaging technology based on raster scanning confocal and wide field microscopy limits their use. The introduction of a low cost accurate volumetric 3D imaging system could revolutionise the drug discovery process. This would benefit a wide range of stake holders from UK photonics, microscopy, and pharmaceutical industries and healthcare systems and governments.

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DISTILLED SOLUTIONS LIMITED	From Through the Glass Comes Light	£91,000	£63,700

Project description - provided by applicants

The Scottish whisky industry accounts for a quarter of the UK's food and drink exports, penetrating 200 worldwide markets, supporting 40,000 jobs and worth £5bn a year to the UK economy. A key challenge faced by all Global Distillers, International Enforcement agencies & World Health Organisations is the trade in counterfeit branded Spirit & Alcohols. Not only are these counterfeited products damaging to health with many resulting in death, they amount to a significant loss of revenue of 500m to the Scotch Whisky Industry per year. The aim of the project is to enable our existing optical technology to take an optical measurement through the glass from outside the bottle to identify the true authenticity of the alcoholic liquid inside to reduce the volume of counterfeited and potentially dangerous products in the marketplace. Through the project we will model the effect the glass bottle has on the optical spectrum and build a algorithm incorporating this logic to allow our technology to identify the true authenticity of the liquid from outside the bottle. This will allow Distilled Solutions to create the worlds first end to end counterfeit prevention system that can scan through the glass from outside the bottle without breaking the seal with accuracy and confidence identifying the liquids true authenticity and show the presence of any dangerous substances like methanol. Distilled Solutions industry partner William Grants & Sons who are currently integrating the existing technology into their biggest bottling line will test and validate the new resulting algorithm. We are expecting to have 300 devices out in the market place generating revenues of £3.6m resulting in increased revenues of £50m for the distillers by the end of year 3\ . This income stream from the distillers will allow Distilled Solutions to distribute it's technology at cost to enforcement agencies and world health organisations to try and reduce and prevent deaths from methanol and denatured alcohol in third world territories where it is most prevalent.

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BETA BUGS LIMITED	Testing the feasibility of creating enhanced strains of Black Soldier Fly through an innovative non-GM technique	£75,837	£53,086
ENTOCYCLE LTD		£24,032	£16,822

Project description - provided by applicants

The growth in the world's population is putting strain on traditional food resources, animal protein in particular. World meat and fish production is projected to double by 2050 and all those animals need to be fed. The traditional sources of protein for animals feeds are wild-caught fishmeal and soy meal, the increasing production of which will further contribute to overfishing and deforestation. Fishmeal production has stagnated as wild stocks are suffering the long-term consequences of depletion as a result of heavy overfishing, halving marine populations in the last 4 decades. This led to a 300% increase in fishmeal price over the last decade. Soya production practices need large expanses of land, expensive fertilisers and huge water requirements. Every year, 4 million hectares of rainforests are destroyed to grow soya crops. Additionally, the use of soymeal in aquaculture feed can result in negative effects on the digestive health of fish, leading to an increased use of synthetic immunostimulants and antibiotics. One solution to this problem is to supplement fishmeal and soymeal in animal feeds with insect protein. Insects grow quickly, requiring minimal land and water, while recycling organic waste streams. A new industry - insects for feed" is growing at an unprecedented rate to provide animal feed manufacturers with sustainable insect protein. The majority of insect farmers in this industry are using a species of fly called *Hermetia Illucens* or the Black Soldier Fly (BSF). The project will allow Beta Bugs to further test, refine and apply a non-GM technique never before applied to BSF giving us the ability to rapidly evolve new strains of BSF which are easier and cheaper for BSF farmers to farm. These strains will then be license to BSF farmers (such as Entocycle) both in the UK and around the world. Beta Bugs believes that the enhanced BSF strains made possible by this technique, and the efficiency and production gains they provide to BSF farmers will be key to unlocking the potential of BSF farming to address the world's growing protein production crisis."

Note: you can see all Innovate UK-funded projects here

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months

Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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
NOBLE FOODS LIMITED	Overcoming the barriers to maximize the commercial potential of vitamin D enriched eggs	£93,349	£23,337
DSM NUTRITIONAL PRODUCTS (UK) LIMITED		£127,797	£31,949
Newcastle University		£91,203	£91,203
RLC & RM HARBORD & son		£31,288	£14,080

Project description - provided by applicants

Vitamin D deficiency is a common public health problem in the UK. As vitamin D is found in significant amounts in few foods there is an urgent need to develop higher vitamin D containing foods, which will increase vitamin D nutritional intake of the population. Currently there are several UK populations at risk from vitamin D deficiency, including people of South Asian origin, younger adults and very old adults. The aim of the proposal is to overcome the barriers, whether real or perceived, with realizing the commercial potential for the enrichment of eggs with vitamin D. We have prior evidence that this can be achieved in commercially laying hens through the use of innovative technology. We will achieve our aim by conducting industry scale feeding trials in hens, where we will manipulate the dietary composition of feed while adhering to strict European feed guidelines. As well as enhancing the content of eggs in vitamin D, we also expect to enhance the welfare of the birds through the improvement in their diet. We will test the effect of cooking and storing eggs in various conditions to understand if vitamin D stability is influenced by these changes. We will also undertake a human dietary intervention study in adults, to determine if consuming enriched eggs leads to improvements in vitamin D status in the body and we will undertake large consumer studies to gain an understanding of whether such products have market potential and identify how any perceived or real barriers to their adoption can be overcome. The beneficiaries of this project will be the project partners and the UK egg industry who will benefit economically from the project outcomes, but importantly the wider public who will be provided with a rich source of vitamin D to meet their dietary needs. The project addresses the challenge of addressing the health of the nation through nutrition.

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months
Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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
ANACAIL LIMITED	Reducing pesticide residues on food products with in-pack ozone	£91,095	£63,767

Project description - provided by applicants

High levels of pesticide residues on fruit and vegetable products remain an area of concern for consumers, especially on food products for children. Soft fruits such as strawberries are susceptible to mould growth during their short shelf life, relying on the application of fungicides to minimise this. However, these fungicides on the fruit need to be below the maximum residue limit (MRL) for the consumer. Products do not always pass this criteria, with high pesticide residues remaining on the fruit. A wash process prior to packing can remove many of these residues; however, as the fruit is wet, this can exacerbate spoilage of the fruit, e.g. moulding. There is a demand to find a solution that is able to reduce the levels of pesticide residues on food products, but without reducing the overall quality/shelf life of the food product. Anacail has a technology which may be able to provide a solution to this problem, and also enhance the quality of the food product further, by generating ozone within a sealed pack of food immediately after packing in a food factory. Ozone has been shown in the past to be very effective at reducing bacteria, viruses and fungi on a variety of surfaces. Anacail are currently using this technology to improve the quality and safety of food products, including on berries. As well as reducing microbes, ozone has previously been shown to reduce pesticide residues under lab conditions. Therefore, Anacail's technology could potentially generate a method for removing pesticide residues within the pack itself, as well as reducing spoilage microorganisms, giving a pack that is safer to eat in terms of the levels of both pesticides and microbes. The aim of this project is to test the effectiveness of Anacail's in-pack ozone generating technology on pesticide residues, both in artificial inoculated trials on inert and food surfaces and by validation tests on real-life retail packs with high pesticide levels.

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months
Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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
PHYTOFORM LABS LTD	Developing high yield herb varieties with gene editing	£99,676	£69,773
Project description - provided by applicants			
It is widely recognised that by 2050 we will need to produce 70% more food than is consumed today and this needs to be achieved more sustainably than ever. To do this we need to drastically change the way we currently produce food. Fresh herbs are important vegetables and provide essential vitamins, oils and other nutrients as part of our daily diet whilst improving the flavour of what we eat. At Phytoform Labs, we use revolutionary biological tools to increase herb production by improving the genetics of commercial varieties and introducing new plant breeding techniques to agriculture and horticulture. Phytoform Labs products will be produced faster, made bigger, have less of an impact on the environment and will be non-GM. The improvements in breeding mean consumers will have access to healthier and bigger herbs at a more affordable price.			

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months

Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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
EVOLVE GROWING SOLUTIONS LTD	RIPE (Rapid Installation Process for ETFE) demonstrating the benefits of utilising advanced ETFE glazing materials in commercial greenhouses	£99,972	£69,980
Project description - provided by applicants			
<p>Innovative glazing films such as ETFE can offer significant benefits to greenhouse crops. Experimental studies confirm that ETFE is the optimal material for protected crop horticulture, maximising light and UV transmission and minimising energy use, whilst providing very long lifespans and resistance to climatic damage. **Evolve Growing Solutions** have already confirmed the benefits of the innovation proof of concept for a patented roof installation system (**RIPE -- Rapid Installation Process for ETFE**). RIPE will provide builders with an effective method to handle and install ETFE film on greenhouse roofs at lower cost level than the traditional glass model. Ultimately, RIPE aims to promote the UK as a worldwide leader in horticultural technology and sustainability in agricultural productivity. Evolve will use this radically different GH environment as the basis to coalesce multiple new UK horticultural technical developments to an international audience, as well as other agricultural and modular commercial building applications.</p>			

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Innovate UK

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Up to 12 Months
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Total available funding is £15m

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
INSPRO LTD	Black Soldier Fly Larvae as bio converter: Food Waste	£69,789	£48,852
University of Liverpool	Assessment Framework including fish feed performance trials	£29,779	£29,779
Project description - provided by applicants			
<p>This project seeks to demonstrate that organic food wastes can be commercially converted to high quality protein using bioconverters, and develop a framework to assess wastes for their potential value. * Protein is in the spotlight. It is essential for a healthy diet, yet the way we currently produce and consume it is having a negative impact on the environment and human health, which will only increase without concerted effort. There are serious questions around whether we will be able to provide sufficient protein sustainably for a further two billion people by 2040\ . * We aim to show how organic food wastes can be used to feed insects such as Black Solider Fly Larvae (BSFL) to produce a protein source which can in turn be used as a protein source in animal feed, primarily aquaculture due to the recent legislation changes (June 2017) which permits feeding to fish.</p>			

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months
Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MUSHROOM MACHINE COMPANY LIMITED	The development of a mushroom harvesting machine to increase yield and production while reducing waste and labour shortage risk	£99,992	£69,994
Project description - provided by applicants			
Currently, fresh mushrooms are intensively farmed and picked, trimmed and packed manually. Manual trimming introduces variability to the base of the stalk which costs farmers up to 10% wastage through unnecessary loss in weight and profit. Accurate mushroom weighing in real time i.e. as cut and packed, means punnet weights can be more accurately assessed and profits lost through over-weight tolerances can be reduced by up to 10%. Workers suffer through manual picking as the risk of cutting their hands and contaminating the punnets is high. This, along with unsociable working hours of around 7am-9pm, causes farmers to face shortages of labour. The Gamechanger mushroom cutting machine will provide accurate trimming of mushroom stalks that will improve the yield, and subsequently profit, for the farmers. Improved working conditions will be provided for workers through better hours and de-risking their roles. The ability to increase the speed of the machine and the validity of introducing a vacuum mechanism for the individual weight and packing of the mushrooms will be investigated through this project.			

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months
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Total available funding is £15m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
HADEAN SUPERCOMPUTING LTD	Hadean - Massively Distributed Simulation Engine	£100,000	£70,000
Project description - provided by applicants			
In this Innovate UK supported project, Hadean intends to demonstrate the potential applicability of a novel, cloud-based computing platform for researchers seeking to model complex cellular interactions. For complex diseases such as cancer, this approach has the potential to generate radical insights into cancer biology, accelerating the identification of novel medicinal approaches, including new cancer drugs.			

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
Up to 12 Months

Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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
MODERN BAKER LTD	Modern Baker: Increasing Dietary Resistant Starch	£70,528	£49,370
CAMPDEN BRI (CHIPPING CAMPDEN) LIMITED		£29,472	£29,472
Project description - provided by applicants			
Modern Baker is a rapidly growing UK food manufacturer and retailer specialising in long-fermented and baked foods. Its ambition is to disrupt the baking industry and to redefine the market. The proposed project seeks to use cutting edge food science to naturally improve nutritional quality and shelf-life.			

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Innovate UK

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Up to 12 Months
Competition Code: 1710_HLS_R3_12M

Total available funding is £15m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
MIALGAE LTD	Scale-up of algal omega-3 oil production from whisky co-products.	£99,666	£69,766
Project description - provided by applicants			
MiAlgae is a startup that aims produce omega-3 oil supplements for the animal feed industry through a zero waste, low carbon process. Algal blooms are well known evidence of pollution. To prevent this, we have partnered with industry to use their by-products to harness this growth. The omega-3 oils then provide vital, high quality supplements for animal feeds. This is being used to solve a real issue in producing a sustainable and cheap source of omega 3s. In particular, the current production fish farms have to feed their farmed fish, wild caught fish, and those wild caught fish are running out. Our solution has the potential to offer a sustainable alternative at a competitive price.			

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
12 to 24 Months
Competition Code: 1710_HLS_R3_24M

Total available funding is £15m

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
CHERRY VALLEY FARMS LIMITED	A Novel Application of Genomic Information in a Duck Breeding Programme	£705,703	£423,422
University of Edinburgh		£235,321	£235,321

Project description - provided by applicants

The global demand for high quality, sustainable animal protein continues to rise as the world's population increases. Poultry meat is now set to become the world's favourite meat source, both in developed and developing countries, providing an affordable, quality and safe source of animal protein and account for around 35% of all animal protein (FAO, 2017). Cherry Valley Farms (CVF) is a UK based market leading Pekin meat duck breeding company, exporting breeding stock all over the world. Although duck production is of smaller scale to the chicken in the UK and Europe, it forms a large proportion of poultry production and consumption in the rapidly expanding Chinese market. To enable the duck breeding industry in the UK to further enhance its ability to produce cost effective, sustainable and welfare friendly duck meat, we intend to introduce the use of genomic information into our routine breeding programme. The introduction of genomic information to CVF serves two major purposes (i) to track parentage of the ducks used in our selection programme; and (ii) enable us to assess the effectiveness of genomic selection in our breeding programme. The implementation of parentage assignment will enable us to house multiple male and female birds together to allow the expression of natural behaviour, help us better maintain genetic diversity, improve the reproductive performance of flocks, thereby reducing the costs of day old ducks to our customers. The introduction of genomic selection aims to improve the accuracy of prediction of genetic merit, which in turn accelerates the genetic progress achieved to translate in faster gains in improving health, welfare, meat quality and the overall efficiency of production to reduce the environmental footprint of the industry. Genomic selection has been applied to many commercial animal species and research has demonstrated a significant impact on selection response in breeding programmes. In order to ensure CVF is able to deliver this ambitious project to implement genomic information into its routine breeding programme we will partner with the Roslin Institute (RI). RI is the world's leading research centre in the application of genomics and quantitative genetics to farm animal breeding having an extensive track record working with industry. Together CVF and RI will develop and implement genomic information into CVF's successful breeding programme. The developments will have far reaching implications for CVF and, as a result of their market penetrance, through global duck supply chain as a whole.

Note: you can see all Innovate UK-funded projects here

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
12 to 24 Months

Competition Code: 1710_HLS_R3_24M

Total available funding is £15m

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
PLASTICELL LIMITED	Development of advanced technologies for gene therapy manufacture	£701,044	£490,731
University College London		£251,507	£251,507
Project description - provided by applicants			
<p>Primary Immunodeficiency disorders are rare genetic defects of blood cells that affect children and often lead to early death. Up to a few years ago the only proven cure for those type of disorders was haematopoietic stem cell (HSC) transplantation, although complicated by the need to identify a suitable donor and severe side effects. Recently developed technologies allow correction of genetic defects in HSCs isolated from peripheral blood or bone marrow by manipulating them ex-vivo and re-infusing them back into the patient. Once back in the patient, the corrected cells home" to the bone marrow where they produce healthy immune cells. One way of correcting genetic defects is by adding a healthy copy of the defective gene to HSCs using a virus vector. The infected HSCs go on to reconstitute the hematopoietic system with blood cells carrying the correct gene. However, a major challenge is to correct a sufficient number of HSCs without altering their ability to give rise to all blood cells for during the lifetime of the patient. Plasticell has developed a clinically compliant process to expand cord blood cells ex vivo and now plans to use its HSC expansion protocol to improve the efficiency of gene therapy. The overall aim of this project is to progress with the clinical application of the Plasticell formulation that stimulates expansion of true hematopoietic stem cells in vitro and to provide a high number of corrected stem cells after gene therapy. We will also use Plasticell's combinatorial screening technology, CombiCult, to increase the efficiency of viral gene delivery in HSC. Both technologies will be used to develop a new clinical protocol for viral gene therapy that would increase the efficacy and lower the overall cost of the gene therapy procedure."</p>			

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Innovate UK

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12 to 24 Months
Competition Code: 1710_HLS_R3_24M

Total available funding is £15m

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	Novel gene editing CRISPR Guided Vector technology to replace antibiotic use in farm animal production	£934,074	£653,852
Quadram Institute Bioscience		£245,971	£245,971
University of Bristol		£145,474	£145,474

Project description - provided by applicants

Antibiotic overuse contributes to increasing the reservoir of resistant bacteria, resulting in increased human mortality (10million deaths a year globally by 2050), increased hospital stay lengths (20-30days), and estimates of global direct- and indirect- costs up to c.£77 trillion. Currently, no new antibiotics are under development and alternatives are ineffective. Consequently, animal production globally is under increasing pressure to reduce antibiotic use as resistance here enters the human food chain. However, limiting the availability of medical interventions to prevent and control animal disease on the farm is directly impacting global food security and food safety. Therefore, there is a major unmet need for effective alternative treatments to antibiotics which are simple, cheap and more sustainable compared to current methods. This project seeks to develop the use of a novel gene editing technology to target a range of currently prevalent bacterial pathogens and deliver a 100% killing system. This will enable Folium, in collaboration with the University of Bristol and the Quadram Institute of Bioscience to establish a leading market position as the first company to formulate this specific genetic technology in to a product range for livestock treatment. The impact of this project would provide an initial cost avoidance to the livestock industry of c.£128million by offering an alternative to current treatment methods and reducing antibiotic resistance in the food supply chain, with potential to go on and transfer this technology to crop treatment applications, human health applications and manufacturing cleaning solutions.

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Innovate UK

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12 to 24 Months
Competition Code: 1710_HLS_R3_24M

Total available funding is £15m

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
BEAMLIN DIAGNOSTICS LIMITED	Solas-Lung	£665,086	£465,560
University College London		£285,037	£285,037
Project description - provided by applicants			
<p>_Solas-Lung_ reinforces a partnership between BeamLine and University College London (UCL) with the primary project aim to complete the 400 patient first in clinic trial required for developing our technology towards regulatory approval: advancing _Solas-Lung_ to TRL6/7\ . UCL have supported IR detection of cancerous cells with >10 years of ground-breaking research. They are the ideal clinical partner to progress _Solas-Lung_ to the next stage, and complement with world leading researchers, to produce a rounded team to ensure project success.</p>			

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Innovate UK

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12 to 24 Months
Competition Code: 1710_HLS_R3_24M

Total available funding is £15m

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
CURTIS ANALYTICS LIMITED	ASNInsta Test: "at the gate" rapid test for asparagine in flour	£109,500	£76,650
APRESLABS LTD		£45,537	£31,876
THE BIO NANO CENTRE LIMITED		£373,974	£261,782

Project description - provided by applicants

Acrylamide is a toxic chemical that forms in starchy food products and in coffee during high temperature cooking, including baking, frying and industrial processing. Acrylamide is a Class 2a carcinogen, is neurotoxic and has been linked to male infertility. The acrylamide metabolite glycidamide appears to be the major carcinogen found in laboratory tests carried out on rodents. In humans, epidemiological studies have presented evidence suggesting a link between AA and the incidence of pancreatic cancer, Hodgkin's disease, and cancers in the brain, central nervous system [Mendel, J. Agri&Food.Chem., 2003]. Recent publication of 20-Nov-2017, EU COMMISSION REGULATION (EU 2017/2158) that establishes mitigation measures and benchmark levels for the reduction of acrylamide in food, requires business operators to follow those procedures necessary to meet targets set to achieve the objectives of the Regulation. To confirm compliance with benchmark levels, the effectiveness of mitigation measures by industry will have to be verified through sampling, testing and analysis. The Maillard Reaction between free asparagine (ASN) and reducing sugars present in food causes the acrylamide to form; it is the same reaction that 'browns' food and produces the flavours and aromas associated with fried baked and roasted foods. In wheat and coffee this reaction is limited by the amount of free asparagine. Therefore, to implement an acrylamide reduction strategy, it is vital not only to measure acrylamide, but also free asparagine. This project will develop ASNInstaTest, an innovative at-the-gate, rapid and easy-to-use test for asparagine in flour (with later applications in coffee and potato) to meet this need and allow the cereal industry to respond to regulatory bench mark levels.

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
12 to 24 Months

Competition Code: 1710_HLS_R3_24M

Total available funding is £15m

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
ALMAC DISCOVERY LIMITED	A Technology Platform for Next Generation VNAR Based Oncology	£1,325,694	£662,847
ELASMOGEN LIMITED	Medicines	£635,847	£445,093

Project description - provided by applicants

Despite marked improvements in outcomes for cancer patients, 35% will succumb to the disease. First line chemotherapy treatments generally rely on the sensitivity of fast-growing cancers being more susceptible to toxic agents than normal healthy cells. The unpleasant side-effects of this treatment, together with a poor prognosis means there is an urgent need for new targeted therapeutics to improve patient health. Developments to-date have included the targeted delivery of drugs to cancer cells as a way of limiting toxic side effects on healthy tissues. Targeted therapies based on monoclonal antibodies have been used with some success. However, their "killing power" can be ineffective against larger solid tumours. To ramp-up their potency, tumour targeting antibodies have been conjugated with highly potent cytotoxic drugs, and antibodies have been engineered that simultaneously target two different cancer proteins in order to improve tumour selectivity. Whilst these antibody drug conjugates (ADCs) and bi-specific antibody approaches show promise, the large size and complexity of antibodies limits their tumour penetrating ability and the ability to engineer therapeutic improvements. Furthermore, the cost of manufacture and off-target side effects are still significant problems for these agents. Consequently, next generation approaches using 'smaller' protein therapeutics with improved tumour penetration, increased stability and less toxicity hold great promise. To meet this challenge, the aim of this project is to build a platform technology for the accelerated development and optimisation of novel oncology medicines based on antibody-like single domain receptors found in sharks (VNARs). Shark VNAR domains are the smallest naturally occurring antigen binding domain in the animal kingdom and their properties are potentially advantageous for cancer therapy. In an initial collaboration between Almac Discovery and Elasmogen, we have shown that high affinity VNARs can be generated to an oncology target and that these VNARs can be site-specifically modified using a bio-conjugation technology developed by Almac Discovery. The aim is to build on this initial proof-of-concept research by combining Elasmogen's expertise in the generation and screening of VNAR proteins, with Almac Discovery's expertise in protein engineering and oncology drug discovery. The idea is to develop a modular VNAR "plug-and-play" platform for the accelerated development of innovative VNAR cancer drugs. Successful development of a platform technology that can overcome the limitations of full-length antibodies, and rapidly deliver VNAR therapeutic candidates with improved efficacy, will enable the full potential of these next-generation approaches to be realised and significantly improve human health."

Note: you can see all Innovate UK-funded projects here

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
24 to 36 Months

Competition Code: 1710_HLS_R3_36M

Total available funding is £15m

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
LABXERO LIMITED	VectorFlow: Scalable viral vector downstream processing for gene therapy production	£417,187	£292,031
COBRA BIOLOGICS LIMITED		£398,158	£199,079
University of Cambridge		£240,514	£240,514
Project description - provided by applicants			
<p>Successful clinical trials of gene-therapies for a range of disease-indications have led to recent regulatory approvals for commercial use. Commercial-supply of viral vectors is limited by lack of affordable large-scale downstream manufacturing processes, which have several drawbacks in terms of process-related impurities, sample/potency loss and scalability_**, **_ with processing losses as high as 90%. Hence, improved scalable methods that guarantee viral vector yield and safety without compromising infectivity/functionality are urgently needed for high-efficiency gene-therapy manufacturing. VectorFlow brings innovative chemical-free viral-vector extraction/pre-filtration to gene-therapy production. This will overcome a key downstream bioprocessing bottleneck and play a pivotal role in increasing the yield and quality of viable viral-vectors in a scalable, low-cost manner, helping to increase the UK's commercial capacity to manufacture viral-vectors for the development of gene therapies to treat human disease. As a platform downstream bioprocessing technology, the VectorFlow platform can also be expanded to other advanced therapy and biomanufacturing applications to maximise commercial impact within the health and life sciences sector.</p>			

Note: you can see all Innovate UK-funded projects here

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
24 to 36 Months
Competition Code: 1710_HLS_R3_36M

Total available funding is £15m

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
RSK ADAS LIMITED	Robo-Pack: The development of an advanced robotic manipulator for rapid inspection and packing of fresh produce	£245,000	£122,500
IMPACT LABORATORIES LIMITED		£194,888	£136,422
London South Bank University		£281,947	£281,947
NETROLOGIX LTD		£632,317	£442,622
SUNCROP PRODUCE LIMITED		£99,902	£69,931
THE SHADOW ROBOT COMPANY LIMITED		£260,250	£182,175
TWI LIMITED		£282,702	£282,702

Project description - provided by applicants

An increasing global population and a difficulty in attracting sufficient numbers of workers from within the current EU is a direct threat to affordable and secure supply for the UK. In order to address this challenge, the agricultural and food manufacturing sectors are increasingly using technology to address the shortfall in labour availability. The suppliers and packers are the nexus between growers and retailers, which in the UK, deal with £13 billion worth of fresh produce annually, 70% of which is sourced and imported by the supply and pack industry to meet consumer demand. Any perturbation in this flow of safe nutritious food will have severe consequences for human health and wellbeing. Robotic manipulation is the "holy grail" for fresh produce packing e.g. fruits and vegetables, which tend to be delicate objects with irregular shapes. This sector is dominated by manual labour, because of the need for intricate human handling and inspection skills; this intervention is required for the selection of unblemished product that consumers expect and demand all year round. In such applications, a sense of touch in the end-effector (robot-gripper) is critical. Unfortunately, robotic manipulator systems do not yet possess this capability. Current state-of-the-art systems essentially act open-loop, without the ability to successfully grasp an object if the mechanical interaction between the end-effector and the grasped object is not well predicted; such is the case with the handling of fresh produce. The consortium will develop ****Robo-Pack****, an advanced robotic manipulator for the inspection and packing of fresh produce, initially targeting tomatoes. ****Robo-Pack**** builds upon proprietary tactile sensing and robot manipulation technology systems."

Note: you can see all Innovate UK-funded projects here

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Innovate UK

Results of Competition: Innovation in Health and Life Sciences Round 3 -
24 to 36 Months
Competition Code: 1710_HLS_R3_36M

Total available funding is £15m

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
ABINGDON HEALTH LTD	Rapid, accurate, on-farm diagnosis and monitoring of mastitis in dairy cows	£570,977	£399,684
University of Glasgow		£234,034	£234,034

Project description - provided by applicants

As the world population continues to grow, we need to produce more food for more people, without compromising on animal welfare. Disease control in animals plays a major role in achieving this. Disease is estimated to reduce productivity in the livestock industry by 20% per annum, with losses from mortality, treatment costs, increased labour and reduced milk or meat yield. The most important production limiting disease in dairy cattle is mastitis (udder inflammation), which is estimated to cost £300 million in the UK and £14-23 billion worldwide. Moreover, it is the most frequent reason for antimicrobial use in dairy cattle which results in drug residues in milk and manure and may lead to antimicrobial resistance, which is a major public health concern across human and animal health sectors. There is therefore a societal desire to limit antimicrobial use for treatment of mastitis, without compromising dairy cow welfare. Detection of mastitis is currently largely based on visual inspection of milk or measurement of somatic cell count (SCC), enzymatic markers, or conductivity, with identification of the causative bacteria based on bacterial culture or advanced laboratory methods. There are significant drawbacks to these tests including inaccurate results, the time needed to obtain a result, and the inability of on-farm tests to quickly differentiate between bacteria. More accurate and informative tests are needed to enable fast, on-farm decision making about antimicrobial treatment of cows with mastitis, and to reduce antimicrobial use whilst safeguarding cow health. Combining the diagnostic assay development expertise of Abingdon Health with the animal health and biomarker knowledge of the University of Glasgow, a rapid diagnostic device will be developed for on-farm use for accurate detection and monitoring of mastitis.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
KROMEK LIMITED	Low Dose Molecular Breast Imaging	£1,137,358	£682,415
The Newcastle upon Tyne Hospitals NHS Foundation Trust		£274,854	£274,854

Project description - provided by applicants

Breast screening was introduced in the UK almost 30 years ago, and relies principally on x-ray mammography. This technique is effective where there is a significant difference in the density of a cancer tumor and the surrounding breast tissue. Around a third of women have denser breast tissue, such that mammography is unable to clearly image tumors, resulting in undiagnosed cancers. The age for breast screening is gradually extending from 50-70 to 47-73. As there is a higher prevalence of dense breasts in younger women, the current provision of mammography even less satisfactory. Molecular breast imaging is a technique whereby a radioactive tracer is used to identify a tumor that is then imaged by a specialist camera. The tracer is concentrated to a much greater extent in malignant breast tissue compared to normal tissue, therefore the malignant tissue shows up as a bright area on the image. Molecular breast imaging currently has the disadvantage of requiring a higher radiation dose than received with a mammogram. The first phase of this project will utilise new developments in detector technology to reduce the required dose such that it is comparable with mammography. This Low-Dose Molecular Breast Imaging (LDMBI) will then be used in a pilot study at Newcastle-upon-Tyne hospital demonstrate the concept. Alongside the detector development we will assess the public acceptance of this technology, and the necessary changes in the clinical pathway. Changes to national screening services require substantial clinical and economic evidence, and a clinical trial programme will be developed to gather this evidence. The project will deliver a functional device and a clinical trial protocol for future assessment of the clinical efficacy.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
EVONETIX LTD	Enzymatic gene synthesis	£893,122	£625,186
Durham University		£365,751	£365,751

Project description - provided by applicants

The revolution generated by next-generation sequencing platforms led to a massive increase in DNA sequence information becoming available over the past ten years. There now exists an unprecedented opportunity to engineer metabolic pathways and organisms, improve industrial processes, create new processes, engineer genomes with new and improved traits and use DNA as a medium for digital data storage. All the foregoing will have a fundamental impact on science and industry, and potentially on the quality of life for millions of individuals. This impending area of research and commercial endeavour has been termed synthetic biology". However, the current inability to produce vast amounts of accurate long, DNA molecules at low cost is limiting the growth of the synthetic biology industry. Current approaches to DNA synthesis involve the generation of oligonucleotides, mostly using phosphoramidite chemistry, followed by annealing and assembly in pools, to generate double-stranded DNA. This is most successful at DNA lengths up to 3 kilobases and less, where accumulated errors do not require the time-consuming and expensive correction of sequences that becomes essential at greater lengths. In addition, current platforms, based on ink-jet and other physical separation modalities, are extremely limited in their ability to secure scaled DNA manufacture. More than 1 billion bases of double-stranded DNA have been synthesised at hugely variable pricing depending on the requirement for post-synthesis correction. Moreover, delivery times for such syntheses have been highly extended and thus many projects remain unfinished. Evonetix, a Cambridge-based start-up, aims to revolutionise _de novo_ gene synthesis. We are developing a highly disruptive DNA/gene synthesis platform to address the increasing demand for accurate synthetic DNA at low cost. We believe the use of enzymatic oligonucleotide synthesis, which operates under milder aqueous conditions compared to phosphoramidite chemistry, will provide a significant commercial advantage for _de novo_ DNA/genes synthesis with our platform; it will achieve this by reducing cost, being more environmentally friendly and further streamlining the industrialisation of high-fidelity DNA synthesis. Enzymes with terminal deoxynucleotidyl transferase/synthetase activities are known to extend single-stranded DNA without the need for a template strand. This unique ability to produce DNA _de novo_ makes these enzymes highly valuable biological tools for the production of synthetic DNA. The aim of our project is to develop novel, modified nucleotides and genetically engineered enzymes with terminal deoxynucleotidyl transferase/synthetase activities as an alternative to the well-established phosphoramidite chemistry, to synthesise high-quality DNA/genes with our innovative technology."

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