Innovate UK

Results of Competition: Developing Non-animal Technologies
Competition Code: 1503_CRD2_ETECH_I_NAT2

Total available funding for this competition was £6M from Innovate UK, NC3R, BBSRC, EPSRC and MRC

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
Asterand UK Acquisition Ltd Definigen Ltd University of Nottingham	Development of a 3D human in vitro model of pancreatic beta cell health	£744,698	£491,696
Project description - provided by applicants			
Diabetes is a serious condition where the amount of sugar (glucose) in the blood is too high because the bodyeither cannot produce enough of the hormone insulin or cannot use the insulin effectively. There is no knowncure for diabetes, and although many treatment options are available, they often do not prevent the disablinglong-term complications of the disease. In the search for new treatments, researchers are now trying to finddrugs that will protect the insulin-producing (beta) cells of the pancreas. To support this research, the aim ofthis project is to develop a new 3D human cell-based model of pancreatic beta cell health. The model will bedeveloped using freshly isolated human islets. The team will then investigate whether a more sustainablehuman cell source can be used and whether the model can be miniaturised, so more drugs can be tested ineach assay. If the project is successful, it will enable the faster testing of potential new anti-diabetes drugs, andultimately help to identify new and improved treatments for diabetes. If widely adopted, the resulting modelwill also reduce the number of animals currently used in diabetes research and drug discovery.			

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Chronos Therapeutics Ltd University of Oxford	An integrated non-vertebrate drug discovery platform for neurodegenerative disease	£856,554	£599,596

Project description - provided by applicants

With a rapidly increasing ageing population, age-related health problems (including neurological disorders suchas Alzheimer's disease and Parkinson's disease) are presenting a challenge to, and burden on existing healthcare provision. Yet whilst such diseases represent a growing therapeutic need, their treatment is hamperedboth by the cost and time commitment to bring new medicines to market. Currently, two major reasons forfailure of new drugs are complications associated with negative side-effects and the ethical and cost issuesassociated with experimentation in non-human vertebrates. Our aim is to develop a robust screening platformin a worm model of neurodegenerative disease. The screening pipeline will make it possible to test drugs foreffectiveness against symptoms of neurodegenerative disease and also establish early on whether the samedrugs have toxic effects; this will help to reduce failure or 'attrition' of drugs at later stages of testing.Consequently, we anticipate that those drugs that do go through to trial in human subjects will offer the bestlikelihood of treatment success without adverse side-effects.

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SimOmics Ltd University of York AstraZeneca UK Ltd	Virtual Fish EcoToxicology Laboratory	£995,661	£446,785
Project description - provided by applicants			
All new active pharmaceutical ingredients must undergo an environmental risk assessment (ERA) before beingauthorised. Currently tens of thousands of fish are used worldwide as part of API ERAs. Development ofpredictive in silico models has the potential to significantly reduce animal use (3Rs) and reduce R&D costsaround the ERA of pharmaceuticals. These models, when combined with recently developed in vitro bioassays,can be used to determine up front risk. Evidence based, in silico approaches that predict the movement of anAPI from the patient to aquatic systems and the subequent impacts on the ecosystems. The "Virtual FishEcoToxicology Laboratory" will be a transparent, evidence-based system of interlinked mathematical models,combined with extensive datasets, that will determine risk to both apical end-points (e.g. impacts on fishreproduction and growth) and non-apical end-points (e.g. effects on behaviour).			

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Asterand UK Acquisition Ltd Sheffield Hallam University	Development of a robust and sustainable in vitro 3D model of human tumours for the identification and evaluation of anti-cancer drugs	£651,866	£465,971
Project description - provided by applicants			
The pharmaceutical industry has relied on in vitro models of cancer using traditional cell lines and animalmodels for the progression of drug treatment of cancer with poor success. This failure could be attributed topoor models with currently available human cell lines (where cell lines have the ability to change their geneticmakeup over time in culture away from the original tumour biology) and results obtained in animals nottranslating to man. The aim of this study is therefore to address this problem by development of an in vitromodel using innovative 3D cell culture methodologies alongside novel genetically stable human lung tumourcell lines (which have been shown to maintain their key tumour characteristics after long-term culture). Ifsuccessful, this model will allow for better understanding of the crosstalk between the numerous cell typesinvolved in this complex disease and how new drugs can manipulate this process. In the longer term, this willhopefully lead to the development of more effective anti-cancer therapies, improved treatments for patientsand ultimately a reduction in the use of animals in cancer research and drug discovery.			

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CN Bio Innovations Ltd Definigen Ltd University College London (UCL)	3D culture model for Non-Alcoholic SteatoHepatitis (NASH) drug discovery	£554,005	£357,613
Project description - provided by applicants			
NASH presents a significant unmet medical need in more economically developed nations, affecting up to 5% ofthe US population alone. There is currently no medical treatment for NASH, where the condition is a precursorto cirrhosis and hepatocellular carcinoma, conditions with very poor prognoses. One key limiting factor in thedevelopment of a treatment for NASH is a lack of suitable in vitro models. The project will produce a highlyrepresentative, medium throughput, 3D perfused model of NASH using both primary human and inducedpluripotent stem cell derived hepatocytes, kupffer and stellate co-cultures. These models can be used incollaboration with industry to enable highly effective drug discovery studies and macrosteatotically relevantADME/Toxicology studies.			

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SAL Scientific Ltd University of Southampton GlaxoSmithKline PLC	Development of a novel 3D microfluidic assay platform for the assessment of human stem-cell derived epithelial function	£630,177	£360,747
Project description - provided by applicants			
We aim to develop a novel analytical platform for the assessment of stem cell-derived epithelial function. Theplatform integrates novel microfluidic technology with a 3D stem cell-derived tissue model and a range ofanalytical outputs and delivers more physiologically relevant data than current in vitro models ' uncoveringpreviously unseen responses to environmental challenge. By delivering more predictive data, the system hashuge potential to impact pre-clinical drug discovery, chemical safety testing and safety pharmacology. Here, wepropose to determine the key design requirements to develop a commercially-viable, scalable platform tofacilitate the analysis of multiple compounds in parallel.			

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InoCardia Ltd Coventry University	InoCardia Human Cardiac Work-Loop Assay: Development Project	£982,075	£708,687

Project description - provided by applicants

When drugs/chemicals are developed to treat a particular disease or for human use purposes they sometimeshave side effects that cause damage to the heart. Occasionally these dangerous side effects are only recognisedafter the drug/chemical has been marketed & taken/used by thousands of people. This is a significant risk tohuman health & is costly to the pharmaceutical industry when a dangerous product is withdrawn from market.Although side effects of drugs can be caused by many things, one area of great concern is the effects of drugson the force that heart muscle can produce during its role in pumping blood around the body. Current drugtesting relies on the use of animals such that often the tests do not do well in predicting the effect on humans.Development of a human heart-cell contractility assay would greatly improve the under-standing of the humanrelevance of non-clinical findings; a chemical might cause a change in cardiac contract-ility in animals, but nothumans & vice versa. We aim to develop a test that uses human heart cells in a way that can efficiently testmany drugs/chemicals used in high-value industries & reduce the risk of causing any damage to the heart.

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NPL Management Ltd University of Hull Xstrahl Ltd	Development of a multipurpose small animal phantom for pre-clinical radiotherapy studies	£688,207	£447,913
Project description - provided by applicants			
The implementation of standardized and traceable dosimetry procedures for preclinical radiation studiessupported by an innovative multipurpose small animal phantom funded by Innovate UK to the tune of£450,000 aims to significantly improve the quality and impact of radiobiological studies whilst reducing thenumber of animals sacrificed. The collaboration includes the National Physical Laboratory, the UoH and Xstrahlwho will combine and utilise their extensive knowledge, expertise and facilities. The funding will enable thepartners to develop standards, equipment and techniques that will allow accurate monitoring of radiationdosages to animals during preclinical trials, something which is not available at present, with the potential ofreducing the number of animals up to 50% for selected studies. The project will also enable scientists todevelop a better understanding of animal and human responses to radiation. The new phantom will provideproducts and services to pharmaceutical companies interested in the development of drugs to aid radiationtreatments, and scientists across the globe to undertake novel and more accurate radiobiology research.			

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