Lead Applicant	Co-Applicant	Research Body	Proposal Title	Funding	Co-Funder	Summary
Rossana Henriques		University College Cork	Mining for climate resilience in Irish forage crops (ResilientCrop)	€776,393.85		Climate change and environmental sustainability are two of the main challenges facing Irish agriculture. Introducing legumes such as white clover into perennial ryegrass swards will reduce fertilizer use and help mitigate its environmental impact. However, the productivity of both species will be affected in a future climate where high temperatures and dry spells will become more frequent. ResilientCrop addresses these challenges by providing breeders with a toolkit of molecular regulators which can help identify climate-resilient varieties; contributing to: 1) promote climate resilience of Ireland's major forage crops; 2) increased food security and 3) environmental sustainability of the agri-food sector.
Caitriona Jackman	Hans Huybrighs	Dublin Institute for Advanced Studies	Placing Ireland at the forefront of the exploration of space	€611,115.10		Space Physics includes studying data from orbiting spacecraft. This proposal focuses on the planet Jupiter's moons, studying the magnetic field and plasma (charged particle) environment near them, in the context of uncovering one of the most important questions in space science: can there be conditions to support life beyond Earth? This work will apply advanced data analytics to large data catalogues to understand the space environment and also to examine when spacecraft themselves can become electrically charged. This charging can damage spacecraft and have a big impact on the measurements that they take, causing the instruments to record incorrect information.
Shalini Singh		University of Limerick	Alkali Metal based Ternary Chalcogenides (ABZ) Nanocrystals (NCs) Design from Materials to Applications: Towards a Retrosynthetic Nanocrystal Synthesis Pathway	€819,775.20		Discovery of new compounds with new technological properties is important for all fields of chemistry. In the field of semiconductor nanocrystals, many earth-abundant and non-toxic compositions with existing properties as predicted theoretically still await to be synthesised. NANOABZ aims to conduct accelerated discovery of novel ABZ nanocrystals (A-alkali metal, B –transition metals/pnictogens, Z is chalcogens) by bottom-up colloidal synthesis approaches. By using a multi-faceted approach of studying reaction kinetics, surface chemistry and structure-property relationship by experimental and computational approaches, NANOABZ will be a route to the systematic discovery of hitherto missing, realizable functional materials.

Rebecca Henry		University College Dublin	Investigation of the role of the GDF-15/GFRAL signalling axis in mediating neuroprotective effects in the presence of co-morbid diet-induced obesity and TBI.	€482,582.10		Evidence suggests that obese patients who suffer from a brain trauma experience more serious clinical complications and higher death rates than non-obese patients. To develop targeted therapeutic approaches for the former group, we first need to understand the mechanistic drivers underlying these complications. This proposal will assess the role of obesity-induced neuroimmune responses in driving brain inflammation and neurological decline in the presence of brain trauma. This research is critically important both at a fundamental physiological level and for the development of novel therapies for brain trauma patients with pre-existing obesity.
Áine Byrne		University College Dublin	Bridging the gap for mathematical models of gap junctions	€504,305.30		This project seeks to understand how changes in a particular type of coupling in the brain, known as gap junction coupling, affect brain function. Gap junctions promote the synchronous activation of neurons, a signature of epileptic seizures. Using a combination of mathematical models and electrophysiological experiments, we will investigate the interplay between gap junction coupling and neuronal synchronisation. Particular attention will be paid to how gap junction coupling varies in response to changes in the surrounding environment. This newfound understanding will be exploited to understand the emergence of excessive neuronal synchronisation in epilepsy and identify novel treatments.
Michael Monaghan		Trinity College Dublin	BRILLFLIM – Optimised design of biomaterial implants to modulate the immunity-directed foreign body response by machine learning of single-cell macrophage stiffness and metabolic adaptations using noninvasive imaging modalities	€775,950.00		Implantation of medical devices injures tissue and recruits immune cells which can cause severe scarring leading to reduction in implant success, speed of patient recovery and return to work, and the need for revision surgeries. It impacts both healthcare and economy. This proposal aims to design novel microscopy tools, that generate large amounts of data for computational analysis, to decipher the relationship between immune cell stiffness, its behaviour, and metabolism, to inform the design of biomaterial coatings (in terms of their thickness, stiffness and topography). Additionally, these computational methods will be used to predict an optimised material to avoid scarring.

Binh-Son Hua		Trinity College Dublin	Language3D: Creating Editable 3D Content from Deep Language Understanding for 3D-First Digital Platforms	€797,557.00		The Language3D project aims to make 3D content accessible to everyone via developing new methods for high-quality 3D content creation guided by deep language understanding. Specifically, we will develop techniques to create photorealistic 3D content from text inputs, exploring pretrained neural networks from 3D data and languages. We will also develop an easy-to-use interface based on user interactions and language descriptions to manipulate 3D content. The output of this project will contribute to the growth of the metaverse, extended reality applications, and motivate the training of future AI models with reduced cost via synthetic data creation from 3D content.
Cormac Murphy		University College Dublin	Mapping the biochemical steps of microbial PFOA metabolism	€491,868.00		Perfluorooctanoic acid (PFOA) belongs to a group of chemicals called per- and poly-fluoroalkyl substances (PFAS) found in numerous everyday products. Exposure to PFAS is linked to severe health effects such as high blood pressure, elevated cholesterol and cancer. Microorganisms can degrade PFAS thus are important in remediation of contaminated environments, but the specific enzymes involved are not known. In this project, enzymes involved in PFOA degradation will be identified in fungi, which can degrade high concentrations of PFOA, and a bacterium. This will enable improved bioremediation strategies and inform the development of future compounds to make them 'benign by design'.
Linda Howard	Siobhan McMahon	University of Galway	Lentiviral vector-mediated modification of the injured spinal cord using a hydrogel delivery system to enhance repair and regeneration.	€554,562.70		Spinal cord injury (SCI) can leave a person completely paralysed below the injury level. After the initial injury has occurred and inflammation subsided, nerve cells show some ability to regenerate. However this potential is thwarted by the normal biological scarring response which poses a barrier to regeneration. Complex sugar structures (glycosaminoglycans, GAGs) produced in the SCI scar are part of this regeneration barrier. This project aims to develop a gene therapy combined with a tissue engineered delivery gel to reduce the amount of GAGs in the scar. This would create a potential therapy to restore function after SCI.
Niamh O'Sullivan		University College Dublin	Developing novel therapeutic strategies for neurodegenerative disease	€548,055.50		Mutations in a gene called ATL1 result in severe problems with brain function from birth. Typically, affected children cannot walk, talk or swallow. There are no therapies to treat children with ATL1 mutations. We aim to develop new drugs that can reduce the amount of the mutant ATL1 protein that is produced in the brain. We will design, test and optimise our drug candidates in cell and animal models which replicate disease-causing ATL1 mutations. Any drug that can lessen the severity of disease would be life-changing for the affected children and their families.

Silvia Caldararu		Trinity College Dublin	Trait-Tweaks: Exploring Ecological Realism in Ecosystem Models under Future Climate Conditions	€657,675.60		Terrestrial ecosystems draw down CO2 from the atmosphere through photosynthesis and are therefore a key component of Earth's climate. If we are to accurately predict what the climate is going to look like over the next century and beyond we must have models that realistically represent such ecosystems, with all their ecological complexity, Plants and ecosystems respond to changes in their environment both short-term through changes in function and long-term through changes in the species present. This project will include both these responses in a mathematical model of terrestrial ecosystems to better predict the future of the planet.
Angela Carnevale	Tobias Rossmann	University of Galway	Machine learning and explicit computations of zeta functions in algebra	€582,635.50		Many scientific tasks involve the enumeration of objects of interest or the study of growth rates of processes. Zeta functions are powerful mathematical tools that can be used to study such problems. The purpose of this project is to combine breakthroughs in machine learning and previous work of the applicants to develop new predictions about and tools to study zeta functions. We will use machine-learning predictions to discover new mathematical patterns and regularities. Using artificial neural networks, we will also train computers to automatically perform computations of zeta functions which were previously reliant on human input or even deemed impractical.
Margaret Jackson		Trinity College Dublin	Improving models of future ice-sheet and sea-level change though assessing the (in)stability of the former British-Irish Ice Sheet	€770,358.40		The rate and magnitude of future sea-level rise depends on the resilience of Earth's large ice sheets in the face of warming. Yet the potential (in)stability of large ice sheets in Greenland and Antarctica in the years to come is uncertain. This project will map and date sediments deposited by the former British-Irish Ice Sheet during a period of sustained climatic change in order to reconstruct the response of the ice sheet to intervals of warming. The results of this work will improve future ice-sheet and sea-level models, future sea-level projections, and community sea-level adaptation plans in Ireland and beyond.

Claire Brougham		Technological University Dublin	Growvalve: A tissue engineered heart valve for paediatric patients	€784,485.26		Replacement heart valves for paediatric surgery cannot grow in tandem with a child's heart. As a consequence, children need to undergo multiple valve surgeries. Growvalve proposes a new type of valve; a valve capable of integrating with the surrounding heart tissue and growing appropriately with the child throughout their life. Made from a combination of natural materials manufactured in a novel way, we can take a child's own cells and create a bespoke, living valve for their unique anatomy. This technology can also be used for identifying pharmaceutical treatments for valvular diseases and represents a paradigm shift in valve technology.
Larisa Florea		Trinity College Dublin	Biomimetic 4D Robotic Micro-tools	€700,335.60		This project will combine state-of-the-art 3D manufacturing techniques with new types of soft materials, to create micro-tools with flexible hinges and joints that can be triggered remotely to move and even deliver drugs on demand. These breakthroughs will be of significant benefit to the health and medicine sectors, where microrobotic tools have the potential to enable surgical tasks that are currently difficult or even impossible to perform (e.g. highly precise surgeries and biopsies, and localised drug delivery).
Aisling Dunne		Trinity College Dublin	Pre-clinical assessment of novel Heme Oxygenase-1 (HO-1) inducers.	€701,614.20		A number of studies are underway to identify new therapeutics that can be used either alone or in conjunction with existing therapies to treat inflammatory bowel disease. Recent studies have suggested that the administration of antioxidants with additional anti-inflammatory action may be of substantial benefit. We have been assessing specific parasite-derived molecules that exhibit both of these activities in our model systems. We now plan to carry out a detailed assessment in relevant cell types/tissue biopsies from individuals suffering from IBD in order to validate their potential as novel treatments, not only for IBD, but inflammatory disease in general.

Roisin Dwyer		University of Galway	Targeting microRNA Megacluster 379/656 in Breast Cancer	€764,657.90		Over 680,000 women die of breast cancer annually worldwide. New methods for treatment of those with advanced disease are urgently needed, and must be based on a more thorough understanding of the factors driving the disease. microRNAs are short sequences that control cell behavior and play an important role in healthy and cancerous cells. Some exciting initial data suggests that a specific cluster of these short sequences may have a strong anti-tumour effect. We will decipher how these sequences function and develop an approach to deliver them directly to tumour tissue, for targeted treatment of patients with advanced disease.
Graeme Watson		Trinity College Dublin	Multiscale modelling of Fluoride ion battery electrolytes: From DFT to Machine Learning-forcefields.	€735,366.40		Limitations of Li-ion batteries are obvious particularly from the cost and range limitation of electric vehicles. Alternative battery technologies could lead to a significant improvement as well as provide a mechanism for storing renewable energy from solar and wind farms. This project will look at one such alternative, the Fluoride ion battery, and examine materials for the electrolyte component which is one of the key issues with the commercialization of this type of battery. The aim of this project is to use advanced simulation methods to understand the limitations of existing materials and predict new materials allowing their commercialization.
Alan Smeaton		Dublin City University	Using collar-worn accelerometers on assistance dogs for signalling the early detection of the onset of epileptic seizures in humans (ADSA)	€492,516.50		Epilepsy is life-limiting, affecting +45,000 people in Ireland. Symptoms are spontaneous and unpredictable seizures though recovery is quick with no lasting damage. Recent science has discovered that prior to a seizure, subjects secrete a volatile organic compound, a chemical, through the skin which trained assistance dogs can detect. We use assistance dogs to detect and signal impending seizures by movements such as repeated spinning. These are detected by a sensor on the dog's collar, and the subject and his/her carers are alerted. This gives time to move to a safe place, reducing the chances of self harm before the seizure.

Andrei Parnachev		Trinity College Dublin	Universality of Correlation Functions in Quantum Field Theories	€791,400.00		The investigation of complex quantum systems, where particles are strongly interconnected, has led to the discovery of fascinating properties. One example is quark-gluon plasma, a unique state of matter created in particle collisions at large-scale research facilities, which flows with very little resistance. To better understand these properties, scientists need to study how the particles within the quantum systems interact. Traditional approaches, however, have encountered difficulties because they are based on the assumption that particles have weak connections. This research project aims to explore the fundamental behavior of such strongly coupled quantum systems.
Gary Brennan		University College Dublin	Long non-coding RNA-mediated cellular dysfunction in acquired and genetic epilepsies.	€809,525.80		Epilepsy is a brain disease which causes seizures. Seizures happen when brain cells are more active than usual. How cells behave is controlled by the genes which are active in those cells. The activity of some genes is changed in epilepsy however there are genes which produce non-coding RNAs which we know almost nothing about. The activity of these genes also changes in epilepsy. Here we test whether correcting non-coding RNA genes can prevent epilepsy or reduce seizures. We also test what happens when these genes are switched off to identify how these genes control our brain cells.
Gediminas Juska		Tyndall National Institute	Solving the Scalability Bottleneck in Quantum Computing: Photonic Cluster States from Quantum Dots	€799,213.30		The unparalleled calculation power of quantum computers will transform multiple aspects of present life. However, building one is a formidable task. Maintaining and continuously performing multiple quantum interactions within a complex network of quantum objects (qubits) is an extraordinary challenge. This project aims to remove the burden of this complexity by providing a functional prototype of calculation resources with an alternative type of quantum computation architecture. This element is based on tiny bunches of semiconductor –quantum dots – capable of shining light quanta (photons) closely interconnected by quantum mechanical interactions, to be utilized for a novel game-changing abridged quantum-calculation procedure.

Cormac McGuinness		Trinity College Dublin	Novel covalently integrated metal porphyrin networks through on-surface synthesis, their characterisation, development and exploitation as a versatile platform for molecular sensing.	€824,791.20		Imagine nanodevices with versatile abilities acting as a sensors or an electronic nose. Multifunctional molecules can be modified to “click together” on surfaces. This is achieved through chemistry and heat, using the right building-blocks. Choose one of many multifunctional molecules from a family found in nature that are sensitive to different chemicals (“odors”), modify to allow for clickable robust structural connections to adjacent functional building-blocks and get new electronic properties. The whole can be greater than the sum of the parts, the result will be a new “nanostructure” uniquely placed to “smell” small volatile molecules, to measure our health.
Alexandre De Menezes		University of Galway	MicroVOCs: determining how microbial volatile organic compounds affect soil nitrogen cycling and N2O emissions	€788,421.50		Agricultural soils are important sources of greenhouse gas (GHG) emissions, especially in Ireland. To control agricultural GHG emissions, it is essential to understand the biological processes that generate them. This project will investigate an overlooked process that influence soil microbial nitrogen cycling, which is one of the main sources of the potent GHG nitrous oxide. This process involves volatile compounds produced by microbes that inhibit key steps in the soil nitrogen cycle. By characterising this process, the project aims to offer novel ways to predict and control nitrous oxide emissions from soil, to support low emissions, sustainable agriculture.
Pete D. Akers		Trinity College Dublin	A new isotopic method to reveal blanket bog drought resilience: DRYPEAT (Deuterium-excess Reconstruction to Yield Peatland Evaporation, Aridity, and Transpiration)	€713,506.60		Blanket bogs are critical carbon and biodiversity reserves for Ireland, but the drier future brought by climate change threatens their existence. If we know what drought intensities bogs have survived in the past, we will gain a better prediction of bogs’ future survival. Bog plants preserve drought signals in their cellular chemistry, and we will learn through DRYPEAT how to translate this chemistry into a drought record by monitoring a modern Wicklow Mountains bog. Then, by studying bog plants preserved for thousands of years within peat, we will reconstruct a drought history to better know what droughts bogs can survive.

Eoghan McGarrigle		University College Dublin	BendZymes – Novel Catalysts for Glyco Applications	€746,312.30		This research seeks to develop more efficient and more sustainable methods for the chemical synthesis of carbohydrate-based molecules. Carbohydrates are important as medicines, vaccines, and in understanding biological interactions (e.g., the interaction between the COVID spike protein and the human immune system); they are also the largest component of biomass and one aspect of the project is to develop new ways to convert biomass into useable building blocks to displace fossil fuels. The project involves developing novel catalysts (molecules that make reactions go faster without being consumed themselves) and will train researchers for careers in the BioPharmaceutical sector.
David Igoe		Trinity College Dublin	Multiscale modelling of soil-structure interaction for renewable energy applications	€657,611.70		The safe and cost effective development of new civil engineering infrastructure is critical to achieving a sustainable future. Large-scale offshore wind projects will be key to helping Ireland to achieve its climate action targets and become an energy-independent nation. In the course of designing these infrastructure, engineers must overcome many technical challenges, including understanding how soil-structure interaction can influence the structures' behaviour. This project proposes to develop innovative experiments and modelling approaches across multiple scales to study the soil-structure interaction for Offshore Wind Turbines, which will ultimately lower the risk and cost of developing offshore wind.
Daniel Granato		University of Limerick	Breaking the link between obesity-related inflammation and oxidative stress by bioavailable compounds from apple pomace delivered in novel dairy beverages	€727,520.00		Irish people (80%) do not consume the recommended daily amount of fibre, and 60% of the population is overweight or obese. A Farm-to-Fork approach will be used to develop new functional beverages as delivery systems of apple pomace (AP) phenolics (APP) and fibres (APF) to mitigate the harmful oxidative and pro-inflammatory effects of obesity. The bioactivity of the beverages containing APF and/or APP will be studied in 3T3-L1 adipocytes to simulate human physiological conditions. DAMA-BIOX contributes to the environmental sustainability and circularity of the Irish agroindustry and, ultimately, provides data to aid mitigation of obesity/overweight.

Vikram Pakrashi	Michelle Carey	University College Dublin	Energy Harvesting for Monitoring Built Infrastructure : HarMonI	€807,030.00		Ireland's material scientists provided recent breakthroughs in developing non-toxic energy harvesting crystals. These are potential game-changers in a world where lead (Pb) – based toxic sensors are popular. However, for these materials to be useful and create impact, we have to develop sensors and devices from them and demonstrate impactful applicatons. HarMonI precisely addresses this gap in a timely manner, developing a sensor-software-data analytics monitoring chain for our built infrastructure lifelines (e.g. bridges, water supply, renewable energy). It creates an authoritative evidence base on their applicability and performance, leading to confidence in commercial viability and industrial uptake with standardization pathways.
Song Miao	Maurice O'Sullivan	Teagasc	Study on the Mechanism of Starch-based Emulsion Gel Regulating Sodium Ion Release and Salt Taste Perception and Food Applications	€801,778.70		High-salt diets are linked to chronic diseases, but reducing salt in food can make it less tasty. This study proposes a new approach to reducing salt in food, by exploring the microstructure of emulsion gels made from starch. By manipulating the structure of the gel, the study aims to promote sodium ion release and salty taste perception, even with reduced salt content. This could lead to the development of new, healthier food options that are more palatable and acceptable to consumers. The study also aims to deepen our understanding of human sensory perception and flavour modulation in low-salt food systems.
Martina Schroeder		Maynooth University	Regulation of the regulator: DDX3X's role in translational reprogramming during viral infections	€788,697.76		This project investigates the human DDX3X protein, which is being explored as target for development of urgently needed broad-spectrum anti-viral drugs. However, our cells also need DDX3X for making new proteins, which is especially important when they are defending themselves against viral infections. This makes DDX3X a pivotal factor during infection. We will investigate how DDX3X regulates the cellular response to virus infection and determine whether viral manipulation of DDX3X is involved in virus-induced pathogenesis. Our results will be crucial for further development of DDX3X-targeting drugs and can inform clinical management of patient cohorts with inactivating DDX3X mutations.

Dearbhaile Dooley		University College Dublin	Targeting Inflammatory Signaling between Microglia and Astroglia in spinal cord injury.	€777,749.60		Spinal cord injury (SCI) is a complex medical challenge affecting ~27 million people worldwide. SCI patients lose capabilities of movement and sensation due to damage to electrical nerve cells in their spinal cord. Following the initial mechanical impact, SCI is associated with a diverse inflammatory response, and this involves other non-electrical cells called 'glia'. Although largely considered to be detrimental, inflammation can also play a beneficial role in regeneration. This research proposal aims to study glial cells using a variety of new approaches, in order to alter their behaviour and provide a more favourable environment for regeneration/recovery after SCI.
Marina Rubini		University College Dublin	Site-specific chemical modifications of human Interferon-gamma for improved therapeutics	€631,699.20		Human Interferon-gamma is a protein that helps the body to fight viral or bacterial infections. Two sugar chains attached to the protein help maintain intact its structure during circulation. Interferon-gamma is approved for the treatment of certain diseases. Due to cost management (among others), Interferon-gamma in industrial settings is produced in bacterial cells that are not able to attach the sugar chains, therefore the circulation time is limited with many associated drawbacks. Here we propose a scalable method for producing Interferon-gamma in bacterial cells and to subsequently attach the sugar chains or other hydrophilic moieties to circumvent the existing drawbacks.
Norah OShea		Teagasc	Evaluating the Fourth Dimension - Innovative 4D Food Printing for Producing Healthy and Flavoursome Snacks of the Future.	€685,906.00		4DSnacks aims to develop a sensory appealing and healthy snack using Irish ingredients (oats, delactosed permeate) produced by 4D food printing. 4D food printing uses a 3D food printed object and by changing the environmental conditions of the object (i.e. temperature / humidity or pH), over time a change in the objects appearance is triggered, resulting in a snack with different texture, appearance or colour. The functional (probiotic inclusion) benefit of the snack in 4DSnacks will be verified by the presence of a biosensor that indicates the strength / stability of the probiotics present (via a colour change of the ink).

Joanna McGouran		Trinity College Dublin	Photochemical covalent protein profiling: a novel approach to enhance targeted drug discovery	€648,069.60		Developing new drugs for diseases is difficult as many promising potential drugs have unintended effects. Often drugs are designed to inactivate a specific enzyme in our cells. Target-engagement probes tell us if a drug has bound its target enzyme and switched it off as intended. Most probes react immediately upon seeing their active enzyme target, like a policeman “catching the enzyme in the act”. Our probes will act more like undercover detectives than policemen. These probes will not capture the enzymes until they are triggered, just like an undercover detective will await orders before launching a sting operation.
Fiona Freeman	Scheryll Alken	University College Dublin	Conjugated STING-agonist nanoparticles as novel therapeutic add-on to enhance the therapeutic response of chemotherapy for the treatment of osteosarcoma.	€506,302.40	CHF	Osteosarcoma is an aggressive bone cancer that affects children, teenagers and young adults. The ability to hide from the immune system is a critical factor in the growth of osteosarcoma tumours within the body. This proposal aims to develop a new therapy that uses the body's own immune system to attack the tumour. It outlines an entirely new concept to treat this debilitating disease. Using innovative engineering techniques, we will create specialized delivery vehicles that can transport the treatment to the immune cells as an add-on to chemotherapy to improve its ability to eradicate the cancer cells throughout the body.

Leila Negahdar		University College Dublin	Programming catalytic surface reactions with dynamic kinetic oscillations	€404,809.60		The recent increase in global average temperature is mostly caused by CO2 emissions from burning fossil fuels such as coal, oil, and natural gas. It is widely accepted that to prevent the worst consequences of climate change, the world needs to urgently reduce the CO2 emissions. Our research aims to develop an approach that effectively transforms CO2 to valuable chemicals and fuels such as methanol. Methanol is an alternative fuel for powering vehicles and ships, and heating in industrial sections. We use low-cost and abundant materials, for example copper as catalyst to convert the CO2 to methanol.
Mary Canavan		Trinity College Dublin	Tissue Specific Immune Memory Mediates Disease Progression and Disease Flare in Rheumatoid Arthritis	€583,512.80		Rheumatoid Arthritis (RA) is an autoimmune disease were our immune system incorrectly attacks healthy cells/tissues in the joint. While treatment has improved, most patients require lifelong medication to control disease flares. This research aims to understand if a novel immune cell known as a Tissue Resident Memory T cells (TRM) are responsible for RA disease initiation and disease flare. TRM cells are memory cells that stay in the tissues so they may quickly respond to an infection if they encounter it again. Therefore, this proposal will examine if TRM persistence in RA joints drives disease progression and flare.
Nicholas Allen	Kathleen Gorman	University of Galway	Therapeutic targeting in patient derived pluripotent stem cell neuronal modelling of KCNQ2-encephalopathy	€638,566.10	CHF (in full)	Childhood epilepsies are common devastating disorders associated with significant disabilities, often caused by ‘mutations’ affecting how nerve and brain cells work. Because brain tissue is difficult to obtain and study, treatment options are limited. Human pluripotent stem-cells (iPSCs) are generated using only a tiny amount of skin cells and offer new opportunities to mimic human disorders in the lab. We have generated iPSCs from children with severe developmental brain conditions and epilepsy to understand how these cells work and cause disease compared to healthy cells. Our goal is to develop novel therapies for severe, currently untreatable childhood-neurological disorders.

Judith Coppinger	Fiona Ringholz	RCSI University of Medicine and Health Sciences	Investigating extracellular vesicles as novel tools to monitor and treat Cystic Fibrosis	€676,886.20	CHF (in full)	Inflammation occurs early in the lungs of children with cystic fibrosis (CF), often before symptoms manifest. Neutrophils are a type of inflammatory cell that can cause significant damage when activated abnormally in CF. As part of our work at Children's Health Ireland we investigate little vesicles released by cells called EVs as regulators of inflammation. We have shown that EVs are produced in CF airways and can attract neutrophils. We propose a comprehensive investigation of EVs as both tools to monitor early CF disease with modulator therapy (Kaftrio) and identify new EV inflammatory signals for the design of auxiliary therapies.