THE UNIVERSITY of York

C2D2 Centre for Chronic Diseases & Disorders

C2D2 Projects funded from second round of first year

Translational

Professor Jonathan Timmis (Computer Science), Dr Mark Coles (CII)
Building Infrastructure for Computational Approaches to Drug Development

The research element of this project is to develop a computer-based tool set to enable data driven design approaches to computational simulations of human autoimmune and inflammatory diseases. At the same time, funding will be used to develop the technology and business infrastructure to establish a spin-out company, *Immune Modelling Solutions*, based in the Hub. This body will work with pharmaceutical companies in employing these computational simulations to assist in reducing the cost and attrition rate of therapeutics in phase II/III clinical trials. If successful this technology has the capacity to produce savings of up to 1 billion pounds per year to pharmaceutical industry.

Dr Stephen Smith (Electronics)
Technology for the diagnosis and monitoring of neurodegenerative diseases in routine clinical practice

A diagnostic toolkit has been developed by Dr Smith's lab which provides straightforward, objective measures to identify neurodegenerative disease type, and to quantify disease progression and which would allow appropriate treatment to be administered at an earlier stage. Funding will be used to help transition the technology from proof-of-concept stage, to a point where it is ready to use in patient evaluation. This will allow the clinicians to extend their current validation of the technology and to trial its use within routine clinical practice. A preliminary market assessment for the technology undertaken in 2010 estimated the market potential for technology in the seven major markets is a maximum of £1.9 billion/year, growing to £4 billion/year by 2050.

Professor Paul Kaye (CII), Professor Jo Milner (Biology)
Ascertaining the metabolic state of diseased human colorectal crypts to determine their susceptibility to treatment with a prototype therapeutic

Colorectal cancer is the third most common type of cancer in the UK and in the USA and the second most common cause of cancer-related death. The global economic impact of colorectal cancer is estimated at $99 billion, excluding the costs of patient therapy. Professor Milner's research group has invented a novel method for selective killing of human colorectal cancer cells without adverse effects on normal, non-cancer cells. Funding will be used to confirm one final element of the

method. Following successful completion, Yorkshire Cancer Research will release the money it has provisionally awarded to help translate the technique into clinical practice.

Research

Dr Penny Spikins (Archaeology), Dr Katie Slocombe (Psychology)
Lost in Translation?: Personal material culture and Autism Spectrum Disorder (ASD).

This project aims, via a cohort study, to test the hypothesis that individuals with and without Autistic Spectrum Disorder (ASD) have a different relationship with their surroundings and material possessions. It will seek to explain how this difference arises from distinct key processes structuring the relationship. The anticipation is that for individuals with ASD the social/emotional meaning of personal possessions are being 'lost in translation'. The results of the study will be important to both arts and science research areas.

Dr Gonzalo Blanco (Biology), Professor Ian Chetter (HYMS), Miss Richa Gohil (HYMS), Dr Paul Potter (MRC, Harwell)
Components of a skeletal muscle z-disc mechanosensor: do they contribute to the age related decline of muscle function in humans?

Muscle wasting is a known morbidity factor in many clinical or behavioural conditions involving chronic muscle paralysis and there are no effective countermeasures to prevent it. This project aims to start to identify the genetic elements of the molecular sensors which are involved in converting mechanical signals into biochemical ones and allowing skeletal muscles to sense loads. A secondary part of the project will be to measure the activity of genes that participate in these mechanosensors in young and old muscles, both in human and mice. This is in order to test the hypothesisis that one reason behind the inexorable decline of muscle power with age is that muscles become progressively less efficient at sensing and adapting to loads, because the mechanosensor complex changes over time.

Dr Jason Lynam (Chemistry), Professor Ian Fairlamb (Chemistry), Dr James Moir (Biology)
Carbon Monoxide-Releasing Molecules as a Dual-Warhead Approach to Antibiotics

Increasingly certain bacteria are developing resistance to antibiotics and there is an urgent need to develop multi-functional drugs that will overcome the resistance of these 'super-bugs'. This project investigates the possibility of using carbon monoxide

(CO), delivered in a safe and targeted way through special carrier molecules, as an antibacterial agent alongside conventional antibiotics.

Dr Nick Pears (Computer Science), Dr William Smith (Computer Science), Professor Paul O'Higgins (HYMS)
Development of a 3D morphable face model for planning, guidance and assessment of craniofacial surgery.

This new collaboration between the Department of Computer Science, HYMS (York) and the Craniofacial Unit at Great Ormond Street Hospital (London) aims to provide surgical planning aids and surgical outcome assessment for patients suffering from chronic facial abnormalities, in particular congenital conditions, such as Apert syndrome. This project is the first step in building an accurate, state-of-the-art deformable 3D face model that is able to show how the face should look were abnormalities removed.

Dr Steven Johnson (Electronics), Dr James Moir (Biology)
Point-of-care, electronic detection of pathogenic bacteria using redox-active biomarkers.

Our aim is to establish and evaluate a point-of-care diagnostic to provide rapid, sensitive and specific *N. meningitidis* screening. The tool will combine microelectronic devices fabricated using the same, low-cost technology developed in the semiconductor industry, with molecular probes targeting *N. meningitidis* specific markers allowing quantitative and rapid screening in a single, simple readout, portable device. The technology developed through this programme is relevant to the detection of a wide range of pathogenic bacteria and our longer-term vision is to provide a versatile technology to enable rapid diagnosis of bacterial infection at point-of-care.

Dr Tracy Lightfoot (Health Sciences), Dr Dimitris Lagos (CII), Professor Simon Gilbody (Health Sciences), Dr Dean McMillan (Health Sciences), Professor Eve Roman (Health Sciences)
Establishment of a cord blood bank for BABY (Born And Bred in Yorkshire)

The purpose of this project is to establish a bank of bloods collected from the umbilical cords of babies from the BABY (Born and Bred in Yorkshire) study when they are born. These blood samples, together with information being collected from parents and maternity records, will help provide the foundation of a valuable resource for cross-disciplinary research on how individuals' genes interact with their lifestyles and health. This information will be of value to the NHS and other researchers now and in the future.

Dr Dimitris Lagos (CII), Dr Gavin Barlow (Hull & East Yorks NHS Trust), Dr Jo Dumville (Health Sciences), Dr Marjan van der Woude (CII), Professor Ian Chetter (HYMS)
Establishing a microbiological and immunological baseline for individuals with surgical wounds healing by secondary intention

This project seeks to lay the foundations for identifying robust biological markers (biomarkers) for wound healing. Such biomarkers could potentially be used to predict time to healing or indicate optimal medical treatment for patient subgroups. The proposed work will be nested within an NIHR-funded cohort study in the Department of Health Sciences and will add value to this project which aims to collect demographic, treatment and outcome data from people with surgical wound healing by secondary intention (SWHSI) in Leeds and Hull.

Dr Yvette Hancock (Physics), Dr Paul Genever (Biology), Dr Marjan van der Woude (CII)
Molecular studies of biological systems using Raman spectroscopy

Raman spectroscopy is a non-destructive method for real-time studies of disease processes at the molecular level. There will be two studies; the first will apply Raman's detailed molecular-level tracking to tissue-engineering, and the second will assess novel anti-microbial treatments on bacteria (biomedical plasmairradiation and antibiotics). Following this broader applications, such as intercellular pathogens, cancer, IBD and diabetes, will be targetted. The combination of cutting-edge biological research coupled with the development of novel methods to produce rapid, in-house Raman analysis, will greatly enhance existing research efforts, therefore propelling York to the forefront in novel applications of this unique, cutting-edge tool.

Professor Celia Kitzinger (Sociology), Professor Simon Halliday (Law), Dr Stephen Holland (Philosophy), Dr Sarah Nettleton (Sociology), Dr Alice Hall (English and Related Literature)
Chronic Disorders of Consciousness: An interdisciplinary Research Project

The development of new medical technologies and procedures is leading to a rapid rise in the number of people it is now possible to keep alive - for years or for decades – after catastrophic brain injuries resulting in chronic disorders of consciousness – states widely referred to as 'coma' – including the permanent vegetative state and minimally conscious states. This project aims to find answers to a range of sociological, legal, philosophical, ethical and economic questions relating to chronic

disorders of consciousness – a novel research area in which there is relatively little research.