Issue
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QUEEN'S UNIVERSITY BELFAST

WELLCOME-WOLFSON INSTITUTE FOR EXPERIMENTAL MEDICINE

theinvestigator

Professor José Bengoechea
WWIEM Director

Welcome

It is my pleasure to bring you the new edition of the Wellcome-Wolfson Institute for Experimental Medicine Newsletter.

During 2019 there have been many highlights for the Institute.

We are delighted with the new members of staff who have joined us in the last months. As part of our vision to improve our research profile, our new colleagues bring exceptional expertise to the institute, complementing and expanding our work in immunology, fungal infections, epigenetics, respiratory medicine, and endothelial biology. Also, we welcome two new VC Research Fellows who have joined the WWIEM coming from the Crick Institute and Indiana University.

This year our summer student programme had a remarkable international profile. Students joined us from Mohamed Bin Rashid University and we received a number of international students as part of British Council's IAESTE.

Our researchers have consistently received support from the Research Councils, sustaining WWIEM's key role in terms of net contribution to the Faculty and the University research income balance. Our collaboration with key industrial partners in the forefront of research, and our clinical trials speak of the quality of our outputs, with colleagues publishing in the best journals of their areas. We are proud and delighted to share the results of research that is changing lives, from WWIEM.

QUEEN'S UNIVERSITY BELFAST

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Meet our Researchers

Dr Rebecca Coll

Rebecca received her **PhD in Immunology in 2013 from Trinity College Dublin** and moved to the **Institute for Molecular Bioscience at the University of Queensland** in 2014 to continue her work on innate immunity and novel anti-inflammatory molecules. **Rebecca joined QUB as a Lecturer in Immunobiology in 2019**. Rebecca's research is focused on inflammasomes – protein complexes at the heart of inflammation and disease – and how these complexes can be targeted therapeutically to prevent damaging inflammation. Rebecca led the biological characterisation of MCC950, a small molecule inhibitor of the NLRP3 inflammasome and an exciting prospect as a new therapy for treating patients with NLRP3-mediated diseases. **In 2016 Rebecca was awarded the Research Australia Discovery Award for her work on NLRP3 inhibitors.**

Dr Selinda Orr

Selinda completed her PhD in Immunology at Queen's University Belfast in 2006. She then spent 5yrs as an **NIH Postdoctoral Visiting Fellow at the National Cancer Institute**, Frederick, where she started working on anti-fungal immune responses. In 2011, she was awarded a **Wellcome Trust VIP award** to relocate to Cardiff University and she was then awarded a **Wellcome Trust/Royal Society Sir Henry Dale Fellowship in 2012** to establish her independent research career focused on understanding anti-fungal immune responses. She was appointed as a Senior Lecturer in Immunobiology at Queen's University Belfast in 2019. Selinda's research program is based on understanding **anti-fungal immune responses in order to identify potential novel immunotherapy approaches** and potential patient stratification factors to target prophylactic anti-fungal therapies to patients with the highest risk of developing invasive fungal infections.

Dr Bronwen Connolly

Bronwen is a **Consultant Physiotherapist in Critical Care**, and former **NIHR Postdoctoral Fellow at Guy's and St.Thomas' NHS Foundation Trust, and NIHR Clinical Trials Fellow at the Intensive Care National Audit and Research Centre**. She completed her **PhD at King's College London** in 2014 focusing on the clinical and physiological assessment and management of intensive care unit-acquired weakness, She joined WWIEM as a Senior Lecturer in 2019. Her research programme focuses on acute and rehabilitation management in critical illness, looking at the recovery, long-term outcome, and survivorship of post critical illness patients, respiratory physiotherapy interventions, and clinical trial methodology around complex interventions such as physical rehabilitation. Bronwen **is currently leading the PRACTICE study**, and a forthcoming multi-centre randomised controlled trial investigating the effectiveness of **mucoactive drugs in acute respiratory failure.**

Dr Effie Kostarelli

Effie is a molecular biologist & geneticist specialized in epigenetics in cancer & leukaemia. She has worked on **Chronic Lymphocytic Leukaemia** since her PhD as a fellow of Propondis Foundation, with a focus on disease mechanisms and immunogenetics. Her research path includes also work in tumor immunology (T regulatory cells in melanoma and antitumor responses) as postdoctoral researcher at **German Cancer Research Center (DKFZ)** funded by Onassis Foundation. She has developed strong expertise in the field of Epigenetics including DNA methylation & histone modifications. As a research fellow at **Heidelberg University Clinic** and ENT Department she investigated epigenetics mechanisms of HPV-related head neck squamous cell carcinomas. She has recently joined Queen's as a Lecturer, leading her research group on Epigenetics with a focus on Leukaemia, Cancer and Lymphocytes biology.

Awards, Prizes and distinctions

Professor Paul Moynagh

Professor Paul Moynagh admitted as a Member of the Royal Irish Academy

In May, Professor Paul Moynagh was admitted as a Member of the Royal Irish Academy. Besides his role at WWIEM, Paul Moynagh is head of the Department of Biology and director of the Human Health Research Institute at Maynooth University. His research focuses on delineating the roles of Pellino proteins in immunity.

He is the recipient of the NUI Centennial Prize for Academic Publishing and the 2014 Biochemical Society (IASBS) medal.
In 2018 Professor Alan Stitt was also admitted as a Member of the Royal Irish Academy.

Professor Stuart Elborn receives the ECFS 2019 award

The European Cystic Fibrosis Society Award is given annually to honour a person who has made an outstanding contribution to basic understanding of cystic fibrosis or to the treatment or care of patients with cystic fibrosis. The winner of the award is invited to present a lecture at the Opening Plenary of the annual ECFS conference.

Professor Diane Mathis (L) receives the Barcroft Medal from Professor Pascal McKeown, Acting Dean & Head of School, School of Medicine, Dentistry and Biomedical Sciences, Queen's

Barcroft Lecture 2019

13 November Professor Diane Mathis of Harvard Medical School, on T cell control of non-immunological processes

Professor Mathis delivered the Barcroft Lecture in the School of Medicine, Dentistry and Biomedical Sciences. Professor Mathis spoke to a packed audience of more than 300 staff and students about the T cell differentiation and tolerance/autoimmunity.

http://www.qub.ac.uk/research-centres/CEM/News/BarcroftLecture2019.html

Summer students

WWIEM host a group of students from MBRU, Dubai

As part of the summer students placement programme, a group of students from MBRU joined WWIEM for a summer placement working in the Institute.

Salama Binhendi, Jana Alanati, and Hamdah Meer, from Mohamed Bin Rashid University of Medicine and Life Sciences spent 8 weeks over summer working at WWIEM.

2019 was the third year of the QUB-MBRU summer student programme. Our summer student programme hosted this year a total of 35 students, both local and international.

Click here to watch our MBRU 2019 summer student's video

Pictured: Elen O'Rawe, Alice Adams and Arthur Lim receiving their prizes from Dr Derek Brazil at the Annual Summer Student Research Symposium

2019 WWIEM Summer Student Research Symposium

Our 2019 Summer Student Programme concluded at the Annual Summer Student Research Symposium on 16th August. Well done to everyone who presented on the day and congratulations to the prize winners; Elen O'Rawe (Watson lab), Alice Adams (Dombrowski lab) and Arthur Lim (Curtis lab).

CQC summer school & China Medical and Guangzhou Medical Universities students visits

On July 23rd and 24th WWIEM received the visit from the CQC summer school and of ten students from China Medial and Guangzgou Medical Universities, respectively. Director Prof Jose A. Bengoechea welcomed the students, and gave the students a short talk about the Institute and the opportunities to carry out postgraduate Masters and PhD studies in QUB. During a tour of the centre, the students were shown the state-of-the-art imaging facility and the research laboratories. It was a very successful visit and we look forward to hosting many of them in WWIEM in the future.

WWIEM
PhD students life

WWIEM PhD students' success at SMDBS Postgraduate Education and Research Forum

The annual SMDBS Postgraduate Education and Research Forum took place on Thursday 7 November 2019 at Riddel Hall. The Forum featured a series of poster and oral presentations from PhD students from research centres across the School. prizes.

Congratulations to all our 3rd and 2nd year PhD students for the oral and poster presentations, respectively, at the SMDBS PGR Forum. Special mention goes to Georgiana Parau and Orla Dunne, who were awarded best oral presentations in their respective sessions, Laura Loughlin, who received 2nd prize for her poster presentation, and Katie Mayne and Caitlin Hull, who were finalists for the poster presentation

International Food night

PhD representatives Órlaith O'Shaughnessy and Georgiana Parau organized an International Food Night on the 22nd of November in the WWIEM. The event was a potluck party, to which everyone brought along some of their favourite native dishes. It was a a great opportunity for everyone in the centre to get to know each other and sample some great food!
With more than 30 nationalities among WWIEM students and staff, the International Food Night was a successful initiative we all enjoyed. Food was delicious and hopefully this will be the first of many events.

WWIEM
Postdoctoral Development Committee (PDC)

Annual Postdoc Symposium

The **3rd Annual WWIEM Postdoctoral Research Symposium** took place on the 25th January 2019 in WWIEM. The PCDC committee raised over £2000 in sponsorship for the event allowing us to invite Prof. Neville Osborne, a leader in ophthalmological research, to deliver the keynote lecture and to provide catering and high quality prizes which ensured high attendance at the event. There were nine oral presentations and **29 posters** presented over the course of the day. A poster networking competition during the poster sessions encouraged active participation in these sessions which, postdocs reported, were highly enjoyable. Winners from the day included: Lindsay Broadbent (Best oral presentation), Declan Doherty and Helina Marshall (Best posters) and Rosana Penalva (Best scientific image).
Declan and Rosana also won the "Poster speed networking prize" and the "Trade stand prize" respectively. The next annual postdoc symposium is on Friday 24th January 2020.

Career Development and Away Day

The away day took place on the 14th June 2019 at the graduate school and had the theme of effective communication. There were two workshops both run by Caroline Broad from Broad Associates, Cambridge, involving both personal and team communication sessions. There was also postdoc networking sessions and a town hall session to allow postdocs to talk about problems they face, followed by a group brainstorming session to find solutions to these problems. 31 postdocs attended the away day and feedback showed everyone found it beneficial.

Community Development

The PCDC buddy scheme has welcomed 16 postdocs to date in 2019. The feedback from the welcome tour and buddy scheme as a whole has been overwhelmingly positive. The community development team have organised social events (Speakeasy, Parlour, culture night) and activities (Inflatapark, Lets Go Hydro) for postdocs. The community development team have also organised events for the entire centre (pumpkin carving competition) at Halloween. As a result of the continued hard work from the community development team the postdoc coffee mornings have now tripled in attendance highlighting the importance of these PCDC activities for encouraging engagement.

External representation

PCDC committee members also sit on the PGET (Amy Dumigan), Postdoc forum (Lindsay Broadbent) and faculty PDC (Declan Doherty), allowing information exchange between the WWIEM PCDC and external groups/committees.

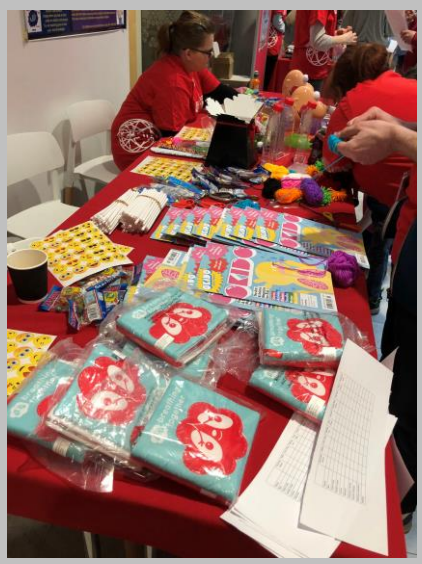
Outreach

Northern Ireland Science Festival

WWIEM offered its annual Open Day Science Event as part of the NI Science Festival on 16 February.

Overall, 300 people attended the event, which offered participation in experiments and showcased our activity.

We received a very positive feedback; and suggestions from attendees are informing our plans for the next edition in February 2020.



Events - Research

Remerge symposium - October 14th

The Queen's regenerative medicine research group (REMERGE) annual symposium took place on October 14th.

Ulster Immunology group meeting British Immunology symposium 13 and 14 June 2019

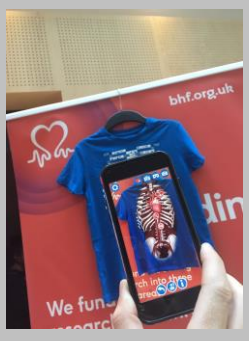
Inaugural lectures

- Professor **Bronagh Blackwood** – Lecture held on Monday 25th March 2019 at 4pm Title - 'Caring in critical illness: from bedside care to research'
- Professor **Tim Curtis** – Lecture held on Monday 8 April 2019 at 4pm – Title - 'Tackling diabetic eye disease by going with the flow'
- Professor **Judy Bradley** – lecture will be held on Tuesday 18 June 2019 at 4pm – Title - 'Cough, Spit, CLEAR'

£1,300 for MS research at Queen's

Evelyn Kyle and her family have raised £1100 for MS research at Queen's, so leading researcher Professor Denise Fitzgerald and her team brought them into our labs to explain the impact of their funds!

BHF Northern Ireland Supporters' Day at WWIEM 26 September



Celebrating sight & Ireland Ophthalmology day 10&11 October

Research

Highlighted publications

Researchers at WWIEM are publishing in the best scientific journals. We've selected only a few examples of the quality of our work. The following papers on ***The Lancet*** , ***JCI Insight*** , and ***PNAS*** illustrate the great impact in translation and patient outcomes that we deliver through our research.

Efficacy and safety of the elexacaftor plus tezacaftor plus ivacaftor combination regimen in people with cystic fibrosis homozygous for the F508del mutation: a double-blind, randomised, phase 3 trial.
Heijerman HGM, McKone EF, Downey DG, et al. Lancet 2019. doi:10.1016/S0140-6736(19)32597-8.

Cystic fibrosis transmembrane conductance regulator (CFTR) modulators correct the basic defect caused by CFTR mutations. Improvements in health outcomes have been achieved with the combination of a CFTR corrector and potentiator in people with cystic fibrosis homozygous for the *F508del* mutation. The addition of elexacaftor (VX-445), a next-generation CFTR corrector, to tezacaftor plus ivacaftor further improved F508del-CFTR function and clinical outcomes in a phase 2 study in people with cystic fibrosis homozygous for the *F508del* mutation.

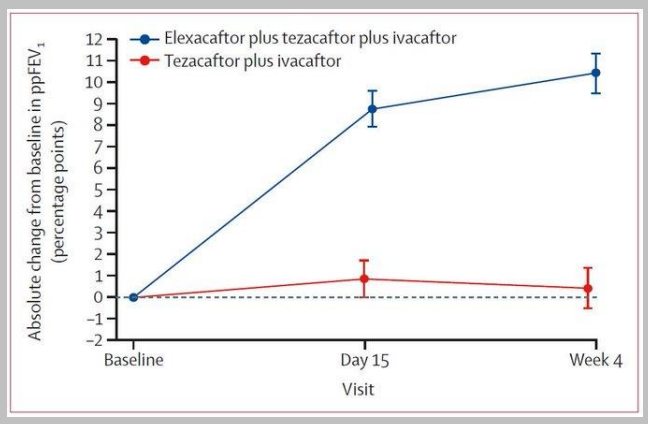


Figure: Absolute change over time in ppFEV1 from baseline

CAMKII as a therapeutic target for growth factor-induced retinal and choroidal neovascularization. Ashraf S, Bell S, O'Leary C, Canning P, Micu I, Fernandez JA, O'Hare M, Barabas P, McCauley H, Brazil DP, Stitt AW, McGeown JG, Curtis TM. JCI Insight. 2019 Mar 21;4(6). pii: 122442. doi: 10.1172/jci.insight.122442. eCollection 2019 Mar 21.

While anti-VEGF drugs are commonly used to inhibit pathological retinal and choroidal neovascularization, not all patients respond in an optimal manner.

Mechanisms underpinning resistance to anti-VEGF therapy include the upregulation of other proangiogenic factors. Therefore, therapeutic strategies that simultaneously target multiple growth factor signaling pathways would have significant value.
Our studies suggest that CAMKII could provide a novel and efficacious target to inhibit multiple angiogenic signalling pathways for the treatment of vasoproliferative diseases of the eye. CAMKIIγ represents a particularly promising target, as deletion of this isoform inhibited pathological neovascularization, while enhancing reparative angiogenesis in the ischemic retina.

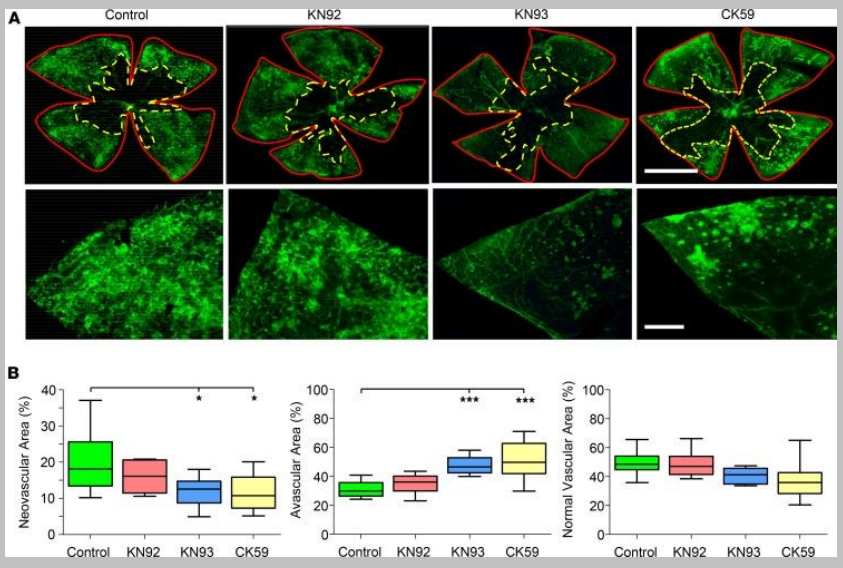


Figure. Pharmacological blockade of Ca2+/calmodulin-dependent kinase II (CAMKII) suppresses pathological angiogenesis in the ischemic retina. The murine oxygen-induced retinopathy (OIR) model was used to explore the role of CAMKII in retinal neovascularization in vivo

Research

Highlighted publications

Uncoupled turnover disrupts mitochondrial quality control in diabetic retinopathy. Hombrebueno JR, Cairns L, Dutton LR, Lyons TJ, Brazil DP, Moynagh P, Curtis TM, Xu H. JCI Insight. 2019 Oct 29. pii: 129760. doi: 10.1172/jci.insight.129760. [Epub ahead of print]

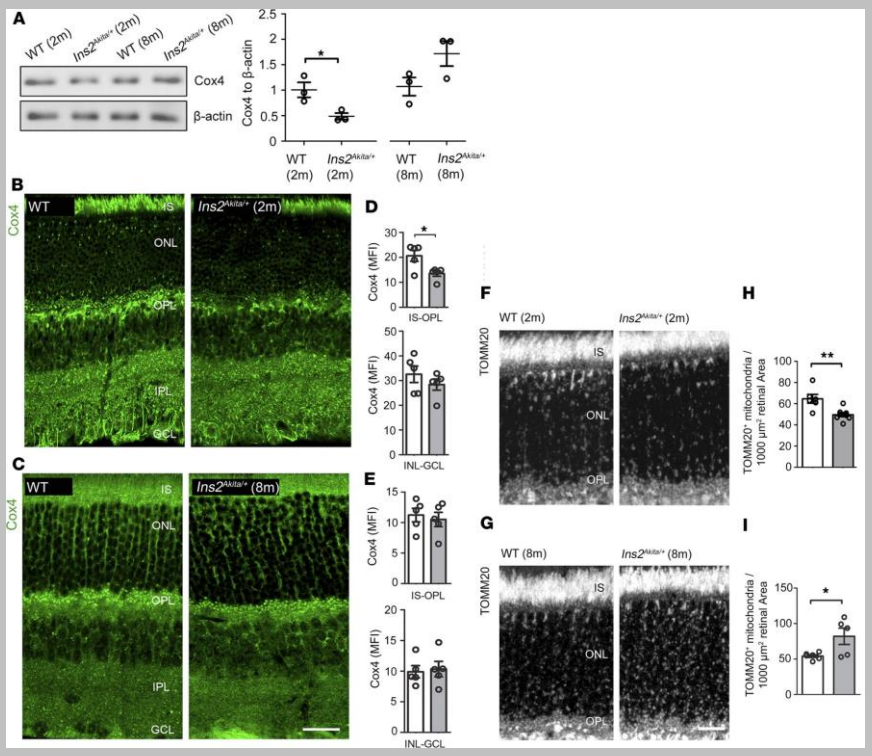


Figure: Mitochondrial contents shift during the progression of diabetes in Ins2Akita/+ mouse retinas.

Mitochondrial quality control (MQC) is crucial for regulating central nervous system homeostasis and its disruption has been implicated in the pathogenesis of some of the most common neurodegenerative diseases. In healthy tissues, the maintenance of MQC depends upon an exquisite balance between mitophagy (removal of damaged mitochondria by autophagy) and biogenesis (de-novo synthesis of mitochondria). Here, we show that mitophagy is disrupted in diabetic retinopathy (DR) and decoupled from mitochondrial biogenesis during the progression of the disease. Our findings suggest that normalizing mitochondrial turnover may preserve MQC and provide novel therapeutic options for the management of DR-associated complications.

The microbiota regulates murine inflammatory responses to toxin-induced CNS demyelination but has minimal impact on remyelination . Christopher E. McMurran, Alerie Guzman de la Fuente, Rosana Penalva, Ofra Ben Menachem-Zidon, Yvonne Dombrowski, John Falconer, Ginez A. Gonzalez, Chao Zhao, Fynn N. Krause, Adam M. H. Young, Julian L. Griffin, Clare A. Jones, Claire Hollins, Markus M. Heimesaat, Denise C. Fitzgerald, and Robin J. M. Franklin

The microbiota is now recognized as a key influence on the host immune response in the central nervous system (CNS). As such, there has been some progress toward therapies that modulate the microbiota with the aim of limiting immune-mediated demyelination, as occurs in multiple sclerosis.

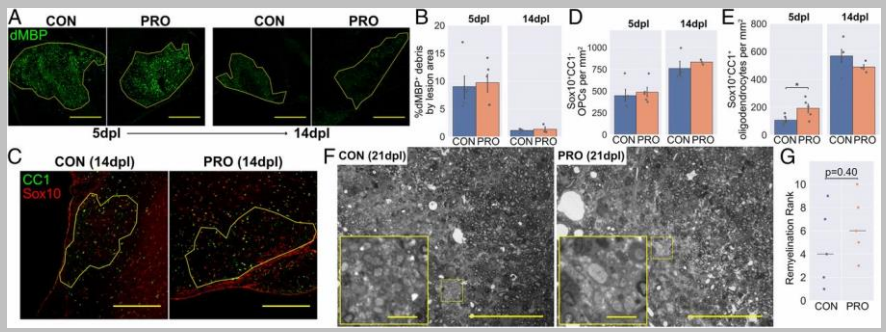


Figure: VSL#3 probiotic does not enhance remyelination in aged mice.

However, remyelination—the regeneration of myelin sheaths—also depends upon an immune response, and the effects that such interventions might have on remyelination have not yet been explored.

Here, we show that the inflammatory response during CNS remyelination in mice is modulated by antibiotic or probiotic treatment, as well as in germ-free mice. We also explore the effect of these changes on oligodendrocyte progenitor cell differentiation, which is inhibited by antibiotics but unaffected by our other interventions. These results reveal that high combined doses of oral antibiotics impair oligodendrocyte progenitor cell responses during remyelination and further our understanding of how mammalian regeneration relates to the microbiota.

Research

Research Council Responsive Mode Awards

Research Councils Responsive Mode Awards are our benchmark of excellence. As such, we are proud to share the successful performance of PIs at WWEIM.

In the first quarter of 2019/20 alone, they have already **secured in excess of £1.8 million**, in what promises to be a great year for the Institute.

Congratulations to **Professor Cliff Taggart** on his MRC project (2nd consecutive MRC award), and to **Dr Reinhold Medina, Professor Miguel Valvano** (2nd BBSRC in a row) and **Professor Jose Bengoechea** (4th consecutive BBSRC).

This year success follows the awards secured in the academic year **2018/19,** by **Dr Anna Krasnodembskaya** (MRC) and **Professor Miguel Valvano** (BBSRC) **in excess of £ 1 Million**

Research Council Responsive Mode Awards -2019/20

MRC

The role of The Role of Extracellular Proteasome in the acutely inflamed lung

Professor Cliff Taggartt

Inflammatory cell recruitment to sites of infection is a common and necessary process to remove bacteria in the lung. In some cases of disease, neutrophils arrive in significant numbers to the lung, and other organ sites, not as result of infection but as a result of a poorly-defined inflammatory process. In the case of acute lung inflammation, excessive inflammatory cell recruitment can lead to damage, which is mediated, in part, by the neutrophil. We have uncovered a recently described protein, the Extracellular Immunoproteasome, which may play a role in bringing, or attracting, damaging levels of these inflammatory cells to the lung. We now wish to confirm further the role of Extracellular Immunoproteasome in inflammatory cell recruitment and lung injury, using novel Immunoproteasome inhibitors, in models of acute lung inflammation.

Understanding how ageing impacts on vascular regeneration through the endothelial senescence associated secretory phenotype

Dr Reinhold Medina

Our project will focus in understanding the ageing of blood vessels at the molecular level. Here, we will elucidate how stem cells in blood vessels change during the ageing process, or cellular senescence. There is evidence to indicate that senescent cells adopt an inflammatory phenotype. The secretion of these inflammatory proteins is called SASP and reinforces the senescence programme. While this idea was demonstrated in human skin fibroblasts, it is not known if this applies to other tissues and cells. Here, we will investigate if inflammation and SASP drives cellular senescence in endothelial progenitors. Importantly, we aim to inhibit this SASP as a strategy to enhance vascular health.
We will provide the first detailed molecular characterisation of SASP in endothelial progenitors. Furthermore, we will identify components of the SASP that could be modulated to promote vascular health. In addition, we will use a unique animal model to test the role of inflammation driving vascular ageing and vascular stem cell exhaustion. Outcomes of this project will provide critical information in relation to how vascular ageing is driven by cellular senescence and inflammation in vascular stem cells.

Research

Research Council Responsive Mode Awards - 2019/20

BBSRC

A conserved protein O-glycosylation pathway in the Burkholderia genus essential for bacterial fitness and antigenicity in humans

Professor Miguel Valvano

Some of the Burkholderia species are particularly dangerous to humans while others are highly useful for bioremediation, and pest biocontrol. We have characterised a protein glycosylation pathway conserved in all Burkholderia that allows the possibility to develop a universal Burkholderia vaccine. This proposal underpins fundamental studies at the forefront of microbial glycobiology, molecular biology and glycochemistry research with the goals to: (i) Decode the functions of the enzymes involved in the Burkholderia protein glycosylation pathway and elucidate the molecular structure of the oligosaccharide glycan; (ii) Elucidate the mechanism behind the physiological alterations due to loss of protein glycosylation in bacteria; and (iii) Determine the structure function of the oligosaccharyltransferase enzyme to enable biotechnological applications through glycoengineering approaches. Aligned to the BBSRC roadmap, this innovative project rises to the challenges of finding novel means to deal with dangerous opportunistic pathogens by advancing biotechnological research elucidating the protein glycosylation system in Burkholderia and exploiting this knowledge to develop wide-spectrum vaccine. It also fits well with the need to find alternatives to antibiotics for the control of multidrug resistant bacteria, such as the Burkholderia, by exposing new ways to prevent infection by these bacteria in susceptible patients.

Klebsiella anti-immunology: exploiting proteins with a eukaryotic SEFIR domain

Professor Jose Bengoechea

Our struggle against infectious diseases is far from over. Of particular concern is the mounting prevalence of respiratory infections caused by Gram-negative bacteria, in particular Klebsiella pneumonia, with isolation of strains resistant to "last resort" antimicrobials removing completely the therapeutic options for treatment.
In this proposal, by combining synergistic expertise across the disciplines of molecular and cellular microbiology, immunology and biochemistry of the Bengoechea, Moynagh and Schroeder laboratories, we will uncover a hitherto unknown Klebsiella immune evasion strategy directed to blunt IL17-governed host defenses. Our research will reveal that this immune evasion strategy also attenuates host defense signalling launched upon activation of the receptors implicated in sensing infections.
This proposal will shed new light into the sophisticated means exploited by pathogens to overcome host defenses while opening new opportunities to develop new antimicrobial therapeutics. There is extensive research on the pathways targeted by Klebsiella, and new drugs are currently under development. We anticipate that the outcomes of this proposal would lead to test these drugs in pre-clinical models of klebsiella disease, hence allowing a potential fast-track transition from the basic research to clinical development.

Research

Research Council Responsive Mode Awards – 2018/19

MRC

The role of extracellular vesicle miRNAs in Mesenchymal Stem Cells' effects on macrophage modulation in ARDS

Dr Anna Krasnodembsskaya

Mesenchymal stem cells (MSCs) have afforded promise in the treatment of multiple conditions from tissue injury to immune disorders. In particular, they are rapidly progressing into clinical trials for Acute Respiratory Distress Syndrome (ARDS) (a major cause of acute respiratory failure in critically ill patients, with no effective treatment). First in the UK phase I/II clinical trial for MSCs in ARDS has already commenced. However the lack of clear understanding of mechanisms of MSC action in the inflammatory environment and the potential for as yet unknown adverse effects (such as iatrogenic tumour formation and immune response) present important challenges for effective clinical translation of MSCs. Dr Anna Krasnodembskaya is leading two MRC funded research projects aiming to address these challenges. First project is focused on better understanding of the molecular mechanisms of therapeutic effects of MSCs in the injured lungs. In this project, we, in collaboration with colleagues from WWIEM Dr David Simpson, Prof Cecilia O'Kane and Prof Danny McAuley, are investigating the functional role of miRNAs secreted by MSCs in extracellular vesicles using a range of in vitro and in vivo models and samples from patients from the REALIST trial. In another project we are working on the characterisation and pre-clinical development of MSC-derived extracellular vesicles as an alternative cell-free therapy for ARDS.

BBSRC

Bacterial lipocalins: Novel role in bacterial protection against antibiotic-induced membrane lipid peroxidation

Professor Miguel Valvano

Research on antibiotic action and resistance has helped elucidate fundamental biochemical and regulatory pathways in bacteria and fungi operating within the microbial cells. However, whether bacteria produce molecules that interfere with antibiotics before they reach cells has been overlooked. We discovered a previously unrecognized mode of bacterial antibiotic resistance operating in the extracellular space that depends on molecules produced and released by bacteria in response to sublethal antibiotic concentrations. This adaptive mechanism protects less resistant bacterial cells of the same or different species from killing by antibiotics. The molecules involved are putrescine, a polyamine, and secreted lipocalin proteins, which are highly conserved in bacteria. We also discovered that lipocalins are part of a previously ignored mechanism to protect cell membranes from lipid peroxidation. Peroxidation occurs as a consequence of environmental stress including bacterial exposure to near-lethal antibiotic concentrations, cold, and inflammation. Lipid peroxidation ends up with the destruction of membrane lipids and their conversion into highly toxic forms which in turn can oxidise and destroy cellular proteins and the genetic material. This proposal is on fundamental microbiology research combining molecular microbiology, biochemistry, and infection models to elucidate the role of a conserved family of bacterial lipocalins in bacterial cell physiology and antibiotic resistance. Our long-term goals are to establish the function of lipocalins by elucidating their mechanism and physiological roles in bacterial cells, and to utilise this information to gain proof of principle that new molecules can be designed to help prevent extracellular bacterial scavenging of antibiotics, and more importantly accelerate peroxidation leading to bacterial death, thus providing a potentially new solution to combat antibiotic resistance.

Help support the pursuit of world-class education and life-changing research

If you would like to donate to any of the research programmes within WWIEM, please contact **Sarah-Jayne Cassells**, Development Manager (Health), Queen's University Belfast; Tel: (+44) 028 9097 5073; Email: S.Cassells@qub.ac.uk. Alternatively, go to **Queen's Foundation - Donate Now** @ **https://daro.qub.ac.uk/DonateNow.** Within the donation form, you can specify how you would like your gift to be used.

Queen's Foundation have launched a new online fundraising guide for people who would like to raise money directly for WWIEM. The simple guide provides helpful tips on planning and promoting a fundraising event, using JustGiving and it includes poster / flyer templates and a sponsorship form. Check it out online at @ **https://daro.qub.ac.uk/file/QUB_fundraising_Guide.pdf** or contact Sarah-Jayne Cassells for more information**.**

Queen's Foundation

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