FOREWORD

Life Sciences Research Network Wales

Innovations in life sciences have resulted in dramatic changes in our ability to manage human disease and improve quality of life for patients, with an increasing ageing population and a number of major drugs coming off patent, there is a pressing need to develop new drugs and therapeutic agents.

The Life Sciences Research Network was founded in 2013 with funding from the Welsh Government and the Higher Education Funding Council for Wales, to enhance Wales' strength in research by developing new therapeutic treatments in areas of unmet medical and veterinary need.

As one of those six Sir Cyril National Research Networks, the Life Sciences Research Network is a peer-led initiative focused on drug discovery and development, and was established with academic partners of Bangor, Cardiff and Swansea Universities and actively engaged with partners in industry, the NHS and charities both nationally and abroad.

We fund a large portfolio of projects including PhD Studentships, Postdoctoral Research Projects and Platform Technologies with a focus (wherever, not exclusively) in the Therapeutic Areas of Neurology, Neurodegeneration and Infectious Disease.

The Network has helped to foster an improved understanding of translational research, highlighting areas of potential strength for innovation and commercialisation. Working in tandem with the Life Sciences Bridging Fund, 55 INI projects have secured Bridging Fund awards to develop their translational potential.

The Network has committed £5.8 million towards life sciences drug discovery projects and has engaged with over 200 partners in collaborative research projects. Collectively, our partners have committed approximately £437,000 in co-funding and INI grants awarded within Wales have provided £2.7 million in additional co-funding all directly in support of our projects.

By September 2017, Network projects had generated over £223m in additional research funding through competitive grant awards, leveraging over £52m funding from Research Councils and £2m from EU Horizon 2020. Researchers had presented their work in over 250 conference presentations and had over 80 papers published in peer-reviewed journals. These levels of output highlight the quantity and quality of research being undertaken by Network projects.

We wish to pay special tribute to the late Professor Chris McCluskey, to whom we are indebted for both establishing and championing this flagship project in the life sciences in Wales.

Professor Andrea Brancati
Network Scientific Director

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A TRIBUTE TO PROFESSOR CHRIS MCGUIGAN

On 17th June 2013, a press release indicated that I would be joining Cardiff University as the first appointment under the Welsh Government's £50M Sir Cyril Morgan initiative. Ole Petersen, then Head of the School of Biosciences and the key operator of my move to Cardiff, explained to me that as part of the initiative, a Sir Cyril Morgan Professorship in Nematology would be created with a focus on Drug Discovery and Development. While the creation of this new role was officially approved by the end of the following month, a charming individual by the name of Chris McGuigan asked me the following day if I would be willing to join the Scientific Advisory Board of this still virtual network. This could be discussed at his home later in the day. What I later realised was a typical McGuigan move. Chris had already prepared a brochure with the names and pictures of the Scientific Advisory Board members, including me. He then explained to me during the course of a lovely summer evening that he had convinced several world-class researchers to join the board. Chris did this in no uncertain terms and Chris documented this first encounter with the enclosed photograph he took in his garden. It also features Gary Baxter, Head of School of Pharmacy and Pharmaceutical Sciences where Chris was affiliated. This occasion was also made memorable by many interesting discussions with Chris's wife, Maria, whose kindness and hospitality I discovered on this occasion. Like everyone who had the privilege to interact with Chris, I was greatly impressed by his energy and commitment to the goals he set himself. Not only the

Professor Yves Barde
Sir Cyril Morgan Chair in Neurobiology

Chris was not just a very effective mover and shaker. His warmth, kindness and good humour made a real delight to work with and for him – also for a short period of time in my case. Little did I realise at the time that the place at which the network had been set up would turn out to be the University of Cardiff. I learned just how much I had enjoyed the role and the Board continued to grow and prosper as an amazing case, with Board meetings subsequently taking place at the Hub in Cardiff Bay which opened in March 2014 – another truly remarkable achievement driven by Chris, with the continued and very effective support of the Welsh Government.
THERAPEUTIC AREAS

The Network Research Portfolio focuses on three main therapeutic areas and other diseases with unmet medical and veterinary need.

- Oncology
  - 48 Projects
- Infectious Disease
  - 42 Projects
- Neuroscience
  - 22 Projects
- Rare Diseases
  - 19 Projects

PROJECTS IN FOCUS

ONCOLOGY

Targeted cancer treatment: Optimising cellular uptake of enzymatically-modified magnetic nanoparticles

Dr. Jennifer Smith, MRI Research Fellow, University of Oxford

This project aims to optimise the delivery of anti-cancer drugs to tumours. By using magnetic nanoparticles, the drugs can be directed to specific locations, improving treatment outcomes.

Bacterial-mediated RNA interference as a new therapy to target advanced prostate cancer

Professor Paul Dyson, Prostate Cancer Project, Swainswick University

Initial network project funding has led to a major international award by Cancer Research UK to develop novel therapies for the treatment of prostate cancer. This £300k award to Swainswick University will support collaboration with Cambridge University, School of Biophysics and the University of Oxford, School of Medicine. It will develop a new therapy to target any solid tumour, including drug resistant prostate cancer. This patented technology is based on the enzyme RNase H, which degrades RNA in the cell. This degrades the messenger RNA that is responsible for producing new tumour cells.

Role of DNA repair in resisting treatment with Gemcitabine and other nucleoside analogues

Laniece Baumelose, PhD Student, Bangor University

The cancer drug Gemcitabine, a nucleoside analogue, inhibits cancer cells by inhibiting their DNA replication. This project aims to understand the mechanisms by which cancer cells resist this treatment and develop new therapies to overcome this resistance.

"Our Network award on the 1st signalling pathway has led directly to the initiation of a new research collaboration with the pharmaceutical company, Merck. This is the largest funding to date for our research team and we have secured an interdisciplinary research team to translate these findings into targeted therapy of drugs and biomarkers for cancer patients."

Professor Trevor Dale, Engagement Programme, Bangor University

"I am a PhD on a Network funded grant. The original goal allowed 1% of the new capacity on oncology oral vector to phase activity in any cancer cell line, data that could improve cancer treatments. However, my work has also allowed me to work on diabetes and obesity models. This is a fantastic opportunity to work in a collaborative network and we have secured an interdisciplinary research team to translate these findings into targeted therapy of drugs and biomarkers for cancer patients."

Dr. Alice Parker, Import Award Holde, Bangor University
NEUROSCIENCE

Sleeping beauty gene dormant for multiple sclerosis
Dr Andreas Bancaud, Postdoctoral Project, Cardiff University

An estimated 2.5 million people in the world are diagnosed with Multiple Sclerosis (MS), where the immune system, which normally helps to fight off infections, mistakes myelin for a foreign body and attacks it. A recent breakthrough in Multiple Sclerosis treatment is fingolimod, which was approved by the FDA as the first oral disease-modifying agent for MS. The Profile approach, developed by Professor Chris Marsh, Platform Technologies Award, Cardiff University

The two biomarkers of Alzheimer’s disease are beta-amyloid and tau. Until recently, the only way to measure the presence of these biomarkers was post-mortem. With the completion of this project, PTIC will have the capability to image, quantify and monitor the levels of these markers in the brain. This will be invaluable in enabling an earlier diagnosis that is currently possible, monitoring disease progression and assessing the effectiveness of novel therapies in this disease.

In vivo imaging of Tau Distribution in the Brain
Professor Chris Marshall, Platform Technologies Award, Cardiff University

We work towards an novel potential drug an antibody called 1L7 which prevents the production and build up of beta-amyloid, one of the main intracellular molecules causing Alzheimer’s disease. Funding from the network has allowed this novel antibody to be tested in to image these intracellular molecules. This research has shown that 1L7 is able to prevent the spread of toxicity problems observed in the beta-amyloid plaques and fibrils. This antibody has now been licensed for further development and is associated with reduced levels of the toxic beta-α1 species.

Charles Estry
PhD Studentship, Cardiff University

INFECTION DISEASE

Exploiting natural products from Hope (Isolus stellatus) to suppress tuberculosis
Robert D Naik, PhD Studentship, Aberystwyth University

According to the World Health Organization, tuberculosis is the second leading cause of death from an infectious disease worldwide. Over the past 20 years there has been an emergence of extensive drug-resistant tuberculosis, which threatens global health control. One metabolite from Hope is known to have significant activity against M. tuberculosis. This Network funded PhD project has conducted a library of promising metabolites with anti-mycobacterial activity from H. stellatus and aims to discover, isolate, and characterise the mechanism of action. This will aid the optimisation of a lead from chemical discovery, with further synthesis of new and more effective drugs against the disease.

Exploring the interaction of CD4+ T cells with infection-derived derived from conserved virus protein, aka: Recognizable Nature, PhD Studentship, Cardiff University

Influenza is a recurrent and ever present threat to global health. The virus is highly variable and continuously evolves in order to escape control by the immune system. This Network funded PhD project has focused on the human immune response to the conserved elements of the influenza virus, specifically the response from a cell population that orchestrates multiple immune mechanisms that mediate strain variability and facilitate protection by identifying the conserved viral elements that these cells recognize, thereby characterizing their presentation by MHC class I1 restricted T-cells.

Dr Miguel Garcia
Senior Lecturer, University of Bath

"It's exciting to be part of the Network’s ongoing development of vaccine approaches that may provide a greater level of protection against influenza. The opportunity to work with colleagues from different institutions and backgrounds has been invaluable. Thank you!"

Lytic transglycosylase - a potential Actinobacillus heat for antibiotic-resistant bacteria
Dr Joel Lowenfield, Postdoctoral Project, Cardiff University

This project has led to the sequencing of the genome of a bacterium that produces an antibiotic and anti-influenza compound which has resulted in further successful funding to identify these compounds. The preliminary work funded by the Network is being further developed by an overseas funded PhD student and a Network funded postdoctoral researcher.

Katharina Sacherer
PhD Studentship, Cardiff University

"The NIH allowed me to study at an existing lab, allowing research experience and to learn from world renowned scientists. A unique experience for which I am very grateful for."

Alexandra Quisn
PhD Studentship, Aberystwyth University

"My PhD project is based on finding antimicrobial compounds in natural products collected by the World Health Organization (WHO). We use these compounds as lead compounds in antimicrobial drug development. Funding from the Network has allowed me to develop my skills as a scientist and prepare for my future career by collaborating with other researchers from different networks. Thank you!"

David Foulkes
PhD Studentship, Aberystwyth University

"My research is focused on developing a new approach to treating tuberculosis. The network has enabled me to interact with other projects, network members and organizations, which has been invaluable. Thank you!"

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OTHER DISEASES OF UNMET NEED

Delivery of immunogenic molecules from acrylic bone cement to encourage regenerative bone repair around cemented joint replacements
Dr Wayne Maley, PhD, Postdoctoral Researcher, Cardiff University

Approximately 180,000 hip and knee replacements are performed in the UK every year, of which a significant amount utilise cement to anchor the implant to bone. Unfortunately, around 30% of these implants fail after 10 years due to loosening which is linked to poor bone repair after surgery. Previous research at Cardiff University developed a patented method of delivering prostaglandins of antibodies locally from the cement. Nanotechnology has given rise to the concept of a 'drug delivery system' to encourage bone growth around the cement by delivering a growth factor released as bone morphogenetic protein 2 (BMP-2). A further EU-funded research project was leveraging from external sources to develop the system further. This has generated sufficient data to justify optimisation of the system, which has the potential to take the technology from lab-based experiments into animal and clinical trials.

Multinodal Therapeutic MHC: A Diagnostic and Therapeutic Platform Dr Jon Falls, Peri-doctoral Project, Cardiff University

Drugs, antibodies (Abs) and radioisotopes have much potential, both individually and in combinations, as therapeutic entities in the treatment of a wide range of diseases. However, the concept of delivering the right molecule to the right target is very important. For this reason, the development of new therapeutics is often driven by cancer. The field is important to radiology because, despite their development's age, radiotherapy remains the mainstay of cancer treatment. The project aims to develop a new approach to personalised medicine by developing new cancer killers and combining them with other therapeutic agents. The project has been able to demonstrate the creation of a single entity with the potential to both diagnose and treat a disease. Further, in order to 'image'-beller, the nanoparticles to the target site new chemistries have been developed for the attachment of antibodies and other groups to target the targeted disease (in this case cancer). The technology is being developed with additional research funding, including the development of a radiolabelled agent and the development of stem cell therapies in cancer treatment. The project has already involved researchers and encourages projects and reach other stakeholders, including industrial investment in other projects. The project has been involved in several successful funding bids.

PROJECT OUTPUTS IN FOCUS

PHD STUDENTSHIP

Multinodal imaging for cancer therapy screening, NRN PhD Project - Life Sciences Bridging Fund award, Daniel Harts (PhD student), Dr George Johnson.

The Unmet Need

Genetic Toxicology is a new and challenging drug development area in which non-clinical testing is used to assess chemotherapeutic potential, which cells can be scored manually or by using flow cytometry or semi-automated microscopy-based image analysers. Manual scoring is laborious and the current high-throughput lead to a potential positive or negative response, respectively. The aim of this project is to develop a new system to improve the current high-throughput lead to a potential positive or negative response, respectively. The aim of this project is to develop a new system to improve the current high-throughput score of the system, which has the potential to take the technology from lab-based experiments into animal and clinical trials.

Research Progression

The NRN PhD project and Life Science Bridging Fund award are interlinked and focused on the development of in vitro assays for assessing DNA damage using the image analysis. The technology allows for the development of machine learning algorithms.
FAN WALES PHD STUDENTSHIPS IN NOVEL ANTIMICROBIALS
Two joint scholarships between Aberystwyth and Cardiff universities from collaborative research programs for Development of Scientific Congress.

Reorganizing non-steroidal anticoagulants as novel antithrombotic inhibitors: University of Groningen, Professor Andrea Schmutz, PhD student

Theünst McCrue

The research project focuses on the development of urgently-needed new antithrombotic agents for the control of atherosclerosis, a neglected tropical disease. The global management of a single chemotherapy drug is being kept up to the spread of antiseptic resistance.

Research Progress:

These interdisciplinary projects bring together biochemistry, natural products, and synthetic chemistry in Aberystwyth and Cardiff universities, allowing the 5 students to collaborate and develop expertise in:

- Cross-linking, a medicinal chemistry, computational biology, and automated screening.
- Collaboration with additional external partners from PhD students
- PhD students will be taking part in 2 postgraduate courses and industry.
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PHD STUDENTSHIP:

Expanding the Interaction of CD4+ T Cells with Influenza Viruses: Defining Host Responses from Reservoir Viruses

The Network:

Influenza is a respiratory infection caused by an RNA virus that can cause serious illness in humans. Influenza vaccines are not universally effective, they do not work with all viral strains, and the protection they afford is short-lived. This is a pressing need for improved therapy. CD4+ T cells, part of our immune system, play a key role in fighting off influenza infections. This PhD scholarship investigates how T cells respond to peptides from conserved viral proteins, such as peptides that serve as targets for universal influenza vaccines and provide a platform for improved vaccination strategies that can generate highly effective immune responses.

Research Impact:

NRF funding has:

- Led to the publication of a paper in Nature on the project results.
- Led to further investigations into the immunological findings of the project in the career setting.

The Network:

- The postdoctoral position for Alex Godin and Ireen Galkovska working on their project.

"The project was about to be published in a high-impact journal. The results could be used to inform new strategies for the treatment of influenza infections."

Alex Galkovska-Winther

PHD STUDENTSHIP:

Prospective cancer cells require a Rub-35dependent endosome population for ontogenic activation and tumor growth.

Vincenzo Young, Dr Abdul Qayyum, Dr Jane Woodfair, School of Medicine, Cardiff University

The Network:

Prospective cancer cells (PCCs) are the most frequent male cancers, with around 40,000 new cases and 10,000 deaths annually in the UK. It is unclear why some prospective cancer cells are more aggressive than others. The team has found that the release of exosomes (complex lipoprotein-bilayered vesicles) from prostate cancer cells may be involved in enhancing tumor growth. Exosomes are small vesicles, less than 100 nanometers in diameter, that are released by cells and have been implicated in the formation of blood vessels to feed and promote tumor growth. The results of this study suggest that the release of exosomes by prostate cancer cells may be a potential target for future therapeutic interventions.

Research Impact:

- The funding has allowed the team to develop new diagnostic techniques and expand the research. The team has been invited to present their findings at international conferences, and the team's research has been featured in numerous medical journals.

Vincenzo Young

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Vincenzo Young
PHD & POSTDOCTORAL PROJECTS

TACKLING GYNAECOLOGICAL CANCERS

A precision medicine approach at Swansea University.

AOC targets frontline 4K high-throughput screening method to target vaginal cancer.

Dr Roberta Fothergill & Dr Dejanca-Gonzalez, Medical School, Swansea University, (Postdoctoral Impact Project)

Antibody-drug conjugates for gynaecological cancers; Belen Pan Castillo (PhD Student/Staff)

The Urgent Need

Antibody-drug conjugates (ADCs) are a new model for novel targeted cancer therapy in patients with advanced metastatic cancers. ADCs are designed to deliver a cytotoxic payload with high specificity and low toxicity to cancer cells, allowing for improved treatment outcomes with fewer side effects compared to conventional chemotherapy. However, there is an urgent need for effective and targeted therapeutic approaches for ovarian cancer.

Research Progression

The NRN impact project was based on 2 initial NRN projects: a Ph.D. Studentship which established screening technology and expertise for ADC research and a postdoctoral project which identified novel targets through in silico screening.

The main objective of these projects was to develop on Antibody-drug Conjugates (ADCs) as a targeted therapy for the treatment of ovarian and endometrial cancers.

Research Impact

NRN funding has generated:

- Research Impact: Belen Pan Castillo

POSTDOCTORAL PROJECT

Delivery of osteoinductive molecules from acrylic bone cement to encourage reparative bone repair around cemented joint replacements.

Dr Wayne Nabi Ayo

The Urgent Need

Joint-related problems such as osteoarthritis are one of the most common conditions experienced by elderly patients. The increase in the elderly population and a rise in osteoporotic fractures amongst the younger population in the UK poses significant problems for health care services. The increasing demand for treatments and prostheses, especially hip, knee, and elbow replacements, has placed a significant burden on the NHS to provide timely treatment related to joint and bone repair after surgery.

Research Progression

Dr Wayne Nabi Ayo secured the NRN postdoctoral project funding at Cardiff University, with the aim of enhancing an antibiotic delivery system to encourage bone growth around cemented joint replacements. By delivering a growth factor which would increase the rate that cells could create new bone material, the delivery system was originally developed and patented by University of Wales PhD students at the School of Chemistry, University College London (UCL) & Pharmaceutical Sciences, Cardiff University.

Research Impact

NRN funding has generated:

- An additional £240,000 research funding, including a Life Sciences Bridging Fund award of £72,000 to further optimise the delivery system scale up manufacturing processes, begin the process of regulatory approval and develop a clinical trial, which will significantly enhance the commercial potential of the system.
- The NRN Annual Scientific Congress, the formation of new collaborations with the School of Medicine at the University of Birmingham.

Dr Wayne Nabi Ayo
POSTDOCTORAL IMPACT
PROJECT

Discarded development of a novel therapeutic for the treatment of inflammatory lung diseases

Professor Caroline Hall
Professor Donato Riccardi
Professor Paul Dobson
Bristol-Myers Squibb

The Unmet Need

Asthma and chronic obstructive pulmonary disease (COPD) are predicted to be the third most common cause of mortality worldwide by 2030 (WHO). The available treatments - corticosteroids and bronchodilators - only target the symptoms of disease and many patients suffering from asthma are resistant to standard therapies. The Bristol-Myers Squibb team aim to develop a novel therapeutic approach to fight disease progression and to alter the lung function.

Results: A protein called Cation Sensing Receptor (CaSR) has been identified for being integral to the pathogenesis of inflammatory lung diseases. Drugs called "atadins" inhibit this protein and open up a completely novel avenue for the treatment of these diseases by targeting one of their root causes (Kerver et al, Sci Tha Med 2020). This novel therapy has IP protection awarded by Cardiff University and King's College London

To allow full commercial and therapeutic realisation of this new therapy, the NRN provided funding and support to market the technology in preclinical and preclinical phases of drug development. This will enable the successful identification, synthesis, and biological evaluation of a novel calcitriol.

Research Progression

The Postdoctoral Project and Impact Project, assisted by the NRN, funded the work to further develop and progress a preclinical application of the technology. The project aims to design and synthesise a novel calcitriol for the treatment of asthma and chronic obstructive pulmonary disease.

In Vitro Imaging of the Distribution in the Brain

PET imaging allows the assessment of brain tissues in order to evaluate drug development in the fields of Alzheimer's and other neurological disorders. This technology could also be applied to the pharmacological assessment of anti-asthma therapy thereby allowing a more targeted approach to treatment. Contact Professor Chris Marsden, Cardiff University - cmarsden@cardiff.ac.uk

PLATFOR TECHNOLOGIES

The Network has funded 13 Platform Technologies, enabling academics from across Wales to access cutting-edge equipment and foster collaborations. The technologies range from microfluidic devices to 3D printing and are highly sought after and have led to a significant increase in the number of paper/theses proposals submitted to the Network as well as collaborations with academia and industry.

PLANE TECHNOLOGIES

In Vitro Imaging of the Distribution in the Brain

PET Imaging enables the assessment of brain tissues in order to evaluate drug development in the fields of Alzheimer's and other neurological disorders. This technology could also be applied to the pharmacological assessment of anti-asthma therapy thereby allowing a more targeted approach to treatment.

Platform Technologies Award

In Silico platform to support drug discovery and development for SARS-CoV-2 (Postdoctoral researcher), Professor Andrew Brancato: School of Pharmacy and Pharmaceutical Sciences, Cardiff University

The Unmet Need

Drug discovery is a time-consuming and expensive process with 10,000 molecules developed reaching the market. The live virus is difficult to screen against, meaning that selective drugs are required to lower the burden of infectious diseases such as pneumonia, influenza, tuberculosis, and up to 1 in 3 NPIs. However, the use of computational technologies to design and screen for new compounds offers an advantage over traditional drug discovery approaches by being faster and cheaper, speeding up the entire drug discovery process. However, because of the technical complexity of these methods, CAAD techniques are often limited in the wider research community.

Research Progression

With expertise in this area, the School of Pharmacy and Pharmaceutical Sciences at Cardiff University was awarded an NRN Platform Technology grant to offer free support to a variety of drug discovery projects across Wales from different scientific backgrounds. The platform has been highly successful, resulting in new projects, generating preliminary data to support grant applications, producing intellectual property, and creating new collaborations across Wales and further afield.

Research Impact

The NRN funding platform gave me the invaluable opportunity to collaborate with excellent scientists from inside and outside Wales. It allowed me to develop a comprehensive understanding of the unique platform and led to various successful collaborations. The platform has had a positive impact on expanding my research portfolio and developing new collaborations across Wales and further afield.

Welsh Computer-aided Drug Design (CaDD) Platform

CAAD has often been indicated as a powerful tool to speed up the drug discovery process. In silico techniques, like molecular docking and de novo drug design, are becoming increasingly important as cheaper, faster, and more effective methods. The platform has allowed Welsh researchers to access a suite of methods, from hit identification to lead optimisation.

Development of a PDx platform for Drug Discovery and Studies of Disease Biology in Wales

The platform establishes PDx models across multiple species through direct collaboration with Welsh-based researchers with expertise in these core fields. This will provide pre-clinical testing of potential therapies and biomarkers while also investigating biological mechanisms of cancer.

All Wales Cellular Biosensor Analysis Platforms

A real-time microfluidic biosensor system that can assess various physiological, biochemical, and kinematic interactions of cells. These technologies are sensitive and portable, allowing for the development and monitoring of drug development and disease progression.

Contact Professor Cathy Pullan, Swansea University - c.pullan@swansea.ac.uk

Research Impact

The NRN funding has:

- Resulted in 10 project collaborations across Wales, UK, USA, and Australia, including anti-cancer, anti-viral, hematological, paracoccidioidomycosis, and tuberculosis.
- Represented 6 publications with projects and presented at scientific conferences.

The NRN has funded technology that is integral to the successful delivery of the overall platform, allowing for efficient and effective drug discovery and development.

Contact Dr Salvatore Ferla, Swansea University - salvatore.ferla@swansea.ac.uk
Cancer Metastasis Modelling Platforms

Enables the testing and discovery of potential agents or molecules that are involved in metastasis. This involves an integrated programme of assays and tests, beginning with molecular discovery right up to in vivo testing. Researchers can benefit from excellent and one of a kind facilities being able to test and evaluate their potential therapeutics or agents.

Contact Professor Wei G. Jiang,
Cardiff University, wjiang@cardiff.ac.uk

Artifilabs Discovery and Development

Offers high throughput analysis of artificial candidate compounds.
The artificial platform seeks to address the lack of effective artificial drugs versus a number of drug pathways with significant social and global health impact, including cancer, dementia, Alzheimer's disease, and viral diseases.

Contact: Prof A Bruzzone, Cardiff University, tmoelk@cardiff.ac.uk

"The NRN-funded platform gave me the invaluable opportunity to collaborate with several world-leading biomedical scientists, develop closer links with research institutions and other forming networks with a number of external organisations. I believe that this level of collaboration has had a positive impact upon my career, in the geriatric and translational research field and in developing and delivering my research potential management tools."

Dr Salvatore Ferial
Welsh Composite adiabatic Drug Design Platforms

"NRN funding has allowed us to establish inter-departmental collaborations with world-leading academics and pharmaceutical companies, which has resulted in closer links with research institutions and other forming networks with a number of external organisations. I believe that this level of collaboration has had a positive impact upon my career, in the geriatric and translational research field and in developing and delivering my research potential management tools."

Dr Edgar Hartshorne
Welsh Composite adiabatic Drug Design Platforms

TOwards COMMERCIALISATION

WORKING WITH THE LIFE SCIENCES BRIDGING FUND

The network argued the case for a Bridging Fund to optimise the probability that successful research opportunities could be "advanced towards commercialisation". Since its inception, the Bridging Fund has enabled the network and the network's members to advance the translation of research opportunities. The Bridging Fund has supported a number of projects, including the development of novel protein drugs, therapeutic antibodies, and small molecule therapeutics.

"I was fortunate to be awarded a 12 month postdoc contract grant, together with my colleagues, to continue research on the Bridging Fund project. I am delighted to report that the project has been successful and that we have been able to translate our research findings into a commercial product.

Professor Paul Dyson
Network bridging Project and Bridging Fund Award Holder, Swansea University

Contact: c.w.smyth@bridgetfund.wales

TIZIANA LIFESCENCES

Network funding has helped to strengthen commercial endeavours.

"After founding Tiziana LifeSciences on the basis of our early drug development project, we sought Network funding to help support our growth. We are now a company with a strong record in developing innovative drugs, which are currently in clinical trials. This success is due to the support we received from the network, which has been crucial in helping us to reach our goals.

Dr Richard Clarkson
Cardiff University

ANNUAL DRUG DISCOVERY CONGRESS

The Annual Scientific Congress takes place in the autumn and provides a key focal point for the drug development community. It brings together researchers and professionals from industry and academia to discuss the latest advances in drug discovery and development.

"GRAND funding is a great way to support innovation and foster collaboration. The Annual Congress is in line with our vision for the network to be a hub for interdisciplinary work that brings together experts from different fields.

Dr Ian Fallin,
Cardiff University

ENDEAVOUR AWARDS

Network Endavour funding provides a small amount of funds to support network development activities. The network has funded a range of activities, including workshops and meetings, focusing on a range of topics, from guidance in writing competition funding proposals, to building collaborative networks in different areas.

Visit the website for more information:
www.bridgenet.ac.uk/what-we-do/fund/endeavour

ENGAGEMENT

The network has engaged in a variety of STEM events where NRN members have interacted and celebrated with members of the public through the demonstration of drug discovery activities.

Engagement Event: July 2017
NRN PROJECTS CO-FUNDER
CONTRIBUTORS £2.7M

GE Healthcare

ReNeuron

Leukaemia cancer society

Qbiotics

Biocytex

LSTM

Cancer Research UK

GEOGRAPHICAL DISTRIBUTION
OF PROJECTS

Network Overall

Awards: 130
Applications: 439
Success Rate: 30%

Bangor University

Awards: 9
Applications: 32
Success Rate: 28%

Aberystwyth University

Awards: 13
Applications: 35
Success Rate: 37%

Swansea University

Awards: 24
Applications: 72
Success Rate: 33%

Cardiff University

Awards: 95
Applications: 27%
Success Rate: 38%
RESEARCH PROJECTS

ONCOLOGY

PhD Studentships

Novel B7-H1 Inhibitors – Target Validation And Anti-Antigen. Least Distinctive, Daniel Tamburrini, Cardiff University: Supervisor, Dr G. Delves

Targeting regulators of autophagy as a mechanism to enhance cancer-associated neutrophil activation and disease progression. Vincent Young, Cardiff University: Supervisor, Dr A. Clayton

Role of DNA repair, targeting treatment with Gemcitabine and other nucleoside analogues. Lennard Blondiecas, Bangor University: Supervisor, Dr H. Bulte

Antibody-drug conjugates for gynecological cancers. Maha Panesar, Swansea University: Supervisor, Dr G. Gonzales

Developing novel reagents to target the DNA damage signal associated with Akt activated colorectal cancer. Marie Konstantopoulou, Cardiff University: Supervisor, Dr W. S. Meekley

Characterisation and targeting of cancer stem cells in high-risk myelodysplastic syndrome that transforms to acute myeloid leukemia. Iain Gonzales, Cardiff University Supervisor, Dr S. Radley

Distrososidase, the synthesis of phosphonate analogues. Ciaran McEvoy, Cardiff University: Supervisor, Dr F. Pertout

Comparison of development: growth and differentiation: Antibody Drug Conjugate formulation: Implications for patient stratification: and precision medicine. Alastair Lewis, Swansea University: Supervisor, Dr J. Rees-Johnston

Combining cancer immunotherapy with anti-VEGF therapy for improved cancer target therapy. Weiming Xu, Cardiff University: Supervisor, Dr S. Coates

Testing a novel chemotherapeutic delivery system using two dendronized dual-modality prodrugs. Patrick Bell, Bangor University: Supervisor, Dr C. Owens

Development of immunity modulators for preventing immune suppression by cancer associated LAG-3/CD47 T-cells. Georgina Mason, Cardiff University: Supervisor, Prof A. Goddard

Evaluation and development of an antibody-drug conjugate for prostate cancer. Thomas Noyce, Trinity Western University: Supervisor, Prof S. Coates

Targeting of extrinsic- I3 receptor (ELDP3) expressing pancreatic cancer by a novel bivalent mAb for pancreatic Cancer. Benjamin Blackshaw, Swansea University: Supervisor, Prof N. Radford

Design and synthesis of a novel anticancer compound: an exploratory approach; a phase 1 trial in DRC patients.

Small multifunctional anticancer agents with biodegradable and dual responsive (ph + temperature) properties. From hypercrosslinked polymers for targeted cancer drug delivery. Chenie Bloch, Bangor University: Supervisor, Dr S. D. Tai

Targeting zinc signaling to prevent cell division in cancer. Declan O’Donoghue, Cardiff University: Supervisor, Dr S. W. Allan

Development of anti-cancer, T cells for targeting cancer. Cardiff University: Supervisor, Prof A. Sewell; PhD Aaron Wall

FOOD SCIENCE & RURAL INNOVATION

PhD Studentships

Developing HCMV as a vaccine vector. Gabriela Stiftmueller, Cardiff University: Supervisor, Dr R. Stanton

Fundamental Research Projects

Multi-Modality Theranostics (MMT) – Towards personalized cancer therapies. Dr S. Charpie, Cardiff University: PhD Dr I. Tanfi

Bacterial-mediated RNA interference as a new therapy to target advanced prostate cancer. Dr T. Morris, Swansea University: PhD Dr P. P. Dyson

Targeting all-crypts (CALP): a possible novel strategy to improve triple-negative breast cancer growth. Dr R. P. Evans, Cardiff University: PhD Dr F. Coates

Continuing cellular uptake of enzymatically activated, custom-arginine: nanoparticle conjugates. Dr P. Perrenisse, Bangor University: PhD Dr S. Coates

The use of 3D culture to test the efficacy of a novel enzyme for cancer drug metabolism. Dr T. Beaman, Bangor University: PhD Dr C. Dawson

Novel nanoparticle delivery of epigenetic modifiers: a targeted approach for endometrial cancer treatment. Dr N. Watson, Swansea University: PhD Dr S. Coates

Developing a stem cell containing 3D culture model for pre-clinical studies of colorectal cancer therapies. Dr N. Evans, Cardiff University: PhD Dr F. Coates

Evaluation of Tropilmachina as a therapeutic and target and diagnostic tool in human prostate cancer. Dr S. Owen, Cardiff University: PhD Dr W. G. Jones

Development of novel ADC/CD200 vaccine to target myeloma. Dr L. Edwards, Cardiff University: PhD Dr S. Taylor

Evaluation of novel ADC/CD200 vaccine to target melanoma. Dr L. Edwards, Cardiff University: PhD Dr S. Taylor

Development of a novel ADC/CD200 vaccine to target melanoma. Dr L. Edwards, Cardiff University: PhD Dr S. Taylor

Future Potential Treatments for Current Medical and Veterinary Need

From potential to treatment of experimental breast cancer. Dr S. Rankin, Cardiff University: PhD Dr A. Walkett

Discovery of novel site-specific FAK inhibitors for potential treatment of metastatic breast cancer. Dr S. Rankin, Cardiff University: PhD Dr A. Walkett

Discovery of novel site-specific FAK inhibitors for potential treatment of metastatic breast cancer. Dr S. Rankin, Cardiff University: PhD Dr A. Walkett

Developing targeted workflows for advanced prostate cancer. Dr T. Curtis, Cardiff University: PhD Dr A. Parker

Evaluation of biomarkers and antiangiogenic therapies in prostate cancer. Dr S. Curtis, Cardiff University: PhD Dr A. Parker

Sensitising to radiotherapy - pre-clinical evaluation of a novel immunisation for advanced breast cancer. Dr A. Shackleton, Cardiff University: PhD Dr A. Shackleton

Advancing analogues of a novel of FLP inhibitor into clinical trials. Dr T. Jones, Cardiff University: PhD Dr S. Taylor

PhD Studentships

Modelling motor neuron disease using patient derived iPSC cells for novel therapeutic discovery. Dr C. Gilmore, Swansea University: PhD Dr T. V. Lewis

The design synthesis and evaluation of novel agents acting in the CNS. Peroulis / Prof A. Bramante

Improved regulators for multiple sclerosis. Dr F. P. Cerwal, Cardiff University: PhD Prof A. Bramante

Investigating the potential of the sphingomyelin-3 phosphatase receptor 1 modulators for the treatment of spasticity disorders. Dr N. Sivas, Cardiff University: PhD Prof A. Bramante

Investigating a novel therapy for Alzheimer’s Disease in a mouse model of amyloid pathology. Dr C. Evans, Cardiff University: PhD Dr E. Kall

Long life imaging probes for Dementia Patient Stratification. Dr D. M. Morris, Cardiff University: PhD Prof A. Bramante

Validation of novel models of a novel approach to local tumour ablation based on EBV signalling interruption. Dr L. Mokbel, Cardiff University: PhD Prof A. Bramante

Development of a bispecific receptor targeting model for SGC isolation p120 polyclonal-positive Mycotic Pathogens. Dr M. Taylor, Cardiff University: PhD Dr E. Kall

Artisanic protein – PHA-conjugates as novel antimicrobial agents. Dr B. Aslam; Dr L. Rahman; Dr E. Kall

Computer aided design and synthesis of novel antimicrobial agents. Dr R. S. A. H. Mathew, Cardiff University: Supervisor, Prof P. Bramante

Evaluation of bacterial infection-resistance in bladder cancer and colon cancer stem cells in TUM4. Dr T. Jones, Cardiff University: PhD Dr S. Taylor

PhD Studentships

Neuroscience

Development of a gene driven neurodegenerative focussing on stem cell defects. Dr A. H. T. McMillan, Cardiff University: PhD Dr G. Delves

Regulation of brain derived neurodegenerative focussing on stem cell defects. Dr A. H. T. McMillan, Cardiff University: PhD Dr G. Delves

Pharmacological manipulations of cell survival pathways therapeutic approaches for Huntington’s Disease. Kyle Rees, Cardiff University: Supervisor, Prof R. Branca

Ewing sarcoma pro-drugs as a new therapeutic opportunities. Edward James, Cardiff University: Supervisor, Prof A. Bramante

Treating progressive Multifocal Scleorosis using a novel repurposable and anti-inflammatory approach. Lewis Waters, Swansea University: Supervisor Dr S. Haddock

Investigating novel small molecule enzyme inhibitors for treating cognitive decline and age related macular degeneration. Dr J. Doherty, Swansea University: Supervisor Dr S. D. Stevens

Developing a new small molecule therapies for common neurological disorders. Rachel Bowes, Aberystwyth University: Supervisor Dr S. Koleblik

Novel drug therapy for Motor Neurone Disease. Laura Brown, Aberystwyth University: Supervisor Dr S. Koleblik

Drug-discovery for a new model of Alzheimer’s Disease. Francesca Rowland, Aberystwyth University: Supervisor Dr S. Koleblik

Radiosynthesis of 18F-labelled pro-motoxides (Ph 1-3) for emission tomography (PET). Dr I. Imaging, Alexander Cserei, Cardiff University: Supervisor, Prof A. Mattay

Development of an in vivo model of Alzheimer’s Disease. Francesca Rowland, Aberystwyth University: Supervisor Dr S. Koleblik

PhD Studentships

Infectious Disease

Exposing the interaction of CD4+ T cells with influenza peptide derived from conserved viral proteins. Alex Grenfell-Baines, Rosalind-Wooster-Mission, Cardiff University: Supervisor Dr D. Cole

Rational design of antibody drug conjugate targets – unblocking ainnamon and acetate. Dr H. Innam, Swansea University: PhD Dr G. Delves

ADV targets from in silico high throughput screening for novel site-specific FAK inhibitors. Dr T. Tan, Swansea University: PhD Dr S. Coates

Antibacterial properties of synthetic flavines as antieubacteria and antifungal properties. Dr S. Kandik, Cardiff University: PhD Dr A. Walkett

Optimisation of FET-labelling strategies for anti-cancer navigation. Swansea University: PhD Dr N. Thomas

Discovery of novel site-specific FAK inhibitors for potential treatment of metastatic breast cancer. Dr S. Rankin, Cardiff University: PhD Dr A. Walkett

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Evaluation of biomarkers and antiangiogenic therapies in prostate cancer. Dr S. Curtis, Cardiff University: PhD Dr A. Parker

Sensitising to radiotherapy - pre-clinical evaluation of a novel immunisation for advanced breast cancer. Dr A. Shackleton, Cardiff University: PhD Dr A. Shackleton

Advancing analogues of a novel of FLP inhibitor into clinical trials. Dr T. Jones, Cardiff University: PhD Dr S. Taylor
Further prospecting and characterisation of novel antimicrobial from bovine metagenomes D1 002. A Wyns, Astractarch University, PhD Dr S. Raw.

Characterisation of novel antimicrobial peptides from the rumen eukaryotes D1 002. A Wyns, Abstractarch University, PhD Dr S. Raw.

Lytic transglycosylase: a potential Achilles heel for antibiotic-resistant bacteria D1 002. A Wyns, Abstractarch University, PhD Dr S. Raw.

Expression and activity determination of novel bestrophin-like peptides Dr A Allen, Swansea University, PhD Dr T. Wilkinson.

Targeting the terminal pathway in complement-driven disease Nicolae Zara, Cardiff University, Swansea University, Supervised: Prof P. Greaves.

Inhibiting IL-17 production by blocking endogenous RORyT agonist for the treatment of autoimmune diseases Darshita Daves, Swansea University, Supervised: Dr T. Wang.

Nanotechnology-induced prolonged antibacterial activity of antibiotic loaded PMMA bonecements Sainte Lattes, Cardiff University, Supervised: Dr P. Skjonnop.

Antimicrobial activity of NFL-derived antibiotics on human T cells Dr Y. Czehelskas, Swansea University, PhD Dr P. Nyat.

A rapid point of care system to manage/monitor drug treatment in therapeutically relevant mycobacterial infections Dr F. C. Carrier.

Countering the uncontrolled inflammation of sepsis by targeting the MAC-SST pathway. In human macrophages Dr M. Turner, E. E. Byers, Swansea University, PhD Prof D. Brown.

Development of a safer method for colorectal stoma-crawling to stop the propagation of Neoplastic or infected colorectal infections Prof Dr A. Ike.

Development of Novel-BMA sulphate based Nanoparticle Delivery system for brain chronic pain Prof Dr M. Balamuth, Cardiff University, PhD Prof M. Gambleton.

Novel antibacterial and antifungal natural products from Pseudomonas mendocinae Dr J. Overy, Aabstractarch University, PhD Dr S. Raw.

Antioxidant activity of rice bran extract Dr K. Rutledge, Swansea University, PhD Prof P. Greaves.

Further research on the bioavailability of S. garayensis in food samples Dr S. Raw, Aabstractarch University, PhD Dr S. Raw.

Mechanistic evaluation of the impact of Superparamagnetic Iron Oxide Nanoparticles conjugated with drugs (SPIONPs) on antitumor signaling/homoeostatic mechanisms. Michael Thewlis, Swansea University, Supervised: Prof P. Greaves.

Lymph node biopsy for metastatic disease Dr S. Raw, Aabstractarch University, PhD Dr S. Raw.

OTHER DISEASES OF UNMET MEDICAL NEED PhD Supervision

Small molecule mediated enhancement of hematopoietic stem and progenitor cell function in transplantation. Laila Iqbal, Cardiff University, Supervised: Dr R. Gillespie.

Position Emotion Terminophony (PET) for therapeutic antibody discovery implemented medicine. Geraint Bobra, Cardiff University, Supervised: Dr R. Gillespie.

Validation of RNAi as a potential tool in drug discovery for antiviral treatment of HIV/AIDS. Dr S. Raw, Swansea University, Supervised: Prof P. Greaves.

Selective Rho Kinase Inhibitors for the treatment of coronary artery disease, Alix Habby, Cardiff University, Supervised: Prof P. Greaves.

Structure-based design of human FZD4 selective small molecule modulators. Gaa Pisk Shape, Cardiff University, Supervised: Dr M. Young.

Pharmacological evaluation of novel gliptins as modulators of several fulminant renal diseases and the potential to ameliorate their underlying mechanisms of action. Shadi Dally, Cardiff University, Supervised: Dr M. Mosley.

Using cytokines to define biomarkers and therapeutic targets in neurodegeneration. Cardiff University, Supervised Dr K. Jones, Daniel L. PhD.

The Sêr Cymru programme is sponsored by Welsh Government and the Higher Education Funding Council for Wales and aims to build upon and enhance research in Wales. Our endeavour focuses on three Grand Challenge areas: of scientific excellence which also have particular relevance to business and society. These are: Life Sciences and Health, Low carbon, energy and environment, and Advanced engineering and materials. The 3 MNS will support collaborative research across these topics to realise a Welsh research landscape that is fully integrative and able to fully develop the potential of its research talent.

The Networks have worked in close cooperation to deliver a variety of events including an Annual Postgraduate Conference, as well as other joint endeavours including a University of Science event.

Contact details: Engineering Research Network Wales

Low Carbon Energy and Environment Network

NIRN Connects with a key note speaker: Vaughan Gething, AM at the Second Sêr Cymru Postgraduate Conference, September 2017

LEGACY

WALLES' LIFE SCIENCES SECTOR

The Life Sciences sector is one of Wales' fastest growing and most innovative industries, employing over 10,000 people in more than 350 companies and contributing around £2bn to the Welsh economy.

The Life Sciences Research Networks supports the breadth of drug discovery and development research in Wales, and are a key focus for the Welsh government.

The Network has helped launch the research careers of 56 PhD students and supported another 130 postdoctoral researchers in furthering their careers.

SÉR CYMRU NATIONAL RESEARCH NETWORKS

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