QUEEN'S UNIVERSITY BELFAST | CCRCB CENTRE FOR CANCER RESEARCH AND CELL BIOLOGY

Bulletin

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PRECISION MEDICINE OPENING

On Wednesday 10 April Queen's University Belfast officially opened the Precision Medicine Centre of Excellence (PMC), which will radically change the landscape of modern medicine in Northern Ireland and beyond.

The PMC is a new laboratory based at Queen's University Belfast campus, boasting state-of-the-art technology, which will bring together high-throughput genomics, artificial intelligence and big data analytics in a fully integrated fashion.

Professor Manuel Salto-Tellez said, "No longer a 'one size fits all', we have seen a major shift towards precision medicine in recent years, focusing on tailored treatment for patients.

"The Precision Medicine Centre of Excellence will provide the necessary infrastructure to meet the increasing demands in the changing field of healthcare and industry in terms of technologies and expertise. The PMC has the potential to boost regional and national biotech companies in the space of artificial intelligence and genomics, while improving the lives of oncology patients across Northern Ireland and beyond. Our long-term vision for precision cancer medicine is that the NI biomarker industry is a key player in making sure that all cancer patients have access to high-quality, comprehensive and timely molecular characterization of their tumour to inform therapeutic and clinical management."

Precision Medicine Centre (PMC) is co-funded by Invest Northern Ireland, Queen's University Belfast and the Health and Social Care Research and Development Division of the Public Health Agency. It has already attracted over £4m in funding to the local economy and employs nearly 30 data analysts and scientists.

Speaking at the opening, Jeremy Fitch, Executive Director of Business Solutions, Invest NI said: "This Precision Medicine Centre will build on our internationally recognised excellence in oncology research and has a potential to generate licensing and collaborative deals with major pharmaceutical companies.

"The expertise and equipment at the Centre is already attracting the attention of overseas companies who are currently considering Belfast as their European location.

"The Centre will also be able to play a crucial role in future research to extend the use of precision medicine in other areas of healthcare."

Dr Janice Bailie, Assistant Director at the Health and Social Care Research and Development Division said: "I welcome the creation of the Precision Medicine Centre, which will be a pivotal part of the R&D infrastructure for Northern Ireland, bringing not only benefits in terms of growth of the local economy and new jobs, but most importantly, working towards the potential of precision medicine to create new diagnostics and treatments that will be more targeted to the benefit of individual patients."

Invest NI offered £5.8m of support in 2017 towards the creation of the new centre.

FAMILY HISTORY INSPIRES QUEEN'S RESEARCHER TO TACKLE OESOPHAGEAL CANCER

A leading scientist from Queen's University Belfast has been awarded over £855,000 from Cancer Research UK to find new ways to prevent oesophageal cancer and improve survival rates.

Dr Helen Coleman, Researcher and Senior Lecturer at the Centre for Public Health and Centre for Cancer Research and Cell Biology at Queen's University Belfast, has been granted the prestigious Cancer Research UK Career Establishment Award.

She says that she has been inspired to work in cancer research after several family members were diagnosed: "Both my parents received cancer diagnoses but thankfully survived. I also know about the devastating impact of oesophageal cancer after three members of my husband's family were diagnosed with the disease."

"One uncle is a survivor, after he was diagnosed early enough to be treated with surgery – but the family sadly lost his other uncle and our sister-in-law's father to the disease, both within two years of their diagnosis."
Approximately 9,000 people in the UK and 200 people in Northern Ireland are diagnosed with oesophageal cancer every year, and less than one in five will survive for at least five years after diagnosis. Over the next six years, Dr Coleman will analyse data from around 20,000 Barrett's oesophagus patients and over 3,000 oesophageal cancer patients.

Barrett's oesophagus, a condition where some of the cells lining the food pipe have started to change is much more common. In a small number of people (1 in 200 annually) these cells may develop into oesophageal cancer over time. Northern Ireland has the only population register in the world of everyone in the country who has been diagnosed with Barrett's oesophagus and this data will form the basis of her study. Dr Coleman will investigate the impact of new endoscopic methods that have been introduced to monitor and treat Barrett's oesophagus.

Previously the only potential intervention for early change in Barrett's cells, called dysplasia, was surgery. This was considered an extreme measure for patients who might never develop cancer but in the past few years new techniques have enabled altered cells to be removed during endoscopic examinations. Dr Coleman will study whether the availability of these new treatments has meant that doctors now are more likely to accurately diagnose dysplasia in Barrett's patients, and therefore potentially prevent more patients from developing oesophageal cancer.

Dr Coleman will also work with data from the UK-wide Oesophageal Cancer Clinical and Molecular Stratification (OCCAMS) Consortium, which includes patients from Northern Ireland. She will look at the effects of lifestyle factors including smoking, alcohol and nutrition, as well as the use of medications such as aspirin on the survival of oesophageal cancer patients after completing common treatments like chemotherapy and surgery.

Dr Coleman explained: "Oesophageal cancer is difficult to treat because around three quarters of cases are diagnosed at a late stage. "It's fantastic to be selected for this career defining award and I am excited about working to find new ways to help prevent this cancer and new treatments to help patients survive for longer. Belfast is the leading centre in this kind of large population study and I believe that our work can really make a difference to patients' lives."

Sean Lennon, 68, from Portaferry, is Dr Coleman's husband's uncle. In 2010 he noticed he was having difficulty swallowing food and visited his GP. He was later diagnosed with oesophageal cancer and underwent chemotherapy and surgery to successfully remove a tumour in April 2011. Mr Lennon said: "I noticed that food was not going down properly and visited the doctor who referred me for a dye test and endoscopy which confirmed cancer of the oesophagus. Although it was a big shock I feel fortunate that it hadn't spread into my stomach, so I know I did the right thing by acting quickly when I noticed changes in my swallowing and I received excellent care throughout my treatment. It was a big operation, but I'm delighted to have responded so well to my treatment and to be able to enjoy life again. I'm so pleased that money is being invested in research in this area to help people who are affected by oesophageal cancer."

CCRCB OPEN DAY

As part of Science Festival 2019, Saturday 16 February saw the fourth CCRCB Open Day, where we welcomed visitors of all ages into the Centre to celebrate a decade of cancer research in Belfast. Attendees included patients and their families, supporters of the charities who fund research in the CCRCB and the general public.

Attendees could choose from a wide range of activities throughout the building. Senior scientists offered talks on the latest research updates in their particular speciality. There were lab activities, which also included informal chats with a researcher. Visitors were able to talk to the CRUK cancer research nurses and members of the NI Biobank. Epidemiologists from the Centre for Public Health had a stand with activities aimed at raising awareness of cancer prevention through lifestyle changes and information on supporting and preparing patients for cancer treatment. Our science interactive activities for all ages included the genetic taste test, extracting DNA from a strawberry and designing your own lab coat, to name but a few.

Representatives from the cancer charities and funders – Brainwaves NI, Cancer Focus NI, Cancer Research UK, Friends of the Cancer Centre, Leukaemia & Lymphoma NI, Oesophageal Patients Association, Prostate Cancer UK, QUB Foundation and the Movember Foundation, Almac and CV6 – all showed their support by having information stands and volunteers at the event.

The CCRCB Open Day Working Group, who organised the event, would like to thank everyone who participated, especially our PhD students who helped with the CRUK activities and lab tours and also to everyone who attended the Open Day.

QUEEN'S JOINS INNOVATIVE PARTNERSHIP TO DEVELOP FUTURE LEADERS IN BIG DATA

Queen's University Belfast have taken a major step forward in developing the future leaders who will use big data to drive improved healthcare and economic prosperity on the island of Ireland. Researchers at Queen's will join colleagues in the Republic of Ireland in the newly established Science Foundation Ireland (SFI) Centre for Research Training in Genomics Data Science. Led by the National University of Ireland Galway (NUIG) and involving partners in University College Dublin (UCD), Trinity College Dublin (TCD), the Royal College of Surgeons (RCSI), and University College Cork (UCC), the new centre will train the next generation of highly skilled genomics data scientists, who will harness the potential of genomics and data science to deliver improvements in heathcare and drive an innovation agenda for the economy.

Speaking at the meeting of the Irish Universities Association, which is being hosted at Queen's, Prof Ian Greer, Vice Chancellor and President of Queen's University Belfast said: "Genomics, Artificial Intelligence and Big Data are key areas of strength at Queen's. This Centre for Research Training is a very important development and shows how a collaborative approach across the island of Ireland can deliver real innovation for our citizens. I am very excited about this research and training partnership which will develop future leaders in genomics data science and strengthen research links across the university, healthcare and industry sectors on the island of Ireland

Commenting on the initiative, Prof Mark Ferguson, Director General Science Foundation Ireland and Chief Scientific Adviser to the Government of Ireland said: "I am delighted that Queen's University Belfast is becoming a partner in the SFI Centre for Research Training in Genomics Data Science. This is one of six new SFI Centres for Research Training, established in collaboration with industry, providing post-graduate training in the important field of data analytics and its application to business, health, agriculture etc. Through this new partnership, PhD students on the island of Ireland will able to participate in one of the best PhD student training programmes and employers will benefit from outstanding graduates."

Prof Mark Lawler, Chair in Translational Cancer Genomics at Queen's and Associate Director Health Data Research Wales Northern Ireland is the Queen's lead for this SFI Centre for Research Training. "Working together with our partners in the Republic of Ireland provides the opportunity for us to harness our complementary skills to make the island of Ireland an international hub for genomics data science. Engaging with the SFI CRT in Genomics Data Science represents a significant opportunity for QUB to participate in a world-leading research training initiative, enabling both academic and industry partnerships and providing an unrivalled opportunity to drive an all-island alliance in data science and data analytics that will have international visibility and impact," said Prof Lawler.

"We are delighted that Queen's has joined us" said Prof Cathal Seoighe, Stokes Professor of Bioinformatics, National University of Ireland Galway and Director of the SFI Centre for Research Training in Genomics Data Science. "This programme brings together key leaders from across the island of Ireland and provides the opportunity to harness the potential of genomics and data science so that large and complex datasets can be distilled into actionable insights and tangible outputs. The vision is to deliver transformative impact so that Ireland is globally recognised as the place to do genomics data science."

LET'S PREVENT THE PREVENTABLE – QUEEN'S RESEARCHERS HIGHLIGHT THAT THE TIME IS RIGHT FOR UNIVERSAL HPV VACCINATION

While it is widely known that human papilloma virus (HPV) infection causes cervical cancer, many of us do not realise that HPV is also implicated in other cancers, which occur in both females and males, including oropharyngeal and anal cancer, while HPV infection also causes genital warts in both sexes.

HPV-related oropharyngeal cancer (OPC) is the fastest-growing cancer in the UK, and will soon be more common than cervical cancer in both Europe and the US. An increasing number of countries currently vaccinate boys, as part of a universal strategy, including Australia, Austria, Bermuda, Brazil, Canada, Croatia, Germany, Israel, Italy, Liechtenstein, New Zealand, Serbia, and the US. However, despite mounting evidence, allied to advice from clinical, scientific and patient advocacy communities, the UK and the Republic of Ireland have been slow to move towards universal HPV vaccination.

Working with HPV Action, an advocacy group involving both patients and healthcare professionals and their "Jabs for the Boys" campaign and the Irish Cancer Society, Dr Gillian Prue from the School of Nursing and Midwifery and Prof Mark Lawler from the Centre for Cancer Research and Cell Biology, together with Dr Donna Graham, formally of CCRCB but now at the Christie Hospital in Manchester and other UK partners have been generating evidence to underpin the absolute need to deliver a gender-neutral vaccination programme which would provide significant protection and reduce mortality for both the UK and the Republic of Ireland populations.

Significant reductions in female HPV vaccination rates have occurred e.g. in Denmark, Japan and most recently the Republic of Ireland (51% uptake), although a recent high-profile government campaign in collaboration with the Irish Cancer Society, led to vaccination rates increasing to >60%. This reduction in vaccination rates means that the "herd protection" associated with high vaccination uptake in females is lost, leaving boys at increased risk of developing cancer and sexually transmitted disease.

Queen's research has shown that universal vaccination can not only help prevent cancer development but can also deliver significant health economic benefits. The additional cost of vaccinating boys in the UK would be £20-22M annually at most (<0.02% of the NHS annual budget). However, this is offset by the annual costs of treating genital warts (~£60M), HPV-related OPC (>£21M) and anal cancer (~£7M) – so £22M versus £88M – a £66M saving. Similar economic benefits can accompany a universal HPV vaccination approach in the Republic of Ireland. Wider economics benefits (increased productivity/earnings, enhanced tax revenue) would also ensue. Thus, universal vaccination can both save lives and yield economic savings for our healthcare system. The data that we generated has been a crucial component to the evidence base that convinced the UK government to recommend universal vaccination, and the Republic of Ireland has followed suit.

It is critical that universal vaccination is implemented rapidly and equitably across the UK, so as to spare the ~400,000 adolescent boys each year left unprotected against the serious life-threatening and health-debilitating diseases that result from HPV infection. Similarly in the Republic of Ireland, over 30,000 adolescent boys per year would be protected.

The lack of an effective screening approach for OPC specifically means that primary prevention via HPV vaccination becomes even more important for future generations. England, Scotland, Wales and the Republic of Ireland have all announced that they will commence vaccination of adolescent boys in September 2019. Unfortunately, no announcement as yet has been made in Northern Ireland, leaving these boys (and unvaccinated girls) at increased risk of HPV-associated disease. If and when Northern Ireland make a commitment to vaccinate boys against HPV, it is critical that they include a catch-up programme for those boys who will have been affected by the delay in decision making. We have at our disposal a way of preventing a disease that is now more prevalent than cervical cancer. Let's use it!

ULSTER FARMERS' UNION DINNER 2019

The Ulster Farmers' Union (UFU) has nominated the Queen's University of Belfast, Centre for Cancer Research and Cell Biology (CCRCB) as the president's charity for 2019. Mr Ivor Ferguson (President) said the choice reflected the fact that he, like many families across Northern Ireland, had lost someone to this disease.

Professor Chris Scott, Acting Director of CCRCB at Queen's University Belfast, said he was delighted with the UFU's decision to support the Centre's work. "Our research is wholly focused on improving outcomes for cancer patients in Northern Ireland and beyond. At the CCRCB, we work to understand the biology of cancer, improve treatments and train the next generation of clinicians and scientists. Despite the success of many new treatments, cancer incidence rates are increasing. The war is far from won and support from the UFU will help support the battle," he said.

Mr Ferguson said that each year with the nominated charity UFU members confirmed their generosity, regardless of the financial fortunes of agriculture. "It was important for me that we picked a charity close to home. The money raised and donated to CCRCB at Queen's University Belfast will go towards research here in Northern Ireland. Cancer is an awful disease that I'm sure has touched every UFU member's family. We are proud to be raising funds to help CCRCB's battle against cancer," he said.

The UFU annual dinner in April was the first fundraising event of the year and members raised over £3,000 on the night. There will be further opportunities throughout the year and the Centre for Cancer Research and Cell Biology at Queen's University Belfast is keen for UFU members to learn more about their work.

Head of Health Fundraising at Queen's University Belfast, Teresa Sloan said, "I am delighted with the generosity of the UFU's

members. The money raised will make a significant contribution to funding local research, clinical trials, staff and equipment at Queen's University Belfast CCRCB. This research is used to help improve outcomes and quality of life for patients in Northern Ireland."

A SCIENTIFIC HAT-TRICK: NORTHERN IRELAND SCIENCE FESTIVAL AT THE GRADUATE SCHOOL

A series of three events were hosted by Queen's at the Graduate School as part of the Northern Ireland Science Festival (NISF). On 14th February, Prof Mark Lawler delivered a public lecture entitled *"Rosalind Franklin, Barack Obama and the Irish Twists in the DNA Tale"* to a sell-out crowd (despite it being Valentines Day!). Mark shone a spotlight on a brilliant, dedicated scientist who was key to discovering the structure of DNA, yet did not receive the credit that she deserved. In this era of #MeToo, gender pay gaps, and gender inequity in science and medicine, Mark looked back at Rosalind Franklin's stellar career, her lack of formal recognition for the most outstanding discovery of the 20th century and her notable omission from the award of a Nobel Prize. Mark also highlighted the significant Irish contribution to the discovery of the "secret of life."

In the wake of the Cambridge Analytica scandal, people are worried about big data. But digital technology and its application to 'big data' has the capacity to transform the future of healthcare. So how do we use the power of big data while preserving the rights of the individual citizen? Queen's hosted a Public Forum (again with a sell-out crowd – who says science isn't interesting?) in the Graduate School with the provocative title *"What's the Big Deal with Big Data"* hosted by Prof Mark Lawler, CCRCB. The panel In this public forum was composed of representatives from patient groups, academia, healthcare and industry, and included Debbie Keatley, from the Northern Ireland Cancer Research Consumer Forum, Prof Cherie Armour from Ulster University, Prof Ian Young the Chief Scientific Advisor to the Department of Health and Dr Derek Hosty from Diaceutics. There was a lively debate on the key issues in big data and how to restore public trust so that the knowledge gained through this data, can bring benefits to patients and society. The Forum also highlighted some of the challenges and barriers that must be overcome before the transformative potential of using health data can be fully realised.

In the final NISF event, entitled *"Keeping the Person in Personalised Medicine"*, again hosted by Prof Lawler, academic experts such as Prof Manuel Salto-Tellez and Prof Stuart Elborn from Queen's and Prof Tara Moore from Ulster University, together with Dr Ian Banks, leading patient advocate and chair of the European CanCer Organsation, Dr Grainne McVeigh Head of Life Sciences at Invest Northern Ireland and Dr Peter Kerr from Almac Diagnostics participated in a panel discussion, sharing their thoughts on how personalised medicine, which is enabling precise and targeted treatments, can ultimately help provide improved healthcare for patients, while also highlighting the hype and increased healthcare costs that accompany the personalised medicine revolution.

QUEEN'S RESEARCHERS, IN PARTNERSHIP WITH ALMAC GROUP, PIONEER A PERSONALISED MEDICINE APPROACH TO THE TREATMENT OF OESOPHAGEAL CANCER

Researchers at Queen's University Belfast, in partnership with Almac Group, have, for the first time, developed a test to help clinicians decide the most appropriate chemotherapy for early stage oesophageal cancer. It is thought that the 'Personalised Medicine' approach could lead to more patients having their tumours successfully removed, improving their prognosis and quality of life.

For oncologists identifying the most effective chemotherapy to reduce the size of oesophageal tumours before they are operated on has been challenging. Dr Richard Turkington, Senior Clinical Lecturer at Queen's and lead author on the study explains: "The UK has the highest incidence in the world of a particular type of oesophageal cancer called oesophageal adenocarcinoma, with 16,000 cases each year. One-third of patients are diagnosed with tumours which have not spread and can be removed by surgery following a course of chemotherapy. However, less than one in five patients show evidence of shrinkage from the chemotherapy when their tumour is removed."

"In order to cure more oesophageal cancers we need to identify the most effective treatment for each patient to give them the best chance of all of their cancer being removed. At present we apply a 'one-size-fits-all' approach where everyone gets the same type of chemotherapy before their surgery. But we know that different chemotherapies work better for different patients so we need to match the right treatment to the right patient. This study highlights how we can use our molecular understanding of each patient's cancer to select the right chemotherapy to shrink their cancer."

Queen's developed a partnership with Almac Diagnostic Services to bring personalised medicine to oesophageal cancer. Almac Diagnostic Services has developed the DNA Damage Immune Response (DDIR) signature, previously known as the DNA Damage Response Deficiency (DDRD) signature, to personalise chemotherapy for breast cancer but further studies indicated that it may be applied to other cancer types. DDIR is a 44 gene signature which uses the level each gene is present in each tumour to generate a score for each patient. A high score indicates that the tumour has a higher likelihood of responding to chemotherapies which work by damaging DNA.

Professor Richard Kennedy, McClay Professor of Medical Oncology at Queen's and Global Vice President Biomarker Development at Almac Diagnostic Services commented: "This study highlights the benefits of close collaboration between academia and industry and the strong links between Queen's University and Almac in particular. It expands the indications for the DDIR signature to oesophageal adenocarcinoma and brings stratified medicine for patients a step closer in this difficult to treat cancer."

This research study is part of the Oesophageal Cancer Clinical and Molecular Stratification (OCCAMS) consortium led by Professor Rebecca Fitzgerald from the Medical Research Council Cancer Unit at the University of Cambridge and funded by Cancer Research UK. Professor Fitzgerald commented: "The OCCAMS collaboration is a UK wide network of centres for the collection of tissue samples and clinical information to study the biology and treatment of oesophageal cancer. A key aim of the consortium is to translate laboratory discoveries into clinical progress and this study is an example of using this knowledge to improve diagnosis and treatment for oesophageal cancer patients."

The research has been published in the prestigious journal Gut, one of the highest ranking gastroenterology journals in the world, and is freely available to the research community. The research team is continuing to test the assay further in other sample collections and through clinical trials.

This work was supported by the Gastrointestinal Cancer Research Charitable Fund administered by the Belfast Health and Social Care Trust, the Cancer Research UK Experimental Cancer Medicine Centre Initiative, Invest Northern Ireland and Almac Diagnostics. Tissue samples used in this research were received from the Northern Ireland Biobank (NIB).

The research paper is available here: http://gut.bmj.com/cgi/content/full/gutjnl-2018-317624

NORTHERN IRELAND JOINS NEW HEALTH DATA RESEARCH ALLIANCE TO TRANSFORM FUTURE HEALTH AND CARE

The NHS in England, Scotland and Wales along with Health and Social Care Northern Ireland, NHS Digital, Genomics England, Health Data Research UK, Public Health England and Clinical Practice Research Datalink (CPRD) have come together in an alliance to accelerate progress in medicine and health.

The UK Health Data Research Alliance will develop and co-ordinate adoption of tools, technologies and designs that enable the use of health data in a trustworthy and ethical way for research and innovation. Its founding members will formulate best practice and standards in areas such as privacy, transparency, public engagement, inclusivity and governance to ensure that health data is shared and used responsibly by researchers and innovators. For the first time, the Alliance will unite expertise to establish best practice in the stewardship of the UK's health data – including patient data from the NHS, genomic data and other molecular data – to enable faster, more efficient access for research at scale. This will speed up progress in science and medicine at a pace never achieved before in the UK.

By combining expertise and a shared commitment to work collaboratively, the Alliance will help researchers to address the most important health challenges faced in the UK, using and evaluating new tools such as artificial intelligence and machine learning. Data has a huge potential to enable discoveries that will improve healthcare services, transform knowledge of disease and drive improvements in diagnosis and care. Through the development of best practice, and by earning trust in health data use, the founding members of the Alliance aim to maximise this potential and ensure it benefits as many people across the UK as possible.

Health Minister, Nicola Blackwood, said: "The NHS has a unique data pool which has the potential to unlock solutions to some of the biggest challenges facing healthcare in the future. The new Alliance will create a framework for organisations to work to the highest ethical standards and enable responsible access to data across the health research community, improving patient outcomes and increasing public confidence."

Ian Young, Chief Scientific Advisor, Department of Health Northern Ireland, said: "We welcome the opportunity to work in partnership with other nations in the UK to develop best practice in relation to sharing and learning from health data, for the benefit of all of our populations."

Prof Mark Lawler Chair in Translational Cancer Genomics at Queen's University Belfast and Associate Director Health Data Research Wales Northern Ireland welcomed the formation of the new cross UK alliance saying: "This is a huge opportunity to work together to ensure that the precious health data resouces that we have in the UK are employed in an effective and responsible was for the benefit of patients, citizens and society. A data-enabed health agenda will deliver a transformational step change to medical research and its translation to best quality clinical care."

Professor Andrew Morris, Director of Health Data Research UK, said: "We are delighted to be working in partnership with colleagues and the public across the UK to identify best practice in how health data can be enabled for research. This will not only improve patient care, but also catalyse new discoveries that transform lives. Currently practice is often siloed and activities duplicated, wasting time and money. The Alliance will propel the UK into an international leadership position. It is not about creating a single data system – by banding together, we are creating a UK wide approach that will demonstrate the research power of health data."

QUEEN'S PROFESSOR DELIVERS KEYNOTE ADDRESS AT DUBAI HEALTHCARE CONFERENCE

Prof Mark Lawler, Chair in Translational Cancer Genomics in the Centre for Cancer Research and Cell Biology and Associate Director, Queen's University Belfast gave the keynote address at the Dubai Healthcare Conference in Dubai, United Arab Emirates (UAE). The theme of the conference was "*Fighting Cancer with Real World Evidence*". In the Middle East, cancer incidence is expected to double by 2030, with 4,500 new cases per year in the UAE alone.

In his talk, entitled "*Applying Data Science to Address Challenges in Cancer Care*", Prof Lawler highlighted how cancer is a ticking time bomb – by 2050, a European citizen will die from cancer every 10 seconds. Prof Lawler emphasised the critical importance of using an evidence-based approach to drive changes in cancer policy, so that the best cancer control can be available to all patients and at all stages of the cancer continuum. "We must make effective use of data in order to provide the evidence base required to help drive improved outcomes for our patients," he said.

He specifically focussed on the cancer challenges that are experienced by the citizens of Central and Eastern Europe, presenting data just published in the *European Journal of Cancer*. Working with Prof Richard Sullivan from Kings College London, Lawler's group have highlighted the critical need for National Cancer Control Plans to be developed and implemented in Central and Eastern Europe. A comprehensive analysis of research activity has demonstrated significant research gaps in Central and Eastern Europe, which is having negative impact on cancer outcomes for citizens in the region.

Prof Lawler also highlighted the emerging role of Health Data Research UK (HDRUK), the national institute for health data research for the digital world, in delivering 21st century healthcare. "We at Queen's, together with our partners in Swansea University are proud to be one of the 6 substantive sites of Health Data Research UK, delivering a programme of data-driven research to enable precision medicine and help modernise public health, through the development of a data-enabled ecosystem that enhances human health and wellbeing," he said. Prof Lawler provided a number of exemplars of how an interdisciplinary data-focussed approach had both informed cancer disease biology and helped enhanced cancer control.

Prof Lawler also highlighted how a data-driven strategy could enhance QUB's partnership with the Mohammed Bin Rashid University of Medicine and Health Sciences (MBRU). "Placing health data at the centre of a research partnership with our partners in the MBRU has huge potential to deliver new understanding of disease and foster an innovative partnership through enhanced health intelligence," he said.

BRAIN TUMOUR INFORMATION & SUPPORT
BRAINWAVES NI
WWW.BRAINWAVES-NI.ORG

BRAIN TUMOUR AWARENESS MONTH CELEBRATED AT CCRCB

Brain tumour research is a highly under resourced research area even though it is the leading cause of cancer deaths in children and adults under the age of 40. March is Brain Tumour Awareness Month and there is a pressing need to build capacity and develop research programs for brain tumour research throughout the UK. At CCRCB, the Brain Tumour Focus Group was established with the generous support of Brainwaves Northern Ireland (NI) and, more recently, the Robin Menary Foundation for Brain Tumour Research building on the vision of Mr Tom Flannery (Neurosurgeon, Royal Victoria Hospital, Belfast). The CCRCB Brain Tumour Focus Group is led by Professor Kevin Prise (Professor of Radiation Biology) and Dr Darragh McArt (Reader in Translational Bioinformatics).

The CCRCB Brain Tumour Focus Group aims to define the molecular mechanisms involved in brain tumour disease progression, recurrence and treatment resistance. In particular, it aims to characterise molecular signatures that can predict disease progression, survival and time to recurrence. Our research is identifying new biomarkers for early disease detection as well as new targets for drug development and/or repurposing. It is expected that this research should assist in improving patient diagnosis and treatment options as part of a precision medicine approach.

From left to right: V Janey Spence, Dr Caitríona McInerney, Kate Ferguson MBE, Dr Darragh McArt, Prof Kevin Prise and Sue Farrington-Smith MBE.

"Wear a Hat Day" at the CCRCB. From left to right: Nathan Brown, Kelsey McCulloch, Amy McCorry, V Janey Spence (Brainwaves NI/Robin Menary Foundation postgraduate student), Dr Kelly Redmond and Dr Caitríona McInerney.

VISIT TO CCRCB BY BRAIN TUMOUR RESEARCH

On 26 March, Prof Kevin Prise and Dr Darragh McArt hosted a visit from the UK Charity, Brain Tumour Research. The CEO of Brain Tumour Research, Sue Farrington-Smith MBE and Hugh Adams, Head of Publicity and Stakeholder Relations, visited CCRCB to discuss new opportunities for supporting brain tumour research at CCRCB. In attendance at the meeting were Brainwaves NI committee members Kate Ferguson MBE (NI Founder & Chair), Gordon Dickson (Secretary) and Julie Adams. Also in attendance from CCRCB were Dr Mehdi Jafarnejad, Dr Karl Butterworth, Dr Conor McGarry and Dr Caitríona McInerney (Brainwaves NI, Research Fellow). The meeting provided a great opportunity for the CCRCB to showcase progress and future plans for their Brain Tumour Research Programme. In addition, a round table discussion took place between Brain Tumour Research, Brainwaves NI and the CCRCB Brain Tumour Focus Group.

BRAIN TUMOUR RESEARCH "WEAR A HAT DAY" FUNDRAISER FOR BRAINWAVES NORTHERN IRELAND

As part of Brain Tumour Awareness Month, on Friday 29 March, CCRCB held a coffee morning fundraiser for the Brain Tumour Research "Wear a Hat Day". All the funds raised were donated to Brainwaves NI. Our grateful thanks to everyone who came along to enjoy some cake, coffee and to donate to the charity. Many thanks for the generous donations of baked goods and to Any McCorry and Deva (Seedevi) Senevirathne for their support in assisting the organisers V Janey Spence and Dr Caitriona McInerney. This fundraiser has been a great success with around £750 raised in the past two years. Thanks also to Clements for sponsoring the tea and coffee in 2018 and 2019.

BRAINWAVES TUMOUR INFORMATION EVENING FOR PATIENTS AND FAMILIES

Later on 26 March, a Brain Tumour Information Evening for patients and families took place at the CCRCB. This patient-focussed event was organised by the CCRCB Brain Tumour Focus Group in association with Brainwaves NI. Patients and their families had the opportunity to hear the latest updates in terms of treatment and research into brain tumours. Over 80 patients and their families were in attendance to this event, which was last held two years ago. Also in attendance were the Brainwaves committee members Kate Ferguson MBE (Chair), Gordon Dickson (Secretary), Julie Adams, Jennifer Arbuthnot, Brendan Grimes, Mo McDevitt, Scott McDowell and Sylvia Watt. Gareth Boyd, a representative from the Robin Menary Foundation for Brain Tumour Research, also attended.

The Brain Tumour Information Evening began with welcome addresses from Prof Kevin Prise and Kate Ferguson MBE. This was followed by presentations by two guest speakers. Mr Tom Flannery gave a clinical update on the latest developments for the surgical management of brain tumours (gliomas). He also discussed wide-awake surgery and continuously interacting with the patients to test their functions during surgery. Patients are asked to do simple tasks like wiggle their fingers and toes during surgery so that the surgeon can prevent damage to functionally important (eloquent) regions of the brain.

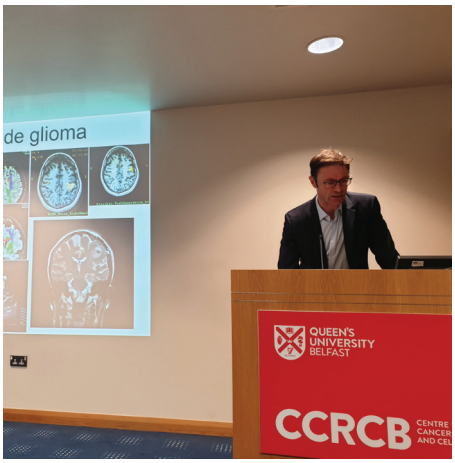
Next, Dr Conor McGarry presented information on the new stereotactic radiotherapy service which has been offered by Belfast Trust since January 2017. Prior to this date, patients had to travel to Leeds to avail of this treatment for brain metastasis. Prof Kevin Prise then gave an overview of the CCRCB Brain Tumour Focus Group and its research. This research group aims to accelerate the delivery of personalised medicine for malignant brain tumours (glioblastomas). The research focus includes understanding the genomics of primary and recurrent brain tumours and targeted radiation treatment modalities. Dr Caitriona McInerney then delivered a talk entitled "Understanding the genetics of brain tumours" where she presented some recent results from a collaborative study with the University of Bristol. Dr Darragh McArt then spoke about utilising state-of-the-art techniques to interrogate the molecular landscape of brain tumours. Dr McArt's research group in Translational Bioinformatics and spin-out company, Sonraí Analytics, are implementing artificial intelligence and deep learning to try to find a cure for cancer.

Prof Kevin Prise finished the Brain Tumour Information Evening with a special presentation to Brainwaves NI to celebrate the charity's 25th anniversary. Prof Kevin Prise congratulated Kate Ferguson MBE, on her fantastic contribution over the past 25 years in supporting patients and families affected by brain tumours. In addition, Prof Kevin Prise heartily thanked Brainwaves NI for all of their support to the CCRCB in recent years. In total, Brainwaves NI have generously donated over £400K towards brain tumour research at the CCRCB.

To round off the evening, patients and their families had the opportunity to gain an insight into the research taking place behind the scenes during lab tours of the CCRCB. Many thanks to Gaurang Patel, Dr Mihaela Ghita, Dr Kelly Redmond and Dr Pankaj Chaudhary who organised and led the lab tours and answered the visitors' many questions.

Overall the Brain Tumour Information Evening was a huge success and feedback was very positive. Visitors commented that they had "a fantastic night" and "enjoyed every minute of it". Visitors mentioned that it was "wonderful to see and hear about all the vital research that is being carried out" on "individualising cancer treatments for individual patients" with brain tumours. They also said that it was great to "see how hard all the professionals are working to try to find a cure" for brain tumours.

Kate Ferguson MBE delivering her welcome address at the Brain Tumour Information Evening at the CCRCB.



Mr Tom Flannery delivering his presentation on the latest clinical updates for the surgical management of brain tumours (gliomas).

Prof Kevin Prise provided an overview of the CCRCB Brain Tumour Focus Group.

Dr Darragh McArt delivering his presentation on applying "Integrated Analytics and Artificial Intelligence" for interrogating the molecular landscape of brain tumours.

CCRCB presentation to Kate Ferguson MBE, to celebrate the charity's 25th anniversary and to recognise all of Kate's good work. From left to right: Dr Caitríona McInerney, Kate Ferguson MBE and Prof Kevin Prise.

BIG DATA AND CANCER DOCTORS

On 26 February 2019, thirteen teachers and five CCEA staff members attended a Bioinformatics event entitled, 'Big data and cancer doctors'. The attendees expressed their thanks for the work which was put into the event and the wonderful hospitality provided. A spokesperson added, "It was great to get an insight in bioinformatics and the research that is being carried out. I particularly enjoyed the activity and think it may be something that teachers could use in the classroom."

ANITAB.ORG HOPPER LOCAL DUBLIN

Dr Jaine Blayney was invited to speak on her work in the application of data science to stratified medicine at the inaugural AnitaB.org (https://anitab.org/) Hopper Local Dublin (https://community.anitab.org/event/hopper-local-in-dublin/) on 27 February 2019 at One Microsoft Place in Dublin.

Hopper Local Dublin was a conference modelled after on the annual Grace Hopper Celebration. The conference brought together women technologists at all levels – along with leading companies from industry, academia, and research – to build relationships, learn, and advance their careers. Hopper Local Dublin will launch an AnitaB.org Local Community in Ireland.

To join: https://community.anitab.org/groups/dublin/

PORTRAIT UNVEILING

Last year, the University commissioned a portrait of our late Vice-Chancellor, Professor Patrick Johnston, to recognise his significant contribution to Queen's.

In February this year, the current Vice-Chancellor, Professor Ian Greer, hosted an event at Riddel Hall to unveil the portrait. This was attended by Paddy's family and friends and the artist, Mr Gareth Reid.

The portrait will hang permanently in the Great Hall alongside those of former Vice-Chancellors and Chancellors.

MINISTERIAL VISIT

Mr John Penrose, MP Minister of State for Northern Ireland visited the Centre of Excellence in Precision Medicine at the Centre for Cancer Research & Cell Biology at Queen's University Belfast on Monday 3 December 2018. The Centre of Excellence in Precision Medicine at Queen's University is developing an internationally accredited laboratory focusing on diagnostics which predicts a cancer patient's response to treatment and will further enhance the personalised medicine and oncology research sector in Northern Ireland.

MITCHELL LECTURE

Prof Scott and Prof O'Sullivan were delighted to welcome Professor David Dearnaley of the Institute of Cancer Research, London to deliver the annual Mitchell Lecture. Prof Dearnaley spoke about the progress in prostate cancer therapy in the past 21 years focusing on the clinical trials he has led in the field, in particular the CHHiP and STAMPEDE Trials. Prof Dearnaley had the opportunity to meet many of our scientists and had a particularly lively lunchtime session with some post docs.

WOMEN TECHMAKERS

Dr Jaine Blayney spoke on data bias within stratified medicine at the Belfast Women Techmakers (WTM) summit on 9th March 2019 at the QUB Queen's Computer Science Building, Belfast. WTM is Google's global program and brand for women in technology. As part of the global event series, a WTM Summit has been held in Belfast since 2016, in celebration of International Women's Day.

SCHOOL POSTGRADUATE RESEARCH FORUM

Thank you to all staff who contributed to and participated in the School's Postgraduate Research Forum which took place on Friday 9 November 2018 in Riddel Hall. The event included a series of talks on career opportunities as well as presentations by postgraduate research students.

The third year students took part in 3-2-1 presentations and the top student from each of the four sessions awarded a prize:

Abdul Akinoso-Imran, CPH
Aaron Green, CCRCB
Amy McCorry, CCRCB
Kim Tu Tran, CPH

The second year students took part in poster presentations with the top 8 presenting again for final judging.

First Place: Ciaran Fairmichael, CCRCB
Second Place: Katie Kerr, CPH.

Congratulations to all our finalists and all our students who took part.

NI SCIENCE FESTIVAL

Dr Jaine Blayney was part of a panel discussing AI in NI as part of the NI Science Festival, on 14 February 2019, at the Ulster Museum, Belfast. Together with Dr Austin Tanney - Head of AI at Kainos, Founder and organiser of the AINI group. Dr Tim Davison - CTO of BrainwaveBank, Daniel Crawford - CEO and founder of Axial3D, Jaine discussed where AI has come from, how it impacts us today and the near-term future of AI as it relates to everyday life, to government and to healthcare.

IRISH CANCER SOCIETY RESEARCH AWARDS

The vital work of cancer researchers and support staff was recognised at the Irish Cancer Society Research Awards.

The ceremony, held recently in Dublin's 'House of Lords', celebrated the achievements of some of the 100+ cancer researchers which, thanks to the public's support, are funded by the Irish Cancer Society.

In an evening where the public learned about potentially life-saving research projects and advances, four awards were presented:

- The Research Support Staff of the Year award went to Susan Nagle, Cancer Clinical Trials Research Nurse, University Hospital Limerick. Susan was nominated by her colleagues in Cancer Trials Ireland for her work in bridging the gap between patients and clinical trials, and was acknowledged for going 'above and beyond' in striving for patient care and well-being.

- Research Paper of the Year was awarded to Dr Aideen Ryan, an Irish Cancer Society Bowel Cancer Research Fellow, for her scientific paper: 'Stromal cell PD-L1 inhibits CD8+ T-cell antitumor immune responses and promotes colon cancer', published in the journal Cancer Immunology Research.

- Post-Doctoral (Senior) Researcher of the Year Award-winner Dr Emma Allott was the Irish Cancer Society's John Fitzpatrick Research Fellow. Her work in the US and Ireland focussed on the potential role of cholesterol in increasing the chances of developing prostate cancer, and whether statins – drugs which lower cholesterol – can tackle the disease.

- The PhD (Junior) Researcher of the Year Award was given to Dr Lisa Dwane of the Royal College of Surgeons in Ireland for her research finding new and better ways to treat a form of breast cancer driven by the hormone estrogen.

Lisa beat off stiff competition from fellow Irish Cancer Society-funded researchers Alexandra Tuzova and Dr Federico Lucantoni, after all three presented their research projects to a packed hall. Alexandra is in the third year of her Irish Cancer Society-funded PhD in UCD, which is all about finding new ways to spot prostate cancers that may become aggressive.

Federico recently completed his PhD in RCSI Dublin. His project looked at how maths can be used to predict a breast cancer patient's response to treatment, potentially saving them the harsh effects of treatments that may not be effective.

The Irish Cancer Society is the leading voluntary funder of cancer research in Ireland. Thanks to the public's generosity, the Society is on track to invest €30 million in cancer research in the decade up to 2020.

Opening the evening, Irish Cancer Society CEO Averil Power said: "Cancer research has long been at the centre of the Irish Cancer Society's work. Our motto is 'We won't give up until cancer does'. I don't think anyone encapsulates that spirit better than our funded researchers."

AWARDS

Bence Tasnadi, Karen McCloskey's Summer Research student, was awarded best poster at the Centre's Symposium and his project was selected out of all Nuffield studentships in UK (roughly 2500). He presented at the Royal Institute in December 2018.

Hajrah Khawaja won the prize for Best Post-Doc poster at IACR in February this year.

Hadil Suleiman won the Wiki Science Ireland photo competition in the category "Women in STEM". She took a photo of her colleagues while working in the lab of Dr Rich Williams.

AWARDS

Congratulations to Dr Christopher McCann who has been awarded the Roche Prize for 2018. Dr McCann, who is a post-doctoral research fellow in Professor Daniel Longley's research group, was presented with the award for £400 at the Centre for Cancer Research and Cell Biology on 29 January 2019. His winning publication was entitled "Cytoplasmic FLIP(S) and nuclear FLIP(L) mediate resistance of castrate-resistant prostate cancer to apoptosis induced by IAP antagonists' in Cell Death and Disease (2018) 9:1081.

The Roche Researcher of the Year Award was launched by Roche Diagnostics Ireland to highlight and support excellence in life science research within the academic centres of Ireland both in the Republic and Northern Ireland.

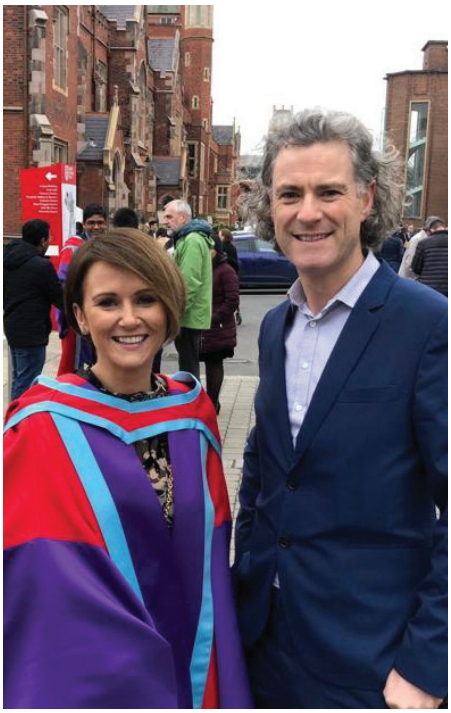
Julie McAlinden (Roche representative), Professor Christopher Scott (CCRCB Director) and Dr Melissa Wilson present the Roche prize to Dr Christopher McCann.

3RD YEAR SYMPOSIUM

The 3rd Year Symposium was held on 5 and 6 February this year. Pictured below are Charles Haughey (winner) with runners up Andrea Lees (right) and Judith Manley (left).

Both Charles and Judith will present at the 5th Annual Researchers Poster Competition in the Graduate School on 5 June 2019.

Angela O'Neill receiving her PhD at Winter Graduation. Angela is the first Therapy Radiographer in Northern Ireland to be awarded a PhD. The subject was the use of naturally occurring calcifications in prostate radiotherapy planning and it was supervised by Prof Joe O'Sullivan (pictured below) and Dr Suneil Jain.



IACR CONFERENCE

Dr Laura Feeney, Clinical Research Fellow in CCRCB, pictured with Margaret Grayson. Laura received the Professor John Fitzpatrick Award at the IACR conference in Belfast this year for presenting her research on the development of an early detection 'liquid biopsy' for ovarian cancer.

Laura also won 'Best flash poster' at the Post Doc Symposium on 22 March in Riddel Hall.

Matt Humphries received a seed funding award from the IACR (Irish Association for Cancer Researchers). The award was funded by a generous donation from AOIFA (Association of Irish Floral Artists). He was presented with the award at the conference dinner in the Europa Hotel in Belfast.

The award was to support a study on the development and validation of a novel immunohistochemistry method to improve the diagnostic molecular test of PD-L1 in lung cancer. The data generated will be presented at next year's IACR2020 in Galway.

The photograph below was taken at the event with Queen's Dr Niamh Buckley who was one of this year's IACR organising committee members.

DONATIONS

Festive Donations for Pancreatic Cancer

For the sixth year running, Wilfred Keys, his family, friends and community have raised funds for CCRCB by making and selling rustic reindeer and snowmen festive decorations. This year, they raised a fantastic £3,680 for pancreatic cancer research which Wilfred and his wife, Anne, presented to Heather Anderson, Centre Manager and Lotte Rietveld, Development Manager.

Thank you to Les Magee

Les Magee, a professional harpist, was inspired by her own experience with breast cancer to raise funds for Mr Stuart McIntosh's research at CCRCB. She raised an amazing £1,700 as well as raising awareness of the centre through her personal journey on social media and TV appearances.

Donnell Family Farm Day

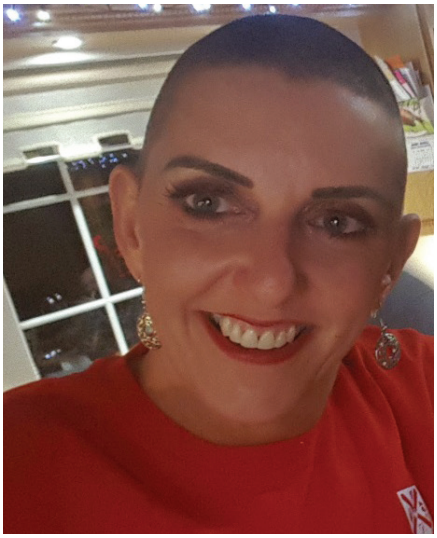
Derick, Sylvia and Hall Donnell held an open day on their farm to launch their new robot systems. Through the generosity of their suppliers and those who attended on the day an amazing £2,000 was raised for prostate cancer research.

The Mathews Family Scholarship

Now in its third year, the Mathews Family Scholarship is awarded to a medical student to undertake an intercalated degree MSc (Res) Cancer Studies focusing on breast cancer research. "Developing this scholarship has given me a wonderful opportunity to re-engage with Queen's Medical School," said Dr Mathews, when he met student Charles McGreevy and supervisor Dr Paul Mullan.

Oliver family funding for brain cancer

Margaret Oliver has raised an incredible £15,000 for brain cancer research, something that has touched her personally. She raised the funds for Dr Tom Flannery through coffee mornings, fayre stalls and a number of other events in Castlerock. Thanks also to the Castlerock Charity Crafters who donated a further £1,000 to her cause.



BRAVING THE SHAVE FOR QUEEN'S

My beautiful Mum, Margaret Nutt, was diagnosed with ovarian cancer at the age of 52 and fought the disease for 8 years - we were originally told her life expectancy was 6 months. However due to the research carried out and the development of new drugs, each time she required chemotherapy, an alternative drug was available which yet again eradicated the tumours. Drugs were available 4 years into her battle which were not available when she was diagnosed. My Mum was a fighter and a very strong and determined lady.

I decided to Brave the Shave on 30 October 2018 to raise valuable funds for cancer research carried out in Belfast for Northern Ireland. The research the Queen's Foundation supports brings together the best teams from Queen's University Belfast, the Belfast Health and Social Care Trust and other local organisations to help beat cancer sooner.

This is called Brave the Shave, but I am not brave: my Mum and those continuing to fight this terrible disease are the brave ones.

1ST YEAR SYMPOSIUM

The 1st Year Symposium was held on 4 and 5 June this year. Pictured above with Dr Nick Orr are Aoife Mc Cooey (winner) and runners up Tim Winter (left) and Jonathan Morgan (right).

PhD SUCCESS

Congratulations to our students who successfully defended their theses since our last Bulletin. Prof Chris Scott presented each of them with a pen on behalf of CCRCB.

L-R Hajrah Khawja, Christopher Connolly, Aidan Seeley and Fiammetta Falcone.

Congratulations also to Soraia Rosa (who is not pictured) and to Adam Uprichard for achieving his MPhil.

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RECENT GRANTS AWARDED

Investigator(s)	Sponsor	Title	Amount
Jain, Suneil., O'Sullivan, Joe	Belfast-Manchester Movember	Prostate Cancer Centre of Excellence	£1,500,000 in total (£685,000 to Belfast)
Jain, Suneil., O'Sullivan, Joe	HSC R&D	Clinical Prostate Cancer Research	£300,000
Lewis, Claire	Friends of the Cancer Centre Public Health Agency	Funding for a research assistant for a study: 'Informed Consent in Biobanking: a systematic review and discrete choice experiment'	£4,200 £5,000

ULSTER GAA SUPPORT PROSTATE CANCER RESEARCH

Ulster GAA are delighted to be "Supporting Prostate Cancer Research" with the Centre for Cancer Research and Cell Biology (CCRCB) at Queen's University Belfast (QUB).

Prostate Cancer Brief Facts
Over 4,500 men in Ireland are diagnosed with prostate cancer every year. In the UK, prostate cancer deaths have exceeded breast cancer deaths for the first time, with over 11,000 men per year dying of aggressive forms of prostate cancer. At present, 1 in 8 men will develop prostate cancer in their lifetime, with an increased risk for those aged 50 or more (the majority of cases are diagnosed in men aged 65+) or with a family history of prostate cancer.

How does prostate cancer present?
Prostate cancer is often diagnosed when men present to their GP with urinary symptoms, such as getting up more frequently at night to urinate, having an inability to empty their bladder completely or going to the toilet more frequently, throughout the day. It is important to note that whilst these symptoms can prompt investigations, more often than not, they indicate a benignly enlarged prostate. Many men are diagnosed with prostate cancer following routine checks in the absence of symptoms, most commonly, a routine blood test called Prostate Specific Antigen (PSA).

How is it treated?
Patients with localised disease within the prostate have a number of curative options available to them including surgery, radiotherapy, brachytherapy (seed radiation) and, in some instances, active surveillance whereby the cancer is low risk but monitored closely for signs of change. For some men, prostate cancer can spread to the bones and other parts of the body, rendering the disease incurable. However, even at this stage a number of newer treatments enable men to live with the disease for many years beyond diagnosis. If you have concerns about yourself or a family member, consult with your GP for further advice.

Prostate Research at Queen's University
The Prostate Clinical Research Team at QUB comprises of a team of Clinical Research and NHS Consultant Oncologists, coupled with expert scientific research from CCRCB. The team's ethos is to improve patient care through world-class clinical trials of new treatments. The Prostate Clinical Research Team is internationally renowned and has led the way in innovative trials which has improved treatment for many men, increased survival rates and reduced the side effects from treatment. In addition to improving education for patients and healthcare workers, the team supervises research from medical students, scientists, physicists and clinical doctors to sustain a culture of ongoing excellence in prostate cancer research. The team is dedicated to ensuring that our patients and their families have the best treatments at the correct time and that survival rates continue to improve.

Ulster President, Oliver Galligan, said "I am delighted to choose prostate cancer research as Ulster GAA's charitable cause for 2019. The reach of the GAA family will help to create greater awareness of the disease and help with early detection, while funds raised will go directly to world-class research being undertaken by Queen's University Belfast.

Dr Aidan Cole from CCRCB at Queen's University said "The Prostate Cancer Research Team at Queen's is delighted to form this strategic partnership with the Ulster Council GAA to improve education, diagnosis and management of men diagnosed with prostate cancer in our communities. We are proud of our strong links with the GAA community and endeavour to provide our patients with the best treatments available and lead in clinical trials that can transform the treatment of prostate cancer in the future."

Ulster GAA will be "Supporting Prostate Cancer Research" at the Ulster Championships in 2019, and throughout 2019-2020.

QUEEN'S UNIVERSITY BELFAST
Centre for Cancer Research & Cell Biology
School of Medicine, Dentistry & Biomedical Sciences
Queen's University Belfast, 97 Lisburn Road, Belfast, BT9 7AE
T: +44 (0) 28 9097 2760
W: www.qub.ac.uk/ccrcb