



Canolfan Ymchwil Canser **Cymru**
Wales Cancer Research Centre



Ymchwil Iechyd
a Gofal **Cymru**
Health and Care
Research **Wales**



2016-17 Annual Report



CONTENTS

Page 2	Introduction and foreword by Prof. John Chester
Page 3	Our leadership team
Page 5	Work packages
Page 12	Key achievements
Page 22	The Wales Cancer Partnership
Page 24	Conclusions



OUR PARTNERS



FOREWORD



It has been both a privilege and a pleasure to lead the Wales Cancer Research Centre in its first two years of operation. We have achieved much, and there are many exciting developments which are currently germinating and will bear fruit in the coming years. I am pleased to be able to share our progress with you over the coming pages.

For every £1 of funding received, the centre has contributed £6 to the Welsh economy. We have created new jobs, growing the scientific community in Wales. Most importantly, we have been able to deliver research that has influenced the care of cancer patients in Wales and beyond.

We have fostered meaningful collaborations throughout the nation between our seven partner

organisations. Our members of staff work within these organisations and it has been through bringing these individuals together that we have begun to spin a tighter knit community across Wales.

In addition to bringing these partners together, we work closely with the third sector and the pharmaceutical industry. Recent projects have also allowed us to work closely with organisations such as the Wales Cancer Alliance, the Wales Cancer Network and other members of Health and Care Research Wales' infrastructure.

Initiatives such as our Translational Research Committee and Multidisciplinary Research Groups are proving tools to researchers to enable them to elevate their research, while our Public and Patient Involvement ensures our research is relevant and valuable.

I hope you enjoy reading about our achievements, and keep up to date with our ongoing work.

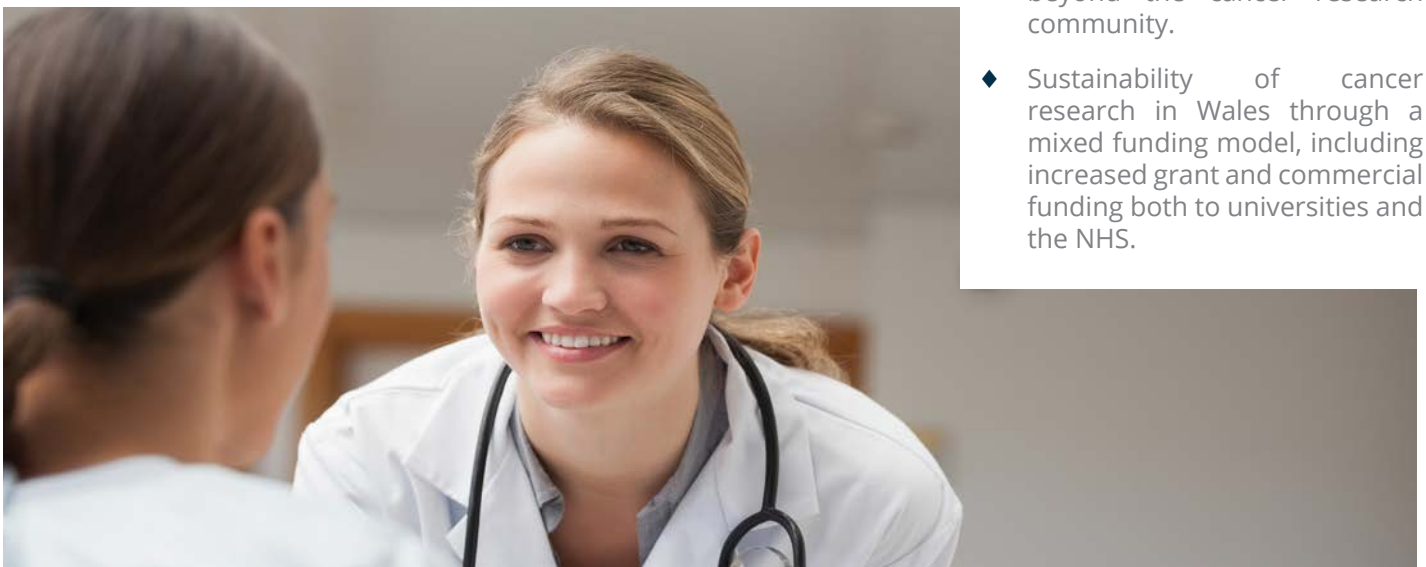
Prof. John Chester
Director

IMPACT STATEMENT

We will deliver a broad range of benefits, from individual patient health and wellbeing, through to improved policy, service configuration and delivery, population health outcomes and economic indicators. The broad range of our activities creates opportunities for impact across all areas of research.

The main types of impact are anticipated to include:

- ◆ Improved UK and international standards of care in oncological practice.
- ◆ More effective and efficient cancer service provision.
- ◆ Greater access for patients to world-class clinical trials research.
- ◆ Increased commercialisation, through patents, licensing agreements and spin-out companies.
- ◆ Enhanced patient and public awareness of, and involvement/engagement with, our research.
- ◆ Knowledge transfer within and beyond the cancer research community.
- ◆ Sustainability of cancer research in Wales through a mixed funding model, including increased grant and commercial funding both to universities and the NHS.



INTRODUCTION

“We will perform and support cancer research of the highest quality, across the translational spectrum, focusing on important areas of clinical need, for the short- and long-term benefit of patients and the public.”



The Wales Cancer Research Centre is funded by the Welsh Government and is a key part of Health and Care Research Wales' infrastructure.

We perform and support cancer research of the highest quality, which builds on Wales' international research reputation, with a clear focus on collaboration, innovation and improved patient outcomes.

Our vision is to work with cancer patients and other partners to develop and deliver research excellence which benefits the health and welfare of people in Wales and beyond.

Whilst Cardiff University is the lead grant holding institution, we have an all-Wales brief, working closely with: Bangor University, Swansea University, Aneurin Bevan University Health Board, Cardiff and Vale

University Health Board, Abertawe Bro Morgannwg University Health Board and Velindre NHS Trust.

We fund 47 part time staff across Wales and aim to improve collaboration in cancer research by bringing these staff and their colleagues together to improve cancer research across Wales. These staff members encapsulate a broad range of roles including research nurses, academics, clinicians, pharmacists, pathologists and biomedical scientists.

An External Advisory Board guides the centre in its work and includes 12 UK experts from across the cancer research spectrum. This board is chaired by Peter Selby (Professor of Cancer Medicine at the Leeds Institute of Cancer and Pathology), and it ensures that our research is of the highest quality

and internationally relevant.

The centre receives £4.5 million of Welsh Government funding over three years (2015-2018). This investment supports cancer research across Wales, in ten work packages, within our four broad research themes - Pre-clinical, Translational, Clinical and Community.



At the centre of our research sits our Public and Patient Involvement group. This group comprises of eight members of the public who are involved in all aspects of our work. At every stage of our research we aim to involve public and patient representatives. Ordinary people are not just the subjects of our work, but are involved in working with our researchers to plan, manage, carry out and publicise our work.

DIRECTOR
Prof John Chester



PUBLIC & PATIENT INVOLVEMENT

Public & Patient Involvement
Dr Jim Fitzgibbon
Dr Annmarie Nelson

COMMUNITY



THEME LEAD
Dr Anthony Byrne




Integration & Informatics
Prof David Ford



Palliative & Supportive Care
Dr Annmarie Nelson & Prof Simon Noble

Screening, Prevention & Early Diagnosis
Dr Kate Brain



CLINICAL



THEME LEAD
Prof Peter Barrett-Lee



Randomised Clinical Trials
Prof John Staffurth



Early Phase Trials
Dr Robert Jones & Dr Steve Knapper

TRANSLATIONAL

THEME LEAD
Prof Malcolm Mason



WORK PACKAGE LEADS

Stratified Medicine
Prof Richard Adams




PRE-CLINICAL

THEME LEAD
Prof Julian Sampson



Cancer Genetics & Genomic Instability
Prof Duncan Baird



Cancer Immunology
Prof Awen Gallimore



Signalling & Stem Cells
Dr Richard Clarkson



Drug Development & Model Systems
Prof Andrew Westwell



WALES CANCER RESEARCH CENTRE LEADERSHIP TEAM

PRE-CLINICAL RESEARCH

Cancer genetics and genomic instability

We aim to investigate cancer-causing mutations and apply this understanding for patient benefit. We identify mutations that lead to inherited forms of cancer and this may provide new genetic tests for families with these conditions. We are striving to provide a more detailed understanding of the consequences of genetic mutations for the origins and evolution of tumours and their responses to therapy.

Highlights:

- ◆ We have characterised the genetic changes involved in the development of inherited bowel cancer and cancer predisposition syndromes.
- ◆ We have found that sections of DNA called telomeres are a highly accurate indicator of how disease will progress in patients with the bone marrow cancer myeloma and pre-leukaemia myelodysplastic syndromes (MDS) (see page 12).
- ◆ Creation of a diagnostics company (TeloNostiX) to provide telomere-based testing for cancer patients. TeloNostiX is also raising funds to develop the health economic case for the adoption of the test within the clinical care pathway of patients with Chronic Lymphocytic Leukemia. In time the company will provide prognostic tests for Multiple Myeloma, Myelodysplasia and Breast Cancer.
- ◆ Grant capture of over £2.6M over two years.
- ◆ 21 publications in two years, 11 of which are high impact.
- ◆ We have worked in close collaboration with colleagues in the Wales Gene Park in providing essential bioinformatics support to 13 cancer research laboratories in Wales, in the last year alone.

Cancer immunology

We aim to harness the activity of the immune system to kill cancers, in much the same way as our bodies might fight a cold or infection. This strand of work builds on existing immune therapies such as anti-cancer vaccines, antibody and white cell therapies. Cancer Immunology is a rapidly progressing field which holds huge promise for treating patients with cancer. This effort is supported by massive worldwide investment.

Highlights:

- ◆ Achieved significant expansion in cancer immunology research capacity in Wales, partly by the acquisition of two new programme grants (£1.3 million from Cancer Research UK and £0.8 million from Cancer Research Wales) and seven PhD studentships over the last two years.
- ◆ Research outputs include 32 publications, five of which have appeared in high impact journals in the last two years. It is clear from publications and grants awarded that we are conducting cutting edge discovery science, we are progressing with academic-led clinical trials, and we are a presence on the national and international cancer immunology stage.
- ◆ Systems in the Community Cancer Research Open Day, held on the 25th June 2016 to share our research with the public. Excellent feedback received.



PRE-CLINICAL RESEARCH

Signaling and stem cells

We are conducting research to give us a greater insight into cancer stem cells as they are the main cause of tumour growth and spread. Molecular pathways in a cell determine whether or not it will act like a stem cell, and it is possible to turn these molecular pathways on and off. Our work in this area is developing new drugs that can do just that, in order to provide better-targeted treatments.

Highlights:

- ◆ Leverage of more than £2m in additional grant funding, including £1.1m from the third sector, and £520,000 in competitive grants from Welsh Government in the last two years.
- ◆ Since our launch, we have published 29 articles in international, journals, nine of which were high impact.
- ◆ Commercial exploitation of research has also been noteworthy, with three patents and associated industrial collaborations attracting an additional £203,000 in inward investment.
- ◆ New industry collaborations with GW Pharmaceuticals and Astra-Zeneca have been fostered. New national and international lab collaborations have been developed in Leicester and Milan.
- ◆ 150 sixth form students attended our engagement event *How do we develop new cancer drugs?* which was delivered in collaboration with our Drug Development and Model Systems work package (see page 13).

Drug development and model systems

We develop molecules that show potential in the lab, and test them in animals. Those that generate positive results will be progressed to the next stage, where we aim to deliver and test new drugs to patients, via clinical trials.

Highlights:

- ◆ In the last two years, £300,000 received in grants from the Welsh Government. 10 research papers published.
- ◆ A compound known as OH14 has been licensed by Tiziana Life Sciences, a British-based pharmaceutical company. Pre-clinical studies have shown it to be effective in eliminating a number of different kinds of cancers cells, including cancer stem cells from human breast cancer patient biopsies.
- ◆ Over 100 people attended a Drug Discovery and Development Day which we held in partnership with the Life Science Research Network of Wales.
- ◆ We were awarded the Cardiff University Innovation in Health Care Award for the "Development of a Novel Anti Metastatic Agent."
- ◆ Co-ordination of the development of a new drug to stop the spread of cancer is ready for clinical trial. A potential first-in-human clinical trial is planned in diseases such as triple-negative breast cancer and other difficult-to-treat cancers which are characterised by early cancer spread. It is expected that the drug will be delivered first to patients in Wales, by NHS Wales doctors, supported by our Early Phase Trials work package (see page 13).
- ◆ Discussions are underway to collaborate with the All Wales Genetics Service to test for tumour DNA found circulating in a patient's bloodstream as a clinical biomarker in the trial mentioned above.



TRANSLATIONAL RESEARCH

Stratified medicine

Stratification is used to identify a group of patients with shared biological characteristics in order to offer them tailored, more effective treatment plans. We support and facilitate the discovery of “biomarkers” to identify these groups. We will then progress our understanding of different characteristics of cancer into clinical trials and routine practice for the benefit of patients.

Our stratified medicine work is facilitated by the Wales Cancer Bank and the All Wales Genetics Service. The Wales Cancer Bank collects blood and tissue samples from consenting cancer patients in Wales and makes these available for researchers around the world.

Highlights:

- ◆ Close collaboration with the All Wales Medical Genetics Laboratories has seen delivery of UK-leading genetic tests which are already having an impact on patient care and therapeutic choices (see page 14).
- ◆ The set up of multidisciplinary research groups in Lung, Breast, Colorectal and Prostate cancers are helping to foster collaboration across the cancer community. Engaging with researchers, clinicians, pathologists and radiologists, the purpose is to discuss areas of research interest, formulate research proposals and inform the tailoring of sample collections (see page 19).
- ◆ A trial called SCOPE2 has opened with a Welsh Chief Investigator, and the first patients are being recruited in Wales. This is a national trial based on using the imaging technique of PET scans to mark patient response and adapt treatment strategy.
- ◆ During the last two years 1,913 patients have consented to donate their blood and tissue samples (9,707 samples), taking the total number of samples collected during the life-time of the Wales Cancer Bank to 132,980.
- ◆ Samples have been supplied to 24 projects this year, compared with 17 last year. A total of 3,053 samples have been issued, which is a 36.5% increase on last year.
- ◆ Influenced policy through contributing to the Wales Genomic and Precision Medicine Strategy.



CLINICAL RESEARCH

Randomised clinical trials

Randomised clinical trials are trials where the people being studied are randomly allocated to one or other of the different treatments under investigation. They are the gold standard trial design, allowing us to compare the effectiveness and possible side effects of different treatments. We bring together key research partners to improve access for patients in Wales to the latest treatments, through the design and conduct of trials involving drug, radiotherapy, hormone, immune and cellular therapies, separately and in combinations.

Highlights:

- ◆ Over £1.5m in funding has been awarded from local charities over the last two years.
- ◆ Successfully secured allocation of Moondance charitable funds for early phase drug and radiotherapy combination trials.
- ◆ There has been a successful application to a UK group known as CTRad to be involved in development of Phase 1 Radiotherapy combination studies in Non-Small Cell Lung Cancer.
- ◆ We have developed innovative clinical imaging studies, via close collaboration between NHS and academic professionals:
 - ◆ PEARL study – an early phase drug and radiotherapy combination study investigating head and neck cancer, facilitated by strengthened collaborations between PETIC, Velindre Cancer Centre, Cancer Research Wales, the All-Wales Medical Genetics Service and the Cardiff ECMC.
 - ◆ NCF study (Neurocognitive Function after Stereotactic Radiosurgery) funded by Velindre and involving state-of-the-art MRI facilities at the Cardiff University Brain Research Imaging Centre (CUBRIC), which has very recently recruited its first patient.
- ◆ Mentoring of new researchers by our two consultant oncologists is bridging the gap between the NHS and Universities and working across Wales to share learning about research capacity building.
- ◆ Building links with the Rutherford Centre, which will soon deliver proton beam therapy.

Early phase trials

We aim to improve access for patients in Wales who have solid tumours or blood cancers to the latest treatment options, via high-quality early phase trials. Our research will build on collaborations between cancer teams in Wales, leading to more new early phase studies being made available.

Highlights:

- ◆ Commencement of patient recruitment to two new multi-centre early phase studies (FURVA and MONOCLE), the latter being an example of translating Cardiff laboratory drug developments into a UK-wide clinical trial (see page 20).
- ◆ The first public presentation of data from the first half of the FIESTA trial was presented at the prestigious ASCO conference in Chicago. The trial is looking at the effectiveness of a drug called AZD4547 in combination with gemcitabine and cisplatin for treating tumours, including bladder cancer.
- ◆ We have achieved year-on-year increases in the number of open trials and patient visits. Numbers of cancer patients starting early phase treatment rose from 88 (2013-15) to 137 (2015-17), saving a calculated 300 days of patient travel time to the nearest equivalent trial units in Oxford and London.
- ◆ Four high impact journal publications and seven presentations at international conferences.
- ◆ Secured over £200,000 additional funding for translational research collaborations over the last two years.
- ◆ Fostering closer working between Velindre Cancer Centre and Cardiff & Vale University Health Board.
- ◆ Building our links with the pharmaceutical industry.
- ◆ Working closely with the Experimental Cancer Medicine Centre to increase our portfolio of trials and deliver improved drug discovery.

COMMUNITY RESEARCH

Palliative & supportive care

This area of our work differs from others as it focuses on patient and carer, rather than disease related outcomes. Our multidisciplinary team researches across all care settings (including social care settings), and are establishing a repository of existing research evidence. This work package engages with clinical teams and policy makers to speed findings straight into practice, and continue to develop high-quality public and patient engagement.

Highlights:

- ◆ Over £2.7m (including the funding mentioned below) has been secured during the first two years, across a range of study types and funders.
- ◆ The Marie Curie Palliative Care Research Centre has secured £2.1m from Marie Curie to fund the Centre's work for the next five years. This reflects the success of the Centre's first five years and its impact on the growth of the palliative care study portfolio in Wales, with increased patient access, and increased inward investment, to support palliative care research. (See more on page 14).
- ◆ 34 publications, 24 oral and 22 poster presentations given in the last two years.
- ◆ We have reported on best practice service models in rural areas for delivery of end of life and palliative care.
- ◆ Held a Social Care and Cancer Conference, bringing together experts in the field.
- ◆ Cariat study received £500,000 funding from the Health Research Authority. This study examines whether carer administration of subcutaneous medication for breakthrough symptoms in UK patients dying at home is feasible and acceptable. Led by Bangor University it will bring together researchers across Wales, as well as international partners in Australia.
- ◆ EAGLE Study: This study has allowed patients in follow-up in oncology clinics to be identified and referred for gastroenterology management of their late effects of pelvic radiotherapy. In usual practice, these patients would not have been identified (more on page 17).
- ◆ We have established a Position Statement on Social Care Research which includes a working definition of social care and social care research guidelines

that will help us identify research opportunities that we believe will result in improved social care, support, and better experiences for people with cancer, and their carers, in Wales.

- ◆ We have recruited 206 participants into our portfolio studies in the last two years.
- ◆ We have developed a Palliative Care Evidence Review Service (PaCERS), which is unique in responding to external clinical/organisational calls for evidence rather than itself defining the review agenda and which addresses a core principle of Prudent Healthcare. Four clinician-initiated reviews have already been completed and the End of Life Care Implementation Board for Wales aims to develop its relationship with PaCERS to inform its strategic objectives.
- ◆ Actively involved with Palliative Care Wales' End of Life Board.



COMMUNITY RESEARCH

Integration and informatics

We provide digital information systems to underpin the activities of the centre, including data management for clinical trials research.

Highlights:

- ◆ A new application, iConsent, is being developed to help facilitate gathering patient consent for blood and tissue samples donated to the Wales Cancer Bank (more on page 17).
- ◆ Supported the main Wales Cancer Bank system running within the NHS environment. Six web applications running on Swansea University servers.
 - ◇ This system has supported the following trials: Add Aspirin, Aristo, Focus4, Furva, Natt, Pin, Totem, Toucan, Stampede.



Screening, prevention and early diagnosis

Working closely with the PRIME Centre, our sister centre in the Health and Care Research Wales infrastructure, we aim to improve understanding of the motivations and behaviours which result in inequalities in uptake of screening programmes, particularly in high-risk, harder-to-reach groups. Through this research we aim to improve screening outcomes and expedite diagnosis, as soon as symptoms occur.

Highlights:

- ◆ £800,000 grant secured from Cancer Research Wales to develop and test educational interventions for GPs aimed at faster referral for suspected cancers.
- ◆ £486,000 received for the ABACUS trial funded by Yorkshire Cancer Research to evaluate the health check for increasing cancer awareness among adults living in disadvantaged communities (see page 16).
- ◆ Generated 16 publications
- ◆ Enhanced external profile of screening, prevention and early diagnosis research in Wales through:
 - ◇ Our LUSH study in lung cancer, supported by Cancer Research UK, which is being undertaken with Cwm Taf Health Board and clinical academic partners in Leeds, Liverpool and Scotland to understand influences on lung symptom perception, help-seeking and smoking behaviour among high risk groups.
 - ◇ A post-doctoral researcher prize at the recent Cancer Research UK Early Diagnosis Conference.
 - ◇ A Cancer Research UK Population Research Committee Fellowship to examine smoking trajectories in young adults.
- ◆ Welsh Government funding secured for Phase II of the International Cancer Benchmarking Partnership, which will be supporting the Cancer Delivery Plan.

PUBLIC & PATIENTS

Public & Patient Involvement (PPI)

At every stage of our work we aim to involve the public and patients in our research. Ordinary people are not just the subjects of our work, but are involved in working with researchers to plan, manage, carry out and publicise our work. We have appointed, trained and provide on-going mentorship to a team of eight lay research partners, with pairs of partners assigned to each of our research themes.

Highlights:

- ◆ Developed a PPI strategy, policy statement and implementation plan which has been consulted upon, then rolled out, across the organisation.
- ◆ Established toolkits aimed at both researchers and lay partners, to guide and standardise best PPI practice. This best practice has been extended to other cancer research organisations, including the Experimental Cancer Medicine Centre (Cardiff).
- ◆ A pilot project which provides research participation opportunities for ordinary people to take consent from patients for donations to the Wales Cancer Bank. (see page 20).
- ◆ Improved patient information sheets and consent forms for research projects.
- ◆ Offered advice and support on how to ensure research opportunities are better communicated to patients.
- ◆ Work in the Community Theme has contributed to core outcome sets for bereavement services.
- ◆ Reviewed a board game designed to teach the public about cancer.
- ◆ Work in the Clinical Theme is encouraging the implementation of the Tell Me More project which raises awareness of clinical trials.
- ◆ We have worked closely with Health and Care Research Wales' support centre in order to provide extra guidance and training to our research partners.
- ◆ Our involvement work identified as Europe-leading by our external advisory board.

Public Engagement

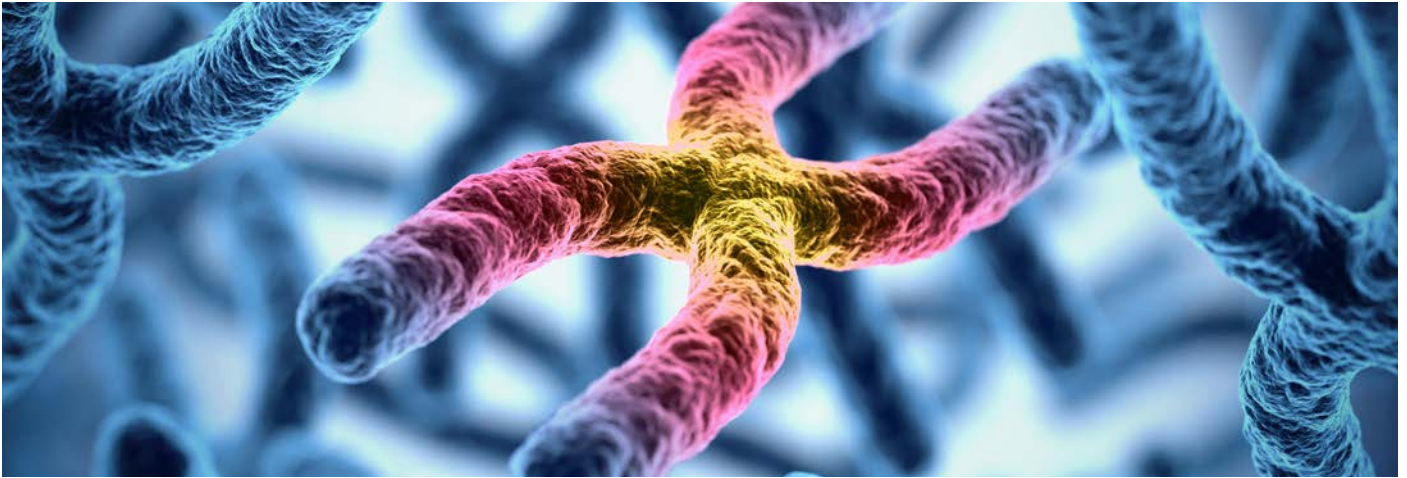
We consistently engage with the public to increase awareness of what cancer research is, its importance, and how it's conducted in Wales. We organise events and bring our research to museums, festivals and busy public spaces. Our engagement activity allows the public direct access to our researchers and is conducted through informative talks, interactive activities and hands-on tours of our facilities.

Highlights:

- ◆ Engaged with over 4,300 members of the public over 28 events and stalls in our first two years.
- ◆ At the 2016 Green Man Festival we presented our research to the public as part of the festival's science fields and directly engaged with 580 people.
- ◆ Together with other members of the Wales Cancer Partnership, we ran a packed schedule of cancer research activity at Techniquet's After Hours event, engaging with 480 adults (see page 23).
- ◆ Facilitated an open day at Cardiff's Clinical Research Facility (CRF). The success of this event has led to other CRFs adopting our model to roll out open days across the UK (see page 16).
- ◆ Delivered well-received series of talks, activities and lab tours to sixth form students with an interest in studying science.
- ◆ Over 15,000 people have visited our website and we have over 600 followers on social media.
- ◆ Worked with Health and Care Research Wales to deliver activity to celebrate International Clinical Trials Day.



CASE STUDIES



Prof. Duncan Baird

“We really need to improve the way we predict how an individual patient’s cancer will behave, as these conditions can vary widely in outcome. Our research provides strong evidence that shortening of telomeres plays a vital role in the progression of some cancers and that a significant number of patients should be receiving different levels of treatment. The next step is to assess our approach in larger studies to establish how it can be integrated into existing assessments that predict patient outcome.”

NEW TEST MORE EFFECTIVE AT PREDICTING SURVIVAL IN BLOOD CANCER PATIENTS

Technology that can detect the length of small DNA structures in cancer cells could hold the key to predicting the outcome of patients with two different types of blood cancer. The test, used in conjunction with current methods, may help doctors make better choices about the most appropriate and effective treatment option for individual patients.

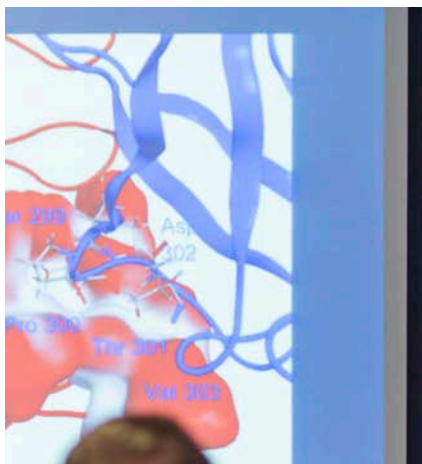
Our researchers showed that measuring sections of DNA called telomeres is a highly accurate indicator of how disease will progress in patients with the bone marrow cancer myeloma and pre-leukaemia myelodysplastic syndromes (MDS) – a bone marrow disorder often leading to life threatening bone marrow failure and even acute myeloid leukaemia (AML).

The team analysed samples from 134 myeloma patients, 80 MDS patients and 95 AML patients to see whether telomere length influences survival in these blood cancers.

Telomeres are protective stretches of DNA that cap the end of chromosomes, and act like plastic tips on shoelaces preventing chromosome ends from fraying and sticking to each other. Every time a cell divides the telomeres gradually shorten and eventually leave the chromosome ends exposed, triggering large-scale DNA damage that accelerates cancer progression and drug resistance.

The researchers found that while patients with AML had significantly shorter telomeres than patients with MDS, whether telomeres were shorter or longer than the functioning threshold did not appear to lead to any significant differences in survival times.





Dr. Richard Clarkson

“This is the first novel targeted agent with anti-cancer stem cell properties to be developed from lab bench to bedside in the UK. It is at the forefront of a new era of anti-metastatic agents to be championed in clinical trials – and is the first anti-cancer agent to be identified, developed, verified and due to be clinically tested in Wales, with funding from the UK commercial sector and Welsh government.”

INNOVATION IN HEALTHCARE AWARD

A partnership which is developing a new drug for metastatic breast cancer won the Innovation in Healthcare honour at Cardiff University's Innovation and Impact Awards 2016.

The venture, led by a joint team from the European Cancer Stem Cell Research Institute and School of Pharmacy and Pharmaceutical Sciences at Cardiff University, combined academic expertise in drug development and cancer biology together with experience of restructuring biotechnology companies.

The project originated from a PhD study of mammary gland development in the University's School of Biosciences, where a team in the laboratory of Dr. Richard Clarkson (our lead for signaling and stem cell research) identified the oncogene Bcl3 as a potential regulator of metastasis.

The lab then collaborated with Dr. Andrea Brancale and Prof. Andrew Westwell (lead of our drug development and model systems research) to design and develop a novel inhibitor of Bcl3 for use as an anti-cancer agent.

The team then approached biotech entrepreneur Gabriele Cerrone to discuss commercial investment, and a new biotechnology company - Tiziana Life Sciences Plc – was founded.

Gabriele Cerrone, Chairman of Tiziana Life Sciences Plc, said: “Work on this project helped us to cement our relationship with Cardiff University and drive forward the new field of cancer stem cell therapeutics. This Award showcases the great work being done at Cardiff to identify inhibitors which can be developed into novel drugs for cancers.”

HOW DO WE DEVELOP NEW CANCER DRUGS?

On the 9th of February 2017, 150 sixth form students attended our public engagement event, *How do we develop new cancer drugs?* The event gave them an opportunity to come into a research environment and find out more from cancer research professionals.

Attendees were welcomed to Cardiff University's Hadyn Ellis Building,

where they were offered an opportunity to hear a series of short lectures about drug development and explore some interactive activities based on research. We also hosted a careers cafe which allowed guests to speak directly to medical students, research nurses and senior researchers about their work. In addition, we ran a series of lab tours, giving guests a glimpse of

the equipment behind the scenes.



MEDIWALES INNOVATION AWARD

The All Wales Genetics Laboratory was awarded the NHS Judges Award at the 2016 MediWales Innovation Awards on 13th December.

The award was presented for an innovation that captured the spirit of innovation in the NHS.

Laboratory staff, including Dr. Angharad Williams (funded by our centre), have developed and now deliver a clinical service that uses circulating tumour DNA as of biomarkers in a cancer patient's blood sample. This enables the monitoring of a cancer patient in real-time to aid treatment decisions, and avoids invasive and costly surgical procedures. The

technology has currently been employed in clinical practice across Wales for lung cancer, and they are also receiving requests for analysis from clinical sites across the UK. The technology may also be applied for other cancer types, for which work is now in progress. The

development and validation of this technology from a research tool to a clinical diagnostic service has taken several years and research projects. These have been supported by the Wales Cancer Research Centre, the Stepping Stones Charity, Velindre Charitable Funds and AstraZeneca.



£2.1M FOR PALLIATIVE CARE RESEARCH

The Marie Curie Palliative Care Research Centre in Cardiff is directed by Dr Anthony Byrne and Dr Annmarie Nelson, who are leaders of our community research. It is the only UK palliative care research centre that is based within a Clinical Trials Unit.

The Marie Curie Centre has recently been successful in securing an additional £2.1m in funding. The funding is for the next five years to build upon research in three thematic areas:

- ◆ Patient and Carer experience and Patient and Public Involvement (including clinical trials, prudent healthcare and shared decision-making).
- ◆ Palliative rehabilitation (including all aspects of maintaining independence, social aspects of function)
- ◆ Thrombosis (including patient experience and impact of thrombosis in palliative settings)

Research in palliative care is far behind other cancer areas, such as oncology. We are working with the



Marie Curie Palliative Care Research Centre in Cardiff to improve the methods we use to enable the same high standard as other areas.

We will work with patients and carers to find out the best ways to do research and will increase the number of studies available to

patients and staff. We will continue to give a clear message that patients want to take part in research studies and that they should have access to an equivalent number of studies as standard oncology, cardiac, respiratory and neurological patients.

CUTTING-EDGE BRAIN TUMOUR TREATMENT MADE AVAILABLE IN WALES



Welsh patients are to be some of the first in the world to access the drug-radiation combination trial, known as PARADIGM 2, which is led from the University of Glasgow.

The Early Phase Unit at Velindre Cancer Centre is working in partnership with the Wales Cancer Research Centre, to adopt its first combination trial, which is now open to a small number of eligible patients. The trial could lead to another treatment option being available to patients on the NHS.

The trial will look at the effects of a drug called Lynparza (olaparib) combined with radiotherapy for patients with aggressive brain tumours. Glioblastoma is one of the most common types of brain tumours in adults, which is usually treated with surgery and radiotherapy. Radiotherapy damages DNA in cells, preventing their replication and growth. Lynparza also prevents repair of damage to DNA and thus works in concert with radiotherapy. Lynparza is made by the pharmaceutical company,

AstraZeneca, and the trial is funded by Cancer Research UK as part of its Combinations Alliance. Dr James Powell is Principal Investigator.

The effectiveness of the combination will be tested on a small number of cancer patients in this early phase trial. This is the first ever early phase cancer trial combining drug and radiotherapy to be opened in Wales.

Following the success of Early Phase trials at Velindre Cancer Centre, the only one of its kind in Wales, there has been a clear ambition to deliver more trials like this, combining new drugs with radiotherapy, in a more local setting.

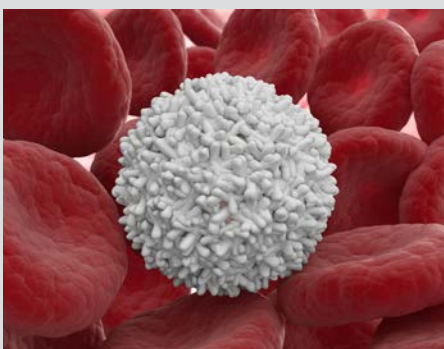
Work to deliver the trial at the Early Phase unit has been facilitated by the Wales Cancer Research Centre,



and is supported by the Moondance Foundation, which has awarded £171,640 to support clinical researchers to lead and deliver these complex trials to patients in Wales.

Dr Paul Shaw is a Clinical Oncologist at Velindre Cancer Centre and the lead on the radiotherapy for the project. He said, "The Velindre team is excited that the focused and rational combination of new anti-cancer drugs with radiation will build upon the technical advances already made in radiation delivery, to maximise treatment effects and outcomes for our patients."

TaCTiCC STUDY



Prof Andrew Godkin and Awen Gallimore have been conducting a study (known as TaCTiCC) which looks into the impact of regulatory T cells on tumour progression.

The study enrolled 55 patients to evaluate how a vaccine called TroVax affects the immune system in people who have bowel cancer that has spread to another part of the body.

Doctors can treat advanced bowel cancer with chemotherapy, but researchers are looking for ways to improve current standard treatments.

If you have cancer, your immune system tries to attack and kill the cancer cells. Treatments such as TroVax may help the immune system to do this. But other cells in

your body can stop your immune system attacking the cancer. Our researchers want to find out if a drug called cyclophosphamide can help to get rid of cells that stop the immune system attacking cancer cells.

The results of the study will tell us if there is a difference in how well your immune system responds to bowel cancer (the immune response) when you have TroVax or cyclophosphamide, or both.

In the coming years, we plan to deliver two clinical studies that test immunomodulating drugs in patients with colorectal cancer.

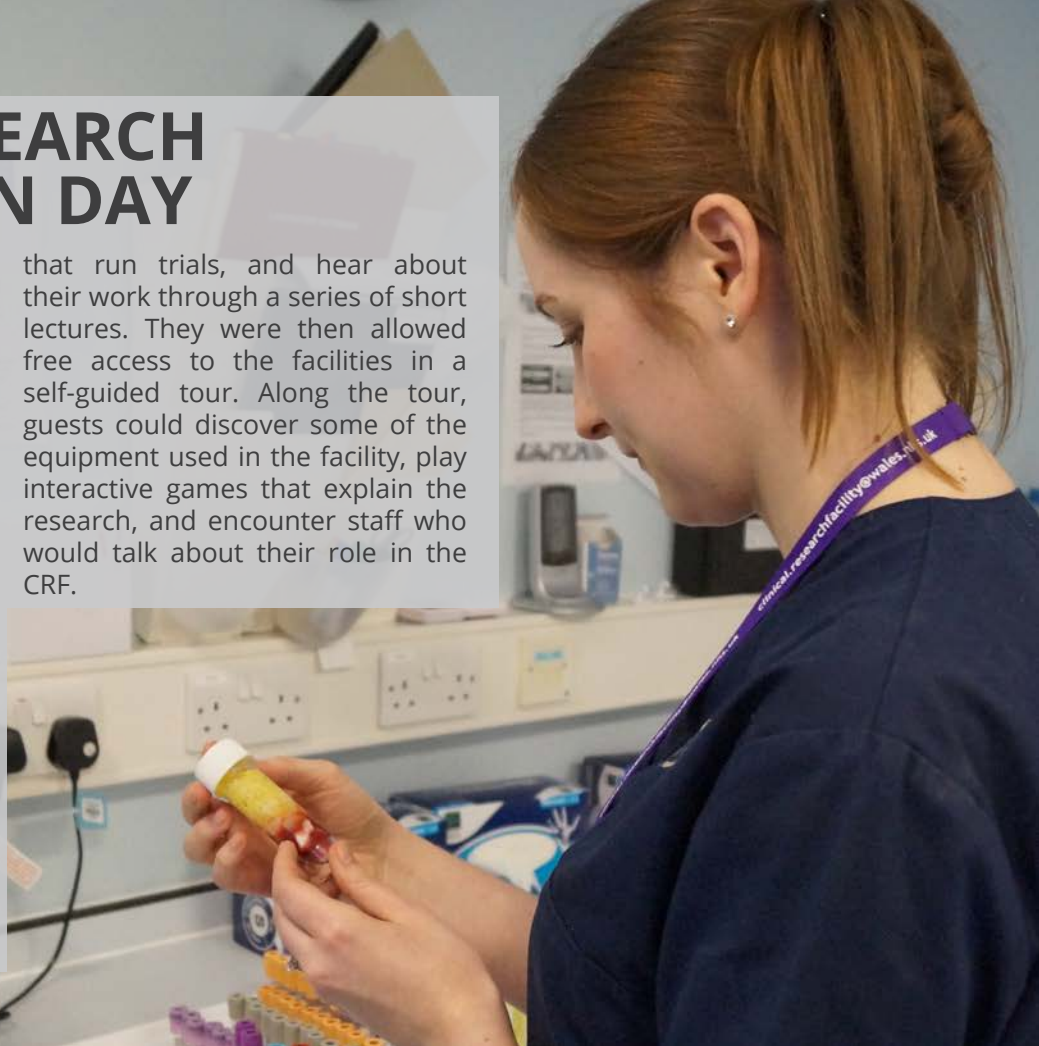
CLINICAL RESEARCH FACILITY OPEN DAY

We were very pleased to have been involved with Cardiff's Clinical Research Facility (CRF) Open Day. On the 31st of January 2017, over one hundred people streamed into the hospital to hear a series of talks and explore the facilities.

The CRF provides a crucial facility for the translation of basic biomedical science developments into clinical practice, and a high quality clinical environment in which patients can undergo research programmes safely and effectively. The CRF runs clinical trials for a number of diseases, with cancer being the most commonly treated.

During the event, guests were offered the opportunity to speak directly to the doctors and nurses

that run trials, and hear about their work through a series of short lectures. They were then allowed free access to the facilities in a self-guided tour. Along the tour, guests could discover some of the equipment used in the facility, play interactive games that explain the research, and encounter staff who would talk about their role in the CRF.



£486,000 FOR ABACUS STUDY

Dr Kate Brain, our lead for research into screening, prevention and early diagnosis, has been awarded £486,000 for a health check project aimed at improving the early diagnosis of cancer in disadvantaged communities.

The Yorkshire Cancer Research charity is providing the funds as part of a £7m investment to improve lung cancer outcomes and increase early diagnosis.

Cancer outcomes tend to be worse in areas of high deprivation. The reasons behind this include higher levels of unhealthy behaviours, such as smoking and drinking alcohol, poor knowledge and awareness of symptoms, and barriers in access to healthcare.

These factors often lead to diagnosis through emergency routes, such as A&E or emergency GP referral. Patients diagnosed with cancer

through an emergency route are more likely to be diagnosed at a late stage, which can mean that treatment options are limited and chances of survival are lower. The health check project (known as ABACus) will include a test that will be carried out with members of the public by trained advisors. A traffic light system will be used to determine whether further medical advice should be sought. The project could lead to improvements in cancer awareness in deprived communities which contribute significantly to the poor outcomes in Yorkshire and Wales.



Dr. Kate Brain

“Trialling the health check will allow us to evaluate whether the intervention improves cancer awareness and encourages earlier help seeking among adults living in disadvantaged communities, ultimately leading to earlier diagnosis and better outcomes.”

EAGLE STUDY



As part of our Palliative and Supportive Care research we are working on a study to improve the quality of life for some prostate cancer patients following their treatment.

The aim of the EAGLE study is to introduce and evaluate an innovative service to improve the care offered to men and their partners/family in the prostate cancer post-curative treatment setting.

The study has already had a direct impact on increasing the awareness among healthcare professionals of the need to identify and manage the late gastrointestinal effects of pelvic radiotherapy. Qualitative interviews with healthcare professionals have demonstrated an increase in referrals to gastroenterology of patients suffering from late effects both as part of EAGLE and outside of the study. Healthcare professionals at the EAGLE sites have reported

that their colleagues are now more aware of asking colorectal and gynaecology cancer patients about their bowel function.

Another impact of the EAGLE study is the successful validation of the ALERT-B screening tool. ALERT-B was developed in a previous Tenovus funded study, DESIGNER. The ALERT-B tool consists of three questions with yes/no answers written in patient friendly language. The tool has been designed to highlight bowel symptoms to clinicians that require further discussion with the patient with a view to a referral to gastroenterology. The tool was validated as part of EAGLE against the Gastrointestinal Symptom Rating Scale. A paper on the development of the ALERT-B tool has been submitted for publication. It is hoped that the tool will be adopted more widely into clinical practice.

BUILDING CAPACITY

During our first two years of operation, we have achieved considerable advances in building capacity. We have managed to attract funding to pay for the equivalent of an additional 71 full time staff. These staff will be working alongside us across Wales.

Our total grant income during those first two years comes to over £19 million. The centre was funded £4.5 million over its first three years. With the additional money we have brought in, we can say that for every £1 spent on the centre to date, we have been able to deliver an additional £6 for the Welsh economy.

We have produced 212 publications which have appeared in scientific journals. 25% of these publications appeared in journals which are recognised as high impact within the scientific community.

We have developed a Translational Research Committee which is a pool of expertise available to the South Wales cancer research community. Its purpose is to improve the quality of our grant applications by providing peer review for new research projects.

iCONSENT

To improve the patient experience the Wales Cancer Bank are trialing an electronic patient consent mobile system (iConsent), developed by Swansea University. Approved by both patient groups and ethics committees, and using a hand-held tablet to register consent, this web-based system offers a secure way to consent patients for taking part in studies or donating samples for cancer research. Hence, it delivers advantages both for patients and researchers.



GREEN MAN

We took our research to the public at Green Man Festival in 2016.

The festival has a special place in its heart for research, reserving a field at the event to showcase science. The field is known as Einstein's Garden, and it was here that we presented a few elements of our research through a series of interactive activities.

We invited festival-goers to join us in our Celtic fortress to make battle with cancer the Welsh way. Young and old alike joined us to learn more about the disease and how we are tackling it, taking up arms beside us. Our activities explained immunotherapy, genetics, targeted therapy, cancer symptoms and debunked some persistent myths about cancer.

Despite the rain, our team of researchers directly engaged with 580 people.



DEFINING SOCIAL CARE IN CANCER

As there is currently no single agreed definition of social care, in October 2016, we reviewed and adapted existing social care literature to create a working definition applicable to adult cancer care.

This definition aims to provide a comprehensive description of social care that includes the full range of adult social care services, as well as the support needs of individuals diagnosed with cancer and their carers. It will be used in conjunction with social care research guidelines to help us identify research opportunities that we believe will result in improved social care and support, and better experiences for people with cancer, and their carers, in Wales.

Working Definition of Social Care

Social care refers to a range of services provided across different settings, usually in the community. Social care services may offer advice, personal care, practical assistance, promotion of equality and protection of rights to adults diagnosed with cancer, and their carers, who require extra support to meet their personal, practical, emotional, economic and social needs. The supportive functions of social care aim to improve quality of life, and to enhance wellbeing on an individual, community and societal level.

Our recently developed Research Associate post will underpin the development of critical mass and the social care portfolio, via

collaborations and engagement with Wales School for Social Care and the Health and Care Research Wales infrastructure.



PUBLIC & PATIENT INVOLVEMENT: ASSESSING IMPACT

Our public and patient involvement (PPI) team, led by Dr Jim Fitzgibbon and Dr Annmarie Nelson, have been working on a toolkit to support the assessment of the impact made by the inputs of members of the public (known as Research Partners) in various studies and trials. As part of this project, Dr Jim Fitzgibbon and another research partner, Sue Campbell, worked on a study to evaluate the potential benefits of automated Intensity Modulated Radiotherapy (IMRT).

Half of all cancer patients receive radical radiotherapy as part of their curative treatment. IMRT is an advanced form of Radiotherapy which, whilst it is an effective treatment, it is also more complex and requires additional resources compared to standard treatments. A solution to this barrier is the field of automated treatment planning, where plans are generated by computer algorithms. This has been shown to minimise time requirements and improve planning computer productivity by a factor of two.

The two Research Partners (RPs) were offered an in depth induction to IMRT, met a range of personnel involved in the treatment who demonstrated to them the historic method used to plan it. They were invited to all the Advisory Group meetings and great care was taken to ensure that they understood in some depth what was a very technical area of medical science. In addition to support received from the study lead, an experienced clinician helped to ensure that the RPs felt engaged and valued.

Where needed, the RPs fulfilled their role as a critical friend and raised their concerns when some aspects of the study failed to meet its requirements. Perhaps not

unsurprisingly, given the technical nature of the study, requests were made (and responded to) more than once to simplify language in documents such as the study protocol.

Both the RPs felt listened to in meetings and involved in decisions. They felt also that some members of the Advisory Group had moved considerably from an initial position of suspicion of PPI and its usefulness to the realisation that inputs from RPs could be very useful. Given this progress, it was suggested that it would be possible to engage the RPs even more deeply in the technicalities of any extension of the study.

The study lead felt that the presence of the RPs helped to keep the study focused on patient benefit. This was particularly important when progress was not as swift as he would have wished. The RPs shared the collective aim of successfully completing the project and helped to keep it focused and patient centered.

While there was much that was positive for all parties in the project, there were a few things which might help to improve the impact of PPI on any extension of the Study. These include:

- ◆ having a clear role description for the RPs;
- ◆ considering training and support needs;
- ◆ refining the diary to link it to the tasks identified for the RPs and completion of the diary by the Study Lead and the RPs in 'real time';
- ◆ and consolidation of the final review meeting around the completed diaries and the minutes of the Advisory Group.



MULTIDISCIPLINARY RESEARCH GROUPS

Four multidisciplinary research groups (MDRGs) have been formed to encourage intra-professional discussion and to facilitate research collaborations. The four groups focus individually on breast, colorectal, prostate and lung cancer research and each group is chaired jointly by a clinician and a scientist.

The MDRGs are developing independently and, by addressing issues specific to the tumour type of interest, and harnessing the huge wealth of knowledge and expertise within the groups, they are exploring innovative methodologies and proposals to expedite research for ultimate patient benefit.

Membership includes, but is not limited to: surgeons, oncologists, pathologists, radiologists, physicians, scientists, research nurses and lay representatives. Representatives from the All Wales Medical Genetics Service and the Wales Cancer Bank are also part of the groups to advise and assist with formulating research ideas which include genetic analysis and bio-sample and/or data collection.

MONOCLE STUDY

The first patient has recently been recruited for a Chronic Myelomonocytic Leukaemia (CMML) trial known as MONOCLE. Our early phase trials co-lead, Dr Steven Knapper, is the Chief Investigator leading the trial in Cardiff.

The trial sets out to test the safety and effectiveness of a new drug, tefinostat, for patients with CMML.

CMML is an uncommon form of cancer that causes a build up of cells called monocytes in the bone marrow and blood. It mainly affects older people and the average length of survival is only 11-17 months.

Most patients with CMML are unsuitable for bone marrow transplant therapy and there are currently very few other treatment options. There is a pressing need for new drug treatments which can target the abnormal monocytes without causing unacceptable side effects.

In this 'phase 2' trial, 40 patients with CMML will be treated at 12-15 hospitals in the UK to allow us to test the effectiveness of Tefinostat in CMML as well as monitoring for side effects. Blood and bone marrow samples from patients will be tested in the laboratory to help us better understand how tefinostat works and to identify which patients are most likely to benefit in the future.

The research is focused on the need for more treatment options for CMML, specifically treatment that does not cause unreasonable side effects.



Dr. Steven Knapper

"We are very excited to be in a position to commence the MONOCLE study which will, for the first time, allow us to assess the effects of Tefinostat, a monocyte-directed therapeutic agent, in patients with this often-neglected haematological malignancy. Hospital sites across the United Kingdom will be open for recruiting patients into the trial."



VOLUNTEERS IMPROVE CONSENT RATES

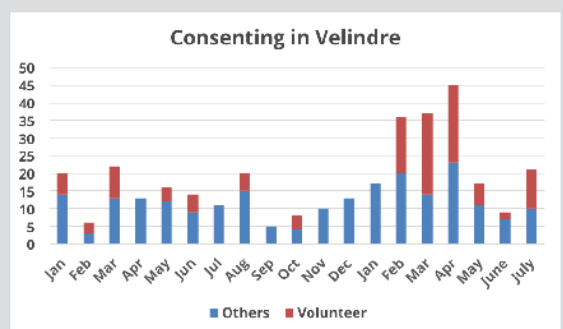
In 2016, the Wales Cancer Bank (partially funded by us) started a programme in Velindre Cancer Centre to expand the number of patients approached for consent to donate their biosamples to the biobank.

Following an application process and training programme, four volunteers from Velindre progressed to shadow nurses consenting in various out-patient clinics and three then moved to

consenting independently. The volunteers approached selected patients when they arrive in out-patient clinics and explained the concept of biobanking and that any tissue or blood samples donated will be used in the future for cancer related research.

The volunteers have all found it to be hugely rewarding and the impact of their presence has been

that one third of all consenting in Velindre since Jan 2016 has been done by the volunteers.



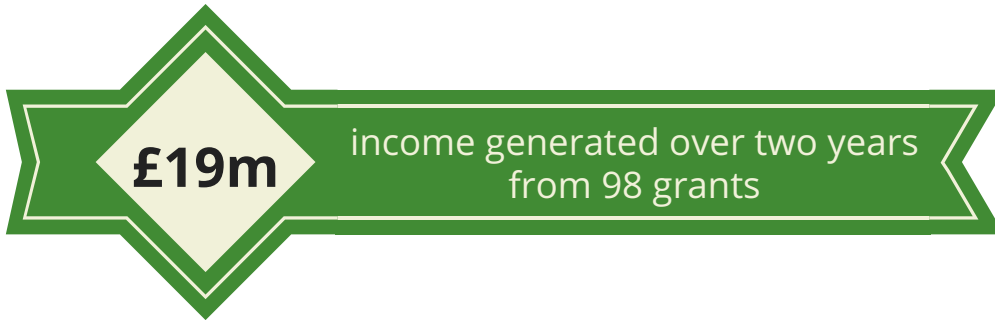


OUR RESEARCH IN NUMBERS



For every £1 invested we have generated £6 for the Welsh economy.

Equivalent of 71 additional full time posts created through our research grants.



100% of newly initiated clinical and translational cancer research trials originating in Wales have public and patient involvement.



1,913 patients provided **9,707** samples to the Wales Cancer Bank. **5,000+** samples issued to researchers in the last two years.

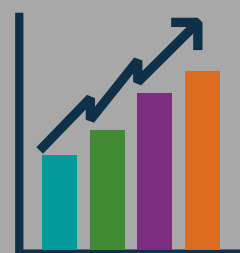


4,300 members of the public engaged with our research at 28 events.

37 trials opened in our first two years



Number of hours travel saved for patients by opening trials in Wales.



Numbers of cancer patients starting early phase treatment rose from 88 (2013-15) to 137 (2015-17).

WALES CANCER PARTNERSHIP



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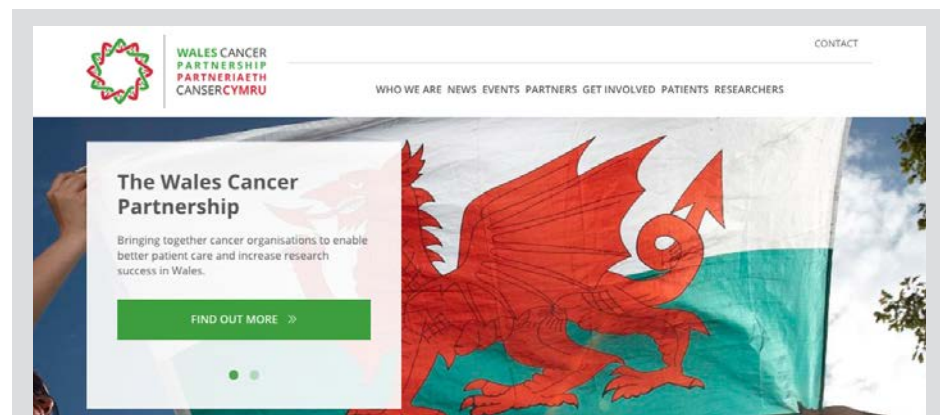
We have established the Wales Cancer Partnership to improve research collaboration in Wales. The Partnership is driven by us and is an extension of our aims. It will help to foster closer relationships between all cancer organisations in Wales, bringing together all our voices for the benefit of current and future cancer patients, their families and communities. The Partnership includes higher education institutions, NHS health boards, patient & public representatives, the third sector, and pharmaceutical companies.

We will bring partners together to decide how best we can work together to enhance existing and developing strengths in cancer research in Wales. The Partnership will bring people together across the nation with an open and inclusive approach.

The Partnership will help establish a better connected community through sharing information and communication. It will provide a greater understanding of the scope of current research infrastructure and identify Wales' unique strengths and gaps to enable informed planning.

Our unified cancer voice will help to consult and inform research and cancer policy.

We warmly invite all organisations involved in beating cancer in Wales to get involved in the Partnership. If you would like to find out more, please contact us on WCP@Cardiff.ac.uk.



PARTNERSHIP WEBSITE

The Wales Cancer Partnership website has been developed to showcase the fantastic work that is being done around Wales to help beat cancer. It includes information for patients about how they can get involved in research, links to resources available to researchers and a stream of up-to-date news and events from across the nation.

www.walescancerpartnership.com

CURRENT PARTNERS



INAUGURAL PARTNERSHIP CONFERENCE

On the 23rd of November 2016 the Wales Cancer Research Centre brought together people working in cancer across the nation for the first Wales Cancer Partnership Conference in Cardiff. The theme of the conference was Collaborating for Research Excellence.

The day was well received and saw over 100 people from the whole spectrum of cancer research come together. Talks and workshops covered both research that is taking place in Wales and how clinical need can influence the research that we undertake across the nation.

The day was delivered through a series of presentations and interactive workshops covering topics such as clinical research, public engagement and early detection of cancer.



CANCER RESEARCH DOES AFTER HOURS

Techniquest's popular "Admiral After Hours" events for adults returned on Thursday 29 September, with a special evening which was host to cancer research talks, activities and an amazing Planetarium.

Thanks to support from Admiral, the Cardiff-based insurance specialist, and the Wales Cancer Partnership (including Cancer Research UK, Cancer Research Wales, European Cancer Stem Cell Research Institute, Healthwise Wales, Tenovus Cancer Care and the Wales Cancer Research Centre), visitors had exclusive access to the 120 hands-on exhibits and ground-breaking cancer research taking place in Wales.

Nearly 500 people came along to hear talks from leading academics and PhD students covering topics such as cancer immunology and drug

discoveries made in Cardiff. Visitors could also take a virtual reality lab tour, play a cancer-based board game, make their own DNA necklace and try to Escape from the Lab before the timer ran out. And if this wasn't enough there was over 15 activity stalls around the exhibition space giving an insight into different areas of cancer research through fun, hands-on activities. A Tenovus Cancer Care Sing with Us choir finished the evening in style.

'As a visitor affected by cancer I wondered what the cancer event at Techniquest After Hours would be like. What amazed me was all the different cancer organisations that were represented in one building. Finding out more about cancer and the amazing ground breaking research that is going on in Wales was fantastic. Having family and friends with cancer I found it reassuring as well as inspiring to know that people are working so hard together to make a difference through research.'



CONCLUSIONS

The Wales Cancer Research Centre's second year of operation has seen us move forward, spurred on by the momentum of our first year's success. More collaborations have been forged, more money and employment brought to Wales and most importantly, more high-calibre research has been conducted to improve the lives of cancer patients in Wales and beyond.

The cornerstones of our approach are transparency, inclusivity and collaboration with the public and our academic and non-academic partners, to conduct and disseminate excellent research with the broadest impact. We aim to maximise the impact of our work by conducting research of the highest quality and importance, collaborating with research partners and communicating our successes.

We have already achieved a changed culture and ways of working within the cancer research community. A significant impact of the centre has been to bring many of the elements of a research consortium (clinicians, academics, lay partners, industry, and third sector) together, forming the basis of the Wales Cancer Partnership. This closer working, across the spectrum of research, is a key justification for the breadth of our activities.

Our public and patient involvement and engagement activities have already had impact, within the centre and beyond. Our lay partners are trained and operate within a carefully-designed structure which has been admired beyond Wales, with potential impact in influencing change elsewhere. Interactions with our lay partners have improved the collective understanding amongst researchers of the need to concentrate on translating research into patient benefits. We hope to further develop our public and patient involvement work and share our best practice with colleagues across the UK.

The growth of our Early Phase Trials activities has had a significant impact on access of patients in South Wales to the latest therapeutic advances, and simultaneously, greatly reduced the necessity for costly, long-distance travel for treatment and review appointments. In the coming years we will investigate new therapeutics for potential translation into clinical trials, and provide access to more existing trials to a broader population in South Wales. Looking forward, with optimism based on our successes so far, we will continue to build our partnerships and our trials portfolio, and will continue to align our research with priority needs of patients and families affected by cancer, in Wales and beyond.

In the years ahead we aim to design and monitor new and existing treatments against cancer stem cells, tumours that resist the immune system, and residual/recurrent disease. We will re-fashion the Wales Cancer Bank as a driving force for a broader range of biobanking in Wales to help this research. We also want to build on our success in palliative and supportive care, and establish Wales as an emerging force in social care, screening, prevention and early diagnosis research.

It has been an enormous pleasure to see our team move forward with such speed and enthusiasm for research excellence. We will endeavour to continuously improve our work for the benefit of cancer patients and their families.



THE HUB TEAM

As part of our efforts to make research across Wales more collaborative, we have developed a "Hub" from which we are able to deliver much more than just support for the centre.

The Hub houses staff from the Wales Cancer Research Centre, Cancer Research UK and the Experimental Cancer Medicine Centre. Together, this team are able to deliver collaborative activity with the freedom that comes with working for multiple organisations.

They deliver engagement activity together with the Wales Cancer Partnership; they are coordinating a cancer research strategy for Wales; and they ensure public involvement in research across the nation. The team also project manages clinical trials, to speed the process at which new treatments can reach patients. They deliver meetings and events that bring the cancer community together to share ideas and shape the future direction for cancer research.

We hope that with their continued teamwork we will be able to deliver an environment in which cancer research breathes collaboration and understanding.



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