

CARDIFF  
UNIVERSITY

PRIFYSGOL  
CAERDYDD

College of Biomedical  
and Life Sciences

Coleg y Gwyddorau  
Biofeddygol a Bywyd

# Research Strategy

2016-2018

Delivering internationally excellent research for  
a healthy, safe and sustainable society

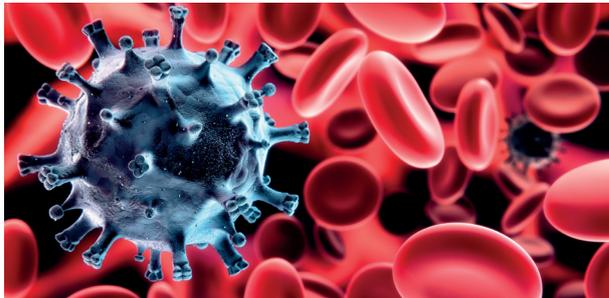
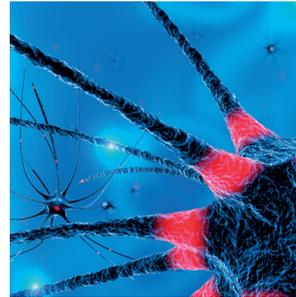
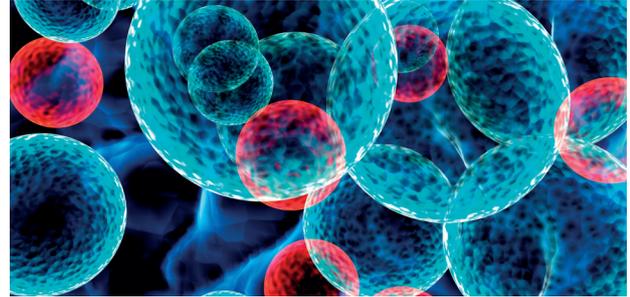
# Mission

The College of Biomedical and Life Sciences aims to deliver **internationally excellent research for a healthy, safe and sustainable society** through:

- Growing our research excellence, focusing on greater coherence and scale alongside the delivery of novel interdisciplinary collaborations, University Research Institutes and Centres of Excellence
- Creating a vibrant research environment via the provision of state-of-the-art integrated research-enabling infrastructure
- Fostering the talents of our researchers, from early career through to senior academics
- Promoting opportunities for closer integration with the National Institute for Health Research, Health and Care Research Wales, and the NHS
- Increasing our international reach and profile
- Enhancing the translation of our research, leading to societal benefit with global health, environmental and economic impact

The College's Research Strategy focuses on five, interconnected 'Research Themes' encompassing and cross-cutting the research activities of the College's Schools and University Research Institutes (URIs).

Research Themes are designed to act as enablers by identifying and fostering research synergies, working to break down traditional disciplinary and structural boundaries, supporting funding applications, developing collaborations and exploiting emergent research opportunities.



# Cancer

To personalise the control, cure and care of cancer patients, in Wales and beyond, through integrated, collaborative research excellence, across the translational spectrum.

Cancer research strengths within the College of Biomedical and Life Sciences cover the full spectrum of pre-clinical, translational and clinical research, focussed within four inter-related sub-themes:

**Tumour and Environment** – tumorigenesis, cancer stem cells, role of tumour heterogeneity in the evolution of treatment-resistant phenotypes.

**Drug Discovery, Development and Delivery** – designing and testing novel targeted therapies which exploit differences between tumours and normal cells.

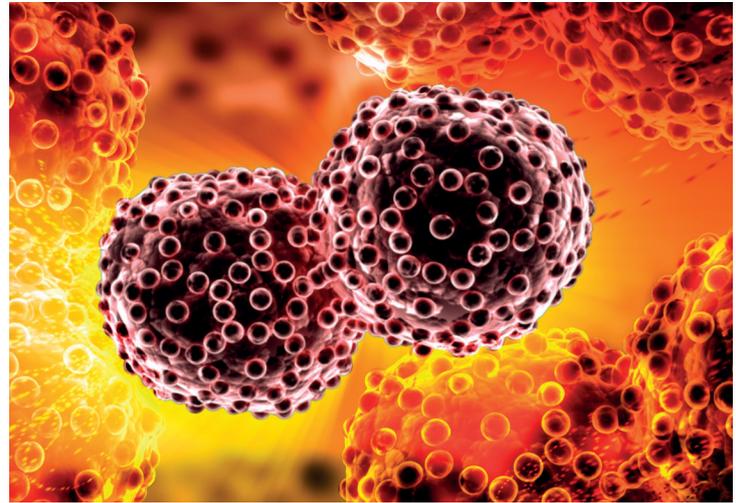
**Personalised Cancer Genetics** – identifying diagnostic, prognostic and predictive genetic biomarkers to guide choice of the treatment most likely to benefit individual patients.

**Clinical Trials** – improving patient access to trials of the latest developments in drug, radiotherapy and biological therapeutics.

Working together and with colleagues in other Colleges and externally, our researchers develop and deliver clinically meaningful benefits for cancer patients, their families and communities.

## Aims of the Theme

- To achieve and sustain recognition as a national leader and global competitor in cancer research
- To integrate and grow the cancer research community in Cardiff University
- To maintain and extend areas of current research strength
- To build capacity and ensure sustainable critical mass in a small number of strategically-important, emerging areas of strength
- To facilitate the development of the next generation of cancer researchers
- To improve the prevention, early diagnosis and treatment of cancers



## Spotlight On:



Canolfan Ymchwil Cancer Cymru  
Wales Cancer Research Centre

### The Wales Cancer Research Centre

Funded by the Welsh Government and led from Cardiff University (with an all-Wales brief), the Centre aims to deliver cancer research excellence for better health for the people of Wales and beyond.

[www.walescancerpartnership.com](http://www.walescancerpartnership.com)



The European Cancer Stem Cell  
Research Institute  
Y Sefydliad Ymchwil  
BŪn-gelloedd Cancer Ewropeaidd

### European Cancer Stem Cell Research Institute

Improving our understanding of the role of cancer stem cells in a range of cancers, through world-leading research.

[www.cardiff.ac.uk/research/  
cancer-stem-cell](http://www.cardiff.ac.uk/research/cancer-stem-cell)

# Immunology, Infection and Inflammation

To deliver public and patient benefit by identifying both the causes of disease and novel treatment strategies.

The Immunology, Infection and Inflammation Theme aims to improve the diagnosis, prevention, stratification and treatment of patients with various forms of autoimmune, auto-inflammatory and infectious diseases, cancers and co-morbidities, and to provide a bridge to clinical innovation.

This theme focuses on three inter-related areas:

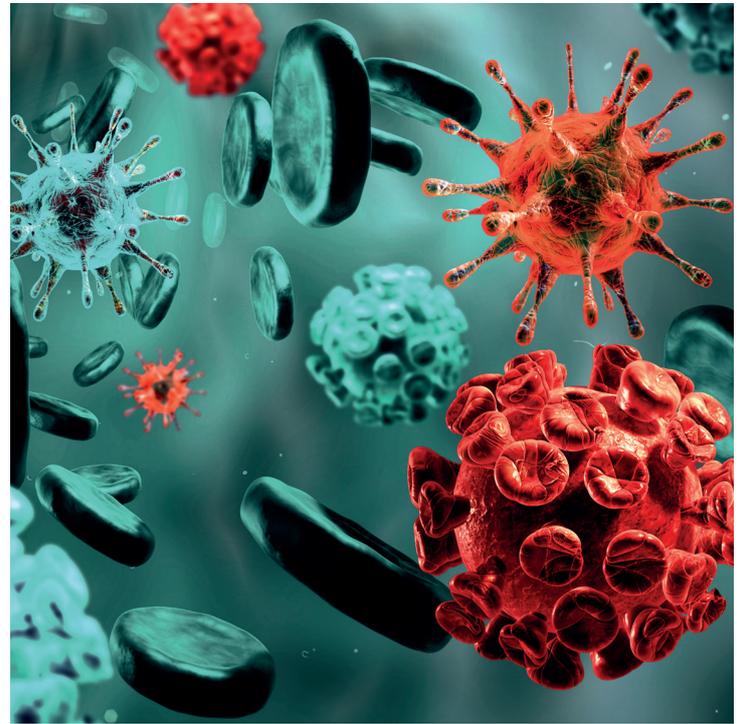
**Immunology** – the activation, regulation and control of adaptive immune responses.

**Infection** – fundamental interests in microbiology, bacteriology, virology, parasitology and mycology.

**Inflammation** – the molecular and cellular mechanisms that determine competent host defence, inflammation-induced tissue injury and chronic disease progression.

## Aims of the Theme

- Directly align with the strategic priorities of funding councils, charities, governments and international agencies
- Realise the opportunity to increase the number of clinical fellows and clinical collaborations to support research translation and innovation
- Utilise pre-existing expertise around a Big Data and Systems Immunity approach to deliver a discrete research identity
- Building on core strengths, ensure the full integration of all researchers across the College, resulting in new and novel collaborations



## Spotlight On: Systems Immunity Research Institute



Systems Immunity  
Research Institute  
Sefydliad Ymchwil  
Systemau Imiwnedd

Delivering a comprehensive systems based approach to immunity research that provides a holistic view of chronic disease progression, the control of infection and mechanisms that determine an effective immune response.

[www.cardiff.ac.uk/research/systems-immunity](http://www.cardiff.ac.uk/research/systems-immunity)

# Integrative Biosystems

To deliver research-led innovations across the entire life sciences ('molecules to the biosphere') through integrative science that makes a tangible difference to our society and planet.

Integrative Biosystems has been structured around sub-themes that reflect our current strengths and perceived future opportunities. They deliver cohesion around activities that scale across molecules–cells–tissues–organisms–biosphere and which are underpinned by close collaborative working with Physical Sciences.

## **Biological Information & Signalling**

– cell:cell communication (animal & plant) during development, health & disease.

## **Stem Cells, Development & Regenerative Biology**

– organogenesis, musculoskeletal systems/disease, tissue repair, stem cell therapies.

## **Engineering Tissue Systems**

– synthetic biology, therapeutic delivery of novel agents, tissue engineering.

## **Systems Function & Response**

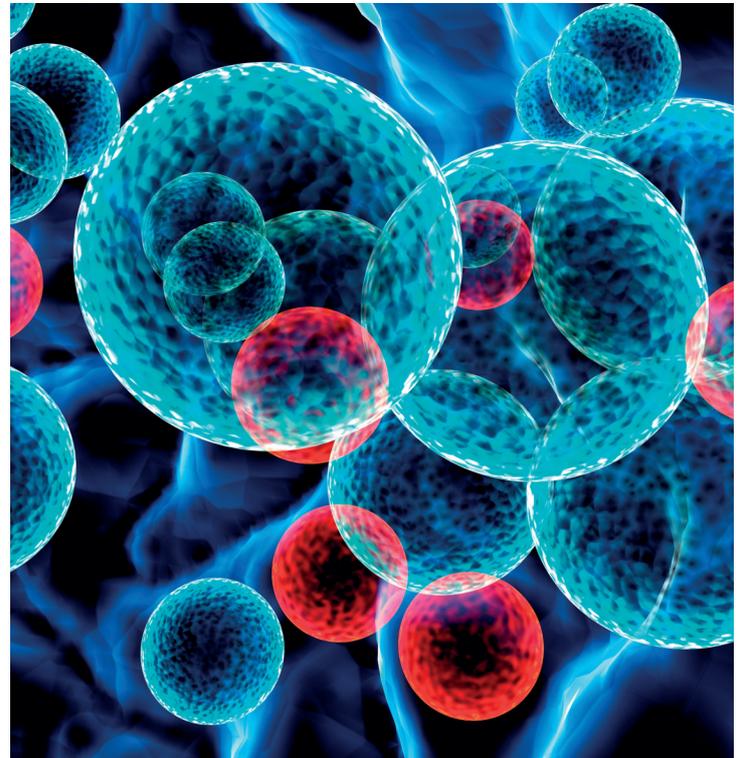
– epigenetics and disease, biophysical properties of tissues, disease processes.

## **Biodiversity, Ecosystems**

**& Global Change** – ecology, animal behaviour, freshwater systems, ecotoxicology, endangered species.

## **Aims of the Theme**

- To bring together Life and Physical Sciences research communities to share interdisciplinary knowledge and expertise
- Develop our potential around Cellular Therapeutics for Repair and Regeneration, Global Change and Adaptation, Engineering Living Systems and Drug Design and Dynamics
- To deliver the widest possible impact of our knowledge generation through an understanding of its scalability and through active engagement with stakeholders
- To support underpinning technologies development through strategic infrastructure investment/placement
- To build fruitful collaborations to develop Global Healthy Living in its broadest concept



## **Spotlight On: Water Research Institute**



Water  
Research Institute  
Sefydliad Ymchwil  
Dyfroedd

Water for people and ecosystems in a changing world. Providing research-led solutions to the problem of the continual misuse and mismanagement of the world's precious water supplies.

[www.cardiff.ac.uk/water-research-institute](http://www.cardiff.ac.uk/water-research-institute)

# Mind, Brain & Neuroscience

To implement a unique 'synapse to society' translational pipeline, utilising our world leading research infrastructure to deliver an integrated, strategically focused research programme that:

**Reduces** the significant societal and financial impact of brain disorders.

**Optimises** quality of life and wellbeing in those with chronic and/or progressive disease.

**Encourages** behavioural change and citizenship behaviour, leading to a sustainable, safe and inclusive society.

**Delivers** new methods for personalised assessment of health and behaviour, facilitating measurement of preventative interventions applied across the lifespan.

Research focuses on the anatomical, genetic and biological mechanisms underpinning health and disease and how individuals, groups and environments influence decision-making relevant to improved health and wellbeing, as well as the building of sustainable and safe communities and environments.

## Aims of the Theme

- Maintain and grow areas of current research excellence including mental health, psychiatric genetics and genomics, brain imaging, neurodevelopment and developmental disorders, brain repair and neuroprotection, aging and dementia, cognitive neuroscience and sustainable environments
- Facilitate new emergent research opportunities in lifespan health, models of brain disorders, drug discovery, adaptive decision-making, behavioural change and interventions
- Create novel cross-disciplinary pathways to better integrate basic and health research by working with Health and Care Research Wales Centres & Units, and developing cohort and population approaches



## Spotlight On:

### Neuroscience and Mental Health Research Institute



Neuroscience & Mental Health Research Institute  
Sefydliad Ymchwil y Niwrowyddorau ac Iechyd Meddwl

Taking new discoveries and translating them into greater understanding and diagnosis of mental illness.

[www.cardiff.ac.uk/research/neuroscience-mental-health](http://www.cardiff.ac.uk/research/neuroscience-mental-health)

# Population Health

To prevent ill-health, protect and prolong life, and address inequalities in health and wellbeing in Wales and beyond through high quality research, innovation and engagement.

Population health requires working across the boundaries of health and non-health disciplines, embracing a host of behavioural, social, economic, and environmental factors that affect the health of a community.

Our work focuses on understanding the biological, environmental and social causes of disease, including the determinants of health risk behaviours. We design, develop and test services and interventions to improve population health and healthcare quality and implement our research findings into policy and practice.

Population Health has been structured around four inter-related areas:

## Healthy Childhood

## Healthy Behaviour Change

## Healthy Living in Adults

## Healthcare Quality and Safety

### Aims of the Theme

- To develop strategic linkages with other Research Themes
- To facilitate the pursuit of funding to better understand causal pathways and develop effective and efficient strategies for promoting healthy behaviour and tackling lifestyles that lead to disease
- To develop a network of expertise on bio-informatics and statistics that encourages joint working on shared research priorities
- To facilitate cross-disciplinary collaborations between population health scientists and researchers
- To attain and sustain international leadership and excellence in population health research, innovation, education and community engagement



### Spotlight On: HealthWise Wales



Doeth am Iechyd  
Cymru  
HealthWise  
Wales

The largest research project of its kind, designed to better understand the health of people living in Wales.

[www.healthwisewales.gov.wales](http://www.healthwisewales.gov.wales)

# Cardiff University Brain Research Imaging Centre

Cardiff University is officially one of the UK's top universities for its research in Psychology, Psychiatry and Neuroscience.

Cardiff University's new Brain Research Imaging Centre boasts a combination of neuroimaging equipment truly unique within Europe. In addition to magnetoencephalography (MEG), and brain stimulation equipment, the facility houses four MRI scanners, including ultra-high field MRI and the National Microstructure Imaging Facility.

Our state-of-the-art equipment and expertise allows us to map the brain over different spatial scales, characterising brain chemistry, electrophysiology, blood flow, structure and function. Better understanding of how these measurements relate to each other allows us to ask how different brain systems work in concert to produce differences in brain function in the healthy brain, and abnormal brain function in a range of developmental, neurological and psychiatric disorders.

In turn, this will help us to understand not only the causes of disorders such as dementia, schizophrenia, epilepsy and multiple sclerosis, but gives us important clues about how to develop more effective treatments to improve the lives of patients with these disorders.

The Cardiff University Brain Research Imaging Centre is part of an ambitious multi-million pound research and innovation capital development plan, which will provide the facilities needed to foster engagement with business, government, the voluntary sector and civic society in all arenas.

[www.cardiff.ac.uk/cubric](http://www.cardiff.ac.uk/cubric)



# Research at Cardiff University

Founded in 1883, Cardiff is now established as one of Britain's leading universities and is a member of the UK Russell Group of 24 "research intensive universities".

We are an ambitious and innovative university with a bold and strategic vision located in a beautiful and thriving capital city. Our world-leading research was ranked 5th amongst UK universities in the 2014 Research Excellence Framework for quality and 2nd for impact.

Cardiff University sees fundamental research as essential to human aspiration and as critical to the development of technologies and services to improve the quality of life for all.

Our experts are acknowledged as undertaking work of international significance and their research has earned us a reputation for excellence and impact.

The College of Biomedical and Life Sciences is a vibrant academic community, which undertakes innovative research and provides state-of-the-art learning facilities.

An integrated approach is taken to all aspects of health and bioscientific research, achieving internationally respected results at all stages of the medical research process, from laboratory science through to improved medical and healthcare practices. It is the largest College in the University with over 2000 staff and 7000 students.

The College brings together seven Schools with immense strength in research and teaching, not just in Wales, but the UK and worldwide.

[www.cardiff.ac.uk/  
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# Contact us

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## Population Health

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[www.cardiff.ac.uk/bls/research](http://www.cardiff.ac.uk/bls/research)



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