

Join the UK's leading biomedical institute dedicated to defeating neurodegenerative disease

The UK Dementia Research Institute at the University of Edinburgh



Founding funders:



Rising to the challenge of dementia

Currently, there are more 850,000 people living with dementia in the UK, caused by a number of disorders such as Alzheimer's, Parkinson's and small vessel disease. This number is set to increase to over 2 million by 2050. In addition to the enormous mental, emotional and physical toll dementia takes on sufferers and their loved ones and carers, it costs the UK economy more than £34.7 billion per year, a figure set to treble by 2040. No other medical condition costs so much and yet, historically, research into it has been underfunded relative to other disease areas such as cancer and heart disease.

Against this backdrop the UK government established the UK Dementia Research Institute in 2017 to tackle one of the greatest global health challenges of our time. Founded by the UK's Medical Research Council, Alzheimer's Society and Alzheimer's Research UK, the UK DRI brings together talent across seven Centres at six leading UK universities, including the UK DRI at the University of Edinburgh.

Dementia is not an inevitable part of the ageing process. The UK DRI at Edinburgh believes it can, and will, be slowed, halted or even prevented. The UK DRI has already made significant discoveries with the potential to impact the lives of people living with dementia today, and it continues to drive forward an ambitious programme of research. However we need more researchers with new ideas and perspectives to help in the fight against dementia. You might not have a background in dementia research or even be a neuroscientist. Your experience may be in vascular biology or inflammation. You may be an engineer, a mathematician, or have expertise in artificial intelligence or bioinformatics. By bringing together diverse specialisms and approaches we aim to take an interdisciplinary approach to dementia research which is already yielding advances. **So long as you're passionate about preventing the leading cause of death in the UK, and have a brilliant mind, we have an open one!**

Dementia is one of the biggest global health challenges of our time.

What we do

We are based in Edinburgh's BioQuarter, an evolving 150 acre site integrating healthcare delivery with academic medical research and spinout life sciences companies. The UK DRI at Edinburgh focuses on understanding how all the different cell types in the brain work together to keep it healthy, how this goes wrong in dementia, and how this process can be slowed or stopped to alter disease progression.

Whilst studies increasingly highlight the important role of immune, vascular and metabolic factors in the development of dementia, interplay between these in disease progression is poorly understood. UK DRI at Edinburgh aims to change that. We examine the complex interactions between cells of the brain, the immune system and blood vessels of the brain.

It is clear that dementia is a disease of the whole brain, not just neurons. Rather than take the more traditional neuron-centric approach involving a linear pathway to neurodegeneration, we examine the entire, multicellular environment surrounding degenerating neurons.

UK DRI at Edinburgh's four specific themes are:

- 1 Macrogliia in neuroprotection and neurotoxicity
- 2 Cerebrovascular & metabolic dysfunction
- 3 Inflammation and immunomodulation
- 4 Synapses and neurons as effectors of a dysfunctional NGVU

By understanding the inner workings of the brain, UK DRI at Edinburgh seek to identify disturbances that can lead to dementia and, in doing so, find new targets for treatments.

Why we need you

Our key strengths complement those of the other UK DRI centres and are vital in helping us identify ways to slow, prevent and, one day, cure, dementia. We are now looking to add to these strengths and our team.

If you think your skills and expertise could make a difference, we'd love to hear from you.

Professor Giles Hardingham,
UK DRI Centre Director,
Glia-neuronal interactions
in neurodegenerative disease



Help us help more people live longer, healthier lives.

Our Team

UK DRI at Edinburgh's creative culture, collaborative ethos and cutting-edge resources have helped us attract – and, crucially, retain - the best talent.

Many of our team are world leaders in dementia. Others are new to neurodegeneration. All are ambitious, bold and among the best in their chosen discipline. We passionately believe that by championing diversity and empowering different ways of thinking we can make important breakthroughs that ultimately can transform lives.

We use expertise in one field to fertilise another.



Prof Giles Hardingham

UK DRI CENTRE DIRECTOR

"Neurons have long been the spotlight of dementia research. Until now. My research focuses on astrocytes. By understanding exactly how these star-shaped cells help maintain a healthy brain over many decades, and what goes wrong in dementia we can find new therapeutic targets."

Prof Tara Spires-Jones

UK DRI GROUP LEADER

"A number of genes increase the risk of developing Alzheimer's Disease (AD). I am researching apolipoprotein E; establishing its normal function and its role in the onset and progression of AD. Understanding these links could help us slow or stop the disease."



Prof Anna Williams

UK DRI CO-INVESTIGATOR

"My research focuses on understanding and trying to repair myelin damage in diseases such as multiple sclerosis (MS) and cerebral small vessel disease (SVD). As myelin acts to protect and nourish the nerves that it wraps around, the hope is that it's repair can reduce disability in these diseases."



Prof Siddharthan Chandran

UK DRI GROUP LEADER

"In healthy individuals, the DNA sequence of C9orf72 contains a short recurring repeat of 6-letters. But in people with a faulty copy, this is hugely expanded and leads to abnormal proteins. By studying the biological consequences of this on different types of brain cell, particularly immune cells, we aim to discover the root cause of Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Dementia (FTD) and identify ways to protect neurons from damage."



Prof Josef Priller

UK DRI GROUP LEADER

"The goal of my research is to characterise the heterogeneity of myeloid cells in the central nervous system and to model the dynamic changes of microglia using patient-derived pluripotent stem cells."

Dr Barry McColl

UK DRI GROUP LEADER

"We're researching the role of specialised immune cells within the brain, called microglia, in neurodegenerative and cerebrovascular disease. Our goal is to gather new knowledge about which of their activities are harmful or helpful, and how this is controlled, paving the way to potential new treatments for dementia."



Prof David Hunt

UK DRI GROUP LEADER

"My team is dedicated to researching brain inflammation, which is an increasingly important target to stop brain degeneration. It is a hugely exciting time to work in this field and we are optimistic that we can help convert scientific progress into better treatments."



Prof Joanna Wardlaw CBE

UK DRI GROUP LEADER

"The brain and heart share many risk factors and dementia has a strong vascular component. I'm applying my expertise in brain imaging, and knowledge of conditions such as stroke and small vessel disease, to help uncover the drivers behind dementia."



Dr Jian Gan

UK DRI GROUP LEADER

"To deconstruct cognition and its deterioration in dementias at the level of synaptic transmission in real-time in vivo is challenging yet long-awaited. We will establish in vivo single-cell physiology approach to tackle this fundamental question, hoping to shed light on targeted intervention for preventing, delaying, and perhaps reversing dementias."

Dr Patricio Opazo

UK DRI GROUP LEADER

"We aim to find ways of boosting the intrinsic synaptic repair mechanisms of the brain, with the ultimate goal of delaying, or even preventing, the onset of cognitive decline."



Dr Bhuvaneish Selveraj

UK DRI EMERGING LEADER

"Using disruptive technologies anchored around human experimental medicine platforms, we hope to decipher cellular and molecular mechanisms that lead to axon degeneration and the selective vulnerability of motor neurons in amyotrophic lateral sclerosis."



Dr Axel Montagne

UK DRI GROUP LEADER

"My group aims to understand how, when, and where endothelial cells and pericytes lining the blood-brain barrier become dysfunctional in the early stages of age-related cognitive decline using cutting-edge brain imaging technology. Our ultimate goal is to develop precise treatments targeting brain vasculature to protect brain functions."



Dr Claire Durrant

UK DRI EMERGING LEADER

"Understanding why synapses are damaged in Alzheimer's disease provides the best hope for developing effective treatments. I hope, one day, our research will help create a world free from the heartbreak of dementia."



Dr Blanca Diaz-Castro

UK DRI GROUP LEADER

"Some of the earliest changes in dementia are thought to occur at the intersection between our nervous, immune and vascular systems. This blood-brain barrier regulates the exchange between the blood and the brain. My team are investigating how the cells that make up this barrier may become dysfunctional and finding ways to maintain a healthy microenvironment instead."



Dr Jing Qiu

UK DRI EMERGING LEADER

"With the support of the UK DRI, my team and I will make advances in unravelling microglial signalling in health and disease, accelerating the discovery of strategies to treat and prevent dementia."



Dr Veronique Miron

UK DRI GROUP LEADER

"Changes in myelin occur early with ageing and contribute to dementia. Understanding what causes these changes will help us develop new therapeutic interventions to ensure healthy cognitive function in ageing individuals."



Prof Seth Grant

ASSOCIATE MEMBER

"The goal of my research is to understand how the molecular diversity of brain synapses supports learning, memory and behaviour throughout the lifespan, and how neurological dysfunctions impact on this synaptome architecture."



Dr Kathryn Bowles

UK DRI GROUP LEADER

"I focus on mutations in the MAPT gene that encodes the protein tau, which accounts for a large proportion of inherited frontotemporal dementia (FTD) cases. Using immortalized human stem cells, generated from FTD patients, we create brain "organoids" to study neurodegeneration and test preventative therapeutics."



Prof Dario Alessi

UNIVERSITY OF DUNDEE, ASSOCIATE MEMBER

My work is focused on deciphering how autosomal dominant missense mutations that hyper-activate the LRRK2 protein kinase, predispose humans to Parkinson's disease.



Dr Mootaz Salman

MRC CAREER DEVELOPMENT FELLOW

"A key aspect of neurodegenerative disease is the blood-brain barrier (BBB). This prevents inflammatory cells and harmful molecules entering the brain. To investigate how the biology of brain cells are affected by a healthy or leaky BBB, I have developed a 3D model of the human BBB through stem cell technology."



Prof Chris Ponting

ASSOCIATE MEMBER

We have a longstanding interest in the functional genomics of brain cells, and associating DNA differences to complex human diseases. We work up to the mega-scale (millions of cells or people) and from single molecules or cells, up to the human population. As a UK DRI Associate Member, I am excited about forming local and national partnerships to help reveal the causes of neurodegenerative diseases.



Setting you up for success

The UK DRI at Edinburgh champion academic freedom. We embrace the courageous and empower the unconventional. After all, you have to be brave enough to take risks to reap the rewards.

We bring together brilliant minds and build meaningful collaborations with researchers across Edinburgh's Bioquarter, the nationwide UK DRI network of Centres, as well as globally. This way, we improve translational knowledge and ensure our staff have access to the best ideas, skills, tools and colleagues. Whatever stage you are at, growth and development are vital. We have training plans in place for researchers of all levels.

PhD Students

PhD students are a critical part of our Centre who will produce the next generation of dementia researchers and whose creativity and drive are already shaping our research direction.

We have over 20 PhD students within the UK DRI at Edinburgh, with a mix of clinical and non-clinical students. Our students are funded from many sources including the MRC, Wellcome Trust, and Alzheimer's Society as well as philanthropic donations. All projects are orientated towards gaining mechanistic insight into dementia and are rooted in human observation- be it patients, samples, or stem cells. To reinforce this our students have at least one clinician scientist in their supervisory team.

Postdoctoral Researchers (ECRs)

The empowerment and development of our ECRs is high priority at the UK DRI at Edinburgh. We fund a post-doctoral data and journal club and all our ECRs join the Bioquarter's Postdoc Society. Each UK DRI Centre has ECR 'reps' who help to organise Institute-wide DRI ECR symposia and skills workshops, and all ECRs can apply to the UK DRI for their own pilot grants to test novel hypotheses.



It is a huge privilege to be recognised as a UK DRI Emerging Leader, and the support is greatly beneficial for my research and career development. I'm grateful for the opportunities, both through access to research funding, and opportunities to collaborate with and learn from world leading dementia researchers within the organisation.

Dr Jing Qiu

Every ECR benefits from annual performance and development reviews. Reviewee-led, it enables them to set out their career aspirations and goals. This scheme, together with Edinburgh University's Mentoring Connections, helps us identify how we can best support our staff. After all, your growth is ours too.

Emerging Leaders

We have created a UK DRI Emerging Leaders programme to support bright and ambitious research fellows on their path to building an independent laboratory. Sponsored and hosted by a UK DRI Group Leader, each Emerging Leader benefits from increased opportunities to build strong research networks and receive career support and mentoring advice on scientific output and future plans, as well as access to UK DRI intra-mural funding schemes.

All the support you need

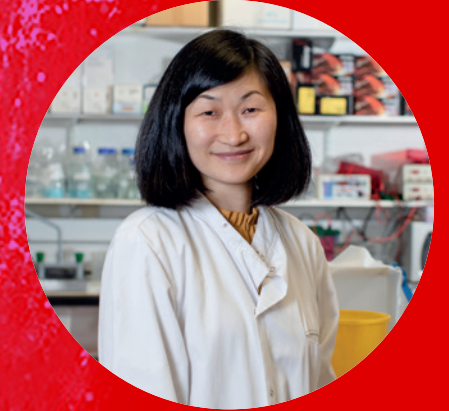
Whether its liaising with the UK-wide network of UK DRI Centres or gaining operational and technical expertise, our team are on hand to help. Our specialists have developed UK DRI standards for the development and sharing of software code and tools. In addition, the Edinburgh DRI informatics core provides training to Centre scientists on handling and interpreting next-generation sequencing and mass spectrometry data. Our microscopy platform manager can also support all aspects of microscopy and image analysis, including multi-photon microscopy and in vivo imaging.

Dr Jing Qiu

I joined Professor Giles Hardingham's group in the UK DRI Edinburgh as a postdoctoral fellow when the Institute was launched in 2017.

I now have my own group as a Rowling Tenure Track Fellow and UK DRI Emerging Leader. The University of Edinburgh is renowned for its first-class neuroscience research, but I have to say the city is first-class too. The breadth of neuroscience research in Edinburgh is a great advantage, as is the collaborative nature of the neuroscience community - particularly the links between basic scientists and clinicians.

My research aims to design new therapies for dementia by understanding the function of a brain cell type called microglia. Every experiment we do is highly rewarding, as each one is a step forward towards helping those who live with these devastating disorders.



I'm very thankful for the funding support from the UK DRI, MRC (Neuroimmunology Data Generation Award) and the Wellcome Trust (ISSF3). The UK DRI has been pivotal in my career development by building an environment that champions collaboration, as well as providing strong career support through training and funding schemes dedicated to early career researchers.

Maria Stavrou

As a clinical neurology trainee, I am currently undertaking my PhD under the supervision of Professors Chandran and Hardingham, at the UK DRI at the University of Edinburgh.

My PhD project focuses on the crosstalk between astrocytes and neurons to better understand the mechanisms of C9orf72 Amyotrophic Lateral Sclerosis (ALS) – an area that until recently has been comparatively neglected.

My ultimate goal is to contribute to the creation and application of science to medicine. This is a hugely rewarding and satisfying pursuit as it leads to real benefits for patients who desperately need help.



I could not achieve this with such momentum without the flagship Rowling Scholars Scheme, funding support from the MRC and the significant advantage of being part of the UK-wide DRI - all of which strengthen clinical academic medicine and promote the translation of science into benefits for our society.

The capital of collaboration

The UK DRI at Edinburgh couldn't be better placed. Situated in Scotland's capital, and embedded in a global top 20 University, it is at the heart of a thriving community of scientists, clinicians, academics and entrepreneurs who make it their lives' work to improve health.

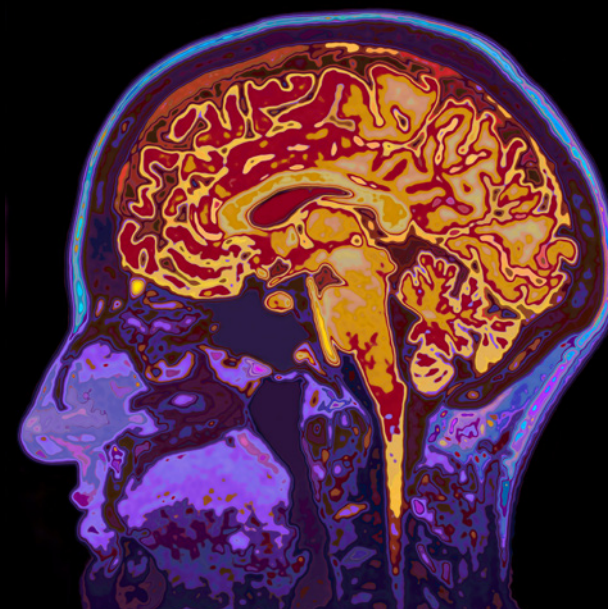
This 150 acre BioQuarter is a formidable network: home to the Royal Infirmary of Edinburgh teaching hospital, clinical research facilities, and more than 25 ambitious life science companies as well as Edinburgh Neuroscience – one of the largest and most cohesive neuroscience networks in Europe. Further, co-location of the UK DRI with the

Edinburgh Centres of Inflammation Research and Regenerative Medicine, the British Heart Foundation Centre of Excellence and the MS Society Centre provides our Centre with further strategic links.

Collaboration is at the heart of all we do. By sharing knowledge, we can build on it. Better it. Working in partnerships, we can move faster to exploit emerging discoveries and turn breakthroughs into treatments.

Join us and you'll be joining one of the best connected scientific communities in the world.

***Join Edinburgh's Bioquarter;
the home of brilliant minds.***



MND-SMART clinical trial

Motor neuron disease (MND) is a devastating terminal neurodegenerative condition. 30% of individuals die within one year of diagnosis, and 50% within two years.

MND-SMART (Motor Neuron Disease – Systematic Multi-arm Adaptive Randomised Trial) is a UK-wide clinical trial established by Professor Siddharthan Chandran which aims to find treatments that can slow, stop and ultimately reverse progression of MND. Using an adaptive platform design, this trial will test different drugs according to new science emerging from the UK DRI

The trial, run by the Euan MacDonald Centre (EMC) for MND Research and funded by the EMC, MND Scotland, and MY NAME'S DODDIE foundation cooperate with the Edinburgh UK DRI Centre, Edinburgh Drug Discovery, and academic neurology to identify drugs to test in the trial and analyse samples to reveal how the drugs are performing. Already trialling two treatments, MND-SMART will introduce the third drug to be tested in late 2023 and will be the biggest ever trial for people with MND in the UK.

Rachel Dakin

CLINICAL TRIAL
MANAGER FOR MND-SMART

I previously did a PhD in cardiovascular biology, worked in the NHS genetics service, and managed some large research projects using patient samples and data. My current job uses a lot of the skills and expertise from these different roles. Being part of a wide team with expertise in different areas gives me the opportunity to learn something new every day.

The most important focus is always on the patients - understanding how to make it as easy as possible to be involved in the trial is our priority. Seeing how we make a difference for people living with MND is very rewarding. Patients take so much joy from being involved in this trial. For us to have such a positive influence on a person's life feels amazing.



***Hope is essential in
any adverse situations.
When you are on a
slippery slope, a brake or
a change of direction is
desperately needed***

MND-SMART trialist

Our achievements

We were the first of six UK DRI centres to be opened in 2017.

We are guided by an international Scientific Advisory Board chaired by Professor Richard Morris and comprised of Professors Beth Stevens (Harvard), Dwight Bergels (Johns Hopkins) and Maiken Nedergaard (Rochester/Copenhagen)



Grown from **6** Group Leaders to **12**
(plus 3 Emerging Leaders)



Launched **3** spin off companies



Attracted over **£100 million** in external grants, donations and investments



Published more than **250** papers



Supported **33** Ph D students



Forged **28** collaborations with other UK DRI centres



Lead **3** clinical trials, spearheaded by the Anne Rowling Regenerative Neurology Centre and the Row Fogo Centre

Research Excellence at the University of Edinburgh

UK DRI at Edinburgh is embedded within Edinburgh Neuroscience, a large integrated interdisciplinary research community directed by Professor Siddharthan Chandran. In the REF2021 (Research Excellence Framework), a UK-wide assessment of research, Edinburgh Neuroscience was ranked 2nd in the UK for Neuroscience, Psychology and Psychiatry as measured by quality, and 3rd in the UK by 'power' which takes into account quantity and quality of the submission. Highlights include:

94%

of our submissions were either ranked as world-leading (4*: 71%) or internationally excellent (3*: 23%)

100%

of our ten impact case studies were awarded 4*, meaning they are world-leading in reach and significance.

100%

of our environment was awarded 4*, meaning the context in which our research takes place is world leading in vitality and sustainability.

However, we don't wish our success to be measured solely on metrics. We believe the work we do should also be judged by the impact it can have on those suffering from dementia: By how effectively it can translate scientific breakthroughs into testable therapeutics, to help people live longer, healthier lives.

Let's make this the beginning of the end of dementia.





Making a home in Scotland's capital

Edinburgh was described as a 'hotbed of genius' by poet and author Tobias Smollett when it played a key role in 18th Century enlightenment. Then, it was associated with leading writers, philosophers, scientists and academics of the time, such as David Hume and Adam Smith. Now home to Edinburgh's prestigious BioQuarter – one of the top medical science sites in the world – it's fair to say its 'hotbed of genius' status holds just as true today.

Scotland's capital is renowned for its outstanding beauty and unique culture. Home to the iconic Edinburgh Castle, the medieval Old Town, classical Georgian New Town and more recent developments, such as the Quatermile and New Waverly Arches, the city holds two UNESCO world heritage designations and regularly ranks as one of the most desirable cities to visit and to live. Edinburgh boasts large city centre green spaces such as Princes St Gardens,

The Meadows, the Royal Botanic Garden, and Holyrood Park containing Arthur's Seat and Salisbury Crags, as well as a large sandy beach at Portobello. Thus, from the bustling, annual Edinburgh Festival and Fringe – the world's biggest arts festival – to the tranquillity of local parks and beaches or, a little further afield, the mountains and lochs of the Scottish Highlands, there's something for everyone here.

Those with families will be impressed by the high standards of the many state primary and secondary schools. Moreover, despite being such a desirable place, the cost of living is relatively low compared to other cities of academic excellence such as Cambridge, Oxford or London. As a compact city, short commutes by bike or on foot are the norm for researchers at all levels making Edinburgh a most liveable city.

“ *Edinburgh isn't so much a city, more a way of life.*
Iain Rankin, author.

“ *The most beautiful of all the capital of Europe.*
Sir John Betjeman, Poet Laureate.



UK Dementia
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