Dementias Platform UK
Medical Research Council

MEETING THE CHALLENGE OF DEMENTIA

DPUK REPORT 2020

Contents

Dementia research is changing, and Dementias Platform UK (DPUK) is at the forefront of these changes. The global growth in cases of dementia has accelerated the search for new treatments, but new approaches are needed if the search is to be successful. DPUK brings together academic, industry, and third-sector partners to bridge the gap between mechanism discovery in the laboratory and successful drug trials by developing innovative solutions to help human experimental studies become faster and better.

This report summarises the achievements of DPUK in its first six years, and bridges to the next phase of development. You will hear from experts and stakeholders on the challenges of experimental medicine and how DPUK is meeting those challenges. You will read about how DPUK scientists identify the early causes of dementia, how we recruit to mechanism-focused experimental studies, and how we collaborate with industry partners to ensure our experimental studies are the most relevant to developing new treatments.

The goal of DPUK is to better understand the complexities of dementia in humans, so that drug trials will succeed and we can reduce the failure rates. This enterprise is globally important, and DPUK welcomes collaboration from scientists, wherever they may be, so that dementia will no longer be the blight on humanity that it is today.

Professor John Gallacher, PhD AFBPsS CPsychol FFPH
Director of DPUK

THE CHALLENGE OF DEMENTIA

Somebody is diagnosed with dementia every three seconds. It is untreatable, and it is the biggest killer in the UK. In 2014, in response to this public health crisis the Medical Research Council funded Dementias Platform UK. Over the past six years DPUK has innovated technology and created expert networks in its ambition to speed up early detection, improve treatment and ultimately prevent dementia.

MRI image of head showing brain.
Credit Shutterstock

Dementia 2020

Dementia is one of the most challenging healthcare and economic problems facing our society today. Around 850,000 people in the UK have dementia, and the number is set to treble by 2050. In June 2019, data published by Public Health England showed that dementia in the UK contributes to, or underlies, a quarter of deaths in those aged over 75.

Following funding in 2014, the Medical Research Council established Dementias Platform UK (DPUK) as a highly collaborative public-private-partnership for translational experimental medicine.

Through our ethos of pre-competitive partnership, the best academic and industry minds are brought together to identify innovative solutions to the difficulties surrounding translating basic research into treatments. These include early detection of disease, precision recruitment to trials, and experimental studies that inform trials decision making.

For early detection, our Data Portal enables researchers to have global, remote access to over 3 million records of population and cohort data for rapid hypothesis generation and testing. Our molecular and structural brain Imaging Network uses the Data Portal to provide image sharing and pre-processing capability across collaborating cohorts, and to detect the earliest brain changes that lead to dementia. Our Stem Cell Network allows cell lines from cohort members to be used to identify the earliest cellular and molecular changes that lead to dementia.

Precision recruitment allows the right people to be recruited for the right study at the right time. Our Clinical Studies Register of 53,245 participants enables members of research cohorts, who wish to support dementia research, to be re-contacted according to their suitability for specific studies. Our Great Minds Register of 3,276 members is for cohort participants who are willing to provide additional cognitive data on a regular basis for studies that require the detection of cognitive change.

Our experimental medicine portfolio is a partnership with a growing number of pharmaceutical and bio-tech companies, where the studies address questions to translate discoveries in synaptic health and vascular health into new interventions for dementia. Our Imaging and Stem Cell Networks provide cutting-edge technologies in support of these studies.

Through these initiatives DPUK is increasing the UK's capacity for translational experimental medicine in the search for new treatments.

Taking up the dementia challenge

Dementias Platform UK
Medical Research Council

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"To accelerate progress in dementia research, scientists are turning to ambitious technological approaches to open new frontiers in the hunt for more effective treatment, risk reduction and detection. Dementias Platform UK is a vital resource for the dementia research community and a key partner in Alzheimer's Research UK's Early Detection of Neurodegenerative diseases (EDoN) initiative. Cohort data and expertise within Dementias Platform UK will be instrumental in allowing us to detect the diseases that cause dementia much earlier than we do today."

DR CAROL ROUTLEDGE,
DIRECTOR OF RESEARCH,
ALZHEIMER'S RESEARCH UK

"From inception, Dementias Platform UK has shown how new thinking can change how we do dementia science. I am delighted that the global reach of DPUK has been recognised in their continued support by MRC and industry."

GEORGE FREEMAN MP

"Dementias Platform UK demonstrates the opportunities for collaborative work in neurodegeneration in the rich scientific environment of the UK. The access to data from large population cohorts, studies such as the Deep and Frequent Phenotyping study for biomarkers of progression in early stage disease, the excellent work being done in synaptic plasticity and neuro-inflammation and more are all important reasons why Janssen is committed to partnering with this important collaboration."

PROFESSOR SIR SIMON LOVESTONE,
VP, DISEASE AREA STRONGHOLD LEAD
NEURODEGENERATION, JANSSEN

"Research must continue into early detection and prevention of dementia – one of the toughest health and economic challenges of our age. I am delighted that DPUK has been re-funded, as it is such collaborations between academia, industry and health study volunteers that will speed discovery of the causes of dementia and lead to new treatments."

ANNELIESE DODDS MP

"Global access to research data is a major piece of the dementia jigsaw; it is essential for accelerating the development of new treatments. DPUK has pioneered remote data access, and Health Data Research UK is delighted to partner with DPUK in developing world leading data access technologies."

PROFESSOR ANDREW MORRIS,
DIRECTOR, HEALTH DATA RESEARCH
UK

"The MRC is proud of the achievements of DPUK in bringing researchers and data together across the UK to improve resources and the ways in which our research community addresses the challenge of Alzheimer's disease and related dementias."

PROFESSOR PAUL MATTHEWS, CHAIR
OF THE MRC NEUROSCIENCES AND
MENTAL HEALTH BOARD

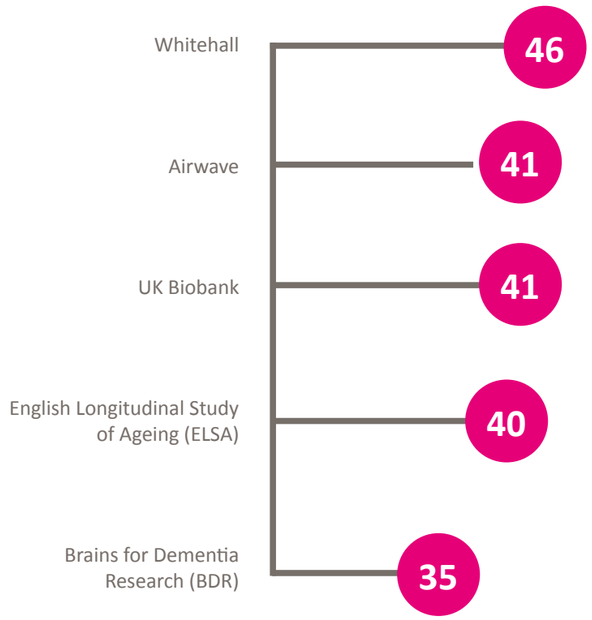
EARLY DETECTION

In the past 20 years there has been an almost 100% failure rate in drug trials for dementia because we are testing treatments too late in the progression of the disease. Once symptoms show, the brain has already been irreversibly damaged by the disease. Detecting dementia earlier and testing the effectiveness of new treatments paves the way for preventing or delaying the disease.

The Data Portal – rapid data access

The DPUK Data Portal operates to the highest data protection standards. Cohort participants and researchers can be reassured that the data are managed securely and responsibly, maintaining privacy whilst maximising scientific value.

The top five cohorts within the Data Portal by applications for access from researchers



42
cohorts

188
applications

479
users

771
data access requests

A global resource

The DPUK Data Portal brings together health records for over 3 million people from dozens of cohort studies in a free-to-access resource for researchers.

Researchers can identify which cohorts are relevant to their proposed area of study, apply for access to the data, and then analyse it in a secure, remote environment complete with data linkage, analytical software packages, and cross-cohort capability.

In the 20 months since launch, the Data Portal has received more than 180 applications involving over 700 individual data access requests spanning 82 institutions across 20 countries. 71 studies are ongoing, on topics as diverse as the links between childhood experiences and later-life cognition, and the association between Parkinson's disease, dementia and insulin resistance.

The DPUK Data Portal was born out of a recognition that rapid data access is key to accelerating scientific progress, and that researchers need access to research data that is structured and curated to common standards. With an effective treatment for dementia having proved elusive for more than a century, this type of high-quality data – from cognitive test results and biological samples to brain imaging and genetics – may hold the key to identifying the changes that take place in the brain and body long before symptoms start to appear.

The vision is simple: to optimise access to the UK's rich heritage of health data collection, powering it with state-of-the-art technology to take on the challenge of finding ways to prevent and treat dementia.

22 researchers, with backgrounds ranging from astrophysics to biomedical science, join DPUK's Exeter University datathon.
Credit: Steve Haywood

The Stem Cell Network

As our most complex, most difficult to access organ, the brain presents scientists with a real problem – how to study living brain cells in detail. Thanks to efforts of the DPUK Stem Cell Network, coordinated research is now possible by using cohort study samples to develop living brain cells in a dish. Members of the DPUK Stem Cell Network are internationally leading in this work.

Studying the 'disease in a dish' demands specialist resources and expertise found in UK universities and industry. Maximising this distributed expertise has been the key to the breakthroughs the teams are making. The DPUK Stem Cell Network has enabled scientists to collaborate with each other and refine highly advanced techniques in reprogramming, differentiation and genome editing using cohort samples.

Scientists working in the pharmaceutical industry use automated robotics technology to conduct drug testing, and now UK universities have these same machines. This puts dementia experts – whether based in universities or industry – in the best position to collaborate effectively. Within the Stem Cell Network, scientists are pooling their resources, making the most of expertise to support drug development. Using cohort-derived samples, teams are testing thousands of drugs to discover new targets for treating neurodegenerative disease.

Automated liquid handling system at the Wade-Martins stem cell lab. Credit: Anna Lukala

"The use of patient stem cell-derived neurons has transformed the way we now study cellular mechanisms of diseases of the brain. Whereas it was previously impossible to access living neurons from patients with Alzheimer's and Parkinson's, we can now do so using stem cell technology. The work of the DPUK Stem Cell Network has allowed UK scientists to undertake and publish world-class research in this area."

PROFESSOR RICHARD WADE-MARTINS, PROFESSOR OF MOLECULAR NEUROSCIENCE, UNIVERSITY OF OXFORD

Cohort stem cell lines

In a sample of skin, or a drop of blood from cohort study volunteers, we have the means of studying Alzheimer's disease and Parkinson's disease 'in a dish', uncovering new detail on the biological mechanisms which cause it to develop.

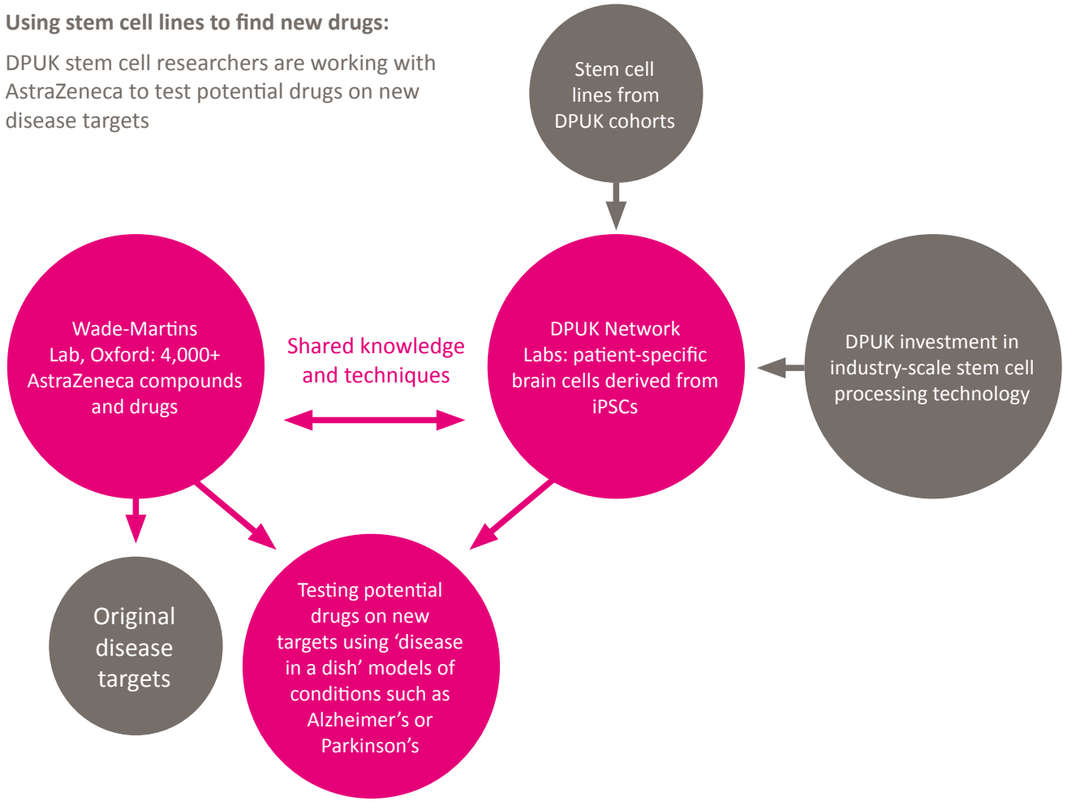
This is possible thanks to the extraordinary advances in stem cell science. Scientists in DPUK's Stem Cell Network have pioneered new techniques that allow them to develop living brain cells from the 'induced pluripotent stem cells' (iPSC) derived from the skin and blood samples of cohort volunteers.

The process of analysing the cells is now well under way, and researchers are able to study the behaviour of living brain cells safely outside of the human body.

The newly-derived cells are allowing scientists to go back in time to study the early undetected stages of dementia. This is providing unprecedented insights into the cellular processes involved in dementia and into targets for potential treatments.

Using stem cell lines to find new drugs:

DPUK stem cell researchers are working with AstraZeneca to test potential drugs on new disease targets



The Imaging Network

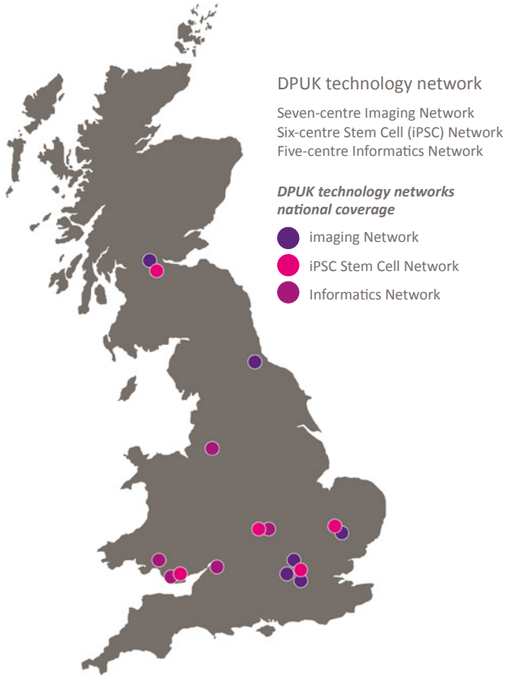
One of the central challenges in dementia research is scale. How can we run brain imaging studies that are large enough to deliver robust findings?

Brain imaging across sites is complex as it is difficult to know which differences in an image are due to differences in the brain, or which are due to differences in the scanner. This represents a real block to research.

The answer comes in creating a network of imaging centres that work together. DPUK's Imaging Network links imaging experts at seven UK sites. Thanks to DPUK, researchers across the network share best practice, have upgraded local protocols to a common standard, and have calibrated scanners across sites. This allows researchers to be more confident that they can detect the subtle brain differences that are due to early disease. These standardised methods and resources are designed to facilitate multi-centre dementia research – a whole new approach in brain imaging studies for dementia.

"The ability to image and quantify pathology in the brain by positron emission tomography (PET) has become a key technology for dementia research. With major investment in a PET-MR scanner network by Dementias Platform UK, we are now in a unique position to fully utilise this powerful technology towards its research objectives."

PROFESSOR FRANKLIN AIGBIRHIO, PROFESSOR OF MOLECULAR IMAGING CHEMISTRY AT THE WOLFSON BRAIN IMAGING CENTRE, UNIVERSITY OF CAMBRIDGE



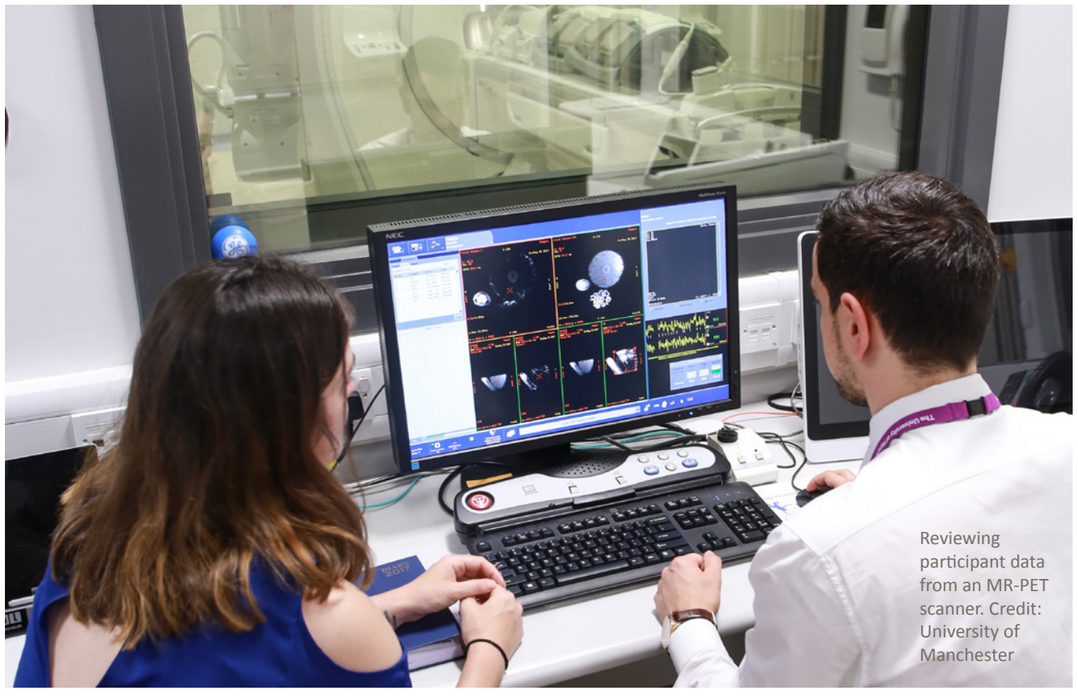
Detecting dementia before it emerges

One of the sad truths about dementia is that by the time symptoms start to appear, it's usually too late to reverse them. And as dementia grows into one of our most pressing public health issues, researchers urgently need the tools to help them detect the disorder in its earliest stages and develop effective treatments.

One of those tools – and one of the most valuable in the fight against dementia – is brain imaging. From detecting the build-up of toxic proteins in the brain, to learning more about how dementia takes hold at a cellular level, the deployment of magnetic resonance imaging (MRI) and positron emission tomography (PET) technologies can give scientists important insights into the development, progression and potential treatment of dementia.

Crucial to this research is the DPUK Imaging Network, which brings together a critical mass of skills, ideas, technologies and best practice to create a world-leading environment for applying advanced imaging in support of experimental medicine and clinical trials in dementia research.

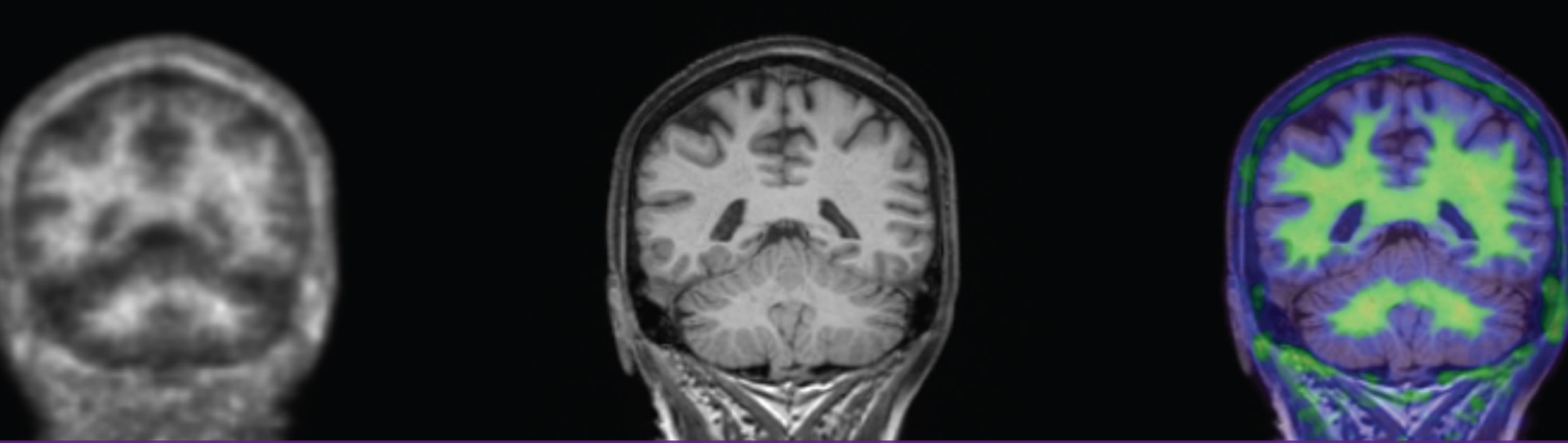
The network includes seven new state-of-the-art combined PET-MR scanners funded by DPUK, manufactured by Siemens and GE Healthcare, and based at universities and hospitals across the UK.



Reviewing participant data from an MR-PET scanner. Credit: University of Manchester

PRECISION RECRUITMENT

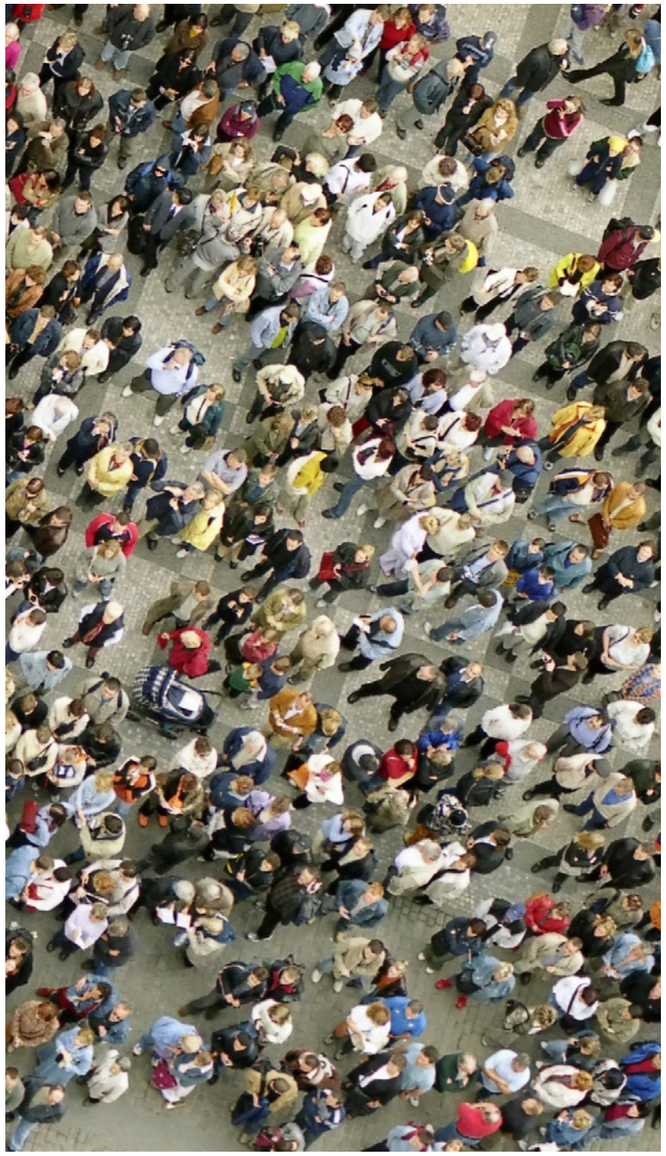
Translating research into effective interventions for diagnosing and treating dementia relies on the right volunteers participating in targeted studies. Yet finding enough volunteers at risk of dementia, but free from the symptoms associated with the disease, is a major barrier to developing such treatments. The pressing need now is to recruit and retain a registry of volunteers with the key characteristics required for dementia studies.



MR-PET scans of two patients - green and yellow show build up of amyloid protein associated with dementia

Trials readiness

Scientists talk about ‘trials readiness’. This term describes a clinical study into a biological process or treatment that has a strong research approach, knowledge of the disease mechanisms, and volunteers with the right biological characteristics available for effective clinical trial. For dementia research, scientists need to identify the risk characteristics for dementia, in those not showing symptoms of the disease.



Volunteers in Great Minds and the Clinical Studies Register

56,521
volunteers consenting to dementia research

20,528
volunteers with genetic information

33,356
volunteers with cognitive test data

Volunteers with rich data

Dementia is the single largest cause of death in the UK, but despite this over the past 20 years no new treatments have been developed. To break this deadlock, DPUK is spearheading recruitment of volunteers with a risk of developing dementia to clinical studies. We are working with cohort partners to re-contact their participants on the basis of risk for dementia, and to recruit them to clinical studies.

Thanks to the generosity of cohort participants, from HealthWise Wales and Airwave studies, researchers will be able to recruit participants who have biological characteristics associated with increased dementia risk for dementia studies. Research needs to identify early indicators and treatments of dementia, before symptoms have irreparably damaged the brain. Recruiting the right people to early clinical trials will speed the discovery of the potential biological mechanisms that cause dementia and help industry to take the most promising treatments to drug trials.

Marianne Talbot is a participant of the ELSA cohort. ELSA stands for ‘English Longitudinal Study of Ageing’. Both her parents had dementia and she is happy to do anything she can to help the fight against these diseases and all others. Marianne is contributing to shaping the volunteer-focused development of Great Minds.

“Working with volunteers with existing rich medical data gives researchers the opportunity to test new treatment in groups at varying risk of developing dementia. Combining the factors that we know increase the risk of dementia in later life, we can pinpoint those that may develop symptoms in about 5-10 years. The main goal of this is to develop treatments that stop or slow down the disease before it starts causing permanent damage.”

DR IVAN KOYCHEV, CLINICIAN SCIENTIST, UNIVERSITY OF OXFORD

EXPERIMENTAL MEDICINE INCUBATOR

The Experimental Medicine Incubator powers a new generation of collaborative studies in humans so that we can identify the mechanisms of dementia. By using non-invasive techniques such as medical imaging and powerful ‘omics technologies we can approach the human as the ultimate experimental model. These studies bring discovery science to the point where drug development can begin.

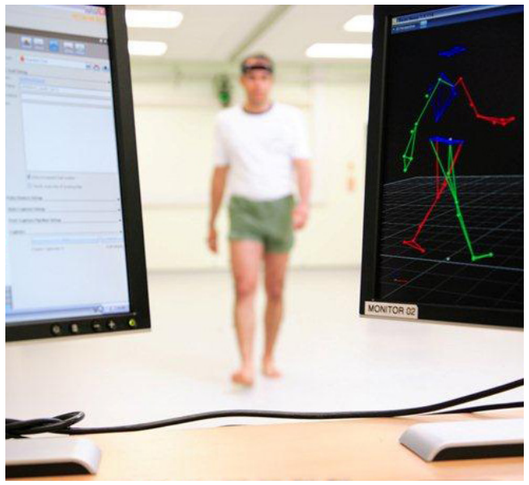
Experimental medicine studies

Experimental medicine studies such as medical imaging and powerful ‘omics technologies allow us to approach the human as the ultimate experimental model for improving human health.

Experimental medicine is vital to early-stage drug discovery, as researchers address fundamental questions in dementia research and conduct the first in-human tests.

By investing in the UK’s research technologies, DPUK has brought together experts and volunteers to speed the development of new treatments. These experimental studies explore promising new areas that promote synaptic health and consider the role of vascular health and neuro-inflammation in dementia.

Developing treatments for neurodegenerative disease involves many different stages. Treating dementia means identifying undesirable cell changes and manufacturing compounds that counter these. Universities and industry each play important parts in the success of the Incubator, bringing expertise and resources together to ensure more effective outcomes.



Gait assessment in the DFP study. Credit Professor Lynn Rochester, Brain and Movement Research Group, Newcastle University, UK.

The experimental medicine portfolio

10
work packages

77
team members

25
locations

916
participants

3,442
samples

13,000
brain scans

138
outputs

The Deep and Frequent Phenotyping study (DFP) – a case study

One of the big challenges facing dementia researchers is how to detect and track Alzheimer’s disease in its earliest stages – often years before symptoms start to show. The DFP study, led by Professor Simon Lovestone and Dr Vanessa Raymont, is jointly funded by the MRC, industry and NIHR to help scientists identify the best early warning signs, and track responses to treatments.

DFP is recruiting 250 participants from across the UK who are over 60 and in good health, including people with a higher than average risk of dementia. Anonymous data from these volunteers will be made available via the DPUK Data Portal to help other researchers understand how Alzheimer’s disease develops and whether early interventions are working.

Tests carried out on participants include regular brain scans, cognitive and memory tests, scans of magnetic fields generated by the brain, retinal imaging, blood tests, and the use of wearable technology to measure movement, gait and ‘real world’ cognitive function. When fully operational, DFP will have testing centres in Edinburgh, Exeter, London, Manchester, Newcastle and Oxford.

For its size, DFP is the world’s most detailed study to date into preclinical Alzheimer’s disease. Without generous volunteers, the pilot would not have been able to reveal the observable characteristics that may contribute to people developing Alzheimer’s disease. Once the study is complete this data will be part of the DPUK Data Portal.

Queen’s University Belfast is leading imaging and image analysis of progression of retinal changes associated with Alzheimer’s disease, which includes ultra-wide field imaging of the retina. Credit Optos/Nikon.

New Therapeutics in Alzheimer's Disease – a case study

With Alzheimer's disease accounting for over 60% of all dementias in the world, the New Therapeutics in Alzheimer's Disease (NTAD) study, led by Professor James Rowe, is testing new brain scans that are revealing early changes in the brain that are a signature of Alzheimer's disease. These markers for the disease will be used to test whether experimental treatments can delay, or even prevent, the progression of the disease.

Across two sites – Cambridge and Oxford – NTAD is using magnetoencephalography (MEG) scanners to identify and test biomarkers with the help of 100 volunteers. It is still early days, but MEG measurements of brain activity promise to be sensitive enough to detect the early disease. The initial findings suggest that it may be feasible to monitor the impact of treatments on the rate of brain cell decline.

Having a biomarker sensitive to subtle changes in the working of the brain is vital if the pharmaceutical industry is to develop early treatments in a timely and cost-effective way.

The study's industry partners – Janssen, AstraZeneca and Lilly – will test any proven and reliable early Alzheimer's biomarkers to assess the effectiveness of new treatments in slowing or preventing the disease and to fast-track drug trials.

Treating Alzheimer's disease early is vital. Damaging amyloid proteins, the hallmark of Alzheimer's disease, build up years before symptoms show and result in irreversible damage to the brain. For this reason, NTAD is focusing on detecting the disease at an earlier stage so that industry can develop treatments that stop the disease before symptoms start.

"I have found taking part in the in NTAD study incredibly positive. Along with being professional, the research team have been personable and considerate. They have been clear about what is involved and I have never felt pushed or forced to participate at any stage.

'I would like to thank the team – they have been superb. Science like this gives me hope. If my contribution goes some way to helping us understand how to slow the disease progress, I feel that I will have helped those with Alzheimer's in the future."

SALLY TAYLOR (PICTURED WITH HER HUSBAND TONY): PARTICIPANT ON THE NEW THERAPEUTICS IN ALZHEIMER'S DISEASE (NTAD) STUDY

Magnetoencephalography (MEG) scanners measure subtle changes in the working of brain cells. Credit National Institute of Mental Health, National Institutes of Health, Department of Health and Human Services

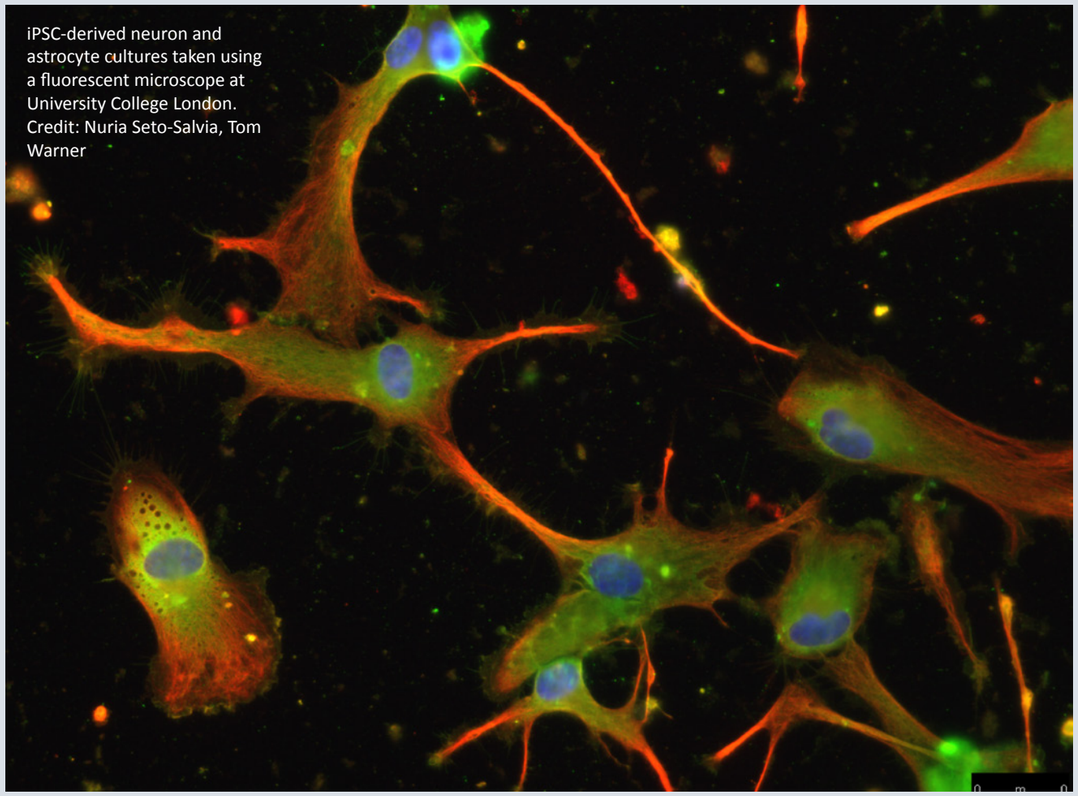
Astrocytes and their role in Alzheimer's disease – a case study

The degeneration of star-shaped brain cells known as astrocytes may have a role in the development of Alzheimer's disease. A joint research team led by Professor Paul Matthews carried out a proof-of-concept study to test whether PET scans could provide useful information about astrocytes in people with Alzheimer's disease.

Commonly characterised as 'helper' or 'housekeeping' cells, astrocytes perform several important functions in the brain, and previous research has suggested that astrocyte alterations are observed in various neurodegenerative diseases. The DPUK researchers found increased uptake of a PET astroglial activation tracer in the brains of people with early and established Alzheimer's disease, compared with healthy control subjects. They also found that the extent of the increase is related to the deposition of amyloid – a protein in the brain linked to Alzheimer's disease.

The study moves forward a UK-led discovery effort for a new biomarker that promises to be important across a number of neurodegenerative diseases, including an improved understanding of the early progression of Alzheimer's disease at the time when it could be treated most effectively.

The proof-of-concept study received support from DPUK partners Imperial College London, Invicro and GSK.



iPSC-derived neuron and astrocyte cultures taken using a fluorescent microscope at University College London. Credit: Nuria Seto-Salvia, Tom Warner

Routes to reduce vascular dementia – a case study

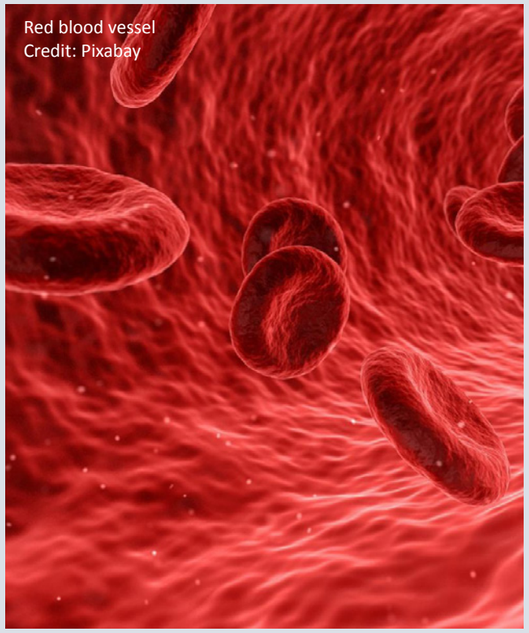
Stroke is a major risk factor for dementia and declining cognition is a major risk factor for stroke. However, the links between vascular health and brain health remain poorly understood. The "Rates, Risks and Routes to Reduce Vascular Dementia study" (R4VaD) is recruiting 2,000 stroke survivors to shed light on vascular and brain health.

Vascular dementia is the second most common type of dementia after Alzheimer's disease. Memory loss, and thinking and language difficulties occur when the brain is damaged because of problems with the blood supply. Not all stroke survivors go on to develop dementia and so the R4VaD study sets out to explain the causes of dementia in stroke patients, and identify the warning signs that predict which patients will be affected.

Under the leadership of Professor Joanna Wardlaw, DPUK's Vascular Health Network has brought together expertise in both disease areas and begun tracking the changes in memory and thinking skills in stroke survivors across the UK.

So far the study has recruited over 1,250 stroke patients, across 53 different sites. Despite COVID-19 pandemic measures pausing new recruitment, remote data collection is still possible, taking place on six to 12 week follow up. Once complete, this will be the first study of its size that has tracked this level of detail for vascular causes of dementia. The data from this intensive study will allow researchers to investigate the impact of stroke on long-term cognition and dementia risk, and stratify treatments according to risk.

R4VaD is a national-scale study with centres at the universities of Edinburgh, Cambridge, UCL, Oxford, KCL, Manchester, Nottingham, Leicester and Glasgow. Such influential, large-scale studies are only made possible through collaboration, and DPUK is a proud partner alongside the Stroke Association, British Heart Foundation and the MRC.



Red blood vessel Credit: Pixabay

COLLABORATION

Universities don’t make drugs – it is industry that takes the discoveries of academia and invests resources and skills into developing new medicines. In this same way academia also works closely with the third sector, helping to influence public health policy, health funding and healthcare in order to improve the lives of those at risk of dementia.

Sharing knowledge and research at the DPUK Annual Conference. Credit: Paul Tait

Academia and industry expertise

DPUK's collaborative mindset has already created new tools and resources to speed up the pathways to developing new medicines, and to equip a new generation of researchers with the skills they need to discover new treatments for dementia.

Cooperating and aligning academic research with drug development helps industry develop and test new treatments faster than ever before. In the New Therapeutics in Alzheimer's Disease (NTAD) collaboration, initial findings show that new biomarkers for early Alzheimer's disease may prove effective indicators of whether treatments slow or alter the disease progression. Industry partners will make use of the new biomarkers to design better clinical trials to find new medicines for dementia.

Collaborating on repurposing drug libraries is another promising research area. By using stem cell technology to develop 'disease in a dish' models, the Stem Cell Network is working with AstraZeneca to test thousands drugs that have not been tested as a treatment for dementia. These drugs offer the opportunity to find new treatments fast by matching existing drug pathways with potential neurodegenerative disease targets.

Stem cell labs
Credit: Anna Lukala

"DPUK's industry and academic scientists bring complementary skills and knowledge to research. Multidisciplinary collaborations are vital in breaking the deadlock in preventing dementia. If we are to develop effective treatments for the most pressing health crisis of our age we need to reduce the time – and cost – of developing new drugs."

DR JOHN ISAAC, SENIOR DIRECTOR IN NEUROSCIENCE, JANSSEN INNOVATION

The dementia landscape: academia and the third sector

Charities and not-for-profits in the UK are inspiring contributors to dementia research and policy development. Their skills in raising funds and influencing policy supports research that addresses detection, care and prevention of dementia. Working with the third sector on researcher-focused events like 'datathons' aligns research skills with public attitudes and innovates research priorities.

Supporting the best researchers from academia, industry and not-for-profits brings knowledge transfer and new skills to the research community.

DPUK's flagship datathon events use the Data Portal to power interdisciplinary research groups of early career researchers, data scientists, dementia researchers and mathematicians, to develop and test new hypotheses.

Through partnering with Alzheimer's Research UK, the Alan Turing Institute, the University of Exeter, Swansea University and the University of East Anglia, DPUK has brought these intensive research events to 121 researchers from over 30 different institutions. Due to COVID-19 we have moved to virtual datathons, which are proving just as popular.

Rafael Jimenez, Head of Research Informatics at Alzheimer's Research UK, at the Swansea University DPUK Datathon

"Charities and not-for-profit organisations have a major role in strategically influencing research and policy agendas. Gates Ventures is working closely with DPUK and other platforms, piloting an international dementia-focused data sharing network.

With its high levels of data security, and breadth and depth of data, the DPUK Data Portal is a key partner in this network and will play an important role in increasing data access worldwide.

Our goal is to reduce the barriers to data discovery and access. Our vision is that the best researchers with the best ideas from academia and industry will be able to access the best data from wherever they live."

NIRANJAN BOSE, MANAGING DIRECTOR, HEALTH & LIFE SCIENCES AT GATES VENTURES

LOOKING AHEAD

Now delivering on international efforts to defeat dementia, new resources are beginning to change the historic underfunding of dementia. DPUK is one of the beneficiaries of this with the MRC announcing reinvestment into DPUK.

The next phase of Dementias Platform UK

DPUK is unique in integrating the discovery science of experimental medicine with population data, within pre-competitive industry collaborations. In the next phase DPUK will expand its capacity in three areas that are vital to filling the knowledge gap in dementia research.

We need to improve access to rich cohort data if we are to accelerate scientific breakthroughs. Through our partnership with Health Data Research UK (HDRUK) the Data Portal will link to electronic health data, becoming the most in-depth longitudinal data resource globally. And by enhancing our imaging pipelines DPUK will provide global access through the 'XNAT' open-source imaging platform offering researchers image storage and processing facilities.

Precision recruitment of volunteers to studies is what underpins ground-breaking research studies. By working with NIHR's Join Dementia Research and the Scottish Brain Health Register, our Trials Delivery Framework will power recruitment and matching of essential volunteers to trials centres across the UK.

Only by unlocking the hidden mechanisms behind the human experience of dementia can we take laboratory discoveries through to early-phase clinical trials. Our Experimental Medicine Incubator brings industry's skills and experience of the requirements of large-scale trials to bear on the root causes of dementia. In association with the UK Dementia Research Institute and Alzheimer's Research UK Drug Discovery Alliance, the Incubator will focus on how we lose synapses, how we can prevent vascular dementia and how to identify the inflammatory processes associated with dementia.

The injection of new funding from the Medical Research Council (MRC), industry, and third sector partners brings together the foremost scientists in dementia research and gives them access to the technology and research resources they need to transform our understanding of this disease.

DPUK has brought scientists from universities and industry together in conferences and specialist training workshops, supporting innovative new studies. Photo credit: Alex Tyler

A global perspective

Dementia is not a disease that one country or one organisation alone can cure. It is a global problem that requires a global solution. DPUK is committed to working internationally in the search for new treatments.

Globally, dementia research still lags behind other public health issues in terms of funding and knowledge creation. For every 12 publications produced on cancer only one is produced on neurological disease. To fill this knowledge gap, DPUK has embraced international collaborative working and partnership.

Researchers need to access the best data available. Through our work with Gates Ventures, the Global Alzheimer's Disease Interactive Network (GAAIN), the Critical Path for Dementia (CPAD), and Aridhia, we are supporting the development of the Alzheimer's Disease Work Bench, a cross-platform solution for international data access.

Critical to the success of international data access is data security. In collaboration with Cohen Bioscience, Fraunhofer Institute, Hong Kong University, Maastricht University, the Ontario Brain Institute, Seoul Samsung Medical Centre, and the University of Peking, we are setting out the principles and practices of secure, high-value informatics networks.

Integrating trials and real-world data (population and clinical data) is critical to accelerating drug development. Underpinned by DPUK and the European Medical Information Framework (EMIF), the Innovative Medicines Initiative (IMI) Roadmap project on real-world data in Alzheimer's disease established the importance of standardised clinical assessments for disease progression modelling and drug evaluation.

As the largest European dementia-related informatics research infrastructure, DPUK brings learnings on data management policy and practice that is informing the development of IMI projects. DPUK is a key partner in the IMI Neuronet, which links and integrates many IMI neurodegeneration projects.

Experimental medicine is the translational bridge between discovery science and drug development. DPUK is collaborating with the European Prevention of Alzheimer's Disease Project (EPAD) and the US Global Alzheimer's Platform (GAP) to develop trials-ready volunteer populations. Supported by pharma and philanthropic partners, DPUK's Trials Delivery Framework will increase the number of experimental medicine studies conducted in the UK.

Dr Sarah Bauermeister supporting Data Portal analyses at the Alan Turing Institute DPUK datathon. Photo: Alex Tyler

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