



## **National Institute for Health Research**

### **BIOMEDICAL RESEARCH CENTRES**

#### **Introduction**

The vision of the National Institute for Health Research (NIHR) is to improve the health and wealth of the nation through research.

This document sets out how the NIHR Biomedical Research Centres are contributing to this vision. Information about other elements of the NIHR clinical research infrastructure can be found in companion documents.

#### **Overview**

In 2007 and 2008 respectively, the NIHR established Biomedical Research Centres (BRCs) and Biomedical Research Units (BRUs) within leading NHS/University partnerships. Following an open competition, a second round of NIHR BRCs and BRUs were designated and funded in April 2012 for a 5-year period.

NIHR BRU funding resulted in the delivery of a substantial portfolio of world-class research, building capacity and critical mass in identified priority areas over the period of NIHR BRU designation and funding. As such, the distinction between BRCs and BRUs had become less valid. As such from 1 April 2017 the NIHR BRU designation was discontinued.

From 1 April 2017, twenty leading NHS and University partnerships have been designated and funded as NIHR BRCs to drive progress on innovation and translational research in biomedicine into NHS practice. These NIHR BRCs translate lab-based discoveries into new cutting edge treatments, technologies, diagnostics and other interventions in clinical settings. The substantial levels of sustained funding which they receive creates an environment in which scientific endeavour can thrive, attract the foremost talent and produce world-class outputs, hence contributing to the nation's international competitiveness as a major component of our knowledge economy.

#### **The aims of the BRCs are to:**

- Drive innovation in the prevention, diagnosis and treatment of ill-health through early translational (experimental medicine) research;
- Translate advances in biomedical research into benefits for patients, the health system and for broader gain;

- Provide a key component of the NHS contribution to our nation's international competitiveness..

### Designation and Funding

The BRCs were selected by open competition during 2016 by an expert international panel, using the following criteria:

- **Quality, volume and breadth** of internationally-excellent biomedical and translational research and researchers.
- Existing **research capacity**, and plans for increasing capacity including training.
- **Strength of the strategic plan.**
- **Relevance of the research portfolio** to the health of patients and the public.
- **Track record** in translating advances in basic biomedical research into clinical research, and pulling through basic biomedical research findings into benefits for patients, the public and the NHS.
- **Strength of the strategic partnerships**, including those with industry and other NIHR-funded research Infrastructure.
- **Value for money.**

In order to ensure critical mass, focus and clarity, funding for each BRC has been awarded to a single NHS organisation (in partnership with academia). The amount of funding allocated to each BRC was determined by the scale, nature and quality of the research activity to be conducted by that centre, and is to be used to support the translation of excellent basic biomedical research (already being undertaken primarily in universities) into excellent clinical research (underway or to be undertaken within the NHS), for the benefit of patients.

NIHR funding and designation has been provided for five years from April 2017, and meets the recurrent costs of patient-based, translational clinical research in the NHS.

Eligible costs include:

- Research staff engaged on patient- or people-focused translational clinical research in the NHS.
- Research support staff supporting patient or people focused translational clinical research in the NHS.
- Research training, leading to a higher degree by research (e.g. MPhil, MD, PhD), for staff, of all disciplines, engaged on patient- or people-focused translational clinical research in the NHS.
- NHS support costs of patient- or people-focused translational clinical research (e.g. pharmacy, pathology, radiology).
- Other, legitimate and reasonable, indirect costs within the NHS (e.g. accommodation, payroll, HR, finance).

The performance of each BRC is monitored and reviewed by the NIHR Central Commissioning Facility. BRCs that are not performing at the required standard will first be put on notice and, if the required standard is not achieved within a defined time-scale, funding will be withdrawn.

## BRC Research Themes

Each BRC has either a very substantial portfolio of world-class biomedical research **across a range of clinical and research areas**, or a substantial portfolio of world-class biomedical research in a **specific clinical or research area**.

Details of the current BRCs and their research themes are presented in the table below.

NHS Organisation	University Partner	Research Themes
Barts NHS Trust	Queen Mary University of London	Cardiovascular devices and innovative trials, inherited cardiovascular disorders
University Hospitals Birmingham NHS Foundation Trust	University of Birmingham	Inflammatory arthritis, inflammatory bowel disease, inflammatory sarcopaenia.
University Hospitals Bristol NHS Foundation Trust	University of Bristol	Cardiovascular disease, mental health, nutrition, diet and lifestyle (including obesity), reproductive and perinatal health, surgical innovation.
Cambridge University Hospitals NHS Foundation Trust	University of Cambridge	Antimicrobial resistance, cancer, cardiovascular and respiratory disease, dementia and neurodegenerative disease, gastrointestinal disease, integrative genomics, mental health, metabolism, endocrinology and bone, neuroscience, nutrition, diet and lifestyle, population and quantitative science, transplantation and regenerative science, women's health and paediatrics.
Central Manchester University Hospitals NHS Foundation Trust	University of Manchester	Advanced radiotherapy, cancer prevention and early detection, cancer precision medicine, dermatology, hearing health, respiratory medicine, targeted therapy in musculoskeletal diseases.
Great Ormond Street Hospital for Children NHS Foundation Trust	University College London	Advanced treatments for structural malformation and tissue damage, gene, stem and cellular therapies, genomics and systems medicine, novel therapeutics and their translation into childhood disease.
Guy's and St Thomas' NHS Foundation Trust	King's College London	Cardiovascular disease, cutaneous medicine, genomic medicine, imaging sciences, infection and immunity, oral health, regenerative medicine and cellular therapy, transplantation, women and children's health.
Imperial College	Imperial College	Brain sciences, cancer, cardiovascular, gut health,

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Healthcare NHS Trust	London	immunology, infection and AMR, metabolic medicine and endocrine, surgery and technology
Leeds Teaching Hospitals NHS Trust	University of Leeds	Preventing disease and disability in immune mediated inflammatory disease, improving treatment of osteoarthritis
University Hospitals of Leicester NHS Trust	University of Leicester	Cardiovascular, lifestyle, respiratory.
South London and Maudsley NHS Foundation Trust	King's College London	Affective disorders and interface with medicine, bioinformatics and statistics, biomarkers and genomics, child and neurodevelopmental disorders, clinical and population informatics, dementia and related disorders, mobile health, neuroimaging, obesity, pain, patient and carer involvement and engagement, psychosis and neuropsychiatry, substance use, translational therapeutics.
Moorfields Eye Hospital NHS Foundation Trust	UCL Institute of Ophthalmology	Gene therapy, genomic medicine and informatics, inflammation and immunotherapy, regenerative medicine and pharmaceuticals, visual assessment and imaging.
Newcastle upon Tyne Hospitals NHS Foundation Trust	Newcastle University	Dementia, liver disease, musculoskeletal disease, neuromuscular disease, skin and oral disease.
Nottingham University Hospitals NHS Trust	University of Nottingham	Deafness and hearing problems, gastrointestinal and liver disorders, mental health and technology, musculoskeletal disease, respiratory disease.
Oxford University Hospitals NHS Foundation Trust	University of Oxford	Antimicrobial resistance and microbiology, cardiovascular, diabetes and metabolism, gastroenterology and mucosal immunity, genomic medicine, haematology and stem cells, multi-modal cancer therapies, multimorbidity and long term conditions, musculoskeletal, neurological conditions, obesity, diet and lifestyle, respiratory, stroke and vascular dementia, surgical innovation and evaluation, technology and digital health, vaccines for emerging and endemic diseases.
Oxford Health NHS Foundation Trust	University of Oxford	Adult mental health, older adults and dementia, precision psychological treatments
The Royal Marsden NHS Foundation Trust	The Institute of Cancer Research	Breast cancer, gastrointestinal cancers, novel cancer therapeutics, prostate cancer, targeted physical therapies, uncommon cancers.
Sheffield Teaching Hospitals NHS Foundation Trust	University of Sheffield	Translational neuroscience for chronic neurological disorders.
University Hospitals Southampton NHS Foundation Trust	University of Southampton	Life-course nutrition, lifestyle and health, respiratory and critical care.

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University College London Hospitals NHS Foundation Trust	University College London	Cancer, cardiovascular disease, deafness and hearing, dementia and mental health, immunity, inflammation and immunotherapeutics, neurological diseases, obesity, oral health and disease.
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## **COLLABORATIVE INITIATIVES**

There are a number of collaborative NIHR initiatives which further build upon the significant investment in Biomedical Research Centres, to facilitate collaboration between the NIHR BRCs and other parts of the NIHR wider research landscape and contribute to the NIHR vision of improving health and wealth of the country. These include the:

- NIHR Translational Research Collaborations in Rare Diseases and Dementia
- NIHR Translational Research Collaboration In inflammatory Respiratory Disease NIHR Translational Research Collaboration in Joint and Related Inflammatory Diseases
- The NIHR BioResource

These are detailed below.

## **NIHR TRANSLATIONAL RESEARCH COLLABORATIONS**

### **NIHR RARE DISEASES TRANSLATIONAL RESEARCH COLLABORATION**

#### **Overview**

There are between 5,000 and 8,000 rare diseases. Each one affects less than 0.1% of the UK's population, but together they affect the lives of 3 million people<sup>1</sup>. They have a high impact on people's lives and collectively form a large part of the work of the National Health Service.

Research into rare diseases is important because of the overall numbers of people affected. It is also important because many common clinical syndromes are now believed to comprise subsets of rare diseases. Research in this field advances our understanding of more common disease mechanisms, leading to potential new treatments. Furthermore, it can contribute to improved targeted and personalised approaches to healthcare, which has the potential to improve efficacy and safety of treatments and to reduce costs.

The UK is at the cutting edge of research in rare diseases internationally. NIHR has a vision that 'deep' phenotyping information combined with data on genomic abnormalities will increase research opportunities, enable faster diagnosis and support improved management and treatment of rare diseases.

The NIHR Rare Diseases Translational Research Collaboration (RD-TRC) provides national coordination to bring those with significant relevant NIHR infrastructure together to increase research collaboration and speed up translation, and will build on our British heritage as a global leader in genomics. This national coordination is needed as each type of rare disease only affects a small number of people, with often poor recognition and diagnosis of disease.

At its core, the RD-TRC consists of NIHR BRCs, NIHR BRUs and NIHR Clinical Research Facilities (CRFs), all with world-leading research expertise into rare diseases, facilities and capacity, which have already been designated and funded after review by independent Selection Panels.

**The aims of the NIHR RD-TRC are to:**

- Develop further the NIHR research infrastructure in the NHS to support patient-centred research into rare diseases.
- Increase the volume of ‘deep’ phenotyping data and combine this with data on genetic abnormalities to provide greater understanding of the mechanisms underlying rare diseases and support translational research - and thereby create insights into which interventions (new or existing) are likely to be effective in preventing or treating these or other diseases.
- Create cohorts of well-characterised patients willing to take part in clinical research studies.
- Facilitate tangible, rapid and efficient collaboration between NIHR-funded research infrastructure, clinical researchers, NHS organisations, other research funders and life science companies.
- Promote and enhance the nation’s reputation as a world-class centre for rare diseases translational research.

**Key themes**

The NIHR RD-TRC works across fourteen themes which focus on specific groupings of acquired and inherited rare disorders. The themes are: Cancer, Cardiovascular, Dementia & Neurodegenerative, Eye Disease, Gastrointestinal, Immunological Disorders, Metabolism, Musculoskeletal Disorders, Neuromuscular Disorders, Non-Malignant Haematology, Paediatric (Cross-Cutting), Renal Disease, Respiratory Disease and Skin.

**Funding and operations**

The NIHR provides dedicated funding for the NIHR RD-TRC of up to £5 million per annum, for four years from 2012, for underpinning NIHR research infrastructure focussed on ‘deep’ phenotyping.

The NIHR RD-TRC works closely with other NIHR initiatives including the NIHR BioResource, Rare Diseases UK and relevant charities and the life sciences industry through the NIHR Office for Clinical Research Infrastructure (NOCRI).

The RD-TRC is co-Chaired by Dr John Bradley and Professor Patrick Chinnery, NIHR Cambridge Biomedical Research Centre.

## NIHR DEMENTIA TRANSLATIONAL RESEARCH COLLABORATION

### Overview

Dementia is a growing problem that affects over 44 million people globally, with approximately 835,000 people currently living with dementia in the UK. With an ageing population the numbers of people with dementia in the UK are increasing and so are the costs. Dementia now costs the UK economy £26 billion a year – higher than cancer, heart disease or stroke<sup>2</sup>.

The NIHR Dementia Translational Research Collaboration (TRC-D) has been created to maximise the significant NIHR investment in dementia translational research. It brings together the considerable world-leading expertise and resources within the six NIHR BRCs: Cambridge BRC, Imperial BRC, Maudsley BRC, Newcastle BRC, Oxford BRC, Oxford Health BRC, and University College London Hospitals BRC.

The TRC-D has a range of workstreams on areas such as biomarkers, MRI protocols, PET imaging, stem cells and bioinformatics, examples include:

- looking for biomarkers for Parkinsons in both blood and cerebrospinal fluid, funded by Parkinson's UK; a biomarker in blood would be hugely advantageous as blood is easily accessible and a blood test can be repeated to obtain measures of change.
- NIHR-MRC Dementia Deep and Frequent Phenotyping feasibility study for intensive phenotyping of pre-clinical dementia patients to identify biomarkers that change over periods of months, rather than years; these biomarkers could be used in a range of follow-up trials.
- providing the ability to interrogate data from dementia patients and return anonymised datasets appropriate for research use, through the NIHR funded Dementia Clinical Record Interactive Search (D-CRIS) system; increasing the speed with which the results from research initiatives can deliver value to direct patient care and improve the close working relationship between practising clinicians and academics.
- Development of an informatics platform across all the TRC-D centres to allow sharing of MRI images, image analysis methods, protocols and QC processes; establishing consistent MRI capabilities and sharing of image databases at a national level.

### The aims of the NIHR Dementia TRC are to:

- facilitate tangible, rapid and efficient collaboration between NIHR-funded research infrastructure, clinical researchers, NHS organisations, other research funders and life science companies.
- significantly increase dementia research capacity and capability.

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<sup>2</sup> Dementia 2014: Opportunity for Change. Alzheimer's Society.

- understand better the mechanisms of the disease and likely targets for intervention.
- Promote and enhance the nation's reputation as a world-class centre for translational research in dementia.

## **Funding and operations**

The NIHR TRC-D works closely with other NIHR Infrastructure, relevant charities and the life sciences industry through the NIHR Office for Clinical Research Infrastructure (NOCRI). The NIHR TRC-D works together with the Dementias Research Platform UK, of which NIHR is a partner.

The TRC-D is Chaired by Professor David Burn, Professor of Movement Disorders Neurology and Honorary Consultant Neurologist for Newcastle upon Tyne Hospitals NHS Foundation Trust, and Pro-Vice-Chancellor of the Faculty of Medical Sciences, Newcastle University.

## **NIHR BIORESOURCE**

The NIHR BioResource provides a national cohort of healthy patients, their relatives and volunteers who are willing to provide clinical information and samples that will enable them to be recalled by genotype and phenotype for early translational (experimental medicine) research studies and early phase trials.

It supports collaborative research, including with the life sciences industry, to recruit participants for experimental medicine studies as well as providing the potential to study the molecular basis of disease, identify the most appropriate biomarkers for diagnosis and drug discovery, and to test the mechanism of action and effects of new treatments.

The NIHR BioResource currently has eight centres: Cambridge BRC (Theme Lead: Rare Diseases), Guy's and St Thomas's Biomedical Research Centre, Imperial BRC (Theme Lead: Infectious, Immunological & Inflammatory Disease), Leicester Cardiovascular BRU, Oxford BRC (Theme Lead: Cardiovascular & Metabolic Disease), Maudsley BRC, Newcastle BRC and University College London Hospitals BRC (Theme Lead: Neuroscience).

## **Funding and Operations**

Total NIHR funding awarded is £39.9 million which runs until March 2017.

Dr John Bradley is the Chair of the NIHR BioResource based at its Headquarters, NIHR Cambridge BRC at Cambridge University Hospitals NHS Foundation Trust.

## **Further Information on the Biomedical Research Centres and associated collaborative initiatives:**

Further details about the NIHR BRCs, TRCs and BioResource are available at [www.nihr.ac.uk](http://www.nihr.ac.uk), or contact the NIHR Office for Clinical Research Infrastructure at [nocri@nihr.ac.uk](mailto:nocri@nihr.ac.uk).

For further information on the RD-TRC, go to: [www.rd.trc.nihr.ac.uk](http://www.rd.trc.nihr.ac.uk)

Detailed information about the resources and capabilities of the existing BRCs is available at [UK Experimental Medicine Resource Finder website](#)

Detailed information about the NIHR BioResource can be found at [www.bioresource.nihr.ac.uk](http://www.bioresource.nihr.ac.uk).

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