



# Future-proofing health research: case studies



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**This collection of examples demonstrates how health research has directly led to significant benefits for patients, society, and the economy – and therefore how crucial it is that the breadth of the UK’s entire health research ecosystem is future-proof and enabled to work sustainably together as a whole.**

Underpinned by sustainable funding from, and interactions between, different parts of the system – whether the public, private and third sectors, or through the contributions of a research workforce and public that are supported to perform and participate across the whole system – these case studies illustrate how health research can and should be supported in the longer term to continue delivering into the future.

## **1. 1794 - present**

### **Glasgow’s ‘Triple Helix’: Cross-sector working to sustain health research infrastructure and the research careers of the future workforce**

The University of Glasgow and NHS Greater Glasgow & Clyde (NHSGGC) Health Board have been effective partners since the opening of Glasgow’s first teaching hospital in 1794 and enjoy a relationship that spans teaching, clinical work and research, and jointly developed academic infrastructure. This includes a Clinical Innovation Zone with purpose-built industry space at the Queen Elizabeth University Hospital (QEUH), creating a setting for innovations such as a new molecular profiling technology from biotech company BioClavis, which is applied to diagnostics and therapeutics development.<sup>1</sup>

This ‘triple helix’ partnership between the NHS, the University and industry is at the core of all translational activity at the QEUH. Recently formalising their relationship with the Glasgow Health Sciences Partnership, the University and NHSGGC aim to improve health outcomes, deliver better healthcare, generate economic benefits, and ensure that Glasgow recruits and retains of the best staff. For example, the NHS Research Scotland Fellowship Scheme also allows newly appointed consultants to dedicate up to one day a week to research. Numerous other opportunities exist for undergraduate medical students and PhD students to gain exposure to research careers.<sup>2</sup>

## **2. 1947 - present**

### **NIMR’s influenza monitoring centre: Sustainably funding and supporting institutions to improve health into the future**

In 1947, an influenza monitoring centre was set up at the Medical Research Council’s National Institute for Medical Research (NIMR), now called the Worldwide Influenza Centre and part of the Francis Crick Institute and overseen by the World Health Organisation (WHO). Thanks to the work of its scientists in monitoring and analysing flu samples from around the world, a much more detailed understanding of the flu virus and the effectiveness of antiviral drugs has been developed. Showing that supporting institutions now is key to providing the building blocks of future discoveries, in 2009 the Centre was crucial in the response to the H5N1 ‘swine flu’ epidemic, and in 2011 identified an antibody that targets all of the dangerous strains of the influenza A virus including swine flu, bird flu and Spanish flu.<sup>3,4,5</sup>

### 3. 1980s

#### **Humanised monoclonal antibodies: Advancing the health and wealth of the UK in the longer term through basic research**

Antibodies are proteins which form part of the immune system, and are used in many treatments, known as 'therapeutic antibodies', to trigger a patient's immune system against various targets. Previously, therapeutic antibodies derived from rodents would cause dangerous immune responses in humans, inactivating the antibodies themselves and therefore preventing medical benefits.

However, MRC Laboratory of Molecular Biology scientist Sir Greg Winter pioneered a way to better apply these antibodies to medical uses, leading to antibody therapies for cancer, rheumatoid arthritis and multiple sclerosis. Spin-out companies established following the discovery enabled a multi-billion pound biotechnology industry to blossom, with monoclonal antibodies now forming the basis of many biotechnology products in clinical development. Sir Greg, awarded the 2013 MRC Millennium Medal for his contributions to UK wealth creation and human health, believes that 'we need to maintain a scientific cadre of people in the UK funded by the Government to work on both basic and more applied research' if we are to continue solving medical problems.<sup>6</sup>

### 4. 2010 - present

#### **UK Biobank: Public and third sector funding leverages further investment and a sustainable resource for the future**

UK Biobank, established by the Medical Research Council (MRC), the Wellcome Trust, the Department of Health, the Scottish Government and the Northwest Regional Development Agency is a large-scale biomedical database and research resource containing in-depth genetic and health information from half a million UK participants, aged 40-69, who agreed to join the study during 2006-10.

The database, which is regularly augmented with additional deidentified data, is globally accessible to approved researchers undertaking vital research into the most common and life-threatening diseases. Since opening in April 2012, over 32,000 researchers from more than 90 countries have been approved to use it and more than 6,500 peer-reviewed papers that used the resource have now been published. During the COVID-19 pandemic alone, 787 research groups accessed data for COVID-19 research. This generated 260 published papers, which were cited over 3,200 times and attracted over 42,000 mentions on social media, blogs and mainstream news.

Its great success is a testament to the vision of several research funders - most notably Wellcome, the Medical Research Council, the National Institute for Health Research (NIHR) and a collection of medical research charities. These funders understood the significance of advances in genomics, and that information from such a database could ultimately lead to improved diagnosis, treatment and prevention strategies for the most devastating diseases, benefiting millions of people in the UK and around the world.

Long-term public funding for UK Biobank has since leveraged more than five times the contribution of the UK Government from industrial and charitable funders, as companies around the globe look to make the most of this world-leading biomedical resource. Since 2016, £228m of funding has been leveraged from industry, including 17 pharmaceutical, diagnostics and informatics companies across the world, to further develop the UK Biobank resource.<sup>7</sup>

## 5. 2010s - present

### AstraZeneca & King's Health Partners Fellows Programme: Fostering exposure to industry with minimal risk to career stability

#### **"The way forward for health research relies on the multiplicity of experts."**

Professor Simon J. Hollingsworth (VP, Global Franchise Head, IO Bispecifics, AstraZeneca)

The pharmaceutical company AstraZeneca (AZ) has developed a scheme that allows academics at the senior lecturer medical consultant level from King's Health Partners (KHP), an academic health science centre (AHSC) comprising King's College London and several London based NHS Foundation Trusts, to undertake a secondment in industry for 1-2 years.

The programme was created to address two related career issues many healthcare researchers face: limited visibility of research in other sectors, and the chance to gain this visibility without making a potentially risky transition to another sector, leaving the security of a current career and role.

Industry secondments are particularly important for clinical researchers if they seek to move cross-sector. However, this requires contractual changes to the flexibilities of working outside (clinical) academia due to the pressures of clinical duties and funding. The programme therefore establishes both the security of the Fellow's role at KHP during the secondment period and the provision of funding for the secondment by AZ.

While the Fellows benefit from industry experience without sacrificing their current career and receive valuable insight to help make informed decisions about later career progression, AZ benefits from the diversified and specialist knowledge, perspective and skills of the Fellow, which can help disrupt complacency and inspire new ways of thinking.

In addition to this increased sharing of skills and understanding between sector, such programmes contribute to a culture of mobility by encouraging a cross-sector mindset in researchers, creating the conditions for flexibility and security in research careers, and building trust between industry, academia and clinical settings.

## 6. 2013 - present

### Marie Curie's Research Voices Group and JLA's Priority Setting Partnerships: Charity-driven networks harness patient voices to refine health research strategies

Marie Curie, the UK's largest charitable funder of research into palliative and end of life care, set up the 'Research Voices Group' in 2013 to ensure those personally affected by terminal illness are represented in, and are able to contribute to, every stage of the research process and in a variety of research projects. The work of the group in identifying research evidence gaps on palliative care was channelled through a 'Priority Setting Partnership' (PSP) facilitated by the James Lind Alliance. This partnership, hosted by the NIHR, brought patients, carers and clinicians together to identify and prioritise issues in this area. Issues raised now 'form a vital part of [Marie Curie's] overall research strategy' and led to the charity funding a number of studies in the areas identified.

More than 40 member charities of the Association of Medical Research Charities (AMRC) have now been involved in PSPs, setting patient-led research priorities that will bring tangible benefits to people in need, and 73% of AMRC members have also reported using patient voices to shape their strategic priorities.<sup>8,9</sup> Marie Curie is currently setting up a project with the aim of reviewing and refreshing the identified priorities, with input from the Research Voices Group.

## 7. 2016 - 2021

### MAGIC/MAGIC2 trial: Involving children and young people in research to improve the study design and success

The 5-year NIHR-funded MAGIC (MAGnetic resonance Imaging in paediatric Constipation) and MAGIC2 projects conducted at Nottingham University Hospitals NHS Foundation Trust and at the University of Nottingham involved a diverse group of children and young people, some of whom had experience of living with digestive conditions, to help design, shape and make decisions about the research into these conditions. The medical technology study used easy-to-swallow mini-capsules, detectable through MRI, to provide objective information about gut transit and allow for more accurate diagnosis. More accurate diagnosis can lead to better treatment decisions and improved health outcomes for patients.

The children and young people co-designed the Transicap™ mini-capsules and their packaging to ensure they met the needs of young patients, making the technology more acceptable for people taking part in the trial. They provided researchers with unique insights and recommendations based on their experience, co-produced accessible patient information sheets, identified protocol flaws and modified the clinical study design. Patient involvement ensured that the research team understood the user experience. This led to an enhanced study design and increased acceptability, which contributed to the project's success.

The involvement of children and young people in this project has become evidence of good practice on NIHR's website. Work on the Transicap™ mini-capsules continues and the project is approaching submission for regulatory approval for sales and subsequent NHS adoption.<sup>10,11,12</sup>

## 8. 2018 - present

### **MRC clinical academic research partnerships (CARP): Collaboration between clinicians and researchers promotes a research culture in frontline healthcare settings**

The Medical Research Council and NIHR run a funding scheme that provides research-qualified healthcare professionals who are not currently undertaking research the opportunity to form a collaborative high-quality research partnership with established biomedical and applied health researchers.

The CARP scheme was formed in 2018 to facilitate the sharing of skills, experience and perspectives while enabling clinicians to become active in research. The scheme ensures that senior, research-qualified NHS staff and consultants receive funding and protected time for research, allowing them to enhance their research skills and gain exposure to academia.

Scheme awardees benefit from their research partner in the form of the training, skills, facilities and networks they are provided with, while partnering organisations benefit from clinical experience and fresh perspectives. The research projects are tailored to the applicant's and partner's interests and expertise, providing a mutually beneficial, and potentially cross-sectoral collaboration. Successful applicants must be able to demonstrate that the partnership has a clear value to both them and their research partner.

The NHS must also provide its employee awardees protected research time, with the guarantee they can re-enter the clinic at the end of the scheme, without any adverse impact on their career progression or status. As with other examples listed here, minimal risk to career status and the opportunity to gain high value experience are key incentives and drivers of a culture of mobility.

Additionally, it has already been shown that engaging in research can improve clinicians' job satisfaction and can reduce burnout<sup>13,14,15,16,17,18</sup> with research-active healthcare settings found to deliver better care<sup>19</sup> and patient outcomes, including lower mortality rates.<sup>20,21</sup> Flexible, mobile careers therefore not only benefit the sustainability of the research workforce, but the sustainability of the NHS and frontline clinical settings, leading to a wider benefit to patients and society.

## 9. 2018 - present

### **Connect Immune Research: Charity and patient collaboration highlights the personal and economic costs of autoimmune conditions**

Connect Immune Research was formed as a coalition between JDRF, the Multiple Sclerosis (MS) Society and Versus Arthritis, supported by the British Society for Immunology, to promote a 'multi-disciplinary approach to autoimmune research, and grow funding and research infrastructure in order to develop new treatment and diagnosis options'.

Working with research teams and individuals living with autoimmune conditions alike, the coalition launched a report, *Are you #AutoimmuneAware?*, in 2018. The work highlighted that type 1 diabetes, rheumatoid arthritis and multiple sclerosis alone represent direct and indirect costs of more than £13 billion per year, and shone a spotlight on individual experiences of some of the 4 million people in the UK that live with these conditions.<sup>22</sup>

Since its launch, Connect Immune Research has expanded to include further partner charities, and in 2022, the coalition announced co-funding delivered with the Lorna and Yuti Chernajovsky Biomedical Research Foundation of ten new pilot projects (together worth almost £1 million) to investigate the links between multiple autoimmune conditions and work towards generating new treatments. Connect Immune Research additionally offers a lab placement scheme supporting early-career researchers to spend time in an immunology lab (in the UK or abroad) learning new skills and techniques which have applicability to more than one autoimmune condition.<sup>23</sup>



## 10. 2019 - present

### **NUPAcT Fellowship with Astex Pharmaceuticals and CRUK Newcastle University Drug Discovery Unit: Cultivating leaders in research at the intersection of different healthcare sectors**

The Newcastle University Partnership Academic Track (NUPACT) Fellowship<sup>24</sup> is a new scheme open to early/mid-career researchers in the pre-clinical and clinical translational research space, jointly funded by Astex Pharmaceuticals and Newcastle University.

The position offers a wide level of exposure and experience during the 5-year appointment, embodying a three-way role, which comprises:

- academic research within the Cancer Research UK (CRUK) Newcastle University Drug Discovery Unit as the commitment to Newcastle University
- an honorary consultant oncologist position in the early phase cancer clinical trials unit at the local NHS trust (The Newcastle upon Tyne Hospitals NHS Foundation Trust)
- a role as an integrated member of the Astex team as a clinical consultant in pre-clinical and clinical research (Translational department).

Built on more than 10 years of established connections between the academic and industrial partner organisations, this appointment is enabled by institutional agreements that set out the Fellow's time commitments in each of the three roles.

During the Fellowship, the researcher has access to support from both academic and industry-based mentors, but is also given the space to develop independently by virtue of the Fellow's exposure to various environments to become a confident and independent leader in health research. As the researcher gains a parallel insight into the ways in which both academic and commercial organisations work, this creates a unique opportunity for the cultural and skills barriers between these different sectors to be challenged.

## 11. 2020

### **Treating gastric carcinoma: Industry and NIHR partnership improves NHS efficiency**

Funding from the NIHR's Invention for Innovation (i4i) programme supported a company called Creo Medical to pioneer a safer and less invasive method for treating gastric carcinoma. Their device has enabled NHS savings of around £5,000 per procedure, as well as roughly £111 million per year in shorter hospital stays, while the company has raised at least £68 million in total and employs 50 people in development and manufacturing.<sup>25</sup> The success of this partnership shows how, when seen as an integral part of healthcare, research is crucial to putting the wider ecosystem on a sustainable footing, delivering benefits to patients, the NHS, and the economy.

## 12. 2020

### **Oxford/AstraZeneca COVID-19 vaccine: Government, private, charity and NHS collaboration and investment leads to breakthrough in pandemic response**

The Government has invested into the University of Oxford's vaccine technology team since 2016, including more than £88 million towards their development of the COVID-19 vaccine.<sup>26</sup> Long-term funding from UK Research and Innovation (UKRI) optimised vaccine manufacturing methods prior to the COVID-19 outbreak<sup>27</sup>, and in the early weeks of the pandemic, non-profit foundation, the Coalition for Epidemic Preparedness Innovations (CEPI), provided initial funding for the manufacture of vaccine materials.<sup>28</sup> During the pandemic, the NIHR played a role in recruiting thousands of volunteers from across the public for clinical trials, and AstraZeneca provided much of the mass manufacturing resource.<sup>29</sup> The vaccines were then approved by the Medicines and Healthcare products Regulatory Agency (MHRA). These collaborations, alongside the major efforts of NHS staff in rolling out multiple doses across the UK, led to the biggest immunisation programme in NHS history, and over 2.5 billion doses distributed to more than 170 countries.<sup>30</sup>

The Oxford/AstraZeneca vaccine was cited by the then prime minister as the clearest example of how 'the single most important thing that we have learned [since the start of the COVID-19 pandemic] is the massive benefits to our country, to our society and to our economy of investing in science'.<sup>31</sup>

## 13. 2020 - present

### **Protas: Applying a 'RECOVERY' approach to increase efficiency and accessibility for patients and clinicians in clinical trials**

The Randomized Evaluation of COVID-19 Therapy (RECOVERY) Trial, the world's largest trial of treatments for COVID-19, rapidly recruited over 48,000 patients and quickly identified dexamethasone and three other life-saving treatments for severe COVID-19, ultimately saving over one million lives. RECOVERY is notable for being delivered at the point of care, streamlining the effort required to deliver the trial and quickly reaching meaningful results to inform patient care. RECOVERY's co-principal investigator, Professor Sir Martin Landray, established non-profit organisation Protas to build on the trial's success and to ensure that the benefits of its approach are applied more broadly. Protas aims to apply the most effective principles of trial design from RECOVERY across other areas, to reduce the barriers in the development of better treatments for common diseases that place a major burden on patients, their families and the healthcare system.<sup>32</sup>

Simpler processes for consent, greater transparency with the public, and wider use of digital technologies (including integration of routine healthcare data) to ease patient participation and data collection are among the improvements that will be applied to trials exploring treatments for common conditions such as heart and kidney disease, diabetes, stroke and influenza. Learning from RECOVERY and other similar trials, Protas' approach will enable more robust and affordable assessment of treatments in a wider range of people than the traditional trial model.

Protas continues to bring in funding and collaboration from across the public, private and non-profit sectors. Since its launch it has announced strategic partnerships with major biopharmaceutical companies (Sanofi, Regeneron and Moderna) and with academic research institutes in the UK and US and has received grant funding from venture capital firm GV, philanthropic organisations including Flu Lab and Schmidt Futures, and the NHS.<sup>33</sup>

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