

Midlands research powerhouse will use powerful new imaging technology to develop the next generation of drugs

May 12 2016, by Emma Thorne



The next generation of drugs to tackle two of the planet's biggest killers are to be developed through a partnership bringing together powerful Nobel Prizewinning imaging technology and some of the brightest scientific minds from around the globe.

The Centre of Membrane Proteins and Receptors (COMPARE) is a collaboration between the universities of Nottingham and Birmingham that will cement the Midlands' position as a research powerhouse for academic drug discovery.

The new centre will be launched with an initial investment of £10 million. It will unite a team of more than 20 leading researchers from both institutions in the quest for more effective drugs with fewer side

effects to treat [cardiovascular disease](#) and cancer, while working with the pharmaceutical industry to take the treatments from bench to bedside. It will deliver globally important scientific discovery and develop the next generation of researchers with the skills to exploit new imaging techniques and facilities as a result of experience they will gain working with world-leading experts.

Transformational results

Professor Sir David Eastwood, Vice-Chancellor of the University of Birmingham said: "This significant £10 million collaborative project, which brings together our internationally renowned scientists and some of the most advanced facilities in the world, highlights our commitment to the partnership and demonstrates the power of leading universities working together to tackle global issues such as cardiovascular disease and cancer. The launch of COMPARE signals a new chapter in the signature collaboration between the universities of Birmingham and Nottingham and I am confident we will achieve ever more remarkable things during our next five years of partnership."

Professor Sir David Greenaway, Vice-Chancellor of the University of Nottingham added: "The establishment of COMPARE signals a genuinely distinctive approach to research collaboration. The Centre is the result of scrutiny from leading experts in a highly competitive process, and will establish our two universities as world-leaders in this area. We have already received significant interest from some of the major funders as well as from world-leading scientists, and I have every confidence that the Centre will go on to achieve transformational results."

Professor Stephen Hill, Professor of Molecular Pharmacology in the School of Life Sciences at The University of Nottingham and Professor Steve Watson, British Heart Foundation Professor in Cardiovascular

Sciences and Cellular Pharmacology in the Institute of Cardiovascular Sciences at The University of Birmingham will co-direct the new centre.

Professor Hill said: "The phenomenal microscopy infrastructure that is required for a project of this scale is now beyond the capability of a single institution. Through our partnership with Birmingham we have the ability to put into place a regional centre with a unique focus that will rival existing centres in other areas of the UK, including Cambridge and London.

"The COMPARE institute will become a magnet for the best scientists in the world working on [cell surface proteins](#) and receptors because we will offer the infrastructure and an inspirational environment that will allow them to tackle the big, exciting questions."

Professor Watson added: "Around 60 per cent of Nobel Prizes in medicine have been awarded to the physical sciences – mathematics, physics, chemistry – rather than the biological sciences, which underlines the importance of other disciplines in driving medical breakthroughs."

"COMPARE is not just about basic science – it will bring together a broad spectrum of skills from across areas including computer and mathematical modelling and chemical engineers to tackle these real-world problems."

The Midlands has a long and proud history of drug discovery. The world's best-selling drug, Ibuprofen, was discovered by Professor Stewart Adams in the Boots Laboratories in Nottingham, while Nobel Laureate Sir John Vane, who was educated at the University of Birmingham was the first to demonstrate the mechanism of action of aspirin. The identification of new targets for drugs and the development of new therapies remains a major research aim for both universities.

Cell-specific drugs

At its core, COMPARE will harness cutting-edge developments in powerful imaging techniques that will enable the researchers to visualise what happens when a drug binds to a [cell surface receptor](#) or protein in real-time. Conventional light microscopes can allow scientists to look at structures that are within a distance of 5,000th of a millimetre apart, which is insufficient for studying the location of individual proteins.

Super Resolution Microscopy, which was recognised with a Nobel Prize in Chemistry in 2014 and which will form one of the technological backbones of COMPARE, will offer the ability to visualise single proteins interacting with each other. Furthermore, other new technological innovations will also be used to enable drug-receptor and protein-protein interactions to be studied at single molecule resolution. The technology will be used to study receptors on the surface of blood vessels and other cells in the blood, which are involved in cardiovascular disease, in order to identify new ways to target the receptors and introduce a new class of cell-specific drugs. Among the research to be undertaken is work looking at a receptor for Vascular Endothelial Growth Factor (VEGF), which controls the growth of blood vessels that supply cancerous tumours. Effective therapies exist for targeting this receptor to halt the growth of these vessels to starve the tumour, but the agents also induce high blood pressure.

Professor Hill added: "These drugs are helping to cure the cancer but at the same time giving the patient another major health issue to overcome, principally because the same receptor is involved in both effects. We want to use our technology to visualise at the single molecule level whether there are subtle local differences in the way VEGF acts on the receptors involved in cancer progression and those concerned with regulating blood pressure with an aim to designing a new generation of drugs that only hit the cancer."

The funding for the new institute has come from the two institutions as part of the formal collaboration that was launched between Nottingham and Birmingham back in 2011, which has seen them working together for mutual success in a range of different areas, including research initiatives, student experience, business engagement and internationalisation.

Provided by University of Nottingham

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