IMPACT

ACCELERATING INNOVATION AND IMPACT IN HEALTHCARE

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HTAF Healthcare Technology Accelerator Facility

THE UNIVERSITY of EDINBURGH

MRC Medical Research Council

EPSRC Engineering and Physical Sciences Research Council

A beacon of medical technology innovation

*The **University of Edinburgh's Healthcare Technology Accelerator Facility** (HTAF) is an innovative concept that could prove invaluable to the efficient commercialisation of healthcare technology*

A team of researchers, based in the Edinburgh Bioquarter in the UK, believes the translation and commercial potential of healthcare technologies within the UK has been (and remains) underexploited. The researchers have identified some of the reasons behind this as: the translational pathway being fragmented, complicated and time-consuming; the presence of a gap between the engineering/ physical sciences 'push' and medical and clinical application 'pull'; and the fact that funding does not typically drive towards first in-human translational studies, which means it doesn't provide the real evidence that many investors and commercial entities require for follow-on support. The researchers are on a mission to drastically improve the situation, and to do so, are developing an ambitious initiative.

Kev Dhaliwal is a Professor of Healthcare Technology at the University of Edinburgh and a Consultant Physician, NHS Lothian, who is based at the Centre for Inflammation Research, University of Edinburgh (UoE), UK. He is involved in the formation of the Healthcare Technology Accelerator Facility (HTAF) at the Queen's Medical Research Institute located at the Edinburgh BioQuarter.

HTAF is a multi-stakeholder, multi-institution partnership borne from a need for a so-called 'one-stop-shop', wherein healthcare technology could be developed. 'Our key objective for HTAF is the creation of an environment and facility in which all elements of medical technology development (preclinical, interdisciplinary, GMP, regulatory, first-into-human, commercialisation and training) are co-located in a single location,' Dhaliwal explains. 'The HTAF aims to become a beacon of medical technology innovation and translation into human disease and commercial benefit.' HTAF aims to remove the barriers facing the development and translation of new healthcare technologies by integrating engineering, physical and biomedical scientists and clinicians into the same environment and providing the infrastructure and expertise that is needed to drive their ideas towards clinical and commercial translation.

AN IMPRESSIVE CONSORTIUM

HTAF has UK academic consortium members at: UoE College of Science & Engineering; Heriot Watt University; University of Bath; Strathclyde Technology Innovation Centre; and the University of Durham. These sit alongside healthcare users and end users in NHS Lothian. 'Collectively, these institutions represent one of the world's strongest pools of engineering and physical science expertise, partnering with all clinical sub-specialties,' says Dhaliwal. 'Other institutions will be invited to join this union as the HTAF develops.' Additional existing key stakeholders are: the EPSRC Proteus project; the Academic and Clinical Central Office for Research and Development (ACCORD); NHS Lothian; NHS Medical Physics; NHS R&D; and industrial partners. These stakeholders are invaluable, as Dhaliwal highlights: 'The UoE and NHS Lothian have major strengths and a track record in clinical translation, enabled by the Edinburgh BioQuarter with research institutes such as the Queen's Medical Research Institute juxtapositioned alongside the New Royal Infirmary of Edinburgh.' He says: 'HTAF will offer clinicians, researchers and industry a team-based, collaborative approach when designing and developing quality research ideas, including crucial exposure to, and support from, the clinical, regulatory, risk, ethics and quality assurance expertise necessary to expedite human translation.'

In this way, the stakeholders will help overcome barriers to the translation of healthcare technology. 'A significant hurdle is layers of misunderstanding, a lack of knowledge and fear of the unknown, which often delay, hinder or in certain circumstances, present roadblocks for investigators,' Dhaliwal states. 'This unique collaboration between research and development teams, the sponsor, clinical advisors and technology experts will overcome these traditional hurdles and knowledge gaps and will lead to a more streamlined, joined up and efficient approach to clinical translation.'

The HTAF environment will include the following components, all working towards successful translation:

- A clinical expert faculty from all specialties in the NHS (along with experienced clinical project managers)
- Trial design, methodology, statistics and health economics expertise
- Market analyses
- A direct portal for industry access and collaboration
- Phase 1 accredited MHRA clinical research facility
- Business development, commercialisation and legal support
- Chemists and production and software engineers with an ethos and experience of translation
- Flexible laboratories for engineering and physical sciences, with associated biological validation facilities that will operate as a UK-wide R&D resource
- Laboratories and 'clean rooms' for instrumentation development, medical device validation and prototype 'build' facilities
- A GMP facility to synthesise and validate chemical entities and bespoke sensing biomaterials
- GMP sterile liquid product manufacture
- Medical device sterilisation capability
- Oversight of professional technology consultants

> *'The HTAF would ... become a beacon of medical technology innovation and translation into human disease and commercial benefit'*

'This environment contains both the facilities and the expertise required for the rapid and economical translation of healthcare technology,' Dhaliwal explains.

This will be invaluable for small-medium enterprises (SMEs) who currently face an uphill struggle to translate their ideas and bring their products through to testing in patients. HTAF has the bandwidth to work on multiple projects simultaneously and can deliver services in a fast and economical manner.

HTAF will support and streamline future commercial outputs, as Dhaliwal explains: 'Commercial outputs will be realised through support from both local and international teams including the California Life Sciences Institute and Edinburgh's Codebase, which will be mentoring and supporting projects and teams. This powerhouse of support from mentors that have a world-leading proven track record in company creation, growth and investment, is incredibly exciting and completes the jigsaw puzzle for translation. The goal is to sow the seeds for multiple new enterprises that can grow locally in BioQuarter and generate major economic, social and cultural benefits.

'Working across the universities, the NHS and with support from California Life Sciences Institute and Codebase, will jointly create a UK Healthcare Technology footprint that will be prepared for follow-on funding, industry and venture,' Dhaliwal says.

SHIFTING MINDSETS

HTAF is built upon the experience and learnings gained in the Proteus project, an interdisciplinary research collaboration supported by the Engineering and Physical Sciences Research Council (EPSRC). Dhaliwal says: 'HTAF develops and sustains one of the legacies of Proteus, broadening the technology development pathway across clinical care pathways and NHS colleagues, to other engineering & physical science teams and industrial groups.'

Looking ahead, Dhaliwal's goal is for HTAF to help embed the philosophy and culture of innovation and translation in clinicians and researchers, shifting mindsets in academia and the NHS. The key features of a centralised hub at the Edinburgh Bioquarter, with embedded clinical expertise from all specialties, governance expertise, mentoring and guidance for company formation and a fundamental ethos of translation, interdisciplinary research and training the next-generation of innovators, will mean HTAF has a profound and lasting impact.

Project Insights

FUNDING
Medical Research Council (MRC), UK • Engineering & Physical Sciences Research Council (EPSRC).

COLLABORATORS
University of Edinburgh College of Science & Engineering, UK • Heriot Watt University, UK • Strathclyde Technology Innovation Centre, UK • University of Durham, UK • University of Bath, UK • Proteus project • Academic and Clinical Central Office for Research and Development (ACCORD) • University of Edinburgh and NHS Lothian, UK • NHS Medical Physics • NHS R&D Research Nurses • Edinburgh Research and Innovation (ERI), UK

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PRINCIPAL INVESTIGATOR BIO
Professor Kev Dhaliwal is Professor of Molecular Imaging and Healthcare Technology at the University of Edinburgh and a Consultant Physician in Respiratory Medicine. He sub-specialises in Pulmonary Infection and Tuberculosis and is currently performing translational research in collaboration with the Intensive Care Unit (ICU) developing and applying non-invasive methodologies for imaging inflammation. Dhaliwal is the Chief Investigator of six 'first in human' trials of optical molecular imaging reagents and devices. He collaborates widely with industry and is passionate about translating physical sciences into healthcare.

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Impact Objectives

- Create a 'one-stop facility' in which all elements of medical technology development (preclinical, interdisciplinary, GMP, regulatory, first-into-human commercialisation and training) are incorporated in a single location
- Remove the barriers currently facing those working on the development and translation of new healthcare technology by integrating physical and biomedical scientists and clinicians into the same environment
- Provide funding for early-stage research projects and help researchers map out the pathway by which their research can be developed and commercialised
- Encourage and support a mindset of innovation and translation into academic settings

Accelerating innovation and impact in healthcare

***Professor Kev Dhaliwal** introduces the **Healthcare Technology Accelerator Facility** (HTAF), an initiative that will provide a unique environment for the development of healthcare technology*

What inspired the formation of the Healthcare Technology Accelerator Facility (HTAF)?

Medical technology is at the centre of the healthcare revolution, but innovation is currently stifled by expensive and cumbersome development pathways that lack critical mass initiatives. Too often, technology development occurs isolated from the clinical interface and lacks any consideration of downstream commercialisation pathways and viability. There is often limited, if any, appreciation of health economics and user requirements, poor industrial engagement, and ultimately poorly designed clinical studies. Isolated development, in which team skills and knowledge are fragmented, is unlikely to succeed. We perceived a real need for a 'one-stop shop' for the development of healthcare technology – a facility that could take technology from inception through translation to commercialisation. HTAF provides the environment, clinical end user expertise, facilities and mentorship to help academics, NHS colleagues and industry to rapidly progress their ideas and research. Projects that are scientifically interesting but have limited commercial potential can be culled at an early stage, ensuring those technologies that receive investment have a broad impact potential from a health economics perspective.

What projects are currently underway?

HTAF is supporting large-scale industrial projects, UKRI-supported projects and frugal innovation projects in low- and middle-income countries. It is the recipient of a MRC Confidence in Concept (CiC) portfolio award, which it is using to support several early-stage interdisciplinary research projects from across the UK, focusing on interventional technologies.

The current HTAF CiC portfolio encompasses a diverse range of projects from low cost diagnostics to therapeutic medical devices. HTAF will support the development of technologies intended for use in low, middle and high resource environments. Projects are spanning areas such as surgery, intensive care, ophthalmology, gastroenterology and respiratory medicine, and are agnostic to the sub-specialty with emerging projects being developed for dermatology, cardiology, paediatrics and pathology.

HTAF is utilising the CiC support to advance ideas and technologies to the position where they can attract follow-on support. The CiC funding awarded by HTAF can support some early technical development, but is primarily used to develop clinical and commercial cases for the technology under consideration. Too often, teams will work for years developing a technology, only to find they had misjudged the size of the target market, that their technology is too expensive for the market to bear, or that they had overlooked one of the many other product development factors that could render their idea commercially non-viable. Insights gained from analysis of target markets and competing technologies has allowed the teams to refine the direction their work is taking, and to think more about what a minimum viable product would actually look like.

Can you discuss the commercialisation aspect of your work?

The vast majority of clinicians and academics have little to no experience of commercialisation and those barriers that stand between research and bringing a product to the point where it can benefit patients and be commercially viable. Involving experienced commercial experts in projects from the very beginning means researchers are aware of what is required and they can then focus their research efforts in the most practical way. ●