Institution: University of Brighton

Unit of Assessment: A3 Allied Health Professions, Dentistry, Nursing and Pharmacy

a. Context

Over the last 30 years, the University of Brighton (UoB) has recognised the mutual advantages inherent in developing and sustaining research relationships with professional bodies, healthcare providers, policymakers, industry and patients to deliver translational research for societal benefit; it is an integral element of the research environment described in our REF5. Our approach has been informed by: (i) the commitment of successive governments to focus investment in specific healthcare research such as ageing, health technologies, tissue regeneration and chronic diseases (NIHR, BBSRC, MRC and EPSRC) to support the healthcare industry in reducing primary healthcare costs and improving human healthspan and quality of life; (ii) the increased participation of patients in healthcare research (NIHR), and; (iii) the promotion of the NHS as a primary research partner to enable the faster translation of scientific developments into benefits for patients (NHS Mandate 2012). Our impact case studies address government healthcare challenges with demonstrable societal and professional benefits.

Our primary non-academic user groups and/or beneficiaries are the medical technology sector (eg Biocompatibles, Denfotex, Invatech/ Medtronic), healthcare professionals working in the NHS and private practice, regulatory bodies, professional bodies, patients and carers. Working with these partners, our primary impacts are in the areas of commerce (through inward investment in R&D, revenue generation, process improvement and product commercialisation), the development and delivery of healthcare services (particularly in the uptake of research findings and the influence of our research on practice standards) and public policy and services.

Our most significant commercial impacts have been developed primarily from research under the *Healthcare Technology* and *Chronic Diseases* themes in tissue-material interactions (eg our TSB-funded work with Avecia Biologics on dermal mesenchymal stem cells (DMSC) which is a cell-based treatment for chronic wounds featured in TSB's *Innovation Results*; the novel chemoembolisation technologies we developed in partnership with Biocompatibles) and under the *Growth, Development and Ageing* theme in cell and molecular biology (eg patented high-throughput assays for PGP in partnership with Sirius Analytical from our transmembrane protein research); novel inward investment for the production of novel cell lines from Mars Waltham). Our *Applied Clinical Research* theme has led to: (i) improvements in the delivery of osteopathic professional services through changes in practice in terms of effective management of patient expectations; (ii) increased mobility and independence for patients with hemiplegia in partnership with local NHS Trust, and; (iii) improved emergency response. Our impacts on healthcare policy and services include modifications of the General Osteopathic Council's regulatory policy and Code of Practice for Osteopaths in the UK (*Applied Clinical Research*) and the introduction of new approaches for the worldwide treatment of diabetes and asthma (*Chronic Diseases*).

b. Approach to impact

Our approach to impact focuses primarily on the development of strategic partnerships with stakeholders relevant to the health technologies sector and specific communities of healthcare practice. However, we have also established and developed funded research partnerships with a range of other sectors, including the pharmaceutical industry (more than ten companies, including Sirius Analytical, Y carbon (US), Allergy Therapeutics, Bausch and Lomb and GSK), leading food manufacturers (eg Mars), the Ministry of Defence, major charities (eg Arthritis Research UK and SPARKS), regulatory bodies (eg General Osteopathic Council), and professional bodies (eg Chartered Society of Physiotherapy, International Federation of Musculoskeletal Therapists). These partnerships encompass revenue sharing, IP protection, personnel transfers, working with clinical practitioners, research commercialisation and externally funded secondments, as appropriate. Our partners, along with other users and beneficiaries of our research, are engaged routinely as members of advisory steering groups to inform and support the delivery of impact.

A typical pattern of interaction is one where staff form partnerships as consultants or conduct contract research for healthcare companies. Successful delivery of pilot research findings provides the catalyst for joint funding applications (eg EPSRC CASE studentship with Sirius Analytical and Biocompatibles; BBSRC *Exploiting Genomics* special initiative funding with the SME Destiny Pharm, KTP funding with Sauflon Pharmaceuticals Ltd). Revenue sharing and intellectual property protection mechanisms are put in place (nine patents filed since 2008) and the partnership is strengthened by transfers of personnel (eg four staff employed by Biocompatibles have gained PhDs from UoB). However, given the non-linear nature of the innovation cycle, the route to impact can be frequently more complex than this (eg relying on the initial transfer of staff to industry, as in the case of a PDRA who moved from the unit to take a lead position within Mars-Waltham).

Examples of our partnership approach include: (i) BONE'S and MUKHOPADHYAY'S engagement with local charities, support groups and media to both support and inform their research into the causes of diabetes and asthma while increasing public awareness of novel approaches to treatment; (ii) SANTIN'S development of intellectual property in relation to novel wound dressings to treat diabetic ulcers; this is subject of an ongoing venture capital round to fund clinical trials next year; (iii) the development of sophisticated blood purification technologies that allow effective treatment of kidney and liver diseases by SANDEMAN and co-workers in partnership with clinician colleagues at University College London and regional technology companies, and; (iv) JAMES' enhancement of the R&D capability of a UK leader in stoma care (Welland Medical Ltd) through TSB - and NIHR-funded collaborations, leading to the development of a patented fully flushable colostomy bag (selected by TSB to be presented as a TSB case study for Innovate UK 2014). This project has also developed an odour penetration assay that out-performs the current ISO standard. Adoption of this novel assay as a new ISO standard of odour penetration is underway.

To maximise the potential for research impact, staff have been supported by the university's Business Development and Enterprise Unit with expertise in innovation scouting, intellectual property protection and exploitation, technology transfer and contract negotiation. The university has also invested £250k, through competitive evaluation processes, from its Higher Education Innovation Funding (HEIF) allocation into ten health-related research projects with impact potential through the university's Commercial Activation/Business Investment Seed Funds. A further £250k has been secured for three projects from the S.E. Commercialise Programme – a programme established by the South East Regional Development Agency (SEEDA) in partnership with a consortium of universities in the south east. Faculty-based business development managers (BDMs) support the strategic development of partnerships and interfaces between the university and external partners/research users. This has led to the establishment of research partnerships with thirty companies, seven NHS Trusts, eleven charitable organisations and two other organisations supporting in KTPs (three), Collaborative R&D Projects (twenty), joint patents (four), joint publications (twenty) and direct and indirect impact on patients worldwide through improvements in healthcare service, practice and health technology development. We disseminate best practice through seminars and workshops for those planning to capture research impact and stakeholder engagement, including personal and public involvement (PPI).

Established and emerging partnerships have also been supported via targeted investment in: business-oriented sabbaticals (eg business fellowship awards by the university to support research commercialisation in carbon-based materials for medical applications); UoB Business Investment Funds (BIF) (eg SANTIN), and; externally funded secondments to partners (eg PDRA secondments to overseas partners and UK SMEs as Marie Curie Fellows under EU research programmes – METCALFE was seconded as part of a partnership with the Blond McIndoe Research Centre to support collaborative research development and clinical translation).

c. Strategy and plans

The UoB has strengthened its engagement with the wider impact agenda through investment in the support infrastructure and embedding the delivery of impact within the research environment.

At an institutional level, to enhance the potential significance and reach of our research impact, infrastructure support for research and economic and social engagement will be integrated within a single department to maximise impact from future research. As a consequence economic and

social engagement (EASE) targets, which include collaborative R&D programmes and intellectual property income related to impact activities, will be embedded, alongside research income targets, in our university research strategies. The institution is committed to developing support for current and emerging impact areas and it is envisaged that our area will benefit from: (i) securing university business development sabbaticals or secondments to partner organisations; (ii) funding the early stage protection of intellectual property; (iii) supporting the licensing and spin-out activities; and (iv) ensuring effective monitoring of both the support for and the delivery of direct and indirect impacts arising from linear and non-linear innovations arising from our research, through increased investment in this infrastructure support.

Our local research strategy for the future development of our health-related research portfolio, aims to advance a research environment that not only supports the highest-quality research but ensures that outputs of our research have direct or indirect impacts on patients for economic and societal benefit. We will therefore invest in research areas that meet specific patient needs, have stakeholder support and established routes to impact through appropriate partnerships with industrial or NHS partners – the UoB BDMs will source business intelligence and develop the necessary networks and partnerships with academic colleagues. This will allow us, as a partner in the Kent, Surrey and Sussex Academic Health Sciences Network (AHSN), to contribute significantly to transforming the identification, adoption and spread of proven innovations and best practice. We will embed the development of translation skills required to maximise the impact of research within our research training and staff development for both postgraduate and postdoctoral researchers and will seek to recruit academic staff who not only have exceptional research track records but a demonstrable commitment to the translation of research.

Over the next five years we therefore expect to extend significantly our strategic engagement with end users from research project inception to impact delivery, to increase the ways in which our health-related research leads to innovation with measurable benefits to NHS, industry, policy-makers, and wider society. By 2019 we aim to have: (i) increased the direct or indirect impacts of our research on patients through improvements in services, practises and technologies (*Applied Clinical; Health Technologies*); (ii) diversified our research partnerships with healthcare industries, charitable organisations and NHS Trusts across all themes; (iii) increased the protection and exploitation research outcomes for patient benefit as measured by patent filings and/or licensing/joint venture arrangements (*Chronic Diseases; Growth Development & Ageing; Health Technologies*), and; (iv) increased the volume of ongoing collaborative R&D and/or KTP programmes to deliver new healthcare products to the market (*Health Technologies*).

d. Relationship to case studies

The four case studies have been selected to illustrate both our partnership approach to impact, and our key impacts in the areas of commerce, the development and delivery of professional service and changes in healthcare policy, all of which deliver benefits to patients. REF3b [1] (LLOYD) illustrates how a well-managed, long-standing, mutually beneficial partnership with an SME, involving joint RCUK grants, contract research projects, CASE awards and KTP projects, can contribute significantly to ongoing innovation within a company, leading to new technologies and products that offer economic, clinical and social benefits. REF3b [2] (BONE) highlights the opportunities arising from early stage engagement of academic and clinical partners to support the identification of potential opportunities for impact – this project not only involved clinical partners at an early stage but engaged users and other stakeholders to develop further the research base and to support clinical opportunities for the exploitation of the technology. REF3b [3] (MUKHOPADHYAY) illustrates how fundamental biomedical research, underpinned by strong clinical partners with access to specific patient groups, can impact public debate, influence healthcare policy and deliver direct clinical benefits to patients when promoted by broader media, industrial and third-sector partnerships. REF3b [4] (MOORE) builds on expertise generated through both commissioned and competitively funded research projects with regulatory and other professional bodies and illustrates how the engagement with end users (practitioners, patients and regulators) has been used to develop and design a programme of research that has maximised the impact benefits to stakeholders. This includes a range of projects designed to increase expertise and evidence, within both the physiotherapy and osteopathic professions.