Research Assessment Exercise 2020

Impact Overview Statement

University: The Hong Kong Polytechnic University

Unit of Assessment (UoA): 05 Nursing, Optometry, Rehabilitation Sciences and Other Health Care Professions

Total number of staff of the University in the UoA: 96

(1) Context

The main non-academic users and direct beneficiaries of our research are healthcare practitioners (optometrists, nurses, physiotherapists, medical laboratory technologists, occupational therapists, radiographers, clinicians) and policy makers in the Hong Kong Hospital Authority (HA), Department of Health (DH), private healthcare clinics and elderly homes, prominent NGOs (e.g. HK Red Cross, HK Society for the Blind), patients, professional bodies, and the Hong Kong Government Registration Boards. Our research directly benefits professional/clinical services and patients receiving care, e.g. myopic children, cancer and stroke patients, those with mental health problems, and the elderly, as well as members of the public and our industrial partners. Our research advances knowledge and understanding of disease and its risk factors, improving diagnostic and therapeutic methods/approaches, driving evidence-based improvements to clinical/professional practices for patient care and support, influencing healthcare policies and guidelines, and successfully commercializing our innovative healthcare tools/devices. Our inter-disciplinary research spans laboratory-based/preclinical investigations, epidemiological studies, clinical trials, and the development/evaluation of novel products/approaches to address the healthcare challenges of local and international importance and interest. Case studies elaborate on the impact, highlighting the reach and significance, e.g. the **impact on clinical practice, healthcare policy, professional guidelines and patient care**. Imaging research (Ying M, Wu V) has improved ultrasound scanning protocols for the more sensitive and accurate diagnosis of malignant lymph nodes of the neck, an early sign of cancer spreading, and more clearly defined radiotherapy targeting for enhanced dose-effective therapy. Antioxidant research (Benzie I) has changed the practice of antioxidant testing in the health, environmental and nutritional science fields, as our FRAP assay antioxidant testing method is used globally (e.g. Nestle, Division of Food Processing Science & Technology, U.S. Food & Drug Administration). Our 'Smart Health' research centre, with computer engineering collaboration, developed a new High-fidelity and Real-time 3D/4D Ultrasound Visualization System (Qin H), now commercialized through industry partners. Our novel self-disinfecting coating (O'Donoghue M) is being applied in the HA for the inactivation of healthcare-associated pathogens and environmental decontamination.

Impact on commerce: Our research promotes the economic growth of our industrial partners through novel products that are changing and improving healthcare services. We have successfully commercialized our research and signed eight licensing agreements from 2014 to 19, such as those with HOYA, Vision Science & Technology Co. Ltd., C2 Innovation, Casper Research Ltd. Arborassays, and various companies (e.g. Abcam, Mybiosurce, Cellbioloabs) with global reach, now marketing test kits for our FRAP assay for total antioxidant capacity. Our research attracts philanthropic donations and has drawn the attention of high value consultancies in partnership with local and international companies, including Nestle, Tetley, and Vitagreen Health Product Co. Ltd.. PolyU allows each researcher up to 1 day/week of consultancy work with its commercial partners, contracted via PTech (PolyU's consultancy firm).

Impact on the public: Our collaborative work (with the Department of Applied Social Sciences; Loke A, Li S, Chan T, Sim T) on new concepts for disaster mitigation and relief has seen the implementation of our research to support school development and the resilience of disaster-affected children in China and across SE Asia. Our antioxidant work on natural products (Benzie I) was featured in Time magazine (March 2016) and in The Scientist (June 2014), non-academic publications with global reach. Our work for the more accurate detection of acute stroke (Ying M) and our findings unveiling gene interactions in cancer (Chan L) were each featured in 14 local and

national media outlets (May-June 2015). The Instant Vision Assessment Unit (Woo G) is an inexpensive simple tool for use in underdeveloped areas, and is currently used by an a number of Eye Hospitals to screen thousands of children in rural China, Africa and South America.

(2) Approach to impact:

Over the assessment period, our approach to impact has included **prioritising and supporting research based on significant healthcare challenges of high local prevalence as well as global relevance and interest**. The selection of major themes was informed by local, regional, and international concerns and the healthcare priorities of the HK DH and HA, research funding bodies (e.g. RGC, HMRF), and professional societies and NGOs, and guided by Intellectual Property (IP) and Knowledge Transfer (KT) opportunities. **Our approach also involves supporting and enabling our researchers** by investing significantly in strategic new appointments, developing the talent of existing staff, and major investment into specialized and world-leading research facilities (e.g. University Research Facility in Big Data Analytics or Neuropsychology laboratory with MRI facilities). **We also form and nurture productive partnerships/relationships with stakeholders in the healthcare sector nationally and internationally.** We have a portfolio of longstanding interdisciplinary relationships and partnerships, focusing on healthcare needs, and a wide range of international research partners/networks (e.g. WHO, Cochrane). We also have strong representation in the DH and HA boards, societies/associations and in research councils and panels (e.g., RGC, HMRF). **By forming collaborative and mutually rewarding links with the commercial sector,** we liaise closely with industry for development, licensing, and the successful commercialization of our novel healthcare tools and devices. The strategic oversight and planning of KT is through the Faculty Research Committee, the University Research Office, KT Committee and Office for Technology licensing and commercialization (PTech). **By reaching out to and forming partnerships with charities, NGOs, community and public interest groups,** we host the WHO Collaborating Centre for Community Health for the Region and have an MOU with Cochrane for the Cochrane Global Ageing HK hub. We have an abiding collaboration with the Hong Kong Society for the Blind to promote vision rehabilitation. We develop free user-friendly resources in multiple formats, e.g. brochures or videos, and organize regular public awareness dissemination talks in elderly homes, schools and the community. An example is a YouTube video clip (2019) from our research on intervention with music for people with dementia and their caregivers (Cheung D). **With co-design and impacting our community,** we engage with clinicians, industry (when appropriate), patients, and the public as co-designers and co-applicants and disseminators of our research. We train patients and the public in ways of engaging in research activity, such as through the Cochrane Consumer Network for our Cochrane Global Ageing activity, and are developing and planning priority setting partnerships to inform members of our community and patient groups of our findings. **Public outreach and showcasing for impact involves the use of** social media and other media strategies to increase awareness and engagement with our research activity; e.g., through press releases, university websites, radio and television programmes, news articles, hosting open forums and running workshops, reaching out to local schools, elderly homes and community groups, Facebook and Twitter. To extend our reach, the University's marketing and communication teams promote events and showcase our research on a wide variety of global platforms; for instance, we have a strong presence at the annual Innovation and Industrial Expos, such as the Geneva Innovation Expos where our researchers have won many prestigious awards and which attract industrial interest/partnerships. **Our training on impact** includes regular events involving international experts invited to provide training workshops (e.g. Prof. Karen Luker, University of Manchester; Prof. Tracey Howe, Cochrane Centre). The training focuses on developing impactful research and developing systems to capture impact over time, such as the UK RAND/ARC Impact Scoring System (RAISS) or the US Program Assessment Rating Tool (PART) as well as on implementing science methods.

(3) Strategy and Plans:

We will build on existing strengths, adapt and add to our approaches in order to extend the reach and

significance of our impact. Our 5-year impact strategy includes **incentivising and enabling staff to aim for and achieve high impact.** For this we will provide more guidance and continue training; e.g., a Faculty Impact Steering Group is being formed to better integrate impact planning at the project proposal stage. Annual and final reports on projects will include an impact monitoring section, and assess what 'follow-through' impact-promoting activities are planned; resources will be provided to support strong impact plans. **Developing new partnerships, strengthening existing partnerships and networks, and stimulating commercialization** is also part of our 5-year strategy. Our aim is to develop international/global presence with key international/global research organisations, and industrial and policy agencies. Major improvements are planned to translate research findings into IP and the realm of commercialization. We will enhance links with the PolyU KT and PTech units and with the HK Science Park (with 2 key concurrent directorships with Tech and Science Park and UoA members confirmed in early 2019). **We plan to increase public engagement, showcasing and outreach** by forming an Outreach Steering Group to significantly increase the number and type of activities showcasing our research and take it to non-academic arenas, including industrial expos and professional/clinical meetings, public forums, and use of fast paced social media and other media platforms, including WeChat, blogs, podcasts, Pinterest. **We will also strategically target the recently launched UGC Research Impact Fund.**

(4) Relationship to Case Studies:

Our 5 case studies demonstrate the impact on *improved clinical practice and patient care, policy changes, and wealth generation via successful commercialization of our innovative healthcare tools/devices.* The research impact showcased in the case studies is the result of our approaches outlined in (2) above: **1**) **Each addresses an important healthcare challenge of international interest and relevance, ensuring high significance and wide reach of novel finding**s; *Myopia* affects up to 90% of schoolchildren in HK and ~50% of people worldwide; *Cancer* is the leading cause of death and disability in Hong Kong, is a major global healthcare challenge, and the treatment side-effects are often severe; *Stroke* is the 4th leading cause of death in HK, a leading cause of death and disability worldwide, and many stroke survivors live with serious, life-constraining impairments; WHO reports that >30% of all years lived with disability are due to *mental health* disorders; Life expectancy in Hong Kong is one of the highest in the world, is increasing worldwide, and age-related diseases cause a huge socio-economic burden. **2) We have supported and enabled our researchers and their research activities in these areas** by way of strategic appointments across all levels, investment in sabbaticals, overseas research attachments, skills training, research support staff and services (e.g. Post-doctoral and Scientific Officer positions, editing services, PhD scholarships), and major and continuing investment in advanced central and UoA-hosted research laboratories and equipment. **3) We have actively encouraged and funded mutually beneficial and successful partnerships** with stakeholders and industry; for instance, supported by the PolyU Microfund, PTech and IncuTech from the Hong Kong Science Park, we formed a company to commercialize one of our patented products (DISC), resulting in wider industrial collaboration overseas. 4) **We have put resources and effort into forming partnerships** with charities, NGOs, community and public interest groups; e.g. WHO, Cochrane, HK Society for the Blind, and each Department/School of the UoA has an advisory board that meets at least twice a year and whose membership includes industrial and professional/clinical partners.

Overall, the case studies submitted showcase the impact on health, health policy, health services provision, revenue generation, quality of life and societal well-being. The case studies demonstrate reach and significance, including influence on clinical/practice guidelines (Cancer; Mental Health and East meets West case study), development of innovative devices and tools followed by successful commercialisation (Myopia, Stroke & Cancer case studies), sharing findings with stakeholders (all case studies), improved clinical care and patient/caregiver well-being (all case studies) and service improvement (all case studies). This impact was achieved through the mechanisms and strategies described in Sections 2 and 3 above.