Major Research Area 2: Translational Biomedicine

How

can we translate advances in biomedical research for the betterment of physiological, behavioural or psychological health?

Advances in omics and big data analytics have transformed biomedical research and the practice of medicine in recent years leading to the development of Precision Medicine. Next Gen whole genome sequencing analyses of circulating nucleic acids allow non-invasive pre-natal diagnosis of genetic disorders and liquid biopsy for early diagnosis and prognosis of cancers. These advances also facilitate the integration of biomedical sciences and the humanities. The multigenic and multifactorial nature of cognitive activities such as language acquisition and behavioural disorders such as autism spectrum disorders require interdisciplinary collaboration in studying the basic mechanism of these conditions or disorders. The discovery of induced pluripotent stem cells gives us a new vehicle to recapitulate the developmental process in a culture dish and facilitates the birth of regenerative biology/medicine. Both genome sequencing and the use of embryonic stem cells for research demand a parallel emphasis of the bioethics of biomedical research and its applications.

CUHK, with a mission to bring together China and the West, and to combine tradition with modernity, is well positioned to integrate the practice of Traditional Chinese Medicine (TCM) and Western Medicine. Both the authentication and standardization of medicinal herbs are urgently needed for the healthy development of TCM. Successful integration of TCM and Western medicine will ensure our ability to achieve a healthy living. Biomedicine has made big leaps in the last couple of decades. Recent advances in innovative technologies lead to the design and manufacture of robotics and nano-scale medical devices which can further benefit human care. Extending our focus on the translation of the products of biomedical research to better human life and to integrate natural sciences and the humanities will bring human knowledge to a new horizon.

Genetic, Genomic and Precision Medicine

- application of genomics information and technologies in the studies and diagnoses of diseases, including heritable disorders, neurodegenerative diseases and cancers
- pre-implantation, pre-natal and post-natal genetic diagnosis and counseling
- ethical issues of genetic testing and accidental findings in genome sequencing

Stem Cell Biology and Regenerative Medicine

- cell reprogramming and stem cell differentiation
- induced pluripotent stem cells as disease models
- neural and musculoskeletal regeneration
- tissue engineering and biomechanics
- perspectives from philosophy and humanities in stem cell research

Brain and Mind

- biopsychology
- mechanisms of cognitive and behavioural disorders
- communication sciences and disorders
- neural functions and dysfunctions
- mechanisms and functions of the nervous system
- origins and therapeutic strategies for major brain and cognitive disorders
- application of genetic and genomic techniques to the study of normal and abnormal behaviour and language acquisition

Integrative Medicine

- integration of traditional Chinese medicine and Western medicine
- apply integrative medicine research results in the existing healthcare system to provide effective integrative treatment to benefit patients
- standardization, characterization and pharmacological studies of medicinal herbs

Innovative Medical Devices

- surgical robots, endoscopic and laparoscopic devices
- tele-health sensing devices
- robotic surgery, micro-robots for diagnostic investigation
- design and fabrication of nano-scale medical devices