BACKGROUND

B.C. Knowledge Development Fund-supported projects at UBC

Myology suite: when academia meets international opportunities
- $95,000 BCKDF contribution
- The main objective of this project is to develop a health and life sciences myology suite at UBC and St. Paul's Hospital to study muscular dystrophy and chronic pathologies of the muscles. This infrastructure will create jobs, and train highly qualified personnel in B.C.

First response indicators of inflammation
- $119,619 BCKDF contribution
- Children with chronic rheumatic diseases experience lifelong cycles of remission and inflammatory "flare-ups". The treatment is repeated doses of strong immuno-suppressive drugs that have bad side effects in children. This research aims to find better ways to monitor changes in inflammation levels, so doctors can modulate each child's treatment over time. Children will get safer, more effective disease control and better lifelong health.

Health effects of secondary organic aerosols
- $95,000 BCKDF contribution
- The Air Pollution Exposure Lab (APEL) is dedicated to understanding how traffic-related pollution affects human health. Funding will upgrade the lab to more accurately reflect the polluted air in actual outdoor environments and ensure APEL remains at the forefront of human pollutant exposure research and enhance B.C.'s role as a leader in environmental energy policies.

New models for biogeochemical cycles and microbial ecology
- $120,000 BCKDF contribution
- Funding will develop infrastructure to aid in connecting information obtained through sequencing of microbial DNA to the activities of microorganisms in the environment. This information is key both for predicting environmental responses to human activities and for harnessing the metabolic capacity of microorganisms in geoengineering endeavours.

HemaPATH - precision medicine applied to blood products and treatment of blood disorders
- $798,034 BCKDF contribution
- Transfusion, the most frequent medical process used in hospitals in B.C., depends on safe and effective blood products. Funding will aid the development of safer blood products and blood substitutes, increased understanding of blood-borne diseases, design and validation of approaches to prevent excess bleeding and blood clotting, and the discovery of biomarkers for disease detection and monitoring.
Targeted approach to validating epigenetic signatures of socio-environmental exposures across the lifespan

- $95,000 BCKDF contribution
- Research in epigenetics (heritable changes in gene activity and expression that occur without alteration in DNA sequence) to understand why differences in early life environments are associated with differences in health outcomes years later.

Cerebrovascular health of individuals with spinal cord injury: expansion of autonomic research laboratory

- $95,000 BCKDF contribution
- Research in understanding the underlying mechanisms related to cerebrovascular decline after spinal cord injury and the potential of new therapies to restore the brain's health. This program will have significant economic and societal benefits for B.C. and beyond, including enhanced quality of cerebrovascular research, health-care delivery, quality of life of individuals with spinal cord injury, and decrease in cardiovascular morbidity and mortality.

Pairing phenomena in quantum gases

- $100,000 BCKDF contribution
- Research into the phenomenon of particle-particle pairing – a key ingredient to superconductivity and other quantum material properties – using laser-cooled atomic gases. This approach is novel and complementary to work with solid-state materials, with the possibility of future commercial investment in cold atom based technologies.

Climate-controlled growth flumes

- $96,980 BCKDF contribution
- The purchase of climate-controlled growth flumes to enable researchers to investigate the physiological and biomechanical responses of seaweeds to interacting environmental stressors related to climate change. Researchers will identify species and ecosystems that are particularly vulnerable to climate change and optimize growth conditions to inform aquaculture initiatives.

Longitudinal monitoring of neoplasia and inflammatory disease and effectiveness of therapeutics

- $75,000 BCKDF contribution
- Work to identify and therapeutically target "tumor stem cells" that initiate the spread of cancer, as well as the mechanisms by which chronic inflammation leads to tissue destruction in lung and gut. These processes span an enormous range of debilitating and life-threatening diseases in Canada and yet both are essentially untreatable at present.

Centre for biodiversity modelling and synthesis

- $89,817 BCKDF contribution
• The use of large scale data analysis and mathematical modelling to understand how plants can generate energy from sunlight (photosynthesis) over time, from the distant past to the future, when rapid ecological adaptation to climate change may be needed.

Development of novel pharmacotherapeutics for treating epithelial barrier-associated diseases
• $142,730 BCKDF contribution
• Research into developing a new drug intervention strategy for people who suffer from chronic inflammation in the gut, which leads to debilitating and costly diseases such as Crohn's and ulcerative colitis.

Quantitative imaging for diagnosis and therapy
• $639,322 BCKDF contribution
• Research into increasing the functionality of medical ultrasound machines and to make them broadly usable by medical personnel in their offices. Methods will be developed to characterize tissue in a quantitative manner, and to more easily and more accurately visualize disease, such as prostate cancer and liver disease.

Integrative physiology laboratory to study the effect of aging on human lung function during exercise
• $76,127 BCKDF contribution
• Research into the causes of gender-based differences in breathlessness – strongly associated with an increased risk of premature death – in older humans. The research will provide an evidence-base for the treatment of activity-related breathlessness and gender-specific plans for improving the management of lung and heart disease.

Gene therapy for vision loss: ophthalmology for mice
• $99,284 BCKDF contribution
• The purchase of an ophthalmological system, which will enable the development of new tools and gene therapies to help relieve eye disease burden for the 65,000 B.C. residents living with vision loss that impacts their quality of life and inhibits their ability to work.

Research program to optimize recovery after stroke
• $75,000 BCKDF contribution
• The infrastructure required to develop and implement innovative treatments that harness brain recovery after stroke and, in turn, improve physical and cognitive function.

Infrastructure to monitor and optimize reactions through in situ kinetic analysis
• $195,000 BCKDF contribution
• Research into technology for rapidly understanding complex catalytic reactions, including the search for new antibiotics, medicinally relevant compounds and the design
and discovery of new catalysts capable of converting carbon dioxide into value-added commodity chemicals.

Development of polymer- and lipid-based nanomedicines for targeted drug delivery

- $125,000 BCKDF contribution
- The development of nanomedicines (drugs in the form of tiny particles similar in size to viruses, which are easier to take, more effective, and have fewer side effects, than conventional medicines). This project will be the first in Canada to make innovative nanomedicines on a large enough scale aiming for clinical and commercial use, including therapies for drug-resistant cancers.

BC Knowledge Development Fund-supported projects at UBCO

Facility for the restoration and management of ecological processes

- $163,000 BCKDF contribution
- To develop wildlife management approaches that bring together forestry, transportation and First Nations. The proposed research uses innovative methods to track large mammals and to then design novel approaches to forestry and road development that will enhance management of wildlife populations. This research will support jobs in forestry, tourism and hunting-outfitting, facilitate collaborative partnerships between industry and First Nations, improve food security in rural communities and will enhance the safety of B.C.’s roads.

BC Knowledge Development Fund-supported projects at SFU

Fuel cell characterization and fabrication

- $400,000 BCKDF contribution
- Research into enhancing the longevity of devices used for electrochemical energy systems, focused primarily on fuel cells, ultimately creating B.C.-based opportunities for commercialization, economic growth and international trade.

Next-generation isotope fingerprinting

- $400,000 BCKDF contribution
- Research using new, cutting-edge isotope fingerprinting methods to address two key areas of research: forensic applications to aid the RCMP and the B.C. Coroners Service, as well as analysis of animal remains to reconstruct geographically distinct climate changes, potentially supporting identification in cases where all existing investigative avenues have been exhausted.

Transformative approaches and novel biomedical technology to assist motor function

- $397,000 BCKDF contribution
• Mechatronic science and biomedical research into assistive technologies to improve the quality of life of individuals with both temporary and permanent finger, hand, or arm dysfunction.

**Synthesis and characterization of new ion-conducting materials and membranes**
• $348,560 BCKDF contribution
• Research into synthesizing new electrochemical component materials for fuel cells and electric batteries, leading to less expensive, higher performing fuel cells and reduced manufacturing costs.

**Airborne miniature synthetic aperture radar (SAR) system**
• $368,000 BCKDF contribution
• The development of a new specialized airborne sensor which will make detailed synthetic aperture radar (SAR) images of the Earth's surface, improving maritime surveillance and security, and fisheries and environmental regulation enforcement in B.C.