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BACKGROUNDER

Three Genomics in Society Program Projects Funded

Genome Canada is proud to announce the launch of three projects within its Genomics in Society Interdisciplinary Research Teams (hereafter "Genomics in Society") program.

The Genomics in Society program aims to bring researchers from different regions, sectors and disciplines together to investigate factors affecting the advancement, adoption, evaluation and governance of genomics research and **address issues at the intersection of genomics and society** that will ultimately contribute to Canada's leadership and social and/or economic benefits in these sectors. This program helps address one of the action items in the response to the Review of Integrated GE^{3}LS program (**G**enomics and its **E**thical, **E**nvironmental, **E**conomic, **L**egal and **S**ocial Aspects) by supporting GE^{3}LS research through funding mechanisms in addition to integrated GE^{3}LS research.

Together, these three Genomics in Society projects **represent a total investment of $5.8 million ($2.6 million from Genome Canada and $3.2 million from co-funding partners** including provincial governments, private sector and not-for-profit organizations).

Title: Canadian Network for Learning Healthcare Systems and Cost-Effective 'Omics Innovation (CLEO)
Academic Leaders: Dean A. Regier (BC Cancer), Tania Bubela (Simon Fraser University) and Timothy Hanna (Queen's University)
Genome Centres: Genome British Columbia and Ontario Genomics
Total funding: $2.5 million

Cancer is a collection of related genetic diseases. These are caused by DNA mutations that change how cells grow and develop. The term 'genome' refers to the complete set of DNA. Recent innovations allow us to sequence the complete set of DNA and RNA in a patient's cancer, known as the tumour genome. The hope is that the knowledge generated about the tumour genome compared to the normal genome will help us to develop treatments that target and kill cancer cells based on specific cancer-causing mutations. It will also help us repurpose drugs that have been approved for other cancers sharing similar mutations. This mutation targeted approach is called precision oncology.

To date, Canadians have had limited access to precision oncology because of a lack of data about the clinical effectiveness (does it work?) and cost-effectiveness (can we afford it?). Answering these two questions requires coordinating large amounts of different kinds of data. Before precision oncology can benefit Canadian cancer patients, data systems, policies, and practices are needed to get the right data, to the right researchers and care providers, at the right time, in the right way.

Healthcare systems that generate data, produce evidence, and use this evidence to guide patient care are called Learning Healthcare Systems. Unfortunately, current systems are not

designed to allow for learning healthcare. In response to this unmet need, major Canadian precision oncology initiatives are building platforms for data integration and sharing to enable learning healthcare systems. To guarantee the success of precision oncology initiatives, we need to understand their economic impact and make sure that their design is in line with patient and public values as well as Canadian laws and regulations.

Our Canadian Network for Learning Healthcare Systems and Cost-Effective 'Omics Innovation (CLEO Net) will meet these needs by partnering with Canadian learning healthcare system initiatives for precision oncology. Together we will: (1) inform the design of learning healthcare systems that turns genomic knowledge into sustainable cancer care; (2) advance research; (3) build capacity to deliver this research and its benefits into the future; and (4) produce research that yields individual, social, and economic benefits for all Canadians.

Title: The Role of Genomics in Fostering and Supporting Arctic Biodiversity: Implications for Wildlife Management, Policy and Indigenous Food Security
Academic Leaders: Maribeth S. Murray (University of Calgary) and Peter Pulsifer (Carleton University)
Genome Centres: Genome Alberta and Ontario Genomics
Total funding: $1.9 million

Wildlife genome information is extremely valuable for environmental decision making, yet much remains unused for this purpose. This project draws together partners with expertise across disciplines, cultures and organizations, building upon team strengths in Arctic observation and monitoring, biology, conservation, cyber-cartography, data management, genomics, geography, Indigenous Knowledge, the legal and policy sciences, and resource management. Together the team will co-develop a suite of genomics knowledge-mobilization tools that will support environmental decision making. The focus is on supporting end-users with responsibilities for or interests in the areas of biodiversity monitoring, conservation, and the co-management of wildlife that are key to the social, cultural, physical and economic well-being of northern Indigenous Peoples.

The team will develop decision support tools building on an assessment of genomics data availability (can it be located, is it obtainable?) and accessibility (is it useable by non-experts and for decision making and policy development?), and we will consider the potential and the practical, economic, legal and ethical issues of mobilizing genomics for decision making – including those pertaining to Indigenous perspectives and rights, and national and international frameworks and commitments that may influence policy at different levels of government. Project activities and outcomes will support conservation, natural resource management, and the sustainability of Arctic wildlife. Outcomes will also support Canada's efforts to protect Arctic species and ensure food security for Arctic People. The project can serve as a model for mobilizing genomics in different regions of Canada and in other nations.

Title: Barriers and Opportunities for Commercialization of Gene-Edited Beef and Dairy Products
Academic Leaders: Michael von Massow (University of Guelph) and Dan Weary (University of British Columbia)
Genome Centres: Ontario Genomics and Genome British Columbia
Total funding: $1.4 million

For years, our understanding of genetics has been used to improve agricultural practices and food production. Conventional plant and livestock breeding have shaped many of the food products we enjoy today. More recent advances in biotechnology are allowing us to address agricultural issues that were inconceivable with standard genetic technologies. One such advancement is the development of gene-editing technologies that may be used to improve the welfare of farm animals, potentially benefiting farmers and broader. However, people have also expressed concern about the use of biotechnology in

food production. This concern — as well as supply chain constraints — can lead to resistance to adopting these technologies by producers, processors, retailers, food service, and other supply chain stakeholders.

The introduction of genetically modified foods was largely met with mistrust and skepticism. We must therefore ask: What factors affect societal acceptance of these technologies? The primary aim of this research project is to answer this question, focusing on potentially animal welfare enhancing gene-edited technologies as applied to dairy and beef cattle. Although our project will focus on these specific technologies, the larger objective is to better understand how novel gene-edited food technologies are likely to be perceived.

The proposed research will focus on understanding of perception, trust and adoption among all interested groups from farmers to consumers. The potential benefits of this project are as diverse as the stakeholders involved. A better understanding of perceptions towards gene-editing technologies may allow for improved communication efforts, and potentially result in enhanced trust in the food system. Moreover, Canadian food businesses will be able to more confidently predict which gene-editing technologies are likely find societal acceptance.