GenomeCanada

Released on March 10, 2016

BACKGROUNDER

Genomic Applications Partnership Program
Funded Projects – Round 3 and 4

The Genomic Applications Partnership Program (GAPP) funds research projects that address real world challenges and opportunities as identified by industry, government, not-for-profits, and other "users" of genomics research. The following four projects have been selected for funding in the third and fourth round of GAPP. Backgrounders on previous projects funded under the program (including Round 1, Round 2 and first set of Round 3) are available on Genome Canada's website.

SIRPαFc: Translating Genomics Research into a Novel Cancer Immunotherapy

Project Leaders: Jean Wang, University of Toronto (academic) and University Health Network; Robert Uger, Trillium Therapeutics Inc. (user)
Lead Genome Centre: Ontario Genomics
Total project funding: $3.4 million
GAPP Round: 3

Nearly all (96 per cent) people aged 65 or older diagnosed with acute myeloid leukemia (AML) die within five years, as do two-thirds of younger patients. Because it primarily affects older people, the incidence of this aggressive cancer is expected to rise in coming years as the population ages. Chemotherapy regimens for AML have remained essentially unchanged since the 1970s. With standard treatment, many patients can achieve remission, but most will relapse; following relapse two-thirds of patients will die within 3 years.

One of the reasons for the high rate of relapse in AML is that standard chemotherapy does not kill leukemia stem cells, leaving them to grow and mature into new leukemia cells. Leukemia stem cells express high levels of a protein called CD47. This protein sends a "do not eat" signal that stops white blood cells of the immune system called macrophages from surrounding and "eating" cancer cells.

With previous support from Genome Canada and Trillium Therapeutics Inc. (TTI), a publicly traded biotech company in Toronto, Canada, Dr. Jean Wang and team at the Princess Margaret Cancer Centre, University Health Network, and Dr. Jayne Danska and team at SickKids have

developed SIRPαFc, a novel therapeutic that blocks the "do not eat" signal, freeing the immune system to attack leukemia stem cells. TTI is completing formal preclinical studies and will carry out clinical trials aimed at demonstrating SIRPαFc's safety and efficacy. The collaboration between Drs. Wang and Danska and TTI will assist in realizing the commercial potential of this promising discovery.

Enhancement of commercial utilization of canola oil and meal by manipulation of cellular and sub-cellular metabolism involving fats and carbohydrates

Project Leaders: Randall Weselake, University of Alberta (academic); M. Tahir, Dow AgroSciences (user)
Lead Genome Centre: Genome Prairie
Total project funding: $0.9 million
GAPP Round: 3

Canola is more than big agribusiness — it's huge. It is Canada's fastest growing crop and generates one-quarter of all farm cash receipts. Canola oil has high levels of monounsaturated and polyunsaturated fatty acids making it a favorite among health-conscious consumers. The oil is also light and tasty making it the oil of choice for many chefs and food processors. Once crushed for its oil the remaining seed provides a high protein feed supplement for animals. The sector contributes $19.3 billion to the Canadian economy annually; it also supports some 250,000 jobs and $12.5 billion in wages.

As the world's need for healthy oil continues to rise, global demand over the next decade is expected to require a 40 percent increase in Canadian canola production. Exports are already worth nearly $3 billion annually. Clearly, any measures that make canola seeds produce more and higher quality oil and meal will have a large payoff for Canadian farmers and processors.

That's the goal for Dow AgroSciences and Dr. Randall Weselake. Dow AgroSciences has done pioneering work in developing canola hybrids for healthy oil production, while Dr. Weselake heads the University of Alberta Phytola Centre, a research body dedicated to providing market-responsive, oilseed biotechnology products and technology solutions in partnership with industry. His work has led to genomic tools that can help further improvement of canola seeds for production of even higher quality oil and meal.

This project will combine Dr. Weselake's findings with Dow AgroSciences' results to add value to canola seeds. Their objective is to use genomic approaches to enhance the seed's oil content and its protein levels while also reducing fibre and saturated fatty acid content. Success will ensure that Canadian canola growers and associated sectors continue to play a leading role in capturing global markets.

New test to rapidly diagnose infections

Project leaders: Michel G. Bergeron, Université Laval (academic); Patrice Allibert, GenePOC, Inc. (user)
Lead Genome Centre: Génome Québec
Total funding: $5.7 million
GAPP Round: 4

Infectious diseases need to be treated as early as possible, before the infection can progress and lead to complications and even death for the patient and transmission to others. Today, early and appropriate treatment, however, is hampered by the use of culture-based testing that take more than two days and thus results in empirical treatment and the overuse of broad spectrum antibiotics that are associated with complications like deadly *C. difficile* diarrhea and the development of antibiotic resistance. Now there may be a quicker and cheaper alternative, creating better health outcomes for patients and saving the health care system money from both rapid (<1h) lower-cost testing and reduced patient stays in hospital.

GenePOC has used technologies and intellectual property developed at the Infectious Disease Research Centre of Université Laval (CRI) under the leadership of its director, Dr. Michel G. Bergeron, to develop a simple cost-efficient, rapid, specific and sensitive, integrated point-of-care molecular testing instrument, together with a disposable device called PIE, to support close-to-patient diagnosis for infectious diseases. The instrument works by identifying specific microbial gene sequences. Health care providers in multiple settings, including hospitals, clinics and pharmacies, can use the instrument to rapidly diagnose and select the optimum treatment for several infectious diseases, all in less than one hour. In this project, Dr. Michel G. Bergeron and GenePOC are expanding the range of infections for which low-cost, portable instrument can test. Two new products will be developed, one for the detection of streptococcal pharyngitis and the other to detect staphylococci a major cause of severe and mortal hospital-associated infections often resistant to antibiotics.

In 2013, GenePOC won the prestigious “North American Molecular Diagnostics Entrepreneurial Company of the Year” Award. Now, as a result of the GAPP funding, GenePOC will be able to consolidate its position as the game changer in point-of-care gene-based diagnostics, with five tests on the market by 2018.

Fibre composite and biomatrix genomics (FiCoGEN)

Project leaders: David Levin, University of Manitoba (academic); Shawna DuCharme, the Composites Innovation Centre (user)
Lead Genome Centre: Genome Prairie
Total funding: $3.3 million
GAPP Round: 4

Bast fibres such as hemp, linseed flax and kenaf are grown in North America for their oil seeds, used in foods, cosmetics and lubricants. The crops need minimal herbicides, pesticides or

irrigation, making them both affordable and environmentally friendly – but until now, there has been little demand for the fibres left over after the oil seeds are extracted. Increasingly, however, these fibres are being used in industrial markets, providing a secondary income stream for farmers.

One of the most promising uses of biofibres is in combining them with a resin to make a biocomposite. These biocomposites are particularly valuable in the automotive industry, where their light weight, recyclability and sound insulation offer advantages over other materials. The market for biofibre composites is expected to grow by more than 10 per cent per year during 2014-19.

The University of Manitoba's Dr. David Levin is working with the Composites Innovation Centre, a globally recognized centre of excellence specializing in the commercialization of biocomposite materials, to develop and test a prototype part from a parking enforcement vehicle using a novel biocomposite. The biocomposite uses flax fibres with traits enhanced for use in advanced composite materials (developed through previous Genome-Canada funded projects) and a binding resin/polymer produced in Dr. Levin's laboratory from novel microbial strains. Westward Industries (WI), a Manitoba SME, will manufacture the vehicles. The new, lighter-weight vehicle with its lower carbon footprint will enable WI to triple annual sales to existing and new customers within three to four years. The composite tub is also estimated to decrease production costs of the parts it replaces by one third as well as increase workplace safety. Another Manitoba company, Minto Bioproducts, will be licensed to produce the polymer, bringing further economic benefits to the province and contributing to fulfilling Manitoba's bioproducts strategy.