

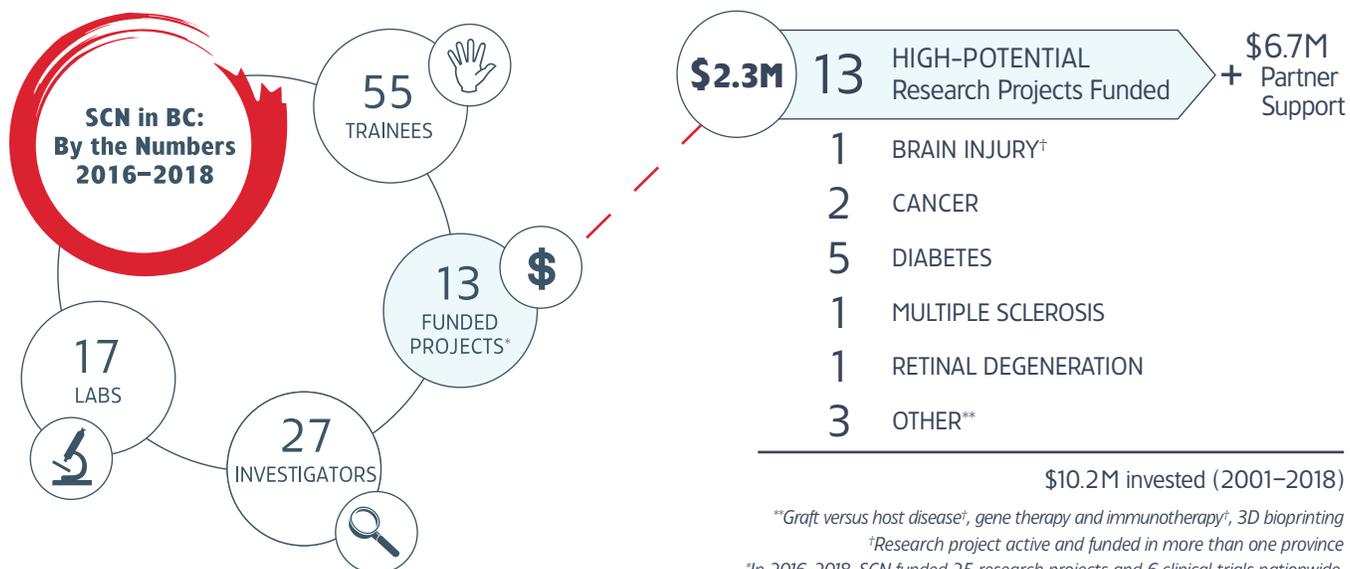
## In British Columbia MAKING AN IMPACT

### STEM CELL INNOVATION

Researchers in British Columbia are investigating stem cell therapies for diseases such as cancer, diabetes, and retinal degeneration, and their discoveries will improve treatments worldwide.

Each one of these discoveries is linked to the Stem Cell Network's (SCN) catalyzing support for stem cell research, training, policy, and commercialization. SCN allocated more than \$2.3M in funding for stem cell research in BC in 2016 alone, and has provided more than \$10.2M since its inception in 2001. This funding is moving high-potential research from *bench to bedside* and will allow those who live with a chronic disease or illness to receive innovative therapies based on stem cell technologies.

#### Stem Cell Network Research in BC 2016-2018



\*\*Graft versus host disease\*, gene therapy and immunotherapy†, 3D bioprinting  
†Research project active and funded in more than one province  
\*In 2016-2018, SCN funded 25 research projects and 6 clinical trials nationwide.

**DYK?** ..... 31% of principal investigators (PIs) and co-investigators for BC research projects are women.

## Disrupting the Field: Stephanie Willerth

It may sound like science fiction, but Stephanie Willerth's research at the University of Victoria is proving to be anything but. Dr. Willerth is one of the first researchers to harness Aspect Biosystems' patented microfluidic-based 3D printer technology, which prints cells on demand using the material that surrounds them (bioink). By reprogramming a person's adult cells back into their stem cell state, Dr. Willerth can use them to create living human neural tissue through Aspect Biosystems' printing platform, taking that Vancouver-grown technology one step further. The printed tissue can be screened for potential drug candidates to treat that person's disease—a new advance in the concept of personalized medicine.



*Aspect Biosystems was recognized as the "Most Promising Startup" at the BC Tech Association's 2016 Technology Impact Awards.*  
[aspectbiosystems.com](http://aspectbiosystems.com)

Dr. Stephanie Willerth,  
University of Victoria

Dr. Willerth's research has two goals: to determine a suitable and stable fibrin (a protein that plays a role in blood coagulation) bioink formulation for printing stem cell-derived neural cell progenitors; and to use bioink to print neural tissues. Besides providing the printing platform, Aspect Biosystems supports the protection of intellectual property generated through this project and assists in its commercialization. The model is expected to be licensed to pharmaceutical companies to use for drug-screening applications. In 2016, SCN allocated \$100,000 to Dr. Willerth's team to accelerate the commercialization of this promising and potentially lifesaving application.

Dr. Willerth is one of a new generation of stem cell researchers in Canada, recognized as a Canada Research Chair and a Young Innovator in Molecular and Cellular Bioengineering.

## BC Innovation at Work: Mesentech

Vancouver-based Mesentech is a new type of biotech company that is starting to emerge across Canada. It is unique because it has a strong regenerative medicine focus and is seeking innovative ways to treat bone-related diseases, such as infections and cancers. The company was formed by SCN investigators Drs. Fabio Rossi, Michael Underhill, Robert Young, and Pieter Cullis—all prominent and respected BC researchers.

Bones are notoriously difficult to target with drugs. As such, Mesentech's products and technologies are designed to deliver biologics all the way to the bone's interior. This novel approach is important for stimulating bone regeneration and providing those who suffer from bone diseases hope that they will be able to return to a more productive and healthier life.

[mesentech.com](http://mesentech.com)

## Disrupting the Field: Christopher Laver & Corey Kelly

Retinal degeneration affects half a million people in Canada and vision loss has the highest direct healthcare cost of any disease group. This cost averages \$33,000 per patient per year, while the annual global cost of age-related macular degeneration is nearly US\$400B. The issue has captured the interest of two young investigators at the University of British Columbia.



Dr. Christopher Laver,  
University of British Columbia



Corey Kelly,  
University of British Columbia

*SCN's funding is described by Chris Laver & Corey Kelly as "the linchpin in the therapeutic development and commercialization of novel technologies."*

Dr. Christopher Laver specializes in ocular tissue engineering while Corey Kelly works at the crossroads of biophysics, software engineering, and bioengineering. Their partnership has led to the creation of VisuCyte Therapeutics Inc. through UBC's Entrepreneurship Program. VCT Inc. is developing technology that helps regenerate co-dependant layers of retina in order to improve the treatment of retinal degenerative diseases. In 2016, SCN awarded \$100,000 to further the development of VCT Inc's biotechnology. The project has since expanded to include three Canadian universities, five principal investigators, and five trainees.

As two of SCN's early career investigators, Laver & Kelly exemplify how scientific collaborations can translate discoveries into meaningful applications. They are also a striking example of how the next generation is focused on innovation and commercialization. The combined entrepreneurial and scientific spirit that Laver & Kelly put forward will in time benefit those living with debilitating eye diseases.

**DYK?** It was in BC where breast cancer stem cells were discovered, where stem cells were turned into insulin-producing cells for the first time, and where a major advance in blood stem cell expansion took place. BC researchers are also involved in one of the most significant type 1 diabetes clinical trials in history.

## Breast Cancer & Stem Cells

In Canada, breast cancer is the second-leading cause of women's death from cancer, and an estimated 26,300 women will be diagnosed in 2017. With SCN funding support, leading researcher Dr. Connie Eaves and her team at the BC Cancer Agency described the "mother cell" of the mammary gland and grew human mammary glands in mice. This breakthrough is helping researchers determine the cause of breast cancer, discover ways to prevent malignancies, and develop tumour-fighting drugs.

## Diabetes & Stem Cells

Type 1 diabetes affects over 31,000 people in BC alone, with more than 300,000 affected nationwide. It is estimated that 11 million people in Canada live with prediabetes and diabetes types 1 and 2. SCN-funded investigators are developing potential treatments to tackle this disease. Dr. Tim Kieffer and his team at the University of British Columbia have developed a protocol that can turn stem cells into insulin-producing cells in a matter of weeks. As a result, doctors are one step closer to having an unlimited supply of insulin-producing cells to treat type 1 diabetes. Dr. Kieffer's research has been supported by SCN throughout the years; he is one of the many health research superstars whom Canada can claim as its own. Today, SCN is proud to support Dr. Kieffer's clinical trial, which is addressing a novel therapy that will allow insulin replacement in those who have diabetes.



There is enormous potential for stem cell therapies to treat chronic diseases and debilitating illnesses such as:

<i>Parkinson's disease</i>	<i>Kidney disease</i>	<i>Leukemia and other cancers</i>	<i>Diabetes</i>
<i>Crohn's disease</i>	<i>Septic shock</i>	<i>Respiratory diseases</i>	<i>Heart disease</i>
<i>Muscular dystrophy</i>	<i>Multiple sclerosis</i>	<i>Brain injury</i>	<i>ALS</i>
<i>Retinal degeneration</i>			

The Stem Cell Network is Canada's stem cell research organization. It is committed to working with researchers from coast to coast to get new therapies and medicines to market and to those who need them most.

## SCN's 2016–18 BC based Partners

- Aspect Biosystems
- BC Cancer Agency
- BC Children's Hospital Foundation
- Centre for Drug Research and Development
- Child & Family Research Institute
- Heart and Stroke Foundation
- Multiple Sclerosis Society of Canada
- Simon Fraser University
- STEMCELL Technologies
- University of British Columbia
- University of Victoria
- ViaCyte Inc.

SCN's partners provide important support for stem cell research. Partnerships are critical for ensuring high-potential research is funded appropriately. In BC, SCN investigators have leveraged over \$6.7M in partner contributions on the \$2.3M provided by SCN. This investment will see new therapies move more rapidly towards the clinic in the coming years.