

ANNUAL REPORT 2017/18

*Our People*  
*Our Strength*



Stem Cell Network  
Réseau de **cellules souches**



# *"To capitalize upon Canada's competitive advantage in stem cell research for the benefit of Canadians"*

In just over 17 years, the Stem Cell Network has forged a national community that has transformed stem cell research in Canada and placed it at the forefront of international efforts. SCN has pushed the boundaries of what was a basic research area towards translational outcomes that are changing clinical practice and driving innovation in regenerative medicine, a field that will have an estimated global value of \$53.7B by 2021.



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## *A Message from the Chair of the Board of Directors, Scientific Director & Executive Director*

Dear Friends:

On behalf of the Stem Cell Network (SCN), we are pleased to provide the Government of Canada and the stem cell and regenerative medicine (RM) community with our 2017/18 annual report. Over the past year, we have built on our achievements to contribute to Canada's health and well-being through support for stem cell research.

SCN has reaffirmed the roots of our success, by focusing on the strength of our community. It is precisely this community of experts – researchers, clinicians, trainees, cell manufacturing and industry leaders, policy makers and our health charity partners – who have enabled Canada to remain competitive in this innovative field.

By the end of fiscal year 2018, SCN's investigators had completed 25 research projects and six clinical trials. Each of these delivered important results that have added to scientific knowledge, pushed research closer to the clinic or provided new technologies with commercial and clinical benefit. With the support of the government, SCN was also able to run a new funding competition that took place over the second half of the year, leading to new projects valued at \$4M that were announced at the close of the fiscal year. This new portfolio, including 21 research projects and three clinical trials, will advance knowledge in promising areas, including type 1 diabetes, brain injury and vision repair.

Inside the pages of this annual report, readers will see how we are building a healthy and prosperous future for Canadians, built upon a strong scientific foundation. This continues to be achieved by funding the best and most promising stem cell research, providing skills and opportunities for the next generation of researchers, informing policy and regulatory issues and sharing information about stem cell therapies and the state of stem cell science with the Canadian public. We hope that you will take the time to read about some of the innovative work being conducted by SCN investigators across the country.

In June 2017, SCN partnered with STEMCELL Technologies and CCRM to host the Regenerative Medicine Growth Summit. This event brought together members of the Regenerative Medicine Alliance of Canada (RMAC; formed with SCN leadership in 2017), government policy makers, industry members and investors to discuss opportunities and challenges for the sector. It led to the creation of an ecosystem map that provides extensive detail on all the major inputs, outputs and players that comprise Canada's emerging and innovative regenerative medicine sector. This map has been shared extensively and underscores the importance of developing a pan-Canadian strategy for regenerative medicine.



(L) Andrew McKee  
(C) Dr. Michael Rudnicki  
(R) Cate Murray

SCN began working towards this future by issuing a call for Letters of Intent in March 2018. This call helped to shed light on where the research activity is greatest, what technologies are emerging and where support for clinical research is most needed. This information is key to understanding the role SCN must play over the next five years and for informing a longer-term national plan for regenerative medicine as envisioned by RMAC.

**Our strength is our people.** We're extremely proud of the work they do, from feeding cells in a lab each day, to sharing experiences and knowledge through conferences and new media, to working with patients whose insights and participation in clinical trials is invaluable. These are the people with the talent and ability to make a difference in the lives of Canadians and enhance the economic well-being of our country. As a leader, funder and coordinator in this space, SCN's role is paramount. It's a role we have the experience and trust from our community to deliver upon.

Sincerely,

A stylized blue ink signature of Andrew McKee.

Andrew McKee  
Chair

A cursive blue ink signature of Dr. Michael Rudnicki.

Dr. Michael Rudnick, O.C.  
Scientific Director & CEO

A cursive blue ink signature of Cate Murray.

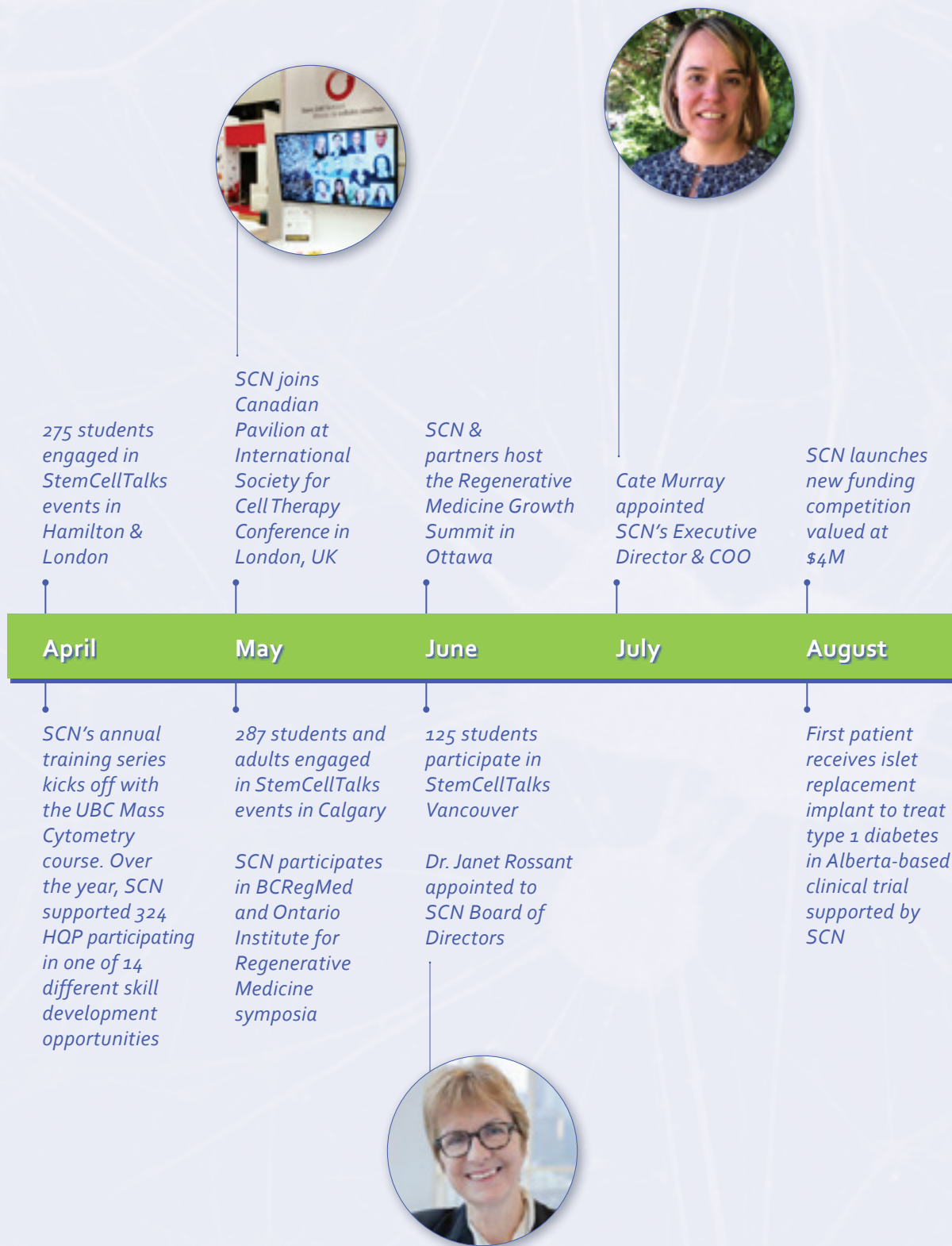
Cate Murray  
Executive Director & COO





## The Year in Review

2017





Dr. Harold Atkins wins 2018 Till & McCulloch Award for his Lancet paper on treating MS with stem cells



400+ attendees from Canada and abroad attend the Till & McCulloch Meetings in Mont-Tremblant, Quebec, co-hosted by SCN and CCRM

SCN launches Regenerative Medicine Ecosystem Map

First patient receives encapsulation device to treat type 1 diabetes in BC-based clinical trial supported by SCN

Over 37,000 impressions achieved from SCN's Twitter campaign, highlighting outstanding women in regenerative medicine for International Women's Day

SCN launches new website

2018

September

October

November

December

January–March

SCN Scientific Director & CEO Dr. Michael Rudnicki appointed Chair of Regenerative Medicine Alliance of Canada for two-year term

Dr. Mona Nemer, SCN Board member, named Chief Science Advisor for Canada



SCN hosts workshop on Unproven Stem Cell Therapies in Ottawa

Debra Lynkowsky appointed to SCN Board of Directors

Dr. Molly Shoichet, SCN researcher, appointed Ontario's Chief Scientist



SCN hosts Parliamentary Luncheon about stem cell research, in partnership with Research Canada

House of Commons Finance Committee recommends stable and predictable funding for SCN

SCN's LOI competition launched for new projects for 2019-2024

470 students engaged in StemCellTalks events in Guelph, Hamilton, Ottawa & Toronto



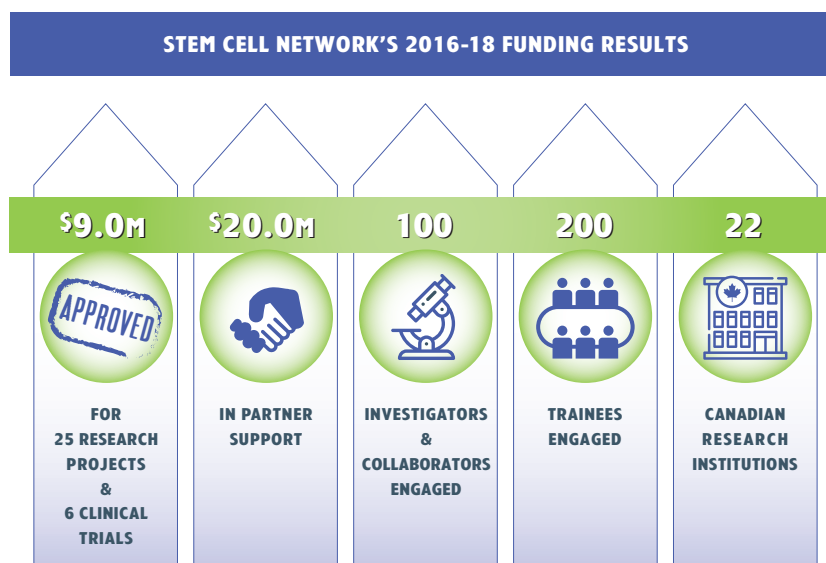


## Research Achievements

SCN is Canada's only national network and funder of stem cell and regenerative medicine research. SCN has a focus on providing support for translational research where there is a clear path to commercialization, the clinic or policy development.

SCN's 2017/18 research program built upon projects that commenced in the previous year, thanks to the federal government's 2016–2018 commitment of \$12M in support of high-quality, innovative and leading-edge stem cell research. Thirty-one goal-directed projects from across Canada were awarded through this competitive process: six clinical trials, eight disease teams and 17 impact projects. Arising from this research, 54 peer-reviewed articles and book chapters were published in 2017/18. Much of this work has informed the translational path, from lab bench to bedside, in areas such as brain injury, kidney disease and breast cancer. It has also contributed to the consideration of emerging policy issues relevant to the field, such as gene editing and misleading marketing claims.

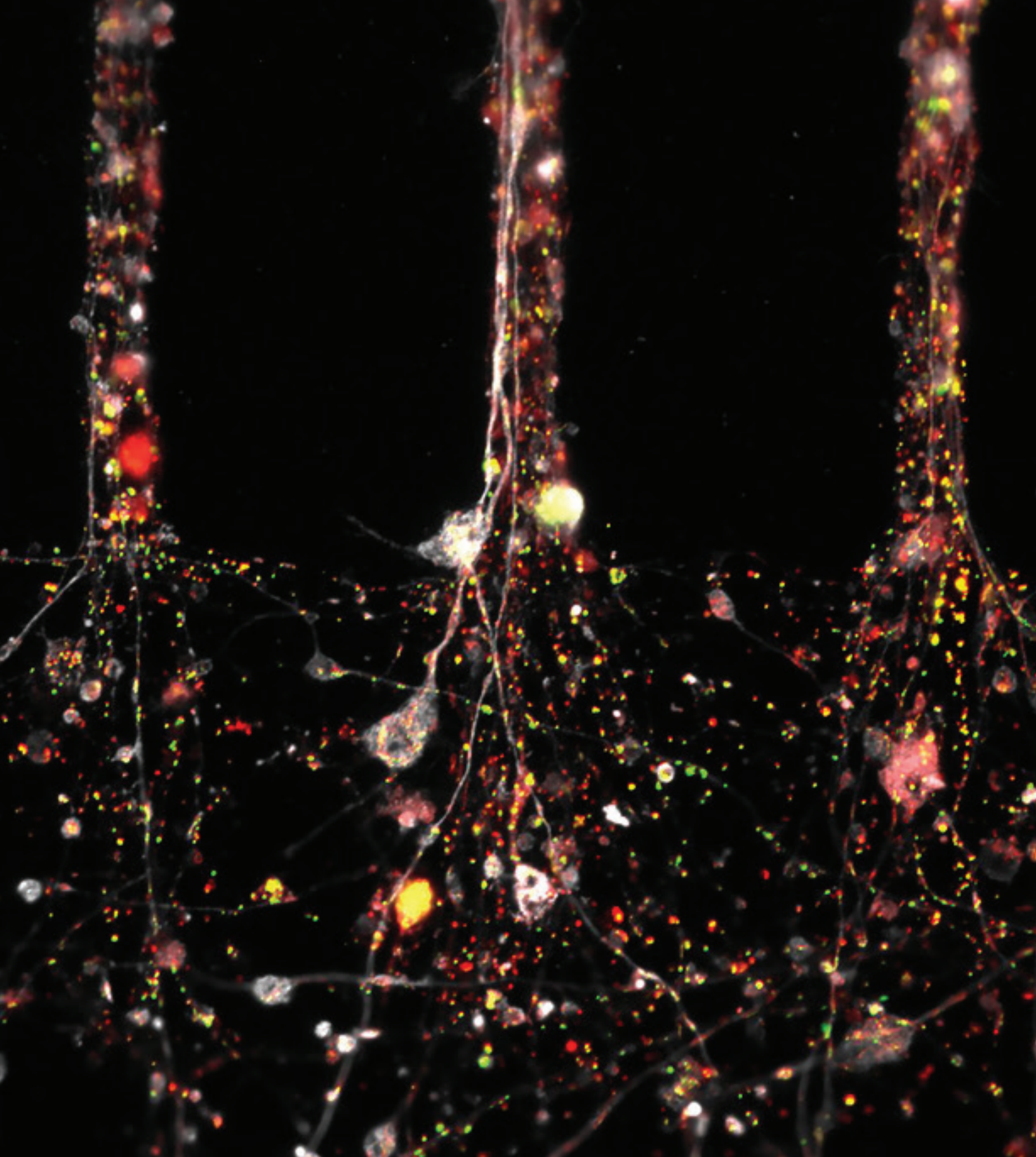
These projects involved nearly 100 investigators and 200 trainees based at one of 22 Canadian research institutions. They further involved 59 partners representing industry, not-for-profits, institutions and other sources. These partners contributed in excess of \$20M in additional funding to the projects, which is a strong indication of the strength of the sector and support for this transformative research. The following pages provide a summary of activities and outputs achieved with SCN support.



*SCN is pleased to support translational stem cell research taking place across Canada.  
This funding has been allocated through three programs:  
Clinical Trials, Disease Teams, and Impact Awards*

Figure 2: 2016–18 Research Program Summary





*The Roots of Life* | Photo credit: Frédérique Larroquette  
Entry in the 2017 *Cells / See* art contest at the Till & McCulloch Meetings

Clinical Trials

The Clinical Trials Program provided **\$4.214M for six trials**. This was a continuation of the program initiated in 2016 and represented the first time SCN had directly supported early-stage (phase I & II) clinical trials. A total of 38 investigators (six Principal Investigators and 32 Co-Investigators) at 12 institutions, together with 50 trainees, were engaged in these trials, which are aimed at determining the safety and efficacy of new stem cell treatments in humans. This program supports trials with the potential to be economically viable for healthcare systems and that show a benefit to patients. Funded trials focused on a spectrum of health issues including treating fatal illnesses such as septic shock and myocardial infarction, expanding stem cells from cord blood for use as a therapy for blood cancers and improving outcomes for patients receiving liver transplants. SCN's funding also supported two ongoing clinical trials to evaluate the use of a "tea-bag"-like device for type 1 diabetes. These two trials are profiled on the following pages.

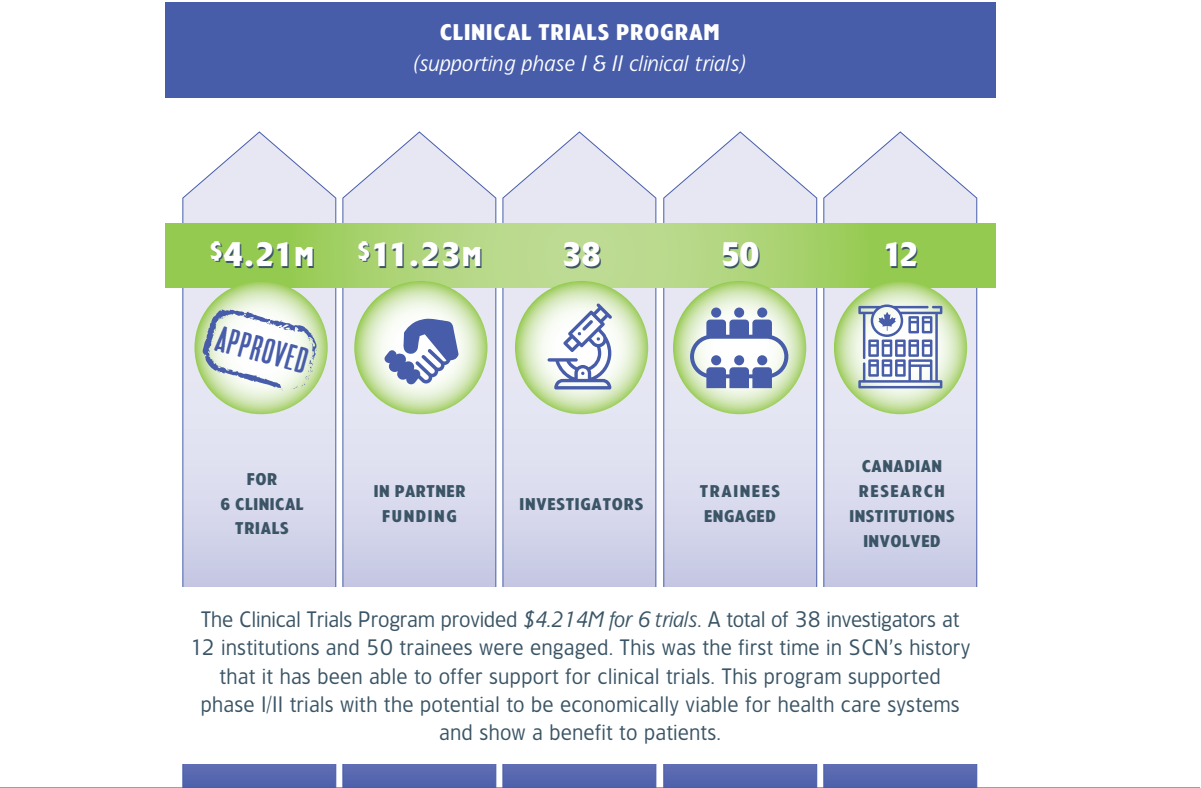


Figure 3: 2016–18 Clinical Trials Program





PRINCIPAL INVESTIGATOR WITH CO- INVESTIGATORS	PROJECT TITLE AND SCN FUNDS ALLOCATED
Harold Atkins, Ottawa Hospital Research Institute (OHRI) Gary Levy (UHN)	<div>Using hematopoietic stem cell transplantation to regenerate a naïve immune system tolerant to liver allografts</div> <div>\$215,700</div>
Sandra Cohen, Hôpital Maisonneuve-Rosemont (HMR) Jean-Sébastien Delisle (HMR), Guy Sauvageau (U de M)	<div>Making cord blood hematopoietic stem cell expansion competitive</div> <div>\$999,968</div>
Timothy Kieffer, UBC David Thompson (UBC), Garth Warnock (UBC), Graydon Meneilly (UBC), Megan Levings (UBC)	<div>A stem cell therapy for insulin replacement in patients with diabetes</div> <div>\$500,000</div>
Lauralyn McIntyre, OHRI John Marshall (U of T), Keith Walley (UBC), Claudia dos Santos (St Michael's Hospital), Brent Winston (U of C), Shane English (OHRI), Alexis Turgeon (Laval U), Geeta Mehta (Sinai Health System), Robert Green (Dalhousie), Alison Fox-Robichaud (McMaster), Margaret Herridge (U of T), John Granton (U of T), Paul Hebert (CRCHUM), Duncan Stewart (OHRI), Shirley Mei (OHRI), Dean Fergusson (OHRI), Kednapa Thavorn (OHRI), Timothy Ramsay (OHRI)	<div>Cellular immunotherapy for septic shock (CISS): A phase II multicenter clinical trial</div> <div>\$1,000,000</div>
James Shapiro, U of A Peter Senior (U of A)	<div>Clinical trials in stem cell transplantation - solving the supply and the survival problem in Type 1 diabetes</div> <div>\$499,596</div>
Duncan Stewart, OHRI David Courtman (OHRI)	<div>Enhanced angiogenic Cell Therapy in Acute Myocardial Infarction (ENACT-AMI)</div> <div>\$999,546</div>

Table 1: Clinical Trials Summary Table



*(L) Dr. Timothy Kieffer,  
University of British Columbia*

*(R) Dr. James Shapiro,  
University of Alberta*

## Clinical Trials Program

### *A packet of relief for type 1 diabetes*

Type 1 diabetes is an autoimmune disease that affects the daily lives of approximately 300,000 Canadians. It occurs when the body's immune system attacks and destroys the cells in the pancreas that make insulin. The positive news is that an innovative stem cell therapy may be the best answer for future treatment.

SCN is supporting novel research in the field, including two first-in-human clinical trials. Both trials, one led by Dr. Timothy Kieffer at the University of British Columbia and the other by Dr. James Shapiro at the University of Alberta, are investigating implantable “tea bag”-like devices that encapsulate beta cell precursors. Once implanted under the skin of a patient with diabetes, these cells mature into functional insulin-producing islet cells and are absorbed into the bloodstream. The ultimate goal is to develop a therapeutic supply of insulin for patients, thereby eliminating the need for and expense of regular insulin injections or an islet cell transplant.

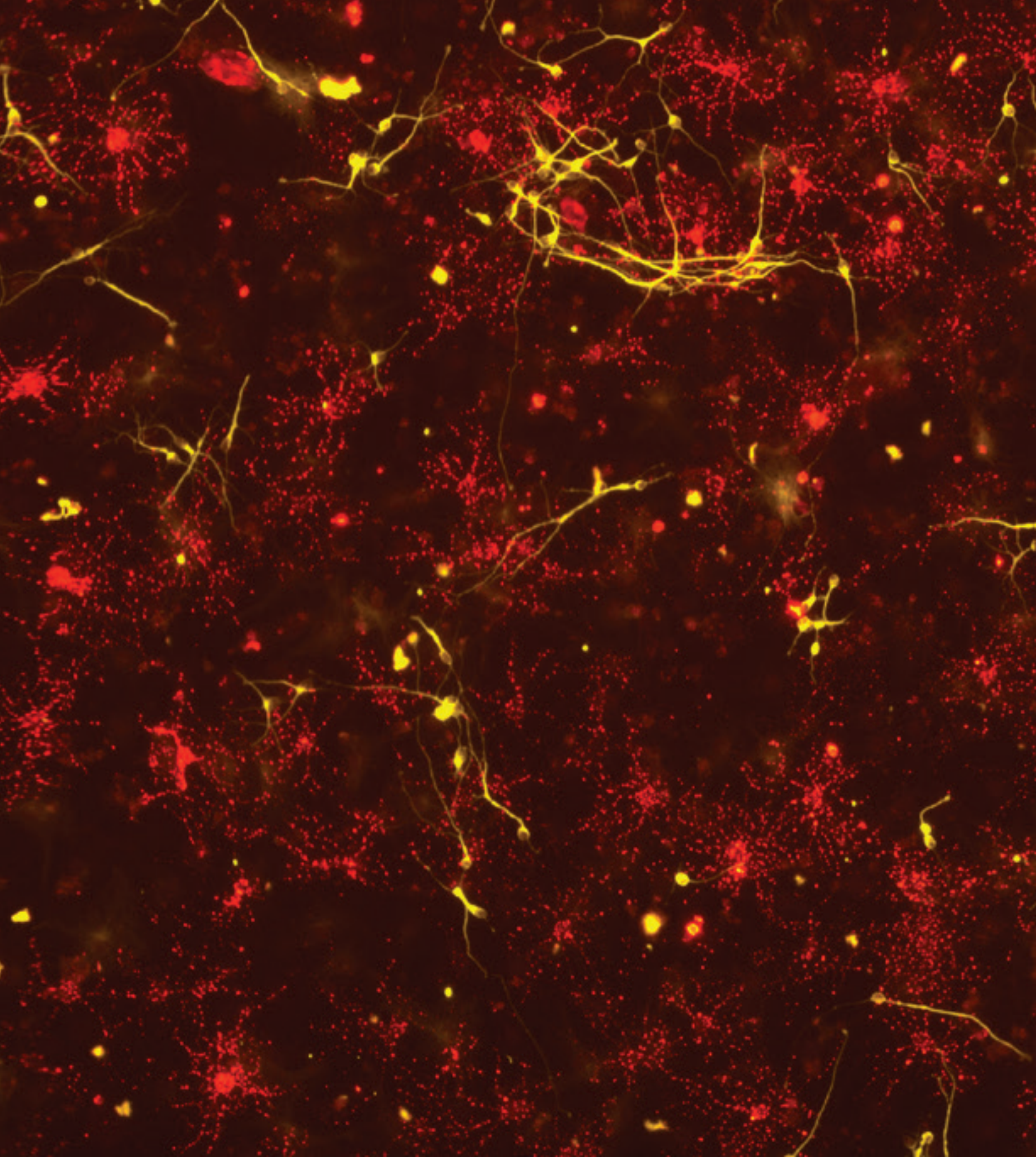
### *Project Outcomes*

- *3 clinical trials (2 Edmonton; 1 Vancouver)*
- *20 patients treated or enrolled*
- *surgical methods established for implant and explant*
- *potential for long-term engraftment demonstrated*

The trials are working with two encapsulation products that vary in size and design. Investigators have thus far determined key modifications critical for successful engraftment and vascularization – ultimately improving the quality of the technology. At the end of the project funding, 13 patients had been treated or enrolled in the

Alberta-based trial and five had been treated in BC, with two additional patients scheduled for transplant. The trial studies will continue through 2018 to further determine safety and efficacy of the encapsulation devices. Drs. Shapiro and Kieffer are hopeful that by the end of the clinical trial process a reliable and cost-effective device will be available for those who live with diabetes.





*Supernova Tango – The Dance of the Cosmos* | Photo credit: Marissa Lithopoulos  
Winner of the 2017 *Cells I See* People's Choice Award at the Till & McCulloch Meetings

Disease Teams

The Disease Team Research Agreement Program provided **\$3.281M for eight projects**. A total of 41 investigators (eight Principal Investigators and 33 Co-Investigators) at 11 institutions, together with more than 80 trainees, were engaged. Multidisciplinary teams supported through this program focused on novel cellular or stem cell-related therapeutic approaches to treat disease that have a direct path to the market or clinic. The projects addressed challenges or advanced ongoing research for diseases such as arthritis, blood cancers and type 1 diabetes. Two of the funded disease teams are featured in this report: the first looking at expanding the use of existing drugs for the regeneration of neural tissue after a brain injury, and the second bringing replacement organoids a step closer to reality for patients with liver failure.

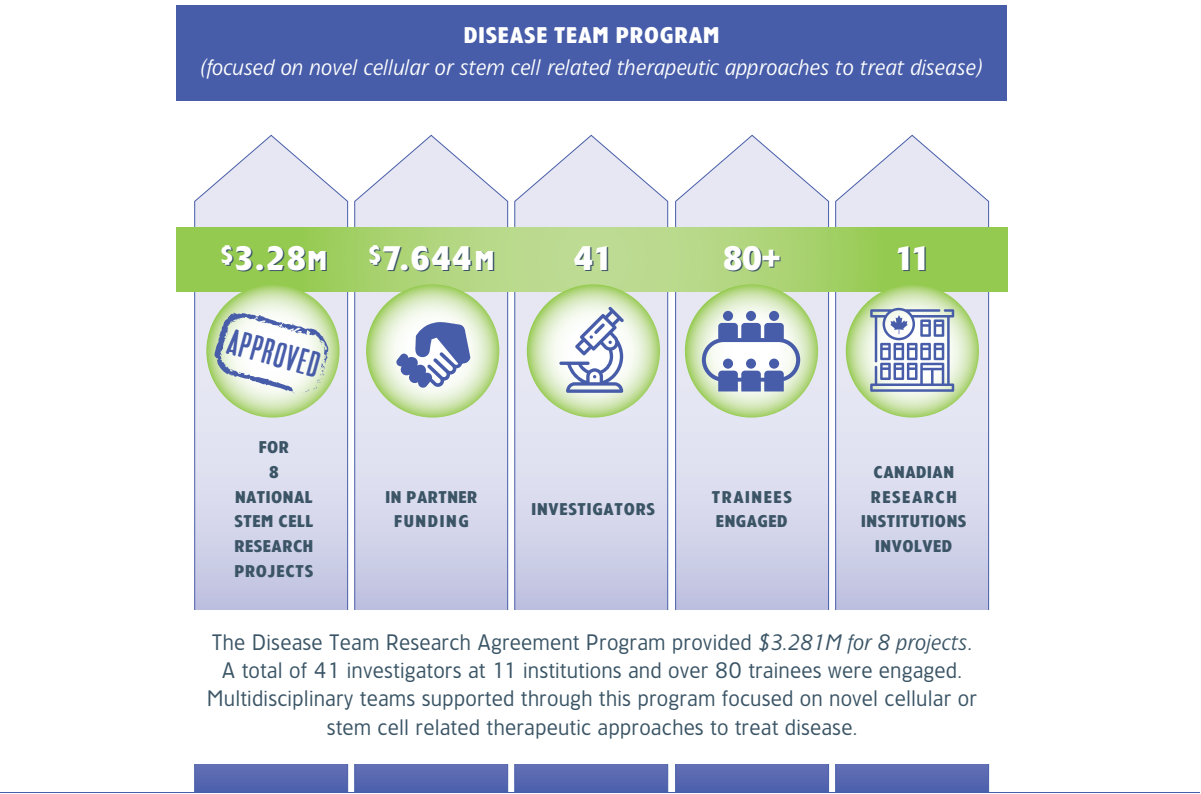


Figure 4: 2016–18 Disease Team Funding Results





PRINCIPAL INVESTIGATOR WITH CO- INVESTIGATORS	PROJECT TITLE AND SCN FUNDS ALLOCATED
Timothy Kieffer, UBC James Johnson (UBC), Francis Lynn (UBC), Brad Hoffman (UBC)	Optimizing stem cell derived beta-cell therapy for diabetes \$500,000
Anne Marinier, U de M Guy Sauvageau (U de M), Connie Eaves (UBC), Keith Humphries (UBC)	Development of hematopoietic stem cell expanding molecules towards the ideal transplant \$500,000
Freda Miller, Hospital for Sick Children (HSC) Cindi Morshead (U of T), Jing Wang (OHRI), Paul Frankland (HSC), David Kaplan (HSC), Ann Yeh (HSC), Doug Munoz (Queen's U), Donald Mabbott (HSC), Wolfram Tetzlaff (UBC)	Pharmacological recruitments of endogenous neural precursors to promote pediatric white matter repair \$500,000
Andras Nagy, Lunenfeld-Tanenbaum Research Inst. Armand Keating (UHN), Mohit Kapoor (UHN), Sowmya Viswanathan (UHN)	Combining gene and mesenchymal stromal cell therapies: steps toward curing arthritis \$394,623
Massimiliano Paganelli, CHU Sainte-Justine	Treatment of chronic liver failure by stem cell-derived mature liver tissue \$199,982
James Shapiro, U of A Gregory Korbitt (U of A)	Development of a novel stem cell-derived transplant modality for type 1 diabetes \$496,905
Vahab Soleimani, Jewish General Hospital Colin Crist (McGill), Simon Tran (McGill), Faleh Tamimi Marino (McGill), Hamed S. Najafabadi (McGill)	Interfering niche-related reprogramming of stem cells during aging \$200,000
Bruce Verchere, UBC Francis Lynn (UBC), Timothy Kieffer (UBC), Megan Levings (UBC)	Genetic manipulation of hESC-derived insulin-producing cells to improve graft outcomes \$490,000

Table 2: Disease Team Summary Table



*Dr. Freda Miller,  
The Hospital for Sick Children*

## **Disease Team Program**

### ***Rebuilding the injured brain***

Brain damage has many different causes and very few treatments. In children and adolescents, damage to the white matter – an area deep in the brain made up of nerve fibres coated with a protective myelin sheath – can be sustained after injury, diseases such as multiple sclerosis or as a side-effect of cancer treatment. In all cases, the white matter's primary function as a conduit for transmitting messages is compromised, which can have lasting negative effects on development and learning.

Dr. Freda Miller, a neurobiologist at The Hospital for Sick Children (SickKids) in Toronto, has discovered a way to repair white matter that she hopes will restore some of the functions lost after brain injury. The solution involves metformin, a safe and widely-used drug for the treatment of type 2 diabetes. Miller and SickKids' colleague Dr. Donald Mabbot recently completed a clinical trial using the drug to restore function in children whose brains had been damaged through cancer treatments. While results are not yet published, the team is optimistic about what they will find.

### ***Project Outcomes***

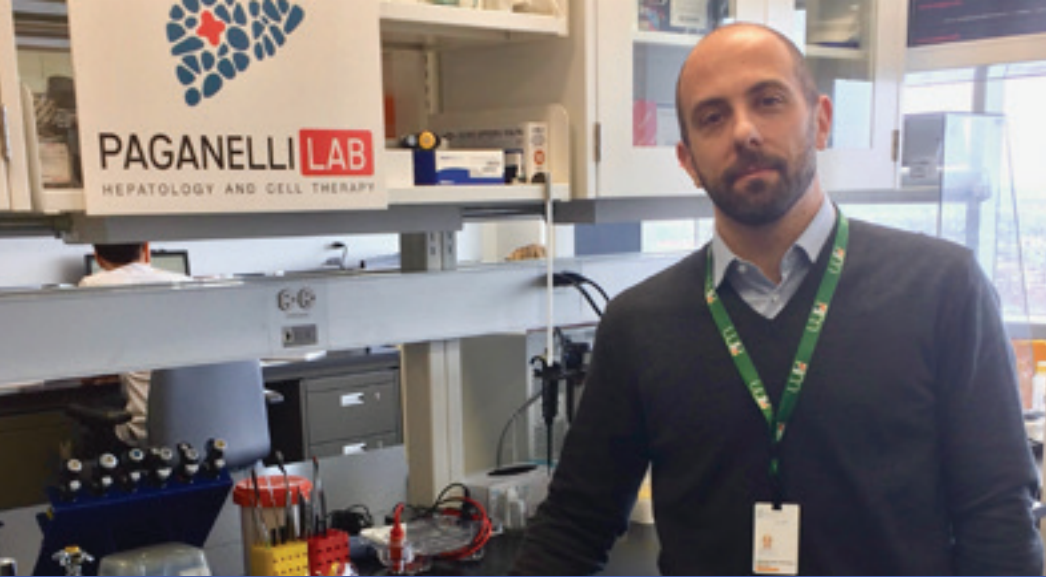
- *35 articles in peer-reviewed publications*
- *10 partners*
- *defined outcome measures for pilot clinical trial*
- *secured SCN funding for 2018/19*

It was while doing this work that they began to ask whether the drug could produce a similar response in other forms of brain trauma – especially those injuries caused by demyelinating diseases like multiple sclerosis. Through a SCN Disease Team award, Miller and her multidisciplinary team have collected evidence that metformin can promote

brain repair in three different types of brain demyelination, including one similar to multiple sclerosis. They have also identified additional supports for brain repair and have identified outcome measures that will be integrated into an upcoming clinical trial using metformin in youth with a first episode of inflammatory demyelination.

Notably, because metformin is already approved and is inexpensive to produce, its potential as a brain repair drug could offer immense cost savings for the health care system while providing drastic improvements in the quality of life for children and adults with a broader range of demyelinating conditions.





*Dr. Massimiliano Paganelli,  
CHU Sainte-Justine*

## Disease Team Program

### *Tiny liver organoids aim for big impact*

One in ten people in Canada has a liver disease, and many of these diseases progress to liver failure. Currently available treatments for liver failure are inadequate, and the death rate from liver-related illnesses is on the rise.

At the Centre hospitalier universitaire Sainte-Justine in Montreal, Dr. Massimiliano Paganelli is seeking better ways to treat liver failure using a novel stem cell therapy. Paganelli is an early career investigator and is among a new generation of researchers pushing the boundaries of science by merging cutting-edge technologies such as 3D printing and organoids (also called 3D cell clusters, microtissues or mini-organs in a dish) with more traditional methods of enquiry. His project, supported in part by SCN, is geared towards developing a stem cell-based product to replace liver functions in both children and adults with liver failure.

Through his Disease Team project, Paganelli and his team used stem cells to create thousands of liver organoids, which work together within a special biomaterial to form a tissue that performs like a human liver. This “encapsulated liver tissue” is ten to a thousand times more effective than any other system developed. The tissue is able to maintain metabolic function long-term and can be safely cryopreserved for future use. It has the potential to be transplanted through minimally invasive surgery into patients with liver failure, and to restore liver functions without the risk of rejection or the need for immunosuppression.

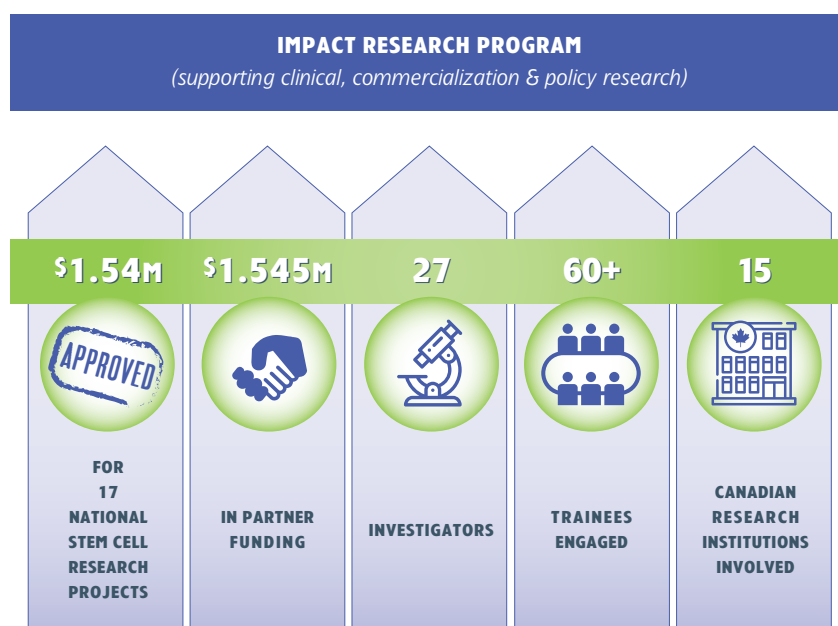
Paganelli’s outstanding work was lauded by SCN’s Research Management Committee in 2018 and was selected for renewed funding through FY2019. Although Paganelli is a dedicated pediatric clinician, his research has the potential to benefit people of all ages.

### Project Outcomes

- *Development of functional liver tissue, secured in a hydrogel for transplant and drug testing*
- *International patent application filed*
- *Several awards/recognition of work at international meetings*

## Impact Program

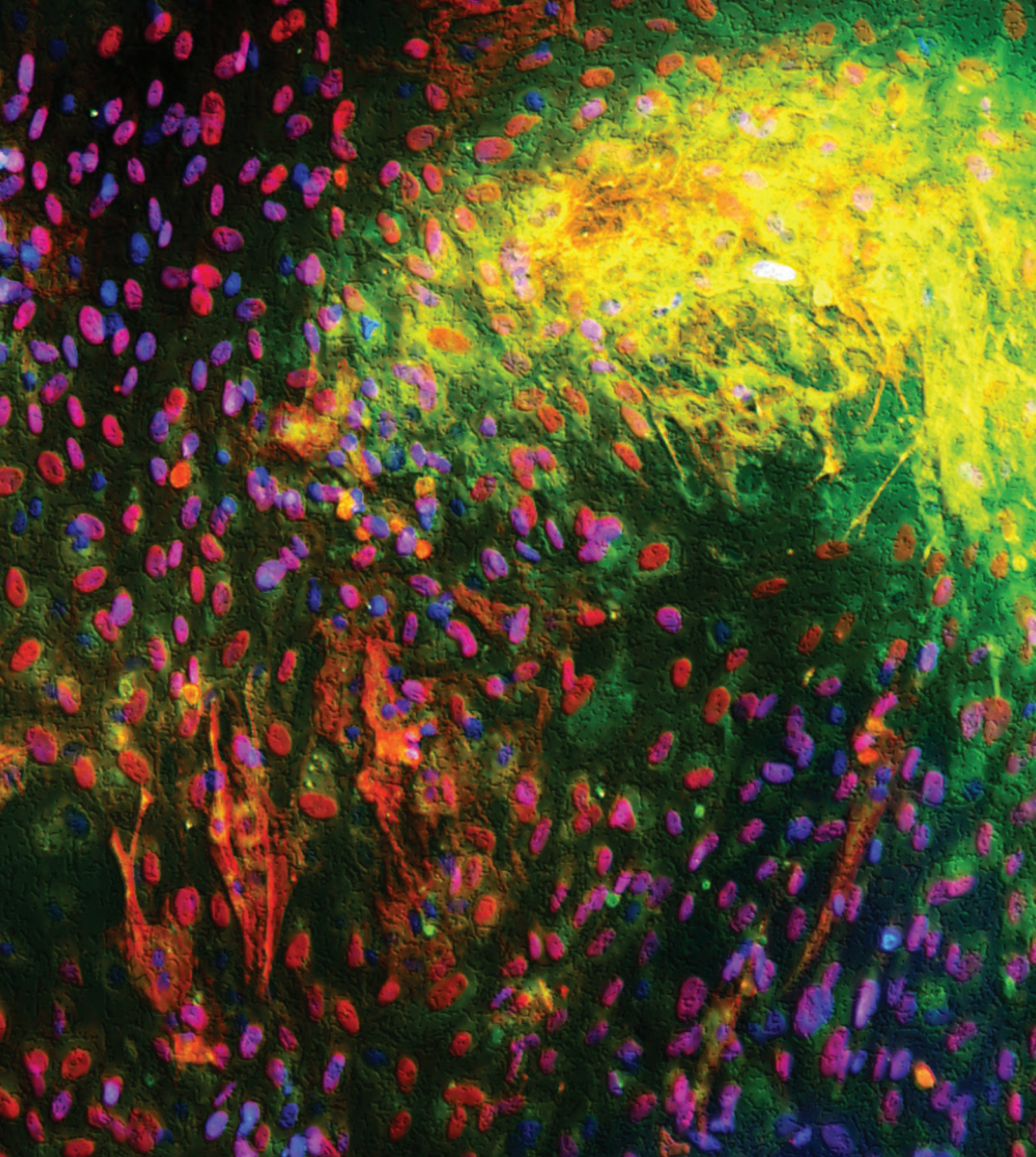
The Impact Research Agreement Program allocated **\$1.54M for 17 projects** that spanned clinical translation, commercialization and public policy. A total of 27 investigators (17 Principal Investigators and 10 Co-investigators) at 15 research institutions, together with more than 60 trainees, were engaged. Diseases such as diabetes, vision impairment and kidney failure were studied through the Clinical Translation stream of the Impact program and one project, on osteoarthritis is described in this report. Commercialization topics included 3D printing of neural tissues and the scalable production of engineered micro-tissues, the latter of which is also profiled on the following pages. In the Public Policy stream, SCN's profiled project examines the differences between patient and physician assessments of risk in off-label stem cell therapies. Other Public Policy projects examined policy development for emerging stem cell research activities and the marketing of unproven therapies.



This \$1.54 million investment project funded 17 research projects to move down a translational path. Impact awards fall under one of three categories: clinical translation, commercialization or public policy.

Figure 5: 2016-18 Impact Program Funding Results





*Tide* | Photo credit: Peter Szaraz  
Entry in the 2017 *Cells / See* art contest at the Till & McCulloch Meetings





PRINCIPAL INVESTIGATOR WITH CO- INVESTIGATORS	PROJECT TITLE AND SCN FUNDS ALLOCATED
CLINICAL TRANSLATION	
Liam Brunham, UBC Glen Tibbits (SFU)	Using human pluripotent stem cell-derived cardiomyocytes to investigate the mechanisms of ibrutinib-induced atrial fibrillation \$ 100,000
Colin Crist, Jewish General Hospital Jean-Philip Lumb (McGill)	Activation of muscle stem cells by pharmacological inhibitors of eIF2a phosphorylation \$99,842
Lucie Germain, Laval U Bartha Knoppers (McGill)	Treatment of patients with corneal limbal stem cell deficiencies using cultured epithelial corneal autografts \$ 100,000
James D. Johnson, UBC	Imaged-based screening to enhance insulin production in human embryonic stem cells \$ 100,000
Timothy J. Kieffer, UBC	Biodistribution of differentiated stem cells following subcutaneous transplant \$ 100,000
Megan Levings, UBC Lori West (U of A)	Garbage to gold: expansion of therapeutic regulatory t-cells from discarded thymus \$ 100,000
Kelly McNagny, UBC	CAR-T cell therapy targeting tumor-specific modifications of podocalyxin in triple negative breast cancer \$ 100,000
Sowmya Viswanathan, UHN Paula Foster (UWO), Mohit Kapoor (UHN)	Iron labeled-mesenchymal stromal cells for clinical tracking in amended phase 1 trial in osteoarthritis patients \$ 100,000
Peter Zandstra, U of T Guy Sauvageau (U de M), Julie Audet (U of T)	Clinical culture optimization to maximize cord blood derived hematopoietic stem cell expansion osteoarthritis patients \$ 100,000

Table 3: Impact Summary Table

PRINCIPAL INVESTIGATOR WITH CO- INVESTIGATORS	PROJECT TITLE AND SCN FUNDS ALLOCATED
<b>PUBLIC POLICY</b>	\$
Timothy Caulfield, U of A Amy Zarzeczny (U of R)	Stem cells and misleading marketing claims \$50,000
Judy Illes, UBC	Decision-making in translation: urgency, access, and evaluation in off-label stem cell interventions \$50,000
Ubaka Ogbogu, U of A Amy Zarzeczny (U of R)	Regulating the future: model policies for emerging stem cell research activities, including research on gene-edited and reconstituted embryos \$50,000
<b>COMMERCIALIZATION</b>	
Kristin Hope, McMaster	Methods and compositions for expansion of human hematopoietic stem and progenitor cells \$ 100,000
Joanne Matsubara, UBC Marinko Sarunic (SFU)	Treating advanced retinal degeneration - re-building multiple co-dependent retinal layers with a single injection of stem-cell-derived-graft \$99,502
Ian Rogers, Lunenfeld-Tanenbaum Research Institute	Improving efficacy and economics of kidney disease therapies using iPS cells \$90,811
Mark Ungrin, U of C	Scalable production of engineered micro tissues \$ 100,000
Stephanie Willerth, U of V	3D bioprinting of neural tissue from human pluripotent stem cells \$ 100,000



*Dr. Sowmya Viswanathan,  
University Health Network*

### **Impact Program: Clinical Translation** *Getting it right for osteoarthritis cell therapy*

More than five million Canadians over the age of 15 are affected by osteoarthritis. There is tremendous promise for stem cell-based therapies to reduce the burden of this disease, but bringing these therapies to the clinic involves validating their safety and efficacy through clinical trials first. To this end, more than 28 clinical trials have been initiated worldwide using mesenchymal stromal cells (MSCs), which are similar to stem cells, capable of forming cartilage, bone and other types of cells.

One of the questions these trials are seeking to answer is how many MSCs would make the best dose? Early-phase clinical trials evaluate dosage as part of their safety testing and will typically increase the number of active cells as the trial progresses to find the optimal amount. But getting it right means knowing how many of the therapeutic cells survive, how long they survive, and where they might migrate to after injection.

#### ***Project Outcomes***

- *Important data and safety measurements collected to inform clinical trial application to Health Canada*
- *New national and international collaborations initiated*

Dr. Sowmya Viswanathan, a researcher with the University Health Network in Toronto, is working on an innovative method to get these answers. In 2016, she received an Impact award from the Stem Cell Network to fine-tune a method of tracking cells. Viswanathan's team successfully tagged MSCs with iron nanoparticles, which allow the cells to

be imaged and therefore followed for migration within the tissues and for cell survival. Iron is naturally present in the body, but was further tested by the team to verify its safety as a tracking device.

Thanks to the SCN award, Viswanathan can now use these tagged cells as part of the next phase of osteoarthritis clinical trials currently being co-led by her and Dr. Jas Chahal at Toronto Western Hospital. The information gathered from the research will be extremely useful as they identify the safest and most efficacious dose. Not only will this be a critical step in moving osteoarthritis cell therapies to the clinic but the availability of tagged cells could also have wide-ranging application for clinical trials using MSCs for a range of other conditions.



A portrait of Dr. Mark Ungrin, a man with dark hair tied back, smiling, wearing a red shirt. The background is a blurred outdoor setting.

Dr. Mark Ungrin,  
University of Calgary

## Impact Program: Commercialization

### *Expanding the impact of a commercial success story*

Three-dimensional cell clusters – often referred to as microtissues, organoids or spheroids – are drawing increasing interest for both basic research and therapeutic applications. Capable of mimicking organ or tissue development, function and response to drugs and toxins more accurately than previously possible, microtissues offer a wealth of possibility for researchers to study cell interactions, disease development and for drug testing. The knowledge gained informs efforts to develop lab-grown tissues and organs, and the microtissues themselves also have therapeutic potential.

Dr. Mark Ungrin at the University of Calgary has been working to advance this field with the help of an Impact award from the Stem Cell Network. Several years ago, Ungrin developed a lab device that allowed the formation of large numbers of microtissues. In collaboration with the Canadian company STEMCELL Technologies, this was translated into a

commercial product, now sold internationally under the AggreWell brand name. This product is a cell phone-sized plastic platform containing six or twenty-four small chambers (similar to petri dishes), each in turn containing thousands of microscopic pits (“microwells”) able to form tiny, uniform microtissues.

The 2016–18 SCN project builds on AggreWell’s success by expanding these plates into small bioreactors, dramatically increasing the total number of microwells, to enable the production of the quantities of microtissues that will be needed for large-scale drug testing and eventual clinical applications. To do this, Ungrin’s team set out to optimize the manufacture of the plate to create a stacked bioreactor system in which each of the layers can receive the right amount of oxygen and nutrient exchange in a closed environment. The research involved finding the right materials and geometry, and confirming that they can support microtissue production consistent with previous versions of the technology.

The resulting prototype is now in final testing phases, with a member of the Ungrin team travelling to STEMCELL Technologies’ head office in Vancouver for several months in 2018 to collaborate on establishing the necessary manufacturing processes for large-scale delivery of a commercial product for use by labs around the world.

### *Project Outcomes*

- *Significant progress in development of a functional, accessible, easily manufacturable microwell bioreactor*
- *Initiated translation to a viable commercial product with established industry partner*



Dr. Judy Illes,  
University of British Columbia

### **Impact Program: Public Policy** *Creating a space for informed hope*

Like drugs and other biologics, the development of stem cell therapies typically follows a standard path through clinical trials before they are approved for medical use. But this is not always the case. There are occasions when an already approved therapy could be used for “off-label” purposes – for a condition other than what Health Canada approved it for. One example of this is the use of hematopoietic (blood) stem cell transplantation, normally used for patients with severe blood disorders, being offered by hospitals as an off-label treatment for patients with aggressive multiple sclerosis (MS). These treatments are associated with higher risk and are not part of a clinical trial.

Within this context, Dr. Judy Illes at the University of British Columbia wanted to know if and how the decision-making processes of the MS patients differed from those of the clinicians responsible for their care. With support from a SCN Impact award, Illes and her team interviewed 11 patients and 15 specialists.

#### ***Project Outcomes***

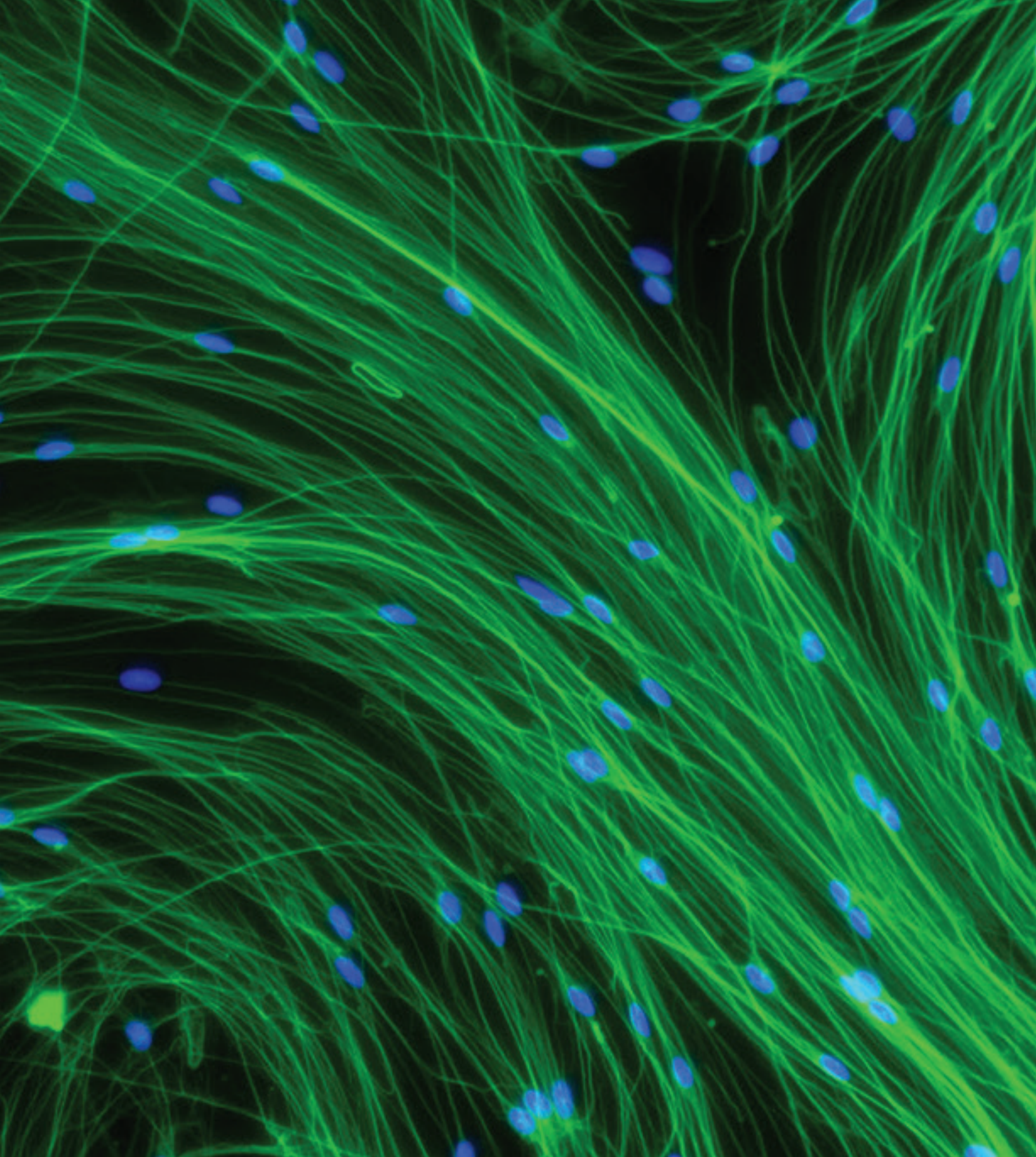
- *New knowledge about patient decision-making process, priorities and concerns regarding off-label stem cell therapies*
- *Development of evidence-based resources and recommendations for patients and providers*

What they found is that patients who had not responded to standard MS therapies had an urgent desire to access a hematopoietic stem cell transplant. By contrast, clinicians emphasized the risks of the transplantation procedure and were reluctant to choose it as a first line of therapy. These risks were more acceptable to patients as an alternative

to rapid disease degeneration and they also cited a desire to help advance knowledge by participating in an investigational stem cell procedure. Such an altruistic motive was not echoed by clinicians, who were ambivalent about the societal benefits and cited concerns that choosing an experimental therapy outside a clinical trial might result in reduced knowledge generation and/or delays getting clinical approval.

The team’s findings point to a need for greater dialogue and shared decision making between the two groups. Providing evidence-based information that supports informed choices and informed hopes will benefit research and patient care for those choosing a hematopoietic stem cell transplant for MS as well as other stem cell therapies currently in the translational space.





*Road to Regeneration* | Photo credit: Ahmad Galuta  
Entry in the 2017 *Cells / See* art contest at the Till & McCulloch Meetings





## Training

Throughout its history, SCN has worked diligently to provide relevant and leading-edge training opportunities for the next generation of stem cell researchers in Canada. In 2017/18, more than 300 opportunities for learning were provided to trainees with SCN support (see Table 4, pages 25–26).

SCN's training program is guided by input from its Trainee Communications Committee (TCC), composed of young investigators from across the country. The 14-member committee is chaired by Dr. Amy Wong of the Hospital for Sick Children, and is supported by Dr. Kelly McNagny, a leading researcher in stem cells and inflammatory diseases at the University of British Columbia. In 2017/18, this committee worked collaboratively to develop a training program that includes a robust suite of workshops, including career development, science communications, ethical, legal and social issues and Meet the Experts sessions, all offered at the annual Till & McCulloch Meetings.

SCN also partners with other regenerative medicine-focused organizations and institutions on training activities. One example of this is the Bench to Bedside for Biotherapeutics workshop, which was convened as a collaborative effort among six different biotherapeutic/regenerative medicine organizations to provide a comprehensive introduction to cell production and preparation for clinical trials.

***Training is not only offered through workshops and conferences. It also comes through hands-on job experience. In 2017/18, 228 individual trainees (55% female; 45% male) worked on SCN-funded projects.***

These young investigators are working with Canada's best and brightest scientific minds to contribute to important projects investigating novel therapies and treatments for diseases like osteoarthritis, myocardial infarction, septic shock, diabetes, vision impairment and muscular dystrophy.

STEM skills are a vital part of a knowledge-based workforce, enabling it to adapt to market needs and compete internationally. By focusing on specialized training and skills development not offered in other milieus in Canada, SCN is supporting a generation that will strengthen Canada's competitive edge today and tomorrow.



Figure 6: SCN Training 2017/18



Dr. Sepideh Abbasi,  
Institut de recherches cliniques  
de Montréal

## Training Profile:

### *Training for a successful career*

The path to career success in research may not always be obvious, but it does contain some common features: find a group or lab that allows you to explore and learn, do good research and write standout papers. However, to distinguish themselves from the crowd, trainees often need to go above and beyond this essential list. Over the past 18 years, the Stem Cell Network has helped more than 2,500 trainees do just that, through research activities, workshops, courses, conferences and participation on various committees.

Dr. Sepideh Abbasi well knows the benefits afforded by extra training. Abbasi was connected to the Stem Cell Network as a PhD student through a funded project in the Jeff Biernaskie lab at the University of Calgary. Here, Abbasi studied hair follicle and skin regeneration and the potential use of skin stem cells to generate new dermal tissue. She leveraged her time in the Biernaskie lab into several training opportunities, including oral and poster presentations at the Till & McCulloch Meetings and involvement in courses and workshops such as Genetic Tools, Cellular Therapies Manufacturing and Clinical Trials, Grant Writing, Science Communications and Career Development.

*"I absolutely enjoy working in the lab trying to answer scientific questions and discover exciting facts related to my research. However, it was never enough for me!*

*I've always been curious to expand my horizons by learning more about other research in stem cell biology and, more importantly, to be able to communicate our knowledge to the public – especially the younger generation. The Stem Cell Network made it possible for me and many other trainees to pursue this goal."*

**– Dr. Sepideh Abbasi, Institut de recherches cliniques de Montréal**

But Abbasi didn't stop there. She began contributing volunteer hours to StemCellTalks, an outreach program initiated by Stem Cell Network trainees and Let's Talk Science in 2010 as a way to engage high school students in active debates on issues relevant to stem cell research. Over seven years, she served as an executive member, co-director of the Calgary branch of StemCellTalks and, now, the organization's national co-chair.

Abbasi's experiences helped shape a promising career, one that has led her to a new postdoctoral position in the Michel Cayouette lab at the Institut de recherches cliniques de Montréal, where she is now turning her expertise towards the goal of retina regeneration to restore vision.

## Training Workshops & Opportunities Supported by SCN

In 2017/18, SCN supported 14 workshops, courses and other training opportunities that provided 324 key skills training opportunities to HQP from across the country.



TRAINING AND DESCRIPTION	DATE	ATTENDEES
<b>UBC CyTOF Workshop</b>  This course covered the complete workflow of mass cytometry, from design and preparation of samples to analysis of data sets using various platforms.	April 3–5, 2017	5
<b>Genetic Tools Workshop</b>  Trainees advanced their biological knowledge and research projects through cutting-edge transgenic technologies.	April 24–26, 2017	6
<b>RNA-Seq Analysis Workshop</b>  Participants gained a more in-depth understanding of the design and analysis of OMICS projects by focusing on RNA-seq, which is being widely adopted in the stem cell community.	May 8–10, 2017	11
<b>UBC Flow Cytometry Workshop</b>  This intensive workshop advanced participants' skills in flow cytometry through hands-on experience and gave an introduction to mass cytometry.	May 30–June 2, 2017	10
<b>Good Manufacturing Practice Workshop</b>  This course covered the complete workflow of mass cytometry, from design and preparation of samples to analysis of data sets using various platforms.	June 11–13, 2017	7
<b>R Workshops</b>  The workshop introduced the essential ideas and tools of the R programming language through hands-on experience.	June 12–14, 2017	1
<b>Hydra Summer School 2017</b>  This one-week program covers aspects of stem cell research, from basic stem cell biology to clinical applications and clinical trials.	September 10–17, 2017	2

Table 4: 2017/18 Training Workshops and Opportunities Supported by SCN



*"SCN's training programs have made great impact in my training, from helping me speak more confidently about my science to all audiences to being awarded fellowships and grants for my research. Because of this, I deeply value the effort and commitment that members of the SCN undertake to organizing these invaluable workshops and training programs and it inspired me to join the TCC to pay it forward and help organize new and exciting programs for the next generation of trainees."*

**– Dr. Amy Wong, SCN Trainee Communications Committee Chair**

TRAINING AND DESCRIPTION	DATE	ATTENDEES
<b>Bench to Bedside for Biotherapeutics Workshop</b> The workshop was a one-day overview of the entire clinical pathway.	October 5, 2017	7
<b>Science Communications Workshop</b> This workshop was a hands-on introduction to effective science communication. Participants refined their skills and knowledge of mainstream media production, including interviews, writing and content creation for social media.	November 5, 2017	40
<b>Career Development</b> This workshop explored career options and opportunities by featuring a panel of professionals to share their experiences in basic research, industry, and government.	November 5, 2017	47
<b>The Till &amp; McCulloch Meetings 2017</b> Students learned about the latest techniques and trends within the field from accomplished Canadian and international speakers. Selected students also had the opportunity to present their work.	November 5–8, 2017	171
<b>Cell &amp; Gene Therapies 101 Workshop</b> This workshop examined manufacturing of cell and/or gene therapy products and taking products to clinical trials and beyond.	November 8–10, 2017	6
<b>Gene Editing of Pluripotent Cells Workshop</b> Trainees advanced their biological knowledge and research projects through cutting edge gene-modulating technologies and in designing and generating appropriate gene expression constructs.	November 28–29, 2017	3
<b>TPRM Annual Regenerative Medicine Symposium</b> This symposium covered broad topics, including: transplantation and organ failure, stem cells and regenerative medicine, and regenerative medicine ethics and society.	April 25–26, 2017	8



## Community Engagement

### TMM2017

The Till & McCulloch Meetings (TMM) are an annual highlight for Canada's stem cell and regenerative medicine community. The Meetings bring together stem cell scientists, clinicians, ethicists, policy makers and industry representatives from Canada and abroad. The event showcases Canada's place in the global stem cell ecosystem and provides a tremendous opportunity for attendees to network and share in the pursuit of scientific and clinical advancement.

In 2017, the Meetings were held in Mont-Tremblant, Quebec in partnership with CCRM and with the support of 15 sponsors, representing industry and NGOs. A strong program attracted more than 400 delegates from across the country and internationally. Of this, approximately 200 were trainees, for whom TMM is a valuable professional development experience and a venue to share science through posters and oral presentations, connect with thought leaders, hear about the latest scientific advances and learn about career opportunities in and outside of academia.

Since 2005, the annual Till & McCulloch Award has been an integral and anticipated part of the annual Meetings. This award recognizes the most significant and/or innovative stem cell research publication emerging from a Canadian-based research group. Dr. Harry Atkins added his name to the growing list of prestigious awardees for his *Lancet* paper detailing the outcomes of a phase 2 clinical trial using stem cells to treat multiple sclerosis (MS).

One of the most popular TMM sessions is the patient talks, in which patients who have been involved in research are invited to share their story and remind delegates why the research they are doing is so important and to ensure the patient perspective is clearly heard. At the 2017 Meetings, these talks were provided by Jennifer Molson, who was one of the first participants in the MS trial led by Dr. Atkins and by William Brock, a stem cell transplant recipient and cancer survivor.

The 2018 Meetings, marking the 17th research conference held by SCN, are scheduled to be held in Ottawa from November 12-14.



(L) Dr. Harold Atkins  
(R) Jennifer Molson



*"I gained valuable insight into the current state of stem cell research in diverse fields and identified potential opportunities for independent research upon completion of my post-doctoral studies. I am already leveraging these opportunities in my new role as a principal investigator at the University of Alberta."*

— Dr. Anastassia Voronova,  
Assistant Professor,  
University of Alberta

*"The soft skills workshops held during the meeting helped me develop strong grant writing skills and were critical in my success at obtaining a CIHR scholarship for my PhD."*

— Peter Feige,  
PhD candidate,  
Ottawa Hospital Research Institute



*"The TTM meeting brings together stem cell experts with a shared vision to translate developing stem cell-based therapeutic into safe and effective therapies to improve patients' lives. Networking with such a broad spectrum of professionals is key to bringing my research closer to the clinic."*

— Dr. Sabiha Hacibekiroglu Petrou,  
Postdoctoral Fellow, Lunenfeld-Tannenbaum Research Institute

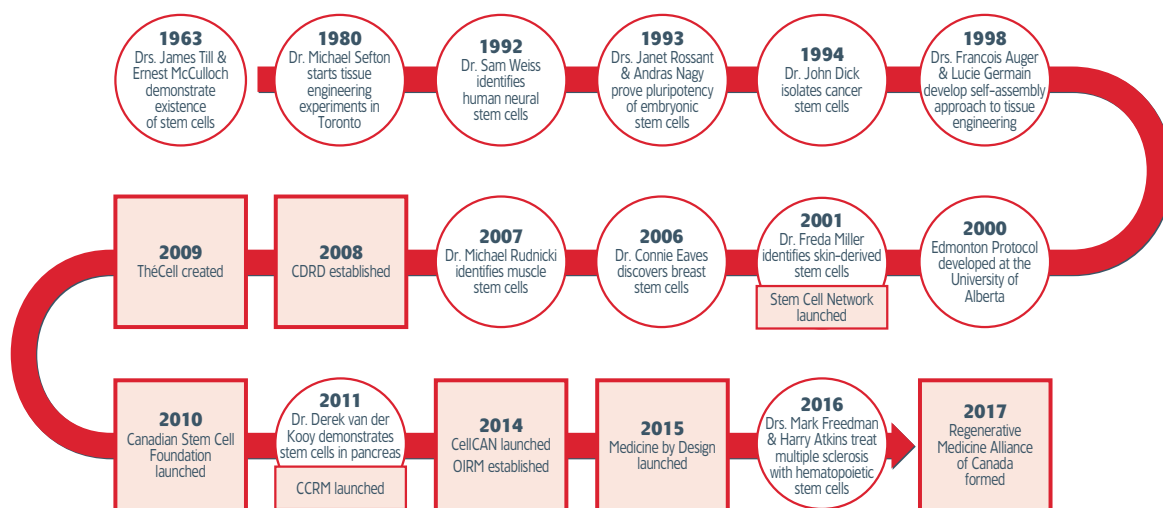


## Regenerative Medicine Alliance of Canada and the Regenerative Medicine Growth Summit

In March 2017, the Stem Cell Network led the creation of the Regenerative Medicine Alliance of Canada (RMAC), a voluntary organization composed of national, provincial and regional organizations committed to building a robust regenerative medicine sector in Canada. The initial concept for this alliance was conceived during a workshop on the state of regenerative medicine in Canada. The workshop, held by the Council of Canadian Academies in 2016, was followed by a report that recognized the importance of strategic coordination among the stem cell and regenerative medicine community.

In parallel with RMAC, SCN initiated conversations regarding Canada's innovation agenda and the federal government's interest in identifying and supporting emerging sectors that have the potential to realize economic and health benefits for Canada. The convergence of these conversations with RMAC's launch resulted in two key activities in 2017. The first was the Regenerative Medicine Growth Summit, coordinated in partnership with STEMCELL Technologies and the Centre for the Commercialization of Regenerative Medicine (CCRM), which took place in June 2017. The summit brought together regenerative medicine business leaders, venture capital representatives, academics and policy makers to discuss how best to support an emerging regenerative medicine sector. The day's discussions and resulting document served to inform the future direction of RMAC; facilitated networking among business, science organizations and policy makers; and made clear the sector's contribution to Canada's innovation agenda and knowledge economy.

### Timeline of Regenerative Medicine in Canada



*Excerpt from Regenerative Medicine Innovation Ecosystem Map.  
Full version available for download at [stemcellnetwork.ca/about-us/rmac/](http://stemcellnetwork.ca/about-us/rmac/)*

Another outcome flowing from the summit was the creation of a Regenerative Medicine Innovation Ecosystem map (available at [stemcellnetwork.ca/about-us/rmac/](http://stemcellnetwork.ca/about-us/rmac/)), which provides a comprehensive look at the inputs, outputs, organizations and activities that are relevant to today's regenerative medicine sector. The map effectively captures the volume of activity taking place across Canada. The map reveals that Canadian regenerative medicine start-ups are being launched regularly and clinical trial activity is picking up momentum. It also demonstrates that scientific activity is particularly strong in British Columbia, Alberta, Ontario and Quebec. Notably, it shows that, while government and industry investments have been modest, Canada's research community has been punching above its weight with many significant contributions made over the past 60 years.

Looking ahead, RMAC will continue to serve as a mechanism to support strategic activity across the regenerative medicine sector. Its members – BCREGMED, CellCan, Centre for Drug Research and Development, CCRM, Medicine by Design, Ontario Institute for Regenerative Medicine, SCN and ThéCell – will work collaboratively to share information, align programs and identify strategies that will benefit the growth of the sector.



## International Society for Cell & Gene Therapy Annual Conference

SCN joined a collaborative effort among several regenerative medicine organizations (BioCanRx, C3i, CellCan, CCRM and OIRM) to form a Canadian Pavilion at the 2017 International Society for Cell & Gene Therapy (ISCT) annual conference, held in London, UK. These Canadian members represented the community to an international audience of clinicians, researchers, regulators, technologists and industry partners, all with a shared vision to translate cellular therapy into safe and effective therapies to improve patients' lives worldwide.

Several SCN researchers participate on the ISCT Boards and committees and were present at the conference, which benefited by having easy access to leading Canadian organizations in the field. Given that Canada 150 celebrations were in full swing during the conference, SCN and its pavilion partners were able to leverage it into greater awareness of Canadian innovation, particularly regarding ongoing cell therapy clinical trials, and encourage interest in attending the 2018 conference in Montreal.



(L) Dr. Lauralyn McIntyre,  
Ottawa Hospital

(R) Mr. Timothy Caulfield,  
University of Alberta

## Parliamentary Engagement

On December 5, 2017, the Stem Cell Network and Research Canada joined forces to celebrate Canada's scientific leadership in stem cell research at a Parliamentary Health Research Caucus Luncheon. SCN-supported investigators Dr. Lauralyn McIntyre, an intensivist at the Ottawa Hospital, and Professor Timothy Caulfield, health law scholar at the University of Alberta, spoke to a packed room of Parliamentarians about the opportunities and challenges that stem cell therapies present. More specifically, McIntyre addressed her world-first clinical trial on treating sepsis and Caulfield provided an engaging talk on his research into unproven stem cell treatments and misleading marketing practices. Parliamentarians had a number of questions for SCN's investigators, including what was the one thing they could do to support the field. SCN's Scientific Director informed them that providing long-term, stable funding was the key to building a leading Canadian field able to produce cell-based therapies for fighting disease.

In conjunction with this luncheon, SCN coordinated two community support letters, representing the views of researchers and trainees, respectively, on the gaps existing in stem cell and regenerative medicine that can be addressed by secure funding. These were presented to Ministers of Parliament in early December, 2017. Excerpts of these letters are included below, and on page 32.

*"We call on the government to ensure that SCN is provided with stable and predictable funding through the 2018 federal budget. Such an investment will allow Canada to compete globally, realize economic benefits and bring novel stem cell based therapies to Canadians who are living with chronic disease and illness each day. Without the Stem Cell Network, Canada would be folding up its tent on a cutting-edge science that this country pioneered – and one that will continue to grow into the singularly dominant field of regenerative medicine, globally."*

**– Signed by 23 prominent Canadian stem cell researchers and clinicians**



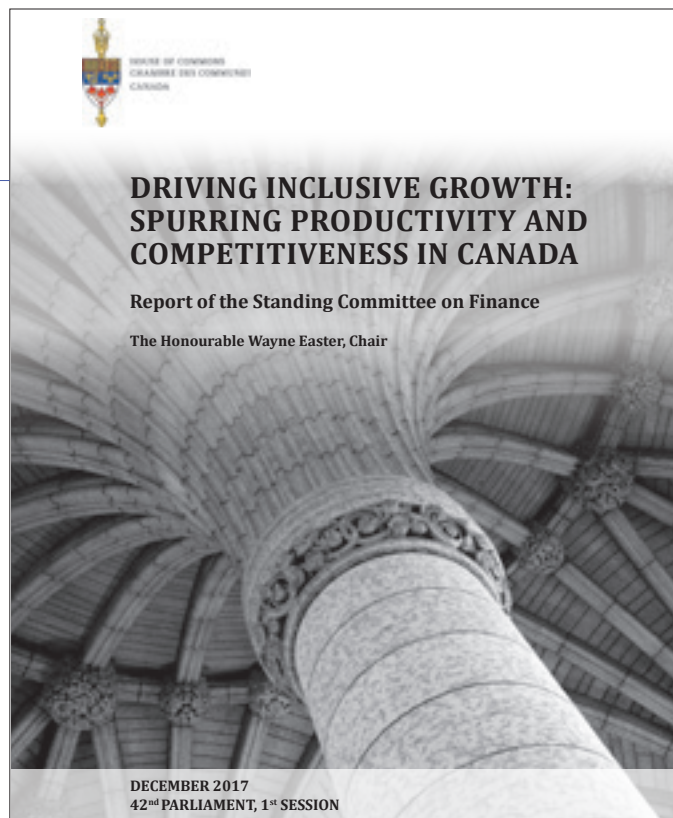
*"SCN has fostered a national ecosystem where trainees – undergraduates, graduate students, and postdoctoral researchers – have access to workshops and networking opportunities that play a key role in our professional development. These services provide targeted training that foster highly relevant skill development and ultimately prepares trainees as they transition towards their next steps of their career, whether in academia, industry or in other sectors. SCN's support over the past 16 years has been critical in this regard and we trust that the federal government will continue to invest in SCN, so they can provide the tools and resources needed to develop a highly skilled workforce ready to bring forward innovative therapies and technologies in regenerative medicine.*

**– Signed by 12 members of the SCN Trainee Communications Committee**

Flowing from these engagements, the December 2017 Report of the Standing Committee on Finance tabled before Parliament included the following recommendation:

***Recommendation 43***

***Ensure that the Stem Cell Network receives stable and predictable funding for translational research.***





## Outreach & Communications

Reaching public audiences to inform them about stem cell research and debunk myths is a broad pursuit that involves many people contributing time, expertise and their passion for science. The Stem Cell Network actively supports outreach and communications activities through its funded research, particularly in the public policy domain, by providing information to health charity partners for dispersal to their communities, and by providing tools, training and financial incentives for early career researchers to engage with the public.

### StemCellTalks

For many years, SCN has maintained its partnership with Let's Talk Science to bring knowledge of stem cells to high school and undergraduate students across Canada. This is done through StemCellTalks, a national stem cell biology outreach initiative, initially conceived by SCN trainees in 2010. Through this program, high school students spend a day with scientists who are experts in stem cell and regenerative medicine to learn about the ins and outs of the field. In 2017/18 SCN provided support for nine StemCellTalks (including two new locations; see table for details), enabling more than 1,000 high school students from across Canada to learn about stem cells, how they're being studied in Canadian labs and the potential they have for treating diseases such as cancer, diabetes and multiple sclerosis.

The success of the StemCellTalks program over its eight years has spurred co-organizers SCN and Let's Talk Science to develop a tool kit that can be used by educators in the classroom. This will allow any Canadian school, no matter how remote, to access the materials for enhanced learning about stem cells and regenerative medicine.

### Comments from StemCellTalks attendees 2018

*"Very interactive experiences, my fundamental knowledge regarding stem cell research and its value has increased drastically."*

*"I really liked being able to hear the patient's perspective, and being able to hear her challenges. It opened up my eyes to the reasons and challenges involved with stem cell research."*

*"I loved how I could approach any of the speakers or volunteers. This symposium answered a lot of my personal questions."*



SITE AND DATE	THEME	PARTICIPANTS HIGH SCHOOL	ADULT
April 2017			
London, ON*	Cellular Therapies to Treat Type 1 Diabetes	87	0
Hamilton, ON	Cancer Stem Cells	186	0
Vancouver, BC	Cellular Therapies to Treat Type 1 Diabetes	125	0
May 2017			
Calgary, AB	Stem Cells & Diabetes	177	0
June 2017			
Calgary, AB	Stem Cells & Multiple Sclerosis	0	110
March 2018			
Guelph, ON*	Translating Knowledge from Veterinary Science to Human Medicine	85	0
Toronto, ON	Neural Stem Cells	148	0
Hamilton, ON	Toward Curing the Incurable: Stem Cell Gene Therapies and the Medicine of the Future	101	0
Ottawa, ON	Neural Stem Cells	136	0

\*New StemCellTalks site added in 2017/18

Table 5: 2017–18 Stem Cell Talks Locations and Themes

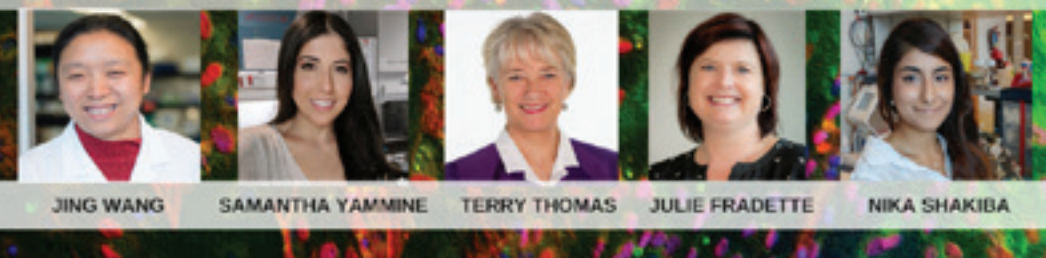
## Super Cells Science Exhibit

*Super Cells: The Power of Stem Cells*, a traveling museum exhibit, originally launched in 2014 by SCN and the Sherbrooke Museum of Nature and Science, along with Canadian and International partners, continued its five-year tour. SCN continued its support of this initiative by working with corporate partner ThermoFisher to replenish the lab equipment used in the exhibit. In 2017, the exhibit spent five months at the Musée du Fjord, Québec. In January 2018, the exhibit travelled to Exploration Place, Prince George, British Columbia, where it will stay until June 2018. These new locations will enable thousands of additional students, parents and educators to tour the exhibit and visit the exhibit website, adding to the more than one million who have already interacted with it.

*Super Cells* will continue to tour through 2019, having already visited numerous locations in Europe, USA and Canada. It is hosted in science centres and science museums and is managed by the travelling exhibition team of the Sherbrooke Museum of Nature and Science. The Travelling Exhibition Coordinator and a team of specialized technicians oversee the setup and take-down of the exhibition at each site as well as providing technical support during the presentation.



## FIVE TO BE INSPIRED BY CELEBRATING INTERNATIONAL WOMEN'S DAY



*"Five to be inspired by" received a remarkable 37,134 impressions on Twitter, making it one of the most successful social media campaigns in SCN's history.*

### Online Activity

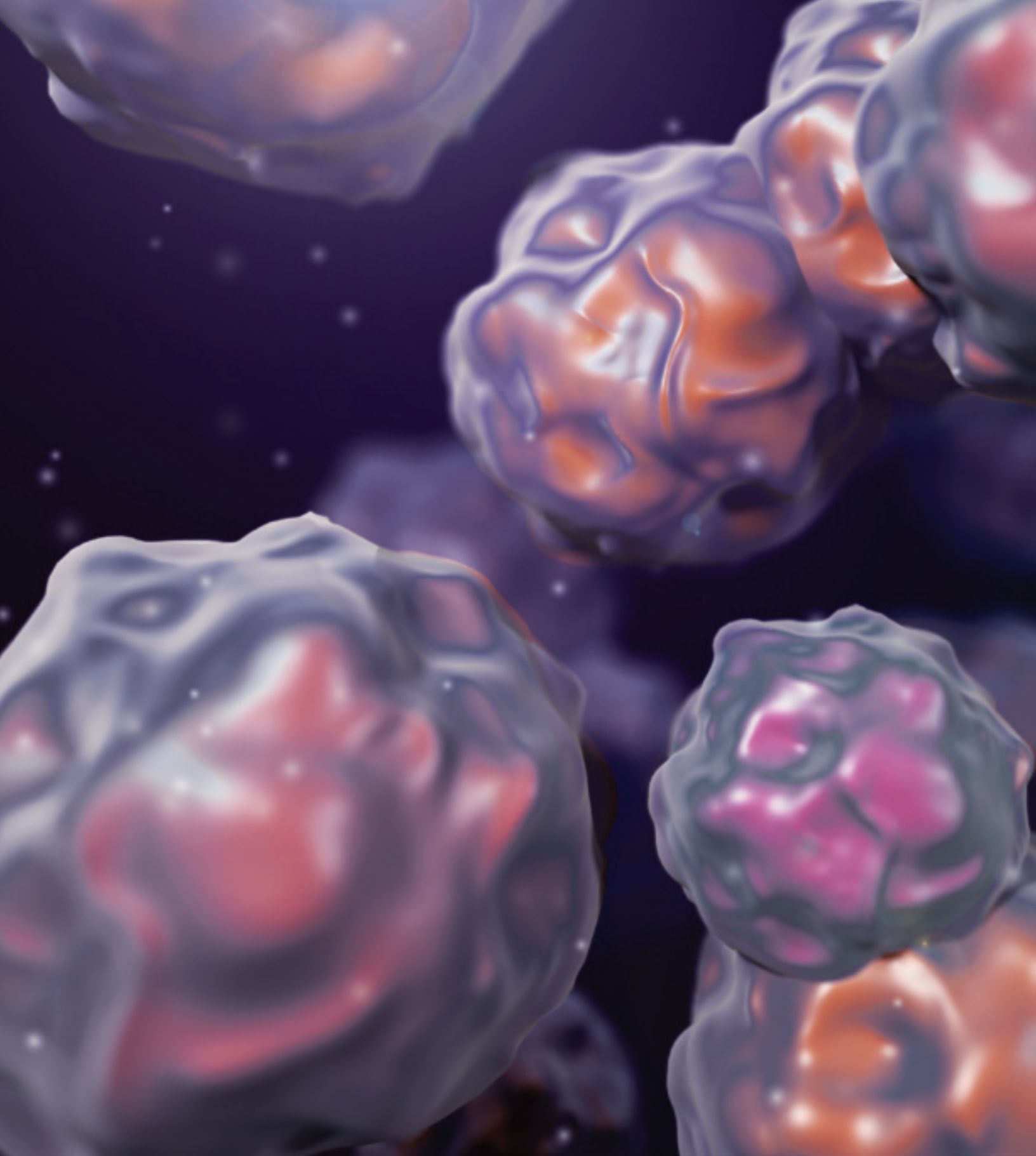
The vast majority of public audiences today seek their information online. Therefore, SCN works hard to ensure our email and web-based communications reflect current best practices and reflect current interests. SCN has also built a strong social media presence. At the end of 2017/18, SCN had just over 17,000 Twitter followers, and 1000 subscribers to its monthly newsletter, *CellLines*. These platforms allow SCN to share research findings, accurate information about the potential of stem cells and events and activities where the public can learn more about stem cells.

In recognition of International Women's Day on March 8, 2018, SCN spearheaded a successful social media campaign entitled, "Five to be inspired by." In it, SCN profiled the careers of five talented women in the stem cell and regenerative medicine research sector from across Canada. Over the course of the one-week campaign, SCN highlighted short interviews with these women on SCN's website, as well as its Twitter and Facebook accounts. SCN received a remarkable 37,134 impressions on Twitter, making it one of most successful social media campaigns in SCN's history. The campaign was also a way to draw attention to a new website launched by SCN in March. The site will serve as the platform for sharing news and information related to SCN activities in the years to come, including individual researcher profiles, focused on and categorized by disease area or geographic region.

*"I have been lucky to be constantly inspired by the women around me – my peers and mentors – in engineering and science. These women are not afraid to ask questions and seek answers."*

– Nika Shakiba,

former SCN trainee, current Postdoctoral fellow at Massachusetts Institute of Technology



*The Deep Dive* | Photo credit: Wendy Gu  
Entry in the 2017 *Cells / See* art contest at the Till & McCulloch Meetings

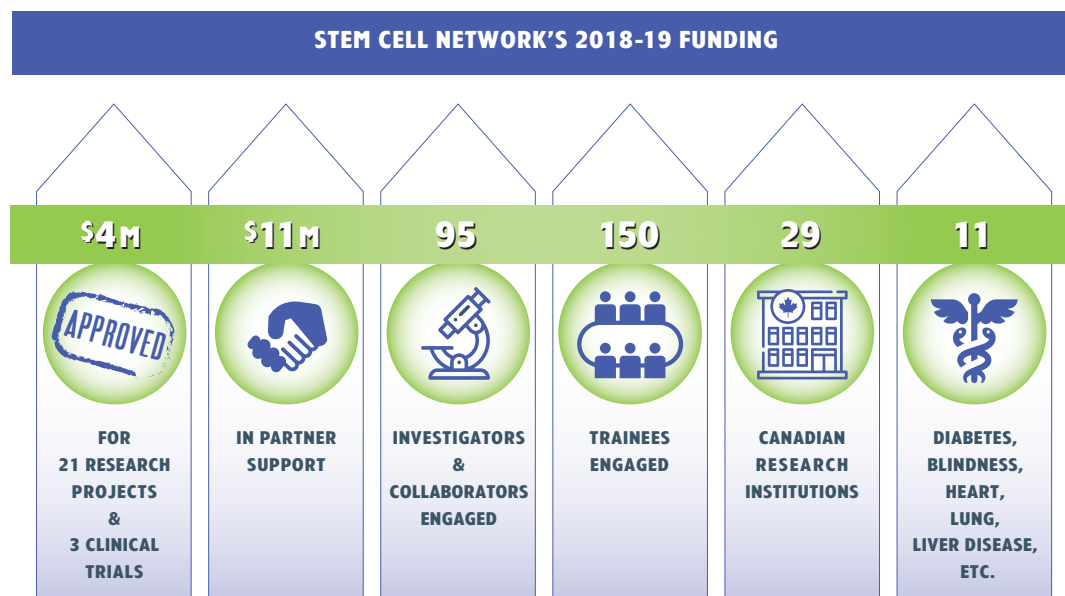


## A Look Ahead

As is clearly demonstrated within the pages of this annual report, Canada's stem cell and regenerative medicine community is hard at work. The quality of science undertaken by SCN-funded researchers is world class and continues to have impact in labs and, increasingly, in commercial and clinical applications in Canada and around the world. The challenge is to keep the research pipeline stabilized and full, so that we will realize new stem cell-based therapies, treatments and technologies well into the future.

### 2018-19 Funding

Following a \$6M commitment from the Federal Government in Budget 2017, SCN launched a peer-reviewed funding competition in August 2017. This resulted in 24 new research projects and clinical trials awards for FY2018/19. These innovative projects, announced in April 2018, will generate a wealth of new knowledge and help advance therapies for conditions such as blindness, diabetes, brain injury and diseases of the lung, liver and heart to the clinic. It is an exciting time for the field and as the only national network and funder for stem cell research, SCN was pleased to be able to sustain the important work that is taking place across Canada.



*SCN is pleased to support translational stem cell research taking place across Canada.*

*2018-19 funding has been allocated through three programs:*

*Clinical Trials, Disease Teams, and Impact Awards*

Figure 7: 2018-19 Funding Results



## 2019 and beyond

SCN has always kept an eye on the future, to ensure its programming and efforts reflect the most direct path to success for the benefit of Canadian health and productivity. The innovations we are commercializing today are the result of basic research carried out 10 or 20 years ago. Today, SCN is building a new research plan that will guide Canada into the future and will not only result in knowledge generation, but also support the emergence of new technologies and therapies.

Regenerative medicine is at a tipping point. It's time to build on our foundation of scientific excellence and harness the benefits of regenerative medicine for the health of Canadians and the economic prosperity of our nation. The Stem Cell Network looks forward to supporting this vision for many years to come.

*"At the heart of SCN are its people. Talented, respected and accomplished.  
SCN is proud to have forged a highly effective and multidisciplinary network over the past  
17 years. Together we have excelled in accelerating discovery towards clinical application and  
powering the new and emerging field of regenerative medicine.  
For the Stem Cell Network, our people are our strength."*

**– Dr. Michael Rudnicki,  
CEO and Scientific Director, Stem Cell Network**



## *APPENDIX: SCN Committees*

### **Board of Directors**

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Co-Founder, 5514KM Canada Wide – Children's Gear

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Senior Scientist & Director, Regenerative Medicine Program  
and Sprott Centre for Stem Cell Research, Ottawa Hospital  
Research Institute

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Professor, Faculty of Law and School of Public Health and  
Research Director, Health Law Institute, University of Alberta

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University of British Columbia

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University of Miami

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University of British Columbia

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Research Assistant, Ages Cancer Assessment Clinic,  
The Ottawa Hospital

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Associate Professor Medical Oncology, Head of Laboratory of Cellular Therapy and Director, Residency School in Medical Oncology, Department of Medical and Surgical Sciences for Children and Adults, University Hospital of Modena and Reggio Emilia

### **KATARINA LE BLANC**

Professor, Clinical Stem Cell Research and Senior Consultant, Department of Laboratory Medicine, Division of Clinical Immunology and Transfusion Medicine, Karolinska Institutet, Hematology Center, Karolinska University Hospital Huddinge

### **JOHN RASKO**

Director, Department of Cell and Molecular Therapies, Royal Prince Alfred Hospital; Head, Gene and Stem Cell Therapy Program, Centenary Institute, University of Sydney

### **DONALD G. STEIN**

Professor, Department of Emergency Medicine and Director, Brain Research Lab, Emory University School of Medicine

### **DANIEL WEISS**

Professor, Medicine, Pulmonary Medicine, Department of Medicine, University of Vermont

### **LORENZ STUDER**

Director, Stem Cell Biology Center, Memorial Sloan Kettering Cancer Center

### **LORI SUSSEL**

Professor, University of Colorado

### **STEPHEN TAPSCOTT**

Professor, Fred Hutchinson Cancer Research Center

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### **BARBARA VON TIGERSTROM, CHAIR**

Professor, College of Law, University of Saskatchewan

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Assistant Director for Science, Johns Hopkins Berman  
Institute of Bioethics

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President & CEO, Council of Canadian Academies

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Assistant Professor, University of Melbourne and  
Monash University

## Trainee Communications Committee (TCC)

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Research Associate, Hospital for Sick Children

### **LILI ASLOSTOVAR**

PhD Candidate, SCCRI, McMaster University

### **SNEHA BALANI**

PhD Candidate, Terry Fox Lab, BC Cancer Agency, University  
of British Columbia

### **TARRYN BOURHILL**

PhD Candidate, University of Calgary

### **DIANA CANALS HERNAEZ**

PhD Candidate, University of British Columbia

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PhD Candidate, University of Western Ontario

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PhD Candidate, Ottawa Hospital Research Institute

### **COLIN HAMMOND**

PhD Candidate, University of British Columbia

### **MICHELLE KAMEDA-SMITH**

PhD Candidate, SCCRI, McMaster University

### **ERIKA KLEIDERMAN**

Academic Associate, McGill University

### **KELLY MCNAGNY**

Professor, University of British Columbia

### **FOROUGH NOOHI**

PhD Candidate, McGill University

### **SUMAIYAH REHMAN**

Post-Doctoral Fellow, Princess Margaret Cancer Center,  
University Health Network

### **NIKA SHAKIBA**

Post-Doctoral Fellow, Massachusetts Institute of Technology

## Training & Education Committee (TEC)

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Assistant Professor, Western University

### **HARRY ATKINS**

Scientist, Ottawa Hospital Research Institute

### **SNEHA BALANI**

PhD Candidate, Terry Fox Lab, BC Cancer Agency,  
University of British Columbia

### **ERIC JERVIS**

Principal Scientist, STEMCELL Technologies

### **ERIKA KLEIDERMAN**

Academic Associate, McGill University

### **KELLY MCNAGNY**

Professor, University of British Columbia

### **EVA SZABO**

Assistant Professor, McMaster University

### **AMY WONG**

Research Associate, Hospital for Sick Children

### **AMY ZARZECZNY**

Assistant Professor, University of Regina



## Financial Statements

### **STEM CELL NETWORK**

#### **FINANCIAL STATEMENTS**

**MARCH 31, 2018**





# STEM CELL NETWORK

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MARCH 31, 2018

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## INDEPENDENT AUDITORS' REPORT

To the Members of the Stem Cell Network:

### Report on the Financial Statements

We have audited the accompanying financial statements of the Stem Cell Network ("SCN"), which comprise the statement of financial position as at March 31, 2018, and the statements of revenue and expenditures, changes in net assets, and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

### Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations ("ASNFP"), and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

### Auditors' Responsibility

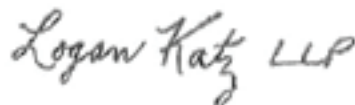
Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to SCN's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of SCN's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

### Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of SCN as at March 31, 2018, and its results of operations and its cash flows for the year then ended in accordance with ASNFP.



Chartered Professional Accountants  
Licensed Public Accountants

Ottawa, Canada  
June 26, 2018

**STEM CELL NETWORK**  
**STATEMENT OF FINANCIAL POSITION**  
**AS AT MARCH 31, 2018**

	2018	2017
<b>ASSETS</b>		
<b>CURRENT ASSETS</b>		
Cash	\$ 412,363	\$ 1,452,411
Accounts receivable	42,955	162,026
Harmonized sales taxes recoverable	29,372	-
Prepaid expenditures	87,006	43,785
	571,696	1,658,222
<b>RESTRICTED CASH EQUIVALENTS (Note 2)</b>	50,000	50,000
<b>PROPERTY AND EQUIPMENT (Note 3)</b>	5,062	9,594
	<b>\$ 626,758</b>	<b>\$ 1,717,816</b>
<b>LIABILITIES AND NET ASSETS</b>		
<b>CURRENT LIABILITIES</b>		
Accounts payable and accrued liabilities (Note 4)	\$ 50,229	\$ 438,696
Deferred revenue	34,441	20,000
	84,670	458,696
<b>DEFERRED CONTRIBUTIONS (Note 5)</b>	87,006	1,017,416
<b>NET ASSETS</b>		
Invested in property and equipment	5,062	9,594
Unrestricted	400,020	182,110
Externally restricted (Note 2)	50,000	50,000
	455,082	241,704
	<b>\$ 626,758</b>	<b>\$ 1,717,816</b>

Economic dependence (Note 8)  
Financial instruments (Note 9)

ON BEHALF OF THE BOARD:



# STEM CELL NETWORK

## STATEMENT OF REVENUE AND EXPENDITURES

YEAR ENDED MARCH 31, 2018

	2018	2017
<b>REVENUE</b>		
Innovation, Science and Economic Development Canada Grant (Note 5)	\$ 6,135,878	\$ 5,777,118
Networks of Centres of Excellence Grant	-	696,163
Annual conference sponsorship and registration	279,048	147,950
Contributed services in-kind (Note 7)	71,342	66,000
Interest	8,105	15,392
	<u>6,494,373</u>	<u>6,702,623</u>
<b>EXPENDITURES</b>		
Administration and general support (Note 6)	467,380	651,669
Amortization	4,532	2,712
Annual conference (Note 6)	582,393	399,294
Business development	13,743	45,823
Communication and outreach (Note 6)	410,028	388,554
Research (Note 6)	4,560,386	5,000,024
SCN board and committees	45,698	39,406
Training program (Note 6)	120,342	71,139
Workshops	76,493	58,777
	<u>6,280,995</u>	<u>6,657,398</u>
<b>EXCESS OF REVENUE OVER EXPENDITURES</b>	<u>\$ 213,378</u>	<u>\$ 45,225</u>

**STEM CELL NETWORK****STATEMENT OF CHANGES IN NET ASSETS****YEAR ENDED MARCH 31, 2018**

	2018			2017	
	Invested in Property and Equipment	Unrestricted	Externally Restricted	Total	Total
<b>BALANCES AT BEGINNING OF YEAR</b>	\$ 9,594	\$ 182,110	\$ 50,000	\$ 241,704	\$ 196,479
Excess of revenue over expenditures	-	213,378	-	213,378	45,225
Amortization of property and equipment	(4,532)	4,532	-	-	-
<b>BALANCES AT END OF YEAR</b>	\$ 5,062	\$ 400,020	\$ 50,000	\$ 455,082	\$ 241,704



**STEM CELL NETWORK****STATEMENT OF CASH FLOWS****YEAR ENDED MARCH 31, 2018**

	2018	2017
<b>OPERATING ACTIVITIES</b>		
Excess of revenue over expenditures	\$ 213,378	\$ 45,225
Adjustments for:		
Amortization	4,532	2,712
Recognition of deferred contributions	(6,135,878)	(6,473,281)
Changes in non-cash operating working capital:		
Accounts receivable	119,071	(65,391)
Harmonized sales taxes recoverable	(29,372)	-
Prepaid expenditures	(43,221)	(25,553)
Accounts payable and accrued liabilities	(388,467)	286,186
Deferred revenue	14,441	20,000
	(6,245,516)	(6,210,102)
<b>FINANCING ACTIVITIES</b>		
Proceeds from deferred contributions	5,205,468	6,794,534
<b>INVESTING ACTIVITIES</b>		
Acquisition of property and equipment	-	(12,306)
<b>(DECREASE) INCREASE IN CASH</b>	(1,040,048)	572,126
Cash position at beginning of year	1,452,411	880,285
<b>CASH POSITION AT END OF YEAR</b>	<b>\$ 412,363</b>	<b>\$ 1,452,411</b>



# STEM CELL NETWORK

## NOTES TO FINANCIAL STATEMENTS

YEAR ENDED MARCH 31, 2018

### GENERAL

The Stem Cell Network ("SCN") was established on November 19, 2001 as an independent not-for-profit corporation and accordingly, is exempt from income taxes. The mission of SCN is to be a catalyst for enabling translation of stem cell research into clinical applications, commercial products or public policy.

As of March 22, 2016, SCN was approved for Innovation, Science and Economic Development Canada ("ISED") funding of \$12,000,000 for the fiscal years 2017 and 2018. As of February 19, 2018, SCN was approved for ISED funding of \$6,000,000 for the fiscal year 2019.

### 1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

These financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations ("ASNFP") and include the following significant accounting policies:

#### Revenue Recognition

SCN follows the deferral method of accounting for contributions. Restricted contributions are recognized as revenue in the year in which related expenditures are incurred. Unrestricted contributions are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

#### *Grant*

Grant revenue represents funds received from the federal government for specific initiatives administered by SCN. Grant revenue is recognized as revenue when costs are incurred in relation to the specific initiatives. Grant funds that have not been fully spent at year end are reported as deferred contributions.

#### *Interest*

Amounts received for interest income are recognized as revenue when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

#### *Annual conference sponsorship and registration*

Registration fees and sponsorships to events, including the conference, are recognized as revenue in the year the event is held.

**STEM CELL NETWORK**  
**NOTES TO FINANCIAL STATEMENTS**  
**YEAR ENDED MARCH 31, 2018**

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**1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)**

Contributed Services In-Kind

Because of the difficulty of determining their fair value, contributed services are not recognized in the financial statements unless a fair value can be reasonably estimated, the services are used in the normal course of operations and the provider of the services has explicitly defined the value of the services to SCN.

Research Programs Expenses

Costs relating to research programs are recorded as expenses when they become payable. The research grants are determined to become payable at the time when the board of directors approves the grant and the grant recipient investigator has submitted a signed acceptance of award and related documentation formally acknowledging the grant. Research grants that have been identified as payments in future periods are disclosed as commitments.

Should the recipients of the grants not fulfill their obligations, the funding will need to be returned to SCN.

Allocation of Expenses

SCN allocates subcontractors and salaries and benefits to applicable programs based on an estimate of the percentage of time spent on the program.

Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, cash held on deposit with a Canadian chartered bank and highly liquid investments with original maturities of twelve months or less, including cashable guaranteed investment certificates. The fair value of cash equivalents approximates the amounts shown in the financial statements.

Foreign Currency Transactions

SCN uses the temporal method to translate its foreign currency transactions.

Monetary assets and liabilities are translated at the rate of exchange in effect at year end. Other assets and liabilities are translated at their historic rates. Items appearing in the statement of revenue and expenditures are translated at average year rates. Exchange gains and losses are included in the statement of revenue and expenditures.

# STEM CELL NETWORK

## NOTES TO FINANCIAL STATEMENTS

YEAR ENDED MARCH 31, 2018

### 1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)

#### Property and Equipment

Property and equipment are recorded at cost. Amortization is provided using the straight-line basis at the following annual rate:

Computer equipment	3 years
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Amortization of an asset commences in the month of acquisition. No amortization is recorded in the month of disposal.

#### Financial Instruments

##### *Measurement of financial instruments*

SCN initially measures its financial assets and liabilities at fair value.

SCN subsequently measures all its financial assets and financial liabilities at amortized cost.

Financial assets measured at amortized cost include cash, restricted cash equivalents, and accounts receivable.

Financial liabilities measured at amortized cost include accounts payable and accrued liabilities.

##### *Impairment*

Financial assets measured at amortized cost are tested for impairment when there are indicators of impairment. The amount of the write-down is recognized in the statement of revenue and expenditures. The previously recognized impairment loss may be reversed to the extent of the improvement, directly or by adjusting the allowance account, provided it is no greater than the amount that would have been reported at the date of the reversal had the impairment not been recognized previously. The amount of the reversal is recognized in the statement of revenue and expenditures. The accounts receivable is netted by an allowance for doubtful accounts of \$Nil (2017 - \$Nil).

##### *Transaction Costs*

Transaction costs are financing fees or costs that are directly attributable to the financial assets or financial liabilities origination, acquisition, issuance or assumption. Transaction costs relating to financial assets or financial liabilities that are carried at amortized cost or cost are netted against the carrying value of the assets or liabilities and then recognized over the expected life of the instrument using the effective interest method. All other transaction costs are recognized in the statement of revenue and expenditures in the period incurred.



**STEM CELL NETWORK**  
**NOTES TO FINANCIAL STATEMENTS**  
**YEAR ENDED MARCH 31, 2018**

**1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (continued)**

Use of Estimates

These financial statements have been prepared by management in accordance with ASNFPO and accordingly, require management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amount of revenues and expenditures during the reporting period. Actual results could differ from these estimates. The significant estimates in the financial statements include the estimated useful lives of property and equipment, allowance for doubtful accounts, the potential recovery of research grants awarded, the amount of certain accrued liabilities and the allocation of salaries and benefits to applicable programs.

**2. RESTRICTED CASH EQUIVALENTS**

Restricted cash equivalents are amounts invested in a non-redeemable guaranteed investment certificate (GIC) which is held by SCN's bank as collateral for their credit card account. The non-redeemable GIC bears interest at 0.5% and matures on March 19, 2019.

**3. PROPERTY AND EQUIPMENT**

	2018		2017	
	Cost	Accumulated Amortization	Net	Net
Computer equipment	\$ 37,979	\$ 32,917	\$ 5,062	\$ 9,594

**4. ACCOUNTS PAYABLE AND ACCRUED LIABILITIES**

SCN does not have any government remittances owing at year end.

## STEM CELL NETWORK

## NOTES TO FINANCIAL STATEMENTS

YEAR ENDED MARCH 31, 2018

## 5. DEFERRED CONTRIBUTIONS

Innovation, Science and Economic Development Canada ("ISED")

SCN has been approved for ISED funding for \$12 million under the terms of the ISED program, until March 31, 2018.

ISED funds are managed in accordance with the funding guidelines contained in the funding agreement between ISED and SCN, whereby the funding transits directly to SCN.

The changes in the deferred contributions balance for the period are as follows:

	2018	2017
Balance at beginning of period	\$1,017,416	\$ -
Restricted contributions received	5,205,468	6,794,534
Amount recognized as revenue	(6,135,878)	(5,777,118)
Balance at end of period	\$ 87,006	\$1,017,416

## 6. ALLOCATION OF EXPENSES

Subcontractors and salaries and benefits of \$648,348 (2017 - \$838,650) have been allocated as follows:

			2018	2017
	Subcontractors	Salaries and benefits	Total	Total
Administration and general support	1,838	294,571	296,409	515,379
Annual conference	\$ -	\$ 24,589	\$ 24,589	\$ -
Communication and outreach	18,189	141,373	159,562	169,687
Research	7,351	135,848	143,199	133,237
Training program	-	24,589	24,589	20,347
	\$ 27,378	\$ 620,970	\$ 648,348	\$ 838,650

**STEM CELL NETWORK**  
**NOTES TO FINANCIAL STATEMENTS**  
**YEAR ENDED MARCH 31, 2018**

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**7. IN-KIND CONTRIBUTIONS**

Under an agreement, the Ottawa Hospital Research Institute ("OHRI") provides administrative support services as well as office space and furniture without charging SCN. The value of the in-kind contributions received for services is estimated to be \$71,342 (2017 - \$66,000) and is recorded in administration and general support expenditures.

**8. ECONOMIC DEPENDENCE**

SCN receives ISED funds under a two year funding agreement. Revenues pertaining to this grant account for 94% (2017 - 86%) of SCN's revenue.

**9. FINANCIAL INSTRUMENTS**

Risks

It is management's opinion that SCN is not exposed to significant credit risk, interest rate risk or concentrations of risk through its financial instruments. The following analysis provides a measure of SCN's credit exposure as at the balance sheet date:

*Currency Risk*

Currency risk is the risk that the fair value of future cash flows of a financial instrument will fluctuate because of changes in foreign exchange rates.

SCN holds activities in foreign countries and as such is exposed to the fluctuations of foreign and Canadian currencies.

*Liquidity Risk*

Liquidity risk is the risk that an entity will encounter difficulty in meeting obligations associated with financial liabilities. SCN is exposed to this risk mainly in respect of its accounts payable and accrued liabilities. SCN manages its liquidity risk by monitoring its requirements through use of budgets and cash forecasts.

Credit Facility

SCN has access to \$50,000, secured credit on a credit card, bearing interest at 19.99% per annum, for which the balance is required to be fully paid on a monthly basis. The credit used at March 31, 2018 amounts to \$Nil (2017 - \$4,871) and is included in the balance of accounts payable and accrued liabilities.



**Stem Cell Network**  
Réseau de **cellules souches**