

ANNUAL REPORT 2018/2019

Bringing Innovations to Market





Our Vision

A world without paralysis after spinal cord injury (SCI).

Our Mission

To lead collaboration across the global SCI community by providing resources, infrastructure and knowledge; and to identify, develop, validate and accelerate the translation of evidence and best practices to reduce the incidence and severity of paralysis after SCI, improve health care outcomes, reduce long-term costs, and improve the quality of life for those living with SCI.

Our Values

Teamwork • Global Collaboration and Partnerships • Innovation for Impact • Integrity and Trust • Exceptional Outcomes





Message from Leadership

It was another successful year for the Rick Hansen Institute, thanks in no small part to the tireless effort of our board, committees, network of experts and of course, our dedicated staff. We had many significant achievements this past fiscal year, including, most notably, the Government of Canada's renewed funding for the next four years which demonstrates its faith in our ability to act as a partner and ally when it comes to improving the lives of Canadians with SCI.

Our international reach continues to grow with collaborations in more than 30 countries and a network that includes more than 100 researchers, health professionals, investors, community organizations and people with SCI. In keeping with the theme of this year's report – bringing innovations to market – we are proud to share the progress that we have made as a result of our commercialization activities in fiscal year 2018-2019. You'll read more about some of these projects which are featured in the following pages.

We were also privileged to be the title sponsor of the annual Working 2 Walk Science and Advocacy Symposium, hosted by American-based, Unite2Fight Paralysis. We were excited to bring this engaging symposium to Canada for the first time, exposing more Canadians with SCI to some of the innovative research taking place in curative therapies. The symposium also featured many Canadian-based researchers, a testament to the quality of SCI research coming out of Canada.

None of this would be possible without the generous funding provided by the Government of Canada through Western Economic Diversification, the Governments of British Columbia, Alberta, Manitoba and Ontario, as well as continuous support from Rick and the Rick Hansen Foundation.

We invite you to read this year's annual report and learn more about the work we have achieved over the last year.

Bill Barrable

Chief Executive Officer

Bill Barrable

Katharina Kovacs Burns Chair, Board of Directors



Message from Rick Hansen

I'm incredibly proud that the Blusson Spinal Cord Centre celebrated its tenth anniversary last year. Rick Hansen Institute's network has expanded in the last decade, with collaborations in more than 30 countries. This year's report highlights innovative technologies in RHI's global partnerships, which includes an international grant competition with India and a Biodesign partnership with Hebrew University of Jerusalem that created two startups that are bringing medical innovations to market. I look forward to seeing where the next ten years of innovation takes us in the journey to advancing SCI research, cure and care.

Rick Hansen

Founder, Rick Hansen Foundation

The work that supports our vision and mission

Our work is comprised of four inter-related program areas that are intersected by six supporting strategies



To advance our vision and mission, our activities are based on four distinct but inter-related program areas:

- Cure
- Care
- Commercialization
- Consumer Engagement

These programs are intersected by six supporting strategies:

- Translational research
- Best practices implementation
- Informatics
- Network development
- Consumer engagement
- Best & Brightest

All of RHI's projects and initiatives fall under one or more of these programs and strategies.

We are based in the Blusson Spinal Cord Centre (BSCC), a state-of-the-art, purpose-built facility located in Vancouver, British Columbia, Canada. The BSCC brings together world-leading multidisciplinary research with expert clinical care providers, international knowledge translation expertise and the wider SCI community to discover and implement innovative treatments and approaches to improve the health, independence and quality of life for people living with SCI.



Traumatic Spinal Cord Injuries in Canada

A look at traumatic spinal cord injury across Canada with data from the Rick Hansen Spinal Cord Injury Registry (RHSCIR).



Spinal cord injury (SCI) is often considered one of the most catastrophic, yet survivable injuries. Traumatic injuries are most commonly the result of a fall, vehicle accident or sports-related injury. To capture the experiences of these individuals, the Rick Hansen Spinal Cord Injury Registry (RHSCIR) was created as a pan-Canadian prospective observational study that collects clinical and demographic data in partnership with major acute and rehabilitation hospitals across Canada. RHSCIR follows individuals with traumatic SCI throughout their lifetime in order to capture participants experiences post-injury. The goal of the registry is to facilitate the translation of research into clinical practice and promote evidence-based practices.

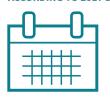
DATA COLLECTED FROM RHSCIR PROVIDES EVIDENCE THAT...







THREE TO FOUR MONTHS IS THE AVERAGE LENGTH OF STAY FOR ACUTE & REHABILITATION CARE ACCORDING TO 2017 DATA



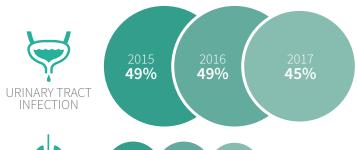
AVERAGE # OF DAYS

Acute	Rehab
7 10000	I COLIGI

PARAPLEGIA		
Complete	29	92
Incomplete	23	62
TETRAPLEGIA		
TETRAPLEGIA Complete	42	93

Source: RHSCIR Annual Reports for 2017, 2016, 2015 on RHI website: http://rickhanseninstitute.org/work/our-projects-initiatives/rhscir

MORE THAN 50% HAD AT LEAST ONE SECONDARY COMPLICATION DURING THEIR ACUTE OR REHABILITATION STAY



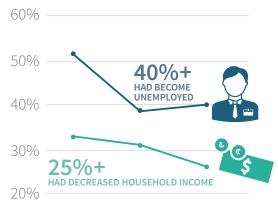






Note: Average length of stay based on 2017 data: 275 (acute) and 279 (rehab). Secondary complication percentages based on: 494 (2017), 570 (2016) and 631 (2015) individuals. Five year post-injury percentages based on interviews completed over four previous years: Employment - 317 (2014-17), 235 (2013-16), 229 (2012-15); Relationships - 361 (2014-17), 271 (2013-16), 253 (2012-15) and 203 (2011-14); and Household Income - 246 (2014-17), 178 (2013-16), and 178 (2012-15).

BY FIVE YEARS POST-INJURY...





RHI at a Glance

An overview of our accomplishments over the years.





WITH SCI BENEFITTED **IMPLEMENTATION** OF BEST **PRACTICES**









PROJECTS FUNDED

50% OF RHI'S RHSCIR NETWORK SUCCESSFULLY ACCREDITED

TO ACCREDITATION CANADA'S QMENTUM STANDARDS FOR SPINAL CORD INURY ACUTE & REHABILITATION SERVICES







2 FACULTY AND 11 POST-DOCTORAL FELLOWS FUNDED



FNROLLED IN RHSCIR

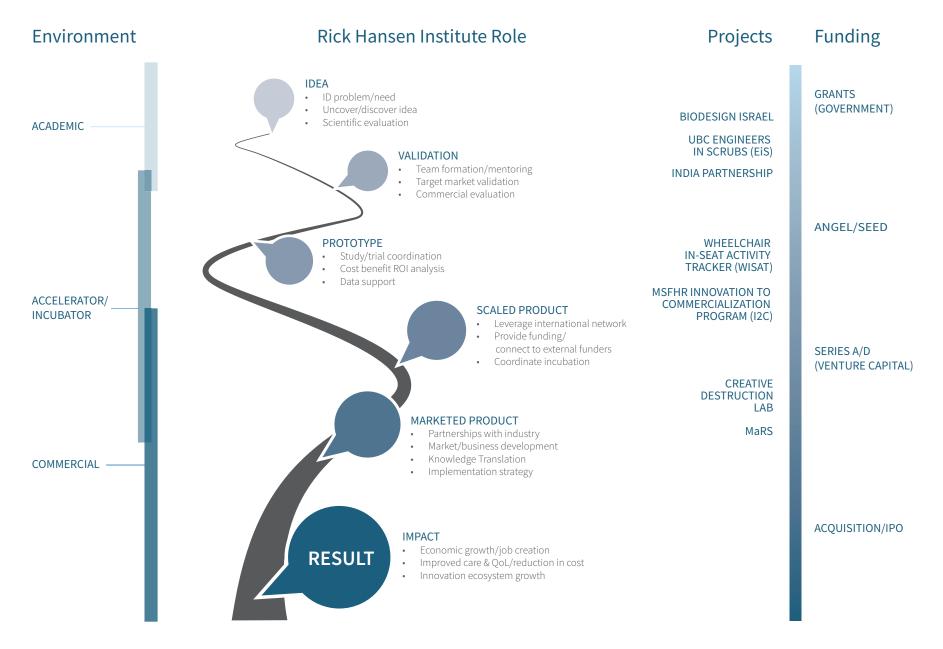
COMMERCIALIZATION FEATURE

Bringing Innovations to Market

RHI's Commercialization Program accelerates the commercialization process for innovative technologies that will benefit people with spinal cord injuries.



Overview of the Commercialization Program



BIODESIGN ISRAEL

Accelerating Medical Innovations



Biodesign is an innovative concept that takes a multi-disciplinary approach to bringing medical innovations to market. The goal of the RHI-Hebrew University Biodesign partnership was to take this method of commercialization and apply it to innovations in spinal cord injury.





Two teams that participated in the first year of the partnership developed solutions for common complications that affect people with SCI. The teams were guided by RHI, the Hebrew University of Jerusalem and RHI-sponsored researcher, Dr. Yaron Blinder. RHI's Consumer Engagement Lead consulted on problem identification and design.

One team developed a device to reduce the risk of bladder infections, a common complication among individuals with SCI, often caused by catheter use. The UFREE is an indwelling catheter for men that allows individuals to empty their bladders at home, manually and easily. As the catheter only needs to be changed once a month, it results in fewer bladder-related complications.

The other team developed a device to improve the ability to cough forcefully, something that some individuals with SCI may find difficult to do, and one of the main mechanisms used to avoid respiratory infections, such as pneumonia. The iCough is a portable, adaptive and self-handled solution that improves ventilation and cough effectiveness.

Now that the teams have graduated from the program, they are looking for investors to help grow their startups.



Funding for these projects was made possible by the Government of Canada through Western Economic Diversification.

UBC ENGINEERS IN SCRUBS

Supporting Emerging Research-Innovators



In 2011 the Engineers in Scrubs (EiS) graduate training program was initiated as an NSERC-funded Collaborative Research and Training Experience (CREATE) program, with funding through to 2017.

Incorporating key components of the biodesign¹ process, EiS is designed to foster innovation in medical technologies by training biomedical engineers in clinical environments. Through the first phase of EiS, 80+ students were competitively enrolled, 22 projects completed, and a number of partnerships and companies emerged, including Arbutus Medical, a surgical equipment company developing innovative devices for use around the world.

RHI is contributing to the second phase of EiS. Beginning in 2018, RHI contributions are intended to strengthen EiS foundational activities and to specifically build programs and outcomes that address priority problems in SCI (including engineering solutions for prevention, repair, rehabilitation, and improving quality of life). In 2018/19 two teams of students designed SCI-related technologies.



Funding for this project was made possible by the Province of BC.

 $^{^{1}}$ Zenios SA, Makower J, Yock PG, Brinton TJ, Kumar UN, Denend L, Krummel TM. Biodesign: the Process of Innovating Medical Technologies, 2nd Edition. Cambridge: Cambridge University Press, 2015.

INDIA PARTNERSHIP

Establishing a Canadian-Indian Research Collaborative

In December 2018, the Indian Spinal Injuries Centre (ISIC), IC-IMPACTS and RHI announced winners of an international grant competition, the Canada India SCI Innovation Award – Getting Solutions to Market.



The Honourable Kirsty Duncan announcing the partnership between RHI, IC-IMPACTS and ISIC at a special event in February 2018.

The five winners are being granted \$50,000 CAD each and international support in order to accelerate their innovative research in the hopes of making it commercially available to people with spinal cord injuries. Based on the peer-review, the winning projects were:

- Development of portable spine MEG scanner for real time spinal functional evaluation and data acquisition. Teresa Cheung, Simon Fraser University (Canada), Rohit Sharma, IIT, Ropar (India).
- Wearable technology to monitor sitting posture and reduce the pressure injury risk. Hossein Rouhani, University of Alberta (Canada), Chester Ho, University of Alberta (Canada).
- COPE: Community health outcomes and personalized education/exercises for spinal injured individuals. Nishu Tyagi, ISIC (India), Andrei Krassioukov, UBC (Canada).

- Design2Impact: Uniting Researchers, makers and Spinal Injury Survivors through Open-Source *Technology.* Aaron Yurkewich, University of Toronto (Canada), Stewart Russell, Makers Making Change at Neil Squire Society (Canada).
- Development of wearable artificial muscle for a tetraplegic hand. Harvinder Chhabra, ISIC (India), Sitikantha Roy, IIT Delhi (India).

Project work commenced in early 2019 with the goal of demonstrating the effectiveness of the innovative technologies for the Canadian and Indian marketplace within the next two years.

"These innovative projects are clear examples of leading researchers coming together to address some of the most serious health challenges facing Canadians. I appreciate the work of these talented individuals who are collaborating to create marketable products and technologies that improve the health of Canadians."

The Honourable Kirsty Duncan, Minister of Science and Sport and Persons with Disabilities, Government of Canada



Funding for these projects was made possible by the Government of Canada through Western Economic Diversification. **WISAT**

Using Technology to Prevent Wounds



Rick Hansen Institute initiated a new collaboration with the Coulter Translational Program.

With funding support from RHI and project management from the Coulter Translational Program, principal investigators Sharon Sonenblum and Stephen Sprigle of the Georgia Tech REARLab are pursuing the commercialization of WiSAT, their Wheelchair In-seat Activity Tracker. Additional funding has been provided by US agencies the National Institutes of Health and the Department of Defense.

WiSAT is a seating system for wheelchair users to track activity and receive feedback through a smartphone app to encourage weight shifts and reduce the occurrence of pressure injuries. The Coulter Translational Program will provide mentorship and project management to guide the WiSAT team through commercialization milestones with the goal of bringing this technology out of academia and into the marketplace.

12C

Partnering to Support the Best & Brightest



BC's health research funding agency

An important part of RHI's commitment to research has been its ongoing partnership with the Michael Smith Foundation for Health Research (MSFHR) to jointly fund BC researchers studying spinal cord injury and related conditions.

This year, RHI partnered with the Foundation on its Innovation to Commercialization Award (I2C) to provide a grant to SFU-based researcher Dr. Siamak Arzanpour. His research project-turned startup, Human in Motion Robotics, involves the development of a novel wearable robotic exoskeleton.



Funding for these projects was made possible by the Government of Canada through Western Economic Diversification.

In addition, a second SCI project by ICORD researcher, Dr. Jaimie Borisoff also received an I2C grant in 2017/18. His project focuses on refining an exercise machine for people with lower limb disabilities. Pilot data for this project were generated using a BICP-supported Seed Grant.



MaRS

Developing an Innovation Challenge



MaRS Discovery District (MaRS) is an innovation hub dedicated to driving economic and social prosperity by harnessing the full potential of innovation. MaRS works with entrepreneurs and investors to launch and grow companies that have broad economic and societal impact. It convenes governments and industry stakeholders to facilitate widespread adoption in complex markets and systems.

In 2018/19, RHI worked with MaRS to design an Innovation Challenge. This involved starting to scope timelines, competition rules, eligibility criteria, submission evaluation criteria, submission templates, and legal templates. The next step is the implementation of the challenge itself. It will have two phases leading up to the selection of winners: ideation and demonstration. In the ideation phase, innovators will describe a concept, prototype or existing technology with the chance of moving on to phase 2 of demonstration if proven promising. This will involve challengers demonstrating real-world applicability of their proposed solutions with the selection of winners moving forward with commercialization.

These challenges are not only linked to innovation and commercialization but are ultimately interlinked with restoring an individual's function after SCI (e.g. walking, grasping and reaching, heart rate, blood pressure, respiratory function, bowel, bladder and/or sexual function etc.). The Innovation Challenge is aimed at identifying:

- Clinical measures Accurately quantify and measure therapeutic interventions an individual with SCI receives to improve function.
- Outcome measures Effectively measure the impact and outcome of therapeutic interventions an individual with SCI receives to improve function.



Funding for this project was made possible by the Government of Canada through Western Economic Diversification.

CREATIVE DESTRUCTION LAB

Creating Mentorship Opportunities for Emerging Startups



The Creative Destruction Lab (CDL) is a seed-stage program for massively scalable, science-based start-ups with the goal of maximizing equity value creation, and enhance managerial and entrepreneurship education.

With locations around the world, the program was initially launched at the University of Toronto; collaboration with the University of British Columbia led to the creation of CDL-West at the Sauder School of Business in 2016. RHI's partnership with CDL-West supports the development of RHI's pipeline of innovations related to SCI as well as enhance RHI's innovation ecosystem network. RHI's target is for at least one company to be mentored each year.

Human in Motion Robotics, which was also supported through the RHI-MSFHR I2C Award was referred by RHI and accepted to the 2017-2018 Health track. Human in Motion's revolutionary exoskeleton supports the full range of motion for users to experience normal walking and maintain their balance even in activities such as walking uphill or downhill, turning, and climbing stairs. Throughout the program they received mentorship from experienced business experts and technologists including assistance in building a technical road map, hiring key personnel, refining a go-to-market strategy and securing investment.

For the 2018/2019 fiscal year, Spiderwort was accepted. Spiderwort is a tissue engineering company specializing in the development of cellulose-based biomaterials for repair and regeneration of human tissues. Their biomaterial platform mimics the 3D architecture of targeted tissues with many applications in reconstructive surgery.





Funding for this project was made possible by the Government of Canada through Western Economic Diversification, and the Province of BC.

Other Highlights

A selection of other accomplishments in 2018/19.



APRIL 2018 MAY 2018



RHI with the Ontario Neurotrauma Foundation supported the **Ontario** SCI Alliance's workshop. In total, 571 participants (351 with SCI) participated online or in person. A key outcome of the Alliance meeting was the development and feedback on a unique community plan that leverages perspectives and input from 70 organizations, 250 members and a readership of 9,000 community leaders and activists across Ontario.



LEARN MORE





RHI funded and participated in the Atlantic Canada SCI Summit. The purpose of this two-day meeting was to begin development on a 5-year action plan to improve SCI treatment in the Atlantic provinces. Atlantic Canada faces unique challenges such as an aging and rural population, with many individuals residing long distances from acute and rehab facilities.



LEARN MORE





The Government of Canada confirmed its commitment to helping more Canadians with disabilities participate in the digital economy on Global Accessibility Awareness Day. Budget 2018 funding of \$23.6 million was announced to support RHI's efforts to achieve breakthroughs in SCI research and care.



LEARN MORE



Scientifique on pressure injuries in Montreal. As RHI has embarked on its own community-acquired pressure injury prevention initiative in BC, RHI sponsored this multi-stakeholder event that included consumers, clinicians and researchers working together to identify challenges and solutions

to reducing the incidence and

severity of pressure injuries for

people with SCI living in Quebec.

MEMO-OC hosted a Café



LEARN MORE

AUGUST 2018

SEPTEMBER 2018



The New Zealand Spinal Cord **Injury Registry** (NZSCIR) released its first annual report. The Registry was modelled after RHSCIR and launched in 2016.









RHI contributed to Parachute Canada's biennial survey. Through the Canadian Ice Hockey Spinal Cord Registry, Parachute has tracked and documented information about spinal injuries in ice hockey. This information provides a detailed account of the mechanism of injury and the player demographics of those who are injured. It is essential in understanding how to prevent injury, including paralysis.





RHI with the Ontario Neurotrauma Foundation supported three of five planned sites trained to establish Mobility Clinics across Ontario. In addition, Mobility Clinic Manual and Case-Based Learning Modules (CBLMs) have been disseminated through the SCI Network of Primary Care Providers. This initiative follows priorities articulated at the Primary Care Summit for Spinal Cord Injuries in November 2016.



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RHI researchers contributed to a publication² examining the accuracy of existing prediction models for recovery of mobility after a traumatic SCI. It highlighted that differences in likelihood and ability of recovery must be considered in order to develop valid and useful prediction models.

²Phan P, Budhram B, Zhang Q, Rivers CS, Noonan VK, Plashkes T, Wai EK, Paquet J, Roffey DM, Tsai E, Fallah N; RHSCIR Network. Highlighting discrepancies in walking prediction accuracy for patients with traumatic spinal cord injury: an evaluation of validated prediction models using a Canadian Multicenter Spinal Cord Injury Registry 2018. Spine J. [EPUB]



RHI with Mitacs funded an intern with the Granville Lab to continue work on a Pressure Ulcer Biobank for SCI patients as part of a larger project. The Granville Lab has been collaborating with RHI to collect wound fluids from the pressure injuries of individuals with SCI to analyze if Granzyme B is also involved in impairing the healing process in pressure injuries. During this project, 19 fluid samples from individuals with SCI were successfully collected and stored in the Pressure Ulcer Biobank. Analyses revealed that Granzyme B was elevated in the majority of the samples. Intriguingly, the Granzyme B concentration was higher in severe pressure injuries and hence, may be correlated to pressure injury severity.





RHI was the title sponsor for the 13th annual Working 2 Walk (W2W) Science & Advocacy Symposium. Hosted by Unite 2 Fight Paralysis, W2W is a consumerdriven, cures focused meeting that brings together consumers, researchers, clinicians and other stakeholders. It took place in Vancouver on October 19-20, 2018; the first time the symposium has been held outside the USA. In total, 182 individuals registered for the conference and RHI financially supported the attendance of 23 consumers. Presentations were given on topics ranging from electrical spinal stimulation, bowel and bladder function, as well as sexual function and fertility after SCI. Almost all of the 52 individuals who responded to a post-event survey reported they would enthusiastically recommend W2W to others.





RHI's home, the Blusson Spinal Cord Centre, celebrated its tenth anniversary. An official event was held on October 18, 2018 to celebrate this occasion.





An RHI article on the development of the Standing and Walking **Assessment Tool** (SWAT) was published in Synapse, a Canadian Physiotherapy Association publication. The SWAT is a guide for the progressive staging and assessment of standing and walking ability in individuals with SCI. It combines staging of mobility status with established measures of balance and walking in order to standardize walking assessment after SCI.





FEBRUARY 2019 MARCH 2019



RHI contributed funding to the development of the **ProACTIVE** SCI Toolkit which is an up-todate, evidence-based set of guidelines and recommendations for prescribing physical activity to improve physical fitness and health in adults with SCI. The toolkit is designed to help physiotherapists work with their clients with SCI to be physically active outside of the clinic. It is a step-by-step resource that uses three overarching strategies including education, referral, and prescription to develop tailored strategies that work for both the physiotherapist and their client with SCI.



DOWNLOAD THE TOOLKIT



Developed by RHI's in-house software development team, CliniQuick officially launched at the Interdisciplinary Spasticity Management Service at GF Strong. The mobile app is designed to increase the speed and effectiveness of knowledge translation by providing measures and metrics to validate practice improvements. This app was developed through close collaboration with Dr. Patricia Mills and the spasticity clinic at GF Strong.



RHI supported a Café Scientifique at the Blusson Spinal Cord Centre Centre in conjunction with the 5th International Autonomic Symposium. The event was held in partnership with ICORD and SCI-BC and brought together people with SCI, their families and supporters, researchers and clinicians to exchange knowledge about women's health and develop networks for partnering on potential projects.





Two publications by RHI staff members were selected as one of the most popular Spinal Cord publications in 2017-2018. The first publication is "An analysis of ideal and actual time to surgery after traumatic spinal cord injury in Canada" and the second publication is "Evidence-Based Scientific Exercise Guidelines for Adults with Spinal Cord Injury: An Update and a New Guideline".



LEARN MORE



Speakers and panel members of the 2019 Cafe Scientifique.

Financials



STATEMENT OF FINANCIAL POSITION

AS AT MARCH 31, 2019

For the Rick Hansen Institute's complete audited financial statements, please visit the Resources section of our website: www.rickhanseninstitute.org.

	2019 \$	2018 \$
Assets		
Current assets		
Cash and cash equivalents	3,847,434	1,303,493
Short-term Investments	7,097,194	1,935,512
Accounts receivable	26,930	10,126,996
Prepaid expenses	98,120	74,719
	11,069,678	13,440,720
Capital assets	101,853	37,456
Investment funds	200,000	
	11,371,531	13,478,176
Liabilities and Net Assets		
Current liabilities		
Accounts payable and accrued liabilities	1,396,996	1,192,188
Deferred contributions	9,028,057	11,821,247
Deferred capital contributions	-	37,457
	10,425,053	13,050,892
Unrestricted funds	946,478	427,284
	11,371,531	13,478,176

STATEMENT OF OPERATIONS AND FUND BALANCES

FOR THE YEAR ENDED MARCH 31, 2019

	2019 \$	2018 \$
Revenue		
Grants and contributions	10,942,564	10,467,564
Donations and sponsorships	3,450	3,227
Investment income	224,786	50,561
Other income	53,230	32,677
Amortization of deferred capital contributions	37,457	50,709
	11,261,487	10,604,738
Expenses		
Translational research	3,930,955	6,508,948
Best practice implementation	3,432,534	1,047,863
Commercialization	929,541	138,467
Informatics	1,053,190	1,168,889
Network development	315,243	497,707
Best & brightest awards	119,988	281,875
Consumer engagement	593,152	646,562
Fundraising	121,022	-
Management and administration	508,799	401,183
	11,004,424	10,553,027
Excess of revenue over expenses for the year	257,063	51,711
Adjustment to Unrestricted fund balance	262,131	-
Unrestricted fund balance, beginning of year	427,284	375,573
Unrestricted fund balance, end of year	946,478	427,284

Thank yous



Thank You

This year we would like to thank our out-going board members Katharina Kovacs Burns and Dustin Paul for their service and dedication to our Board of Directors. We are also delighted and privileged to welcome Ian Rigby as our new Board Chair.



(top row): Jerome So, Shari Hughson, Katharina Kovacs Burns, Jeff Charpentier, Nava Swersky Sofer, Christine Sang, Doug Brown, Michael Beattie. (bottom row): Ross Mason, Dean Bergeron, Ian Rigby, Ben Almond

Not pictured: Kristine Cowley, Maria Barrados, Dustin Paul



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