

A decorative graphic consisting of a grid of light blue hexagons, some of which are missing, creating a pattern that resembles a honeycomb or molecular structure. The pattern is located on the left side of the page, extending from the top to the bottom.

STEM CELL NETWORK | ANNUAL REPORT

*2002-2003*

## A message from SCN Central

On April 1, 2003, the Stem Cell Network celebrated its second anniversary. This ended a year of profound change for the Network – a year in which our scientific program evolved from a collection of individual projects into a small number of multi-disciplinary and multi-institutional projects with huge potential impact for the understanding of stem cell function and their potential as therapeutic agents.

It was a year in which the Board of Directors began to take a more active role in Network affairs, participating in a strategic planning exercise with Network investigators at the first Annual Scientific Meeting. The Board also gave its approval to the 15 new projects that redefine the Network scientific platform and worked closely with Network scientists in developing a new and exciting model for commercialization of Network science.

This was also a year in which we welcomed 12 new investigators into the Network. Their expertise and energy will enhance the Network scientific platform and enrich all Network activities.

Our efforts were not limited to what is being accomplished in research facilities. Much time and effort was focused on Parliament Hill. We are proud of the work we have done in and around Bill C-13, *The Assisted Human Reproduction Act*. Through workshops and letter-writing and our presence at parliamentary committee hearings, we succeeded in engaging both the public and the policy-makers. We have encouraged an environment in which the people and their politicians are informed of the vast potential of stem cells and understand the need for regulatory policies that reflect reality while respecting the ethical concerns of Canadians.

We have responded to the need for more knowledge about stem cells by reaching out, to make Canadians aware that the discoveries being made are bringing theory ever closer to therapy. We have done this through high school pilot projects, through seminars and forums, through the power of the printed word in our news magazine and the exchange of ideas in the growing wealth of knowledge on our website.

We have worked hard to establish and grow partnerships with leading disease-fighting charitable organizations in the belief that we can speed science forward by jointly encouraging and underwriting research with the potential to create cures. We have also strengthened our bonds with private sector partners to build a stronger base upon which to advance the science of stem cells. We have recognized this as an area of growth and have dedicated ourselves to the task. Indeed, in the past year, we have begun to investigate opportunities to build a stem cell industry in Canada, to capitalize on the remarkable body of work that Canadian researchers have contributed thus far. We will play a role in turning that excellence into an economic benefit for all Canadians.

In closing, we want to acknowledge the phenomenal contributions of the Board, the Principal Investigators, the students, fellows and staff who work on Network projects and the dedicated staff in the Network office who keep us all on track. We are proud to be associated with such a fine group of people.



Judy Birdsell,  
*Chair, Board of Directors*



Ron Worton,  
*Scientific Director*



Drew Lyall,  
*Executive Director*

In the decades to come, when we look back on 2002-2003, we will remember this year as the instant ideas became action... the moment when movement became momentum.

Membership in the Stem Cell Network is up: Joining the 53 founding scientists are another 12 leading thinkers whose work has the potential to reshape medicine. More graduate students and postdoctoral fellows from across Canada are involved in Network research. More projects were approved: Fifteen research initiatives have already been set in motion and a crucially important 16th – *Technologies for the Propagation and Characterization of Human Embryonic Stem Cells* – awaits approval from the Canadian Institutes of Health Research's national oversight committee. Partnerships are forming: The Network's seed funding of \$1-million to *The Stem Cell Genomics Project* has spiralled to \$11-million in funding. Common ground was found and common goals were set with The Juvenile Diabetes Research Foundation of Canada, The Foundation Fighting Blindness, and other disease-fighting organizations. StemCell Technologies, a Canadian biotechnology success story, joined the Network as its first Lead Industry Partner. Network researchers published their findings in 74 refereed journals, with dozens of articles, op-ed pieces, letters and reviews appearing in the popular press and mainstream media. Through dedicated work in and around Bill C-13, *The Assisted Human Reproduction Act*, the Network has become the clearest voice in the most engaging medical/ethical debate of our times: The use of human embryonic stem cells.

### **We have just begun.**

These will be remembered as the early days. The strong beginning that led the way to moving research out of laboratories and into clinics ... to turning theory into therapy.

### **The culture of collaboration**

It was the ground-breaking work of two young Canadian researchers – James E. Till and Ernest McCulloch – who proved transplanted stem cells

in bone marrow were “multi-potent” – which led to the creation of a new arsenal of weapons in the fight against leukemia. According to *Nature Immunology*, of the 35 classic stem cell papers published in the last half of the 20th century, 16 were from Canada. Building on that base of rigorous research and cross-discipline co-operation, the Stem Cell Network believes much can be achieved by mobilizing research talent in the academic, private and public sectors and applying it to the task of improving the quality of life in Canada and, ultimately, around the world.

Nowhere is the culture of collaboration better illustrated than the Network's *Stem Cell Plasticity* project, in which “The Dream Team” of stem cell biologists – a group of 17 outstanding researchers from eight universities – will work together for the next two years to uncover the potential behind stem cell “plasticity” – the property that propels stem cells to switch into insulin-producing islets to treat diabetes or into dopamine-secreting neurons to fight Parkinson's disease. “The project has a breathtaking sweep to it ... that few other research groups anywhere can bring,” said Dr. Darwin Prockop of Tulane University.

That same dedication to the strength in sharing has led to the *Stem Cell Genomics Project*, a massive undertaking to provide the crucial understanding of the genetic factors that specify stem cell identity – in essence, defining what makes a stem cell a stem cell. With \$11-million in funding – secured from Genome Canada, the Canadian Foundation for Innovation, the Ontario Innovation Trust, the Ontario Research and Development Challenge Fund and the Ottawa Hospital – the Genomics Project will set the standard for understanding the genetic profile of stem cells. The project brings together researchers from more than 20 labs in a collaborative knowledge-sharing network.

The same can be said for *The Stroke Project*, a diverse group of cell biologists, molecular biologists, psychologists, bio-engineers and clinicians in nine laboratories across the country who, over the next two years, will test cells from different parts of the body. With \$1.8-million in funding through the participation of CIHR's Institute of Neurosciences, Mental Health and Addiction and the Institute of Circulatory and Respiratory Health, as well as the Canadian Stroke Network, their work could lead to the first human trials of adult stem cells to treat stroke – a disease that attacks 50,000 Canadians each year.

These are but three of the bold scientific endeavours initiated this year as part of the Stem Cell Network's commitment to bringing the best minds together to make medical history, right here at home in Canada. Much more is underway.

## An opportunity seized

As this report is being written, Bill C-13, *The Assisted Human Reproduction Act*, is at Third Reading in the House of Commons, awaiting the return of Parliament in the Fall of 2003. Despite the uncertainty of its fate – given the reality of a ruling party in the midst of a leadership change – one thing is certain: The Stem Cell Network has emerged as the clear voice of science in the highly charged debate over the use of human embryos for research.

The tabling of Bill C-13 provided a key opportunity for the Network to fulfill the goal of encouraging informed debate on the ethical, legal and social implications of stem cell research. It also saw the Network emerge as the first port-of-call for those seeking information – including Health Canada officials, politicians, charitable organizations and the media. Almost 20 per cent of the Network's membership appeared as expert witnesses during the draft and legislative stages of the Bill. The Network sent letters to every MP and hosted a Parliament Hill workshop to field questions from over 50 attending MPs or their representatives. This exchange of ideas helped shape the debate and laid a strong scientific foundation upon which to build understanding.

The Network's efforts around Bill C-13 succeeded in delivering the message that the discussions on stem cell research must be as open and informed as possible. While the use of human embryonic stem cells remains an intrinsic part of the controversial debate over when life begins, the potential applications for easing human suffering are so vast, they cannot be ignored or underrated. In terms of public engagement, Bill C-13 represents an opportunity seized. The Network is positioned to follow through in encouraging debate wherever the path to legislation leads.

## Enhancing awareness

For a 17-year-old high school student whose father is currently fighting heart disease and diabetes, the Stem Cell Network's student forum in Toronto last year helped separate the hype from the hope. "It will be too late for my father, but maybe other people won't have to suffer," said Tanya Khan. Workshops are just one of many efforts to enhance awareness – particularly among the next generation of scientists. This forum will be followed up by *Project Engage*, which will see students at 4,500 high schools across Canada thinking about the use of stem cell research from a variety of perspectives – including religious, commercial and legal. The project is a partnership with the Joint Centre for Bioethics and the initiative is funded by Genome Canada through the Ontario Genomics Institute. The Network also collaborated with Genome Canada on the Canadian Museum of Nature's *The Gee!* In *Genome* exhibit.

The Network participated in BIO 2002, the world's largest biotechnology conference, as well as BioNorth 2002, and held workshops in New Jersey and New York to promote awareness of Canada's leadership in the field. With the British High Commission, the Network jointly organized a Canada-UK Stem Cell Mission that brought together more than 60 leading researchers and companies. And it hosted delegations from Australia, Germany and Israel.

Along with those outreach efforts, the Network's twice-a-year *Stem Cell Network News Magazine* is profiling pioneering work by some of Canada's top researchers. It does so in accessible language that is raising the bar of public knowledge and encouraging media inquiry – as shown by the fact the Network was sourced in more than 100 news reports. The monthly internal newsletter, *CELLines*, keeps scientists within the membership current on research results and partnership possibilities, building on the "One Big Lab" approach to sharing knowledge to secure results.

Over the past year, the Network's website has become the destination of choice for anyone – from high school students looking for essay help to researchers staying current with the most recent published findings – interested in stem cells. There are more than 75,000 hits a month on the site. Currently, as part of a partnership initiative with charitable organizations, subsites are under construction to link stem cell research with diseases that, down the road, could benefit from stem cell breakthroughs. A subsite for the Foundation Fighting Blindness should be up and running by the fall, with more to follow. This is using the Internet as it was meant to be used: to facilitate the exchange of ideas, to share the wealth of knowledge.

## Pushing back the darkness

When you are pushing back the darkness, there is no time to burn daylight. Stem Cell Network researchers not only have done remarkable work in the past year, they have brought their findings to the world: Network-funded and/or member research resulted in 74 articles published in prestigious scientific journals. In the July edition of *Nature Biotechnology*, Dr. Mickie Bhatia and his colleagues at Robarts Research Institute in London, Ont., presented startling findings that showed injecting mice with bone marrow stem cells revised symptoms of diabetes. *The American Journal of Bioethics* featured research by Drs. Jason Scott Robert and Françoise Baylis of Dalhousie examining the morality of crossing species boundaries in the context of emerging genetic or cellular research. A groundbreaking study by the Ottawa Health Research Institute's Dr. Michael Rudnicki on adult stem cells that play a key role in muscle regeneration appeared in the June edition of *Cell*. In *Nature Medicine*, Dr. John Dick of the University Health Network presented findings on a new class of stem cells that can grow rapidly when implanted in mice – a discovery that, for the first time, found human cells capable of quickly rebuilding a blood system. These are but a few samples that show what Canada's leading biological scientists, social scientists, clinicians and engineers can accomplish – and how the Network helps it to happen.

## The power of partnerships

When the Network held its first Annual General Meeting two years ago, it was a closed session of 50 scientists talking about their research. The 2003 AGM in Vancouver will be a four-day event that reaches hundreds of biotech companies and service providers, scientists, trainees, and charitable organizations. This has been a natural evolution based on what we know to be true: If the goal is to create a critical mass of highly qualified people who can help speed science forward, working alone is futile. While the horizon for therapy is still distant, the Network is building relationships with the Foundation Fighting Blindness, the Juvenile Diabetes Research Foundation, Muscular Dystrophy Canada, Parkinson Society Canada and others who fight devastating and debilitating diseases. The goal is to spread an understanding of the potential applications of stem cell research so that together we can decide the best direction in which research should go. While the stem cell industry is still in its infancy, we are committed to investing time, money and expertise in research projects, training and outreach activities with all who share the vision of making stem cell therapy a reality and creating an internationally competitive stem cell sector for Canada, and for Canadians.

## The future: bring it on

We are in the early days of stem cell science, five to 20 years away from delivering new therapies to treat diseases. It will take the best and brightest young minds in Canada to make that vision a reality. To that end, across Canada more than 150 graduate students and post-doctoral fellows are currently at work on Network research projects. Benefiting from the \$6-million the Network has invested in research and training grants over its first two years, these brilliant young researchers are working shoulder to shoulder with the world's most talented collection of men and women in the field of stem cell research. These young scientists are doing challenging work in their own country, at state-of-the-art facilities. They are working on projects that encourage cross-discipline collaboration and allow the opportunity to grow academically while contributing fundamentally to the advancement of science in the 21st century. The Stem Cell Network is committed to enhance the training experience to build a world-class research-training program to carry on the world-class work Canada's stem cell scientists are doing.

## Minding the store of ideas

To look at stem cell research is to see Canadian innovation at work. Our research community is internationally respected for its dedication to collaboration to get great results. But unlike pharmaceutical research, with fixed timelines, predictable outcomes and more manageable returns on investment, the field of stem cell investigation is not crowded with deep-pocketed partners waiting to invest. The Stem Cell Network knows that eventually industry involvement will be crucial in translating theory to therapy. Over the past year, a Network team has met with Principal Investigators as well as university and hospital technology transfer offices across Canada to hear their thoughts on the commercialization of stem cell research. The team is looking for ways to capitalize on the advantages we have in Canada, and the advances we have made, to speed the advancement of therapies to the clinic. Whatever emerges – whether it is a national stem cell cooperative or some other model for taking care of the business of research – we are committed to helping bring therapeutic products to the marketplace. We are working to making that happen – not only for the benefit of Canadians and the Canadian economy, but to improve the health of people worldwide.

## STATEMENT OF FINANCIAL POSITION

*Year ended March 31, 2003*

	<b>2003</b>	<b>2002</b>
	<i>(in dollars)</i>	<i>(in dollars)</i>
<b>ASSETS</b>		
<b>Current assets</b>		
Cash	3,082,185	2,801,469
Other receivables	93,635	6,516
Grant receivable	1,220,049	449,125
Prepaid research	133,466	1,355,470
Prepaid expenses	5,320	11,963
<b>Total current assets</b>	<b>4,534,655</b>	<b>4,624,543</b>
Capital assets	63,884	84,577
	<b>4,598,539</b>	<b>4,709,120</b>
<b>LIABILITIES AND NET ASSETS</b>		
<b>Current liabilities</b>		
Accounts payable and accrued liabilities	77,703	97,962
Research commitments payable	10,000	281,543
Contributions received in advance	4,435,134	4,245,038
<b>Total current liabilities</b>	<b>4,522,837</b>	<b>4,624,543</b>
Deferred capital contribution	47,400	63,200
	4,570,237	4,687,743
<b>Net assets</b>		
Invested in capital assets	16,484	21,377
Unrestricted	11,818	-
<b>Total net assets</b>	<b>28,302</b>	<b>21,377</b>
	<b>4,598,539</b>	<b>4,709,120</b>

## STATEMENT OF OPERATIONS

*Year ended March 31, 2003*

	<b>2003</b>	<b>2002</b>
	<i>(in dollars)</i>	<i>(in dollars)</i>
<b>REVENUES</b>		
Network Centres of Excellence grant	4,305,904	2,958,962
Services in-kind	61,915	21,000
Contributions	46,356	-
Deferred capital contribution recognized	15,800	15,800
Gain on disposal of capital asset	-	22
	<b>4,429,975</b>	<b>2,995,784</b>
<b>EXPENSES</b>		
Research grants	3,447,860	2,306,662
Salaries and benefits	457,708	266,721
Conferences, seminars and meetings	268,586	223,326
Communications	90,790	56,702
General and administration	71,924	36,231
Professional and consulting fees	61,126	59,490
Amortization of capital assets	25,056	25,275
	4,423,050	2,974,407
<b>Excess of revenues over expenses for the year</b>	<b>6,925</b>	<b>21,377</b>

## Research centres

B.C. Cancer Agency  
Centre du Recherche en droit public  
Dalhousie University  
Hospital for Sick Children  
Institut de Recherches Cliniques de Montréal  
Jewish General Hospital  
Lawson Health Research Institute  
McGill University  
McMaster University  
Ottawa Health Research Institute  
Queen's University  
Robarts Research Institute  
Samuel Lunenfeld Research Institute  
Sunnybrook & Women's College Hospital  
Université de Montréal  
Université Laval  
University Health Network  
University of Alberta  
University of British Columbia  
University of Calgary  
University of Ottawa  
University of Toronto  
University of Waterloo  
University of Western Ontario

## Industries

Borden Ladner Gervais LLP  
Cangene Corporation  
Cogene Biotech Ventures Ltd.  
Ernst & Young LLP  
HSBC Asset Management  
Immunex  
Invitrogen  
MDS Intl  
Nexia Biotechnologies  
Novartis  
OnManagement Inc.  
Osler Hoskin & Harcourt  
Rx&D- Canada's Research Based Pharmaceutical  
Companies  
StemCell Technologies  
Virtek  
Wyeth

## Government departments and agencies

Biotechnology Research Institute/NRC  
Ontario Research and Development  
Challenge Fund

## Not-for-profit groups

ALS Society of Canada  
Association of Canadian Academic Healthcare  
Organizations  
Association of Canadian Medical Colleges  
Centre for Genetics and Society  
Council for Health Research in Canada  
Foundation Fighting Blindness Canada  
Héma-Québec  
HumGen  
Indiana University  
Juvenile Diabetes Research Foundation  
Muscular Dystrophy Canada  
National Cancer Institute of Canada  
Parkinson Society Canada  
University of Michigan Law School

## Investigators

Aubin, Jane – *University of Toronto*  
Baylis, Françoise – *Dalhousie University*  
Behie, Leo – *University of Calgary*  
Bhatia, Mickie – *Robarts Research Institute*  
Caulfield, Tim – *University of Alberta*  
Clarke, Lorne – *University of British Columbia*  
Cross, James (Jay) – *University of Calgary*  
Dick, John – *University Health Network*  
Dosch, Michael – *Hospital for Sick Children*  
Dubé, Ian – *Sunnybrook & Women's College  
Health Science Centre*  
Eaves, Connie – *B.C. Cancer Agency*  
Ellis, James – *Hospital for Sick Children*  
Galipeau, Jacques – *McGill University*  
Garnier, Alain – *Université Laval*  
Glass, Kathleen – *McGill University*  
Griffith, May – *Ottawa Health Research Institute*  
Hassell, John – *McMaster University*  
Hayden, Michael – *University of British Columbia*  
Hill, David – *Lawson Health Research Institute*  
Humphries, Keith – *B.C. Cancer Agency*  
Iscove, Norman – *Ontario Cancer Institute*  
Jervis, Eric – *University of Waterloo*  
Jirik, Frank – *University of Calgary*  
Karpati, George – *McGill University*  
Kieffer, Timothy – *University of British Columbia*  
Knoppers, Bartha – *Université de Montréal*  
Korbitt, Greg – *University of Alberta*  
Lansdorp, Peter – *B.C. Cancer Agency*  
Lemmens, Trudo – *University of Toronto*  
Leroux, Thérèse – *Université de Montréal*  
Lillicrap, David – *Queen's University*  
Lorimer, Ian – *University of Ottawa*  
Massie, Bernard – *NRC, Montréal*  
McBurney, Mike – *University of Ottawa*  
McInnes, Rod – *Hospital for Sick Children*  
McNaghy, Kelly – *University of British Columbia  
Biomedical Research Centre*  
Megeney, Lynn – *Ottawa Health Research Institute*  
Mendez, Ivar – *Dalhousie University*  
Miller, Freda – *Hospital for Sick Children*  
Morshead, Cindi – *University of Toronto*  
Nagano, Makoto – *McGill University*  
Nagy, Andras – *Samuel Lunenfeld Research Institute*  
Piret, Jamie – *University of British Columbia*  
Power, Chris – *University of Calgary*  
Rancourt, Derrick – *University of Calgary*  
Robert, Jason Scott – *Dalhousie University*  
Rosenberg, Lawrence – *McGill University*  
Roskams, Jane – *University of British Columbia*  
Rossant, Janet – *Samuel Lunenfeld Research Institute*  
Rossi, Fabio – *University of British Columbia  
Biomedical Research Centre*  
Rudnicki, Michael – *Ottawa Health Research Institute*  
Sabourin, Luc – *University of Ottawa*  
Sauvageau, Guy – *Institut de Recherches Cliniques  
de Montréal*  
Schuh, Andre – *University of Toronto*  
Slack, Ruth – *Ottawa Health Research Institute*  
Stanford, William – *University of Toronto*  
Stewart, Keith – *University of Toronto*  
Till, Jim – *University Health Network*  
Tremblay, Jacques – *Université Laval*  
Underhill, Michael – *University of Western Ontario*  
van der Kooy, Derek – *University of Toronto*  
Wallace, Valerie – *Ottawa Health Research Institute*  
Weiss, Sam – *University of Calgary*  
Worton, Ronald – *Ottawa Health Research Institute*  
Zandstra, Peter – *University of Toronto*

## **Board of Directors**

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Simon Fraser University*

Worton, Ron, PhD, – *Scientific Director,  
Stem Cell Network; CEO, Ottawa  
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