



**Stem Cell
Network**

**Réseau de
Cellules Souches**

IGNITE

2022-2025 STRATEGIC PLAN

Powering Regenerative Medicine



What are Stem Cells?

Stem cells are cells with the capacity to self-renew by dividing and developing into more mature, specialized cells.

Depending on the number of cell types to which they can give rise, stem cells can be unipotent, multipotent, pluripotent or totipotent. There are two main types of human stem cells: embryonic and non-embryonic (“adult”). Scientists have also discovered how to make a third type of stem cell, by reprogramming ordinary skin cells that have already “grown up” into those that look and act like cells from an embryo. These cells are named induced pluripotent stem cells or iPS cells. Stem cells are a key technology for the field of regenerative medicine. (*Sources: Nature, National Institutes of Health*).



What is Regenerative Medicine?

The branch of medicine that develops methods to regrow, repair or replace damaged or diseased cells, organs or tissues.

It includes the generation and use of therapeutic stem cells, tissue engineering and the production of artificial organs. Scientific approaches may include cell therapy, drug therapy, gene therapy and correction, artificial intelligence (AI), synthetic biology, mitochondrial transfer, organoids, 3D bio-printing and advanced therapies. (*Source: Nature Research*).

Acronyms & Abbreviations

CTA	Clinical trial application
ECR	Early career researcher
ELSI	Ethical, legal and social implications
HQP	Highly qualified personnel
PI	Principal investigator
REB	Research Ethics Board
RMC	Research Management Committee
RM	Regenerative Medicine
SCN	Stem Cell Network
SCN Trainees	Graduate students, postdocs, Research Associates, and technicians
TMM	Till & McCulloch Meetings

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About the Stem Cell Network

The Stem Cell Network (SCN) is a national not-for-profit that supports three main objectives: stem cell and regenerative medicine research; training the next generation of highly qualified personnel; and supporting the knowledge mobilization and transfer of stem cell and regenerative medicine research.

From the lab to the clinic, our goal is to power science that will benefit Canadians and all people. SCN was created in 2001. With support from the Government of Canada, the Network has grown from a few dozen labs to more than 199 world-class research groups, supporting 200 plus research projects and 24 clinical trials. Since its inception, 21 biotech companies have been catalyzed and more than 4,000 highly qualified personnel have been trained. In 2021, the Government of Canada demonstrated its continuing trust and support in SCN with an investment of \$45 million for the 2022–2025 period. This funding more than doubles the Stem Cell Network's annual budget and will fuel this new Strategic Plan, **IGNITE 2022–2025**.

Our Vision

To power life-saving therapies and technologies through regenerative medicine research for the benefit of all

Our Mandate

To be a national research leader dedicated to accelerating regenerative medicine and its translation for the benefit of Canada

Our Values

Five organizational values are cornerstones of our work and the work of the community across our Network:

- **Excellence and innovation** first
- Continual **learning and improvement**
- **Integrity** in our research and a commitment to ethical practice
- **Equity, diversity and inclusion**
- An environment that fosters **collaboration**



Our Objectives

IGNITE 2022–2025 reflects the Stem Cell Network’s five key objectives as jointly agreed with the Government of Canada. Our objectives are founded on two fundamental building blocks: good governance and a commitment to equity, diversity and inclusion (EDI) in all our work.

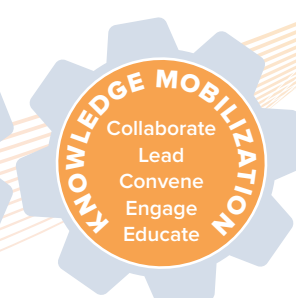
For 2022–2025, our objectives are to:

- **Fuel** world-class stem cell and regenerative medicine research, across the research continuum, and enable its translation for the benefit of Canada
- **Build** world-leading expertise in the translation of regenerative medicine and stem cell research
- **Train** highly qualified personnel to be scientific and industry leaders able to position Canada at the forefront of regenerative medicine
- **Engage** in national and international partnerships that will benefit and accelerate growth of Canada’s stem cell and regenerative medicine ecosystem
- **Deliver** trusted and evidence-based information as Canada’s foremost resource for stem cell and regenerative medicine science



SCN’s Hallmarks of Success

*Powering
Excellence*

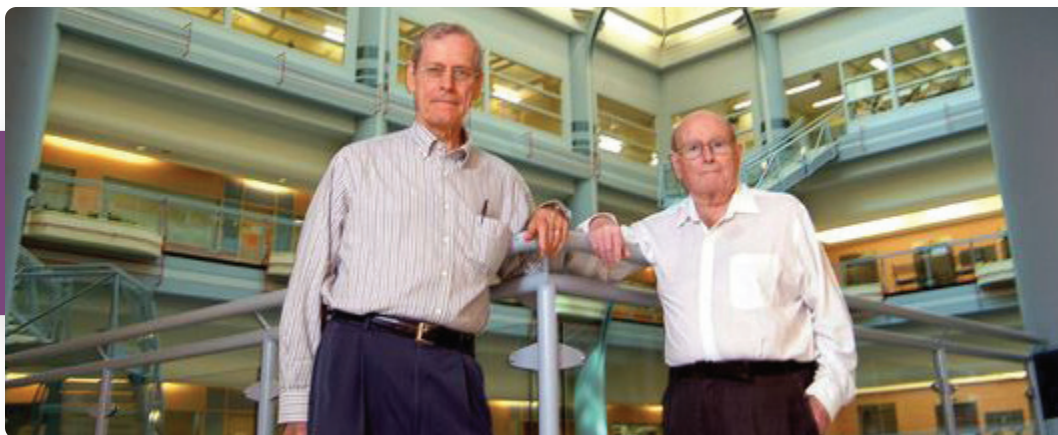


*Driving
Impact*



1.0 | Our Story: New Mandate, New Era

The existence of stem cells was first confirmed by two Canadians from the University of Toronto, Drs. Ernest McCulloch and James Till, in the early 1960s. Since then, Canada has demonstrated itself to be a global leader in the field — a position showcasing the talent and accomplishments of our researchers and institutions.



Drs. ERNEST MCCULLOCH and JAMES TILL, confirmed the existence of stem cells in the early 1960s.

Stem cells are often described as the body's building blocks. With more than 200 cell types in the body, only stem cells can develop into tissues and organs. Regenerative medicine (RM) is a translational science that uses stem cells for the repair or regeneration of cells, tissues and organs with the goal of establishing normal function. The potential for fighting diseases and illnesses that according to the Canadian Institute for Health Information cost the health care system approximately \$265 billion annually is extraordinary.

For 20 years, Canada's Stem Cell Network has been leading the way in building national capacity in stem cell and regenerative medicine research. SCN's ranks are filled with talented biologists, bioengineers, clinicians, ethicists, chemists and many others who have driven and continue to drive the field forward. When the Network began in 2001, it represented only a few dozen laboratories across the country. Today, it represents 199 labs, big and small, from coast to coast, all advancing novel stem cell-based approaches that can be used for regenerative medicine. It is a collaborative and well-networked community, built from the ground up, that believes together we can achieve more.

DID YOU KNOW?

In a 2020 international survey of stem cell researchers, 79% of respondents described Canada's leadership as "outstanding" or "considerable."

The impact of SCN investigators can be described as nothing short of outstanding. A 2020 impact analysis commissioned for the Stem Cell Network concluded, “The research supported by SCN is consistently of strong and exceptional quality and is having considerable impact on the field.” The report added, “SCN researchers are highly collaborative within the global stem cell and RM community.” These findings were further reinforced by a 2020 international survey of stem cell researchers, which stated, “The vast majority of international experts view Canada as playing a significant leadership role, whose contributions to the field have grown substantially over time.” These findings ranked Canada among the top three most significant contributors to the stem cell field alongside the United States and Japan.

New Mandate, New Era

In just two decades, SCN has built stem cell research strength in Canada and established an outstanding international reputation. As Canada’s only national network supporting stem cell research and regenerative medicine, SCN will continue leading the way in building a vibrant sector that is yielding scientific advancements, fuelling clinical trials, delivering health solutions for patients and enabling company creation and growth. Just as the sector is evolving, so too is the Stem Cell Network. Going forward, SCN will be guided by a new vision.

VISION: To power life-saving therapies and technologies through regenerative medicine research for the benefit of all

This vision will more concretely tap into the potential of regenerative medicine, or RM, that marks the future of stem cell research and know-how. As we did over our first two decades, SCN will continue championing the research, training and knowledge mobilization vital to keeping Canada at the leading edge.

Regenerative medicine is the branch of medicine that develops methods to regrow, repair or replace damaged or diseased cells, organs or tissues. It represents a real opportunity for Canada as our nation takes steps to recover from the health and economic burdens created by COVID-19. According to a 2021 report published by the Institute of Health Economics (IHE), Canada is well-positioned to realize — or even surpass — a target of \$5 billion in RM-generated economic growth and create 6,000 highly skilled jobs. As Canada rebuilds an innovative, inclusive economy, it is time to realize the significant potential offered by the field of regenerative medicine, a field pioneered and driven forward by Canadians.

Equally, the health benefits of regenerative medicine cannot be ignored. SCN has been supporting and leading work in areas such as the use of expanded cord blood for treating blood cancers; Type 1 diabetes reversal; understanding the cause of sudden cardiac death in infants; wound repair; and the mechanisms underlying brain repair. Yet, there is much more to be done. An important next step involves building our translational research muscles, a key priority for SCN in the years ahead. Accordingly, SCN is committed to offering research and training programs that will develop translational strength while ensuring the research pipeline is full and that early career researchers (ECRs) can build long-term regenerative medicine research programs.

Powered by two decades of success, the Stem Cell Network aims to ensure regenerative medicine is a cornerstone of Canada’s health and economic recovery. We are at the beginning of an exciting new chapter and we are inviting scientists, patients, industry, like-minded organizations and Canadians to join SCN on this journey — a time of promise and opportunity for Canada.

Translational research has, in part, been defined by the NIH as, “the process of applying discoveries generated during research in the laboratory, and in preclinical studies, to the development of trials and studies in humans.”

<http://grants.nih.gov/grants/guide/rfa-files/RFA-RM-07-007.html>

SCN Patient Profile: Kevin Bolusi

Inspirational recovery for third-degree burn patient



KEVIN BOLUSI

On the evening of August 12, 2015, life changed in an instant for Kevin Bolusi. Out with friends in the Montréal area, he was checking out some train tracks, having fun, “when everything just cut to black.” His friends heard a loud bang and saw a flash of light. Only afterward did they learn he’d been electrocuted. In what he calls “excruciating pain,” Kevin initially thought he’d be OK as “I was conscious and awake.” At that point, he didn’t know the full severity of what had happened. Subsequently induced into a two-month coma, Kevin suffered third-degree burns to 75 percent of his body and fourth-degree burns to his left leg which had to be amputated; he required a tracheotomy and couldn’t speak for months.

When doctors at Montréal’s Hôtel-Dieu hospital asked Kevin’s parents if they would consent to an experimental skin procedure to repair his body, they agreed to the trial as they wanted him to recover as swiftly as possible. When Kevin emerged from his coma, he too agreed.

This innovative wound repair therapy is being led by Dr. Véronique Moulin of Laval University, a Stem Cell Network investigator. The clinical trial, which is funded by SCN, saw most of Kevin’s skin replaced using a new method of tissue engineering, which allowed for enhanced wound closure.

The procedure involved taking samples of Kevin’s skin and using them to grow more batches of skin to repair his body rather than relying on traditional skin grafts, which would have required waiting many months for his damaged skin to regrow.

Kevin says he favoured the clinical trial for its “faster recovery” and that “it didn’t seem as invasive or life-threatening.” He was also happy about contributing to science, saying, **“I’m all about increasing overall knowledge in the world and contributing to that in some way.”**

Though Kevin’s journey has been a long one, he was motivated by the idea of living life’s next chapter. He found motivation in fulfilling his dream of studying aerospace engineering at Concordia University, a way of honouring the many people who played a role in his recovery.

Kevin’s experience is a solemn reminder that our passion for research and tireless efforts towards uncovering the secrets of stem cell biology and innovating novel regenerative therapies are working — and leading to a brighter future for others.

Of the many health care practitioners and researchers who helped Kevin return to “his normal life,” he says, “Your work is valued, especially from a patient on the receiving end like me. Your work is most definitely valued.”



2.0 | Our Three Program Pillars

This strategic plan, **IGNITE 2022–2025**, is built on three core pillars: research, training and knowledge mobilization. Each is vital to SCN as we work to position Canadian-based scientists and expertise at the forefront of regenerative medicine (RM) globally.

Pillar 1: Research with impact

As an outstanding research community dedicated to powering life-saving therapies and technologies for the benefit of Canadians, the Stem Cell Network aims to foster made-in-Canada RM therapies and technologies that will ignite global science advancements and therapeutic and technological innovations. Equally, we aim to build Canada's international reputation for translational research excellence and expertise that will continue driving regenerative medicine into the clinic — creating access to state-of-the-art therapies for tomorrow's patients. SCN's research program for the 2022–2025 period has been designed to meet the following objectives:



OBJECTIVE

To fuel world-class stem cell and regenerative medicine research, across the research continuum and enable its translation for the benefit of Canada



OBJECTIVE

To build world-leading expertise in the translation of RM and stem cell therapies and technologies

Over the course of the 2022–2025 period, two peer-reviewed funding competitions will be held to identify the research projects to be funded. The first will kick off in September 2021 and offer two- and three-year awards. The second, to launch in September 2022, will offer two-year awards. SCN anticipates supporting approximately 50 research projects — including clinical trials.

Over the 2022–2025 period, SCN will allocate up to two-thirds of its program budget to support research. Funding will be allocated across eight programs supporting research from innovation and development through translation and commercialization (see Figure 1).

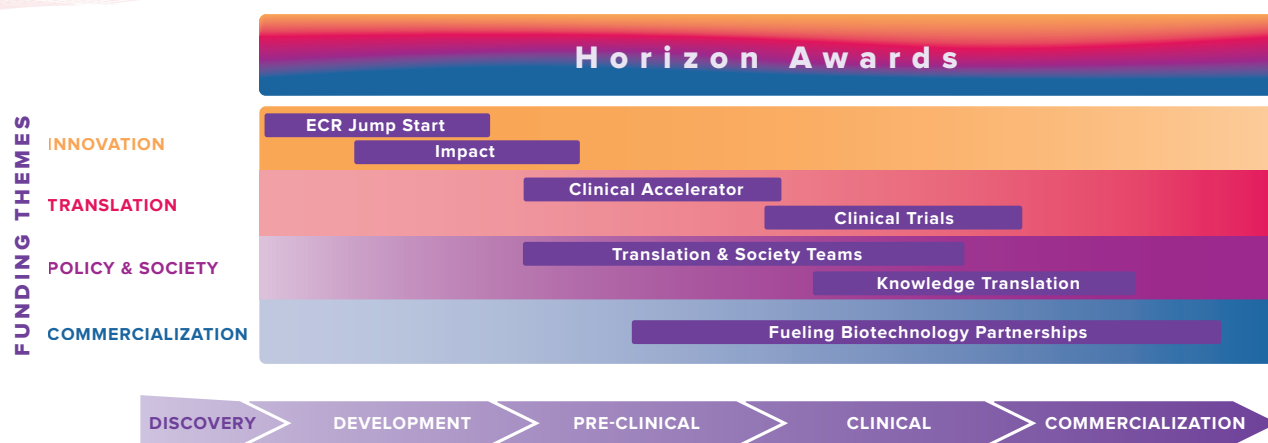


FIGURE 1: SCN's 2022-2025 Research Programming

During SCN-led consultations in 2020-2021, we regularly heard that providing scientific support across the research continuum — at all stages along the research pipeline — is critical to the field's ongoing development and progress. As such, our approach to funding includes robust programs that will allow for the development and pursuit of research ideas through pre-clinical and clinical activity while catalyzing commercial support.

Our largest research awards, which cut across the entire research continuum, are our national *Horizon Awards*. Valued at \$3 million for 34 months, these multi-year awards are the most significant boost for national RM teams offered by SCN since 2011. These awards are expected to:

- **power** transformative and/or novel scientific approaches that will have an impact for a specific disease or illness using RM
- **drive** innovative, transformative technology solutions for tackling significant RM challenges and realize health and economic benefits within one decade
- **engage** national, multi-disciplinary teams, with investigators located in three or more institutions across Canada

The Horizon Awards are about enhancing national collaborative networks and integrating new experts into the Network, as well as more 'untraditional' disciplines such as artificial intelligence, material sciences and health economics. Equally, the Horizon Awards aim to seed research and build made-in-Canada intellectual property that will yield translational or commercialization activity.

Beyond these awards, SCN has a suite of other research programs to support investigators at all stages along the research pipeline or continuum. Some are familiar offerings, while others have been made possible by the federal government's 2021 investment of \$45 million for the 2022–2025 period. Collectively, these award offerings can be grouped under four themes across the continuum (as seen in Figure 1): innovation, translation, policy and society, and commercialization.

Innovation:

➤ **ECR Jump Start Awards** — Valued at \$300,000 for 34 months, funding through this program supports early career researchers from the health, bio-engineering and social sciences who are within the first five years of an initial academic appointment. The aim is to provide targeted funding to support ECRs working to build longer-term RM research programs. Projects can focus on developmental or high-risk, innovative regenerative medicine research with the potential to be translated in the coming years.

➤ **Impact Awards** — Valued at \$250,000 for 24 months, these awards support investigators at all career stages. This popular and long-running program supports research involving proof-of-principle experiments for gene and/or cell therapy development and studies to understand stem and progenitor cell behaviour in disease-relevant settings. Projects must articulate a translational 'bench-to-bedside' research path and clearly identify where the proposed research stands along the path. It is expected they will result in the development of intellectual property that can yield translational or commercialization activity.




“SCN took a risk on a young investigator, and it was that risk that led to the start-up of my company, Axolotl Biosciences, and the emerging success of our bioink.”

– DR. STEPHANIE WILLERTH, University of Victoria

Translation:

Clinical trials are vital to successfully translating research from the lab bench to the bedside. Under this theme, two SCN awards support researchers focused on clinical translation:

 **Clinical Accelerator Awards** — Valued at up to \$600,000 per award for 24 months, these awards support multi-disciplinary research projects in bringing an RM therapy or technology to the clinic within five years. Projects can focus on pre-clinical and toxicity tests, technology development and ‘scale-up,’ manufacturing or animal studies needed for validation and progression to the next research stage. Support can also be used for preparing regulatory documents (e.g., Pre-CTA, CTA and REB); developing patient-focused strategies to support trial study design; and developing data collection and management plans.

 **Clinical Trial Awards** — Valued at up to \$1 million per award for 34 months, these awards support early-stage clinical trial projects taking a novel stem cell or RM approach to treat disease or illness. At the heart of translational research, clinical trial support is a strategic piece of the Network’s research program. Since 2019, approximately 100 patients have benefitted from participating in an SCN-funded trial. As regenerative medicine research continues advancing, SCN anticipates seeing increased demand for these types of awards. For the 2022–2025 period, support will be directed towards proposals demonstrating scientific excellence and that have considered patient perspective and engagement and economic viability for payors, and that are driven by collaborative, multi-disciplinary teams.

SCN’S COMMON FUNDING CRITERIA

Across all SCN research funding programs, there are several requirements that must be met for a project to be funded. They include:

- A clear demonstration of scientific excellence
- A focus on regenerative medicine and potential to move along a translational pathway
- Achievable milestones and deliverables
- Integration of sex and gender into project design, when appropriate
- An explanation of how an inclusive and diverse culture will be fostered and maintained within the research team
- Robust knowledge translation and training plans
- Partner engagement through in-kind and cash contributions

These requirements are essential for SCN, both in meeting its obligations to the Government of Canada and in ensuring the Network is supporting research excellence with a view to improving the health and well-being of Canadians.

Policy and Society:

It is only by supporting those who consider the ethical, legal, and social implications (ELSI) of advanced therapeutics that Canada will succeed in advancing next-generation therapies and technologies. Under this theme, two awards are offered:

➤ **The Translation & Society Team Award** — Valued at \$750,000 for 34 months, this award offers support to one multi-disciplinary team that will focus on a specific ELSI-related challenge/issue relevant to regenerative medicine. The award must be led by Canadian-based ELSI experts and seek to employ strategies that will support training the next generation of ELSI research leaders. The funded project will allow the team to collaborate on key challenges and opportunities required to translate regenerative medicine research. For example, the team might focus on topics such as regulatory modernization; the legal and policy challenges of emerging technologies; ethical governance; market access; health system adoption; patient knowledge and engagement; data management; public education; or consumer awareness.

➤ **Knowledge Translation Awards** — Valued at up to \$200,000 for 24 months, these awards support the knowledge translation of regenerative medicine. Projects can focus on a social, economic, technological, regulatory, patient or ethical question that should be addressed to support growing and advancing RM-related knowledge in Canada and globally. Uniquely, project outputs may generate digital, educational or cultural materials rather than traditional scientific outputs such as journal articles or book chapters.

SCN'S CONTINUAL REVIEW PROCESS

SCN uses a Continual Review process to ensure a research project's milestones and deliverables are being met and that SCN funds are appropriately invested. Continual Review is conducted by the Research Management Committee (RMC), which offers insight and direction in reviewing mid-term project reports. The RMC may also directly meet with investigators to better understand the nuances of their research so investigators receive the best possible feedback and support.

Commercialization:

Under this theme, SCN offers one unique program to support the commercialization of regenerative medicine research and early-stage biotechnology companies committed to bringing Canadian technologies to market.

➤ **Fueling Biotechnology Partnership Award** — Valued at up to \$400,000 for 24 months, this award supports partnerships between academics in RM and early-stage Canadian startups focusing on regenerative medicine. Research funded through this program should resolve a translational question or bottleneck that is essential for moving intellectual property forward and attracting investment. These awards are intended to support projects in the RM space that are novel and competitively differentiated. Projects must be led by an academic at a Canadian research institute, and the partnering receptor company must be a Canadian small- or medium-sized enterprise in the field. Projects are assessed for commercial potential and their value-creating deliverables.

Over the 2022–2025 period, SCN offers an exciting and robust set of research programs that have been carefully designed to meet the needs of Canada’s research community at all stages of the research continuum and prime the success of our emerging regenerative medicine sector. Not only will our research programs further foster Canada’s innovation and translational strengths, but they will fortify our position in a globally competitive area for years to come.

SCN’s support of research does not end with research funding. It extends to training the next generation of talent and building meaningful partnerships that will enhance Canada’s global reputation for regenerative medicine health solutions.

Pillar 2: Training Next-Generation Leaders

Better health and future prosperity depend on the skills, expertise and innovative mindset of the next generation. The Stem Cell Network and its partners provide specialized training to ensure highly qualified personnel (HQP) are well-placed to compete in Canada's knowledge-based economy and equipped with the skills to work in the RM labs and biotech companies of today and tomorrow.

A 2020 assessment found that SCN trainees possess the leading-edge skills needed to succeed in an evolving and growing regenerative medicine sector. They are also choosing to build their careers in Canada. In fact, 82 percent of those tracked elected to remain in Canada following their SCN training.

In its first 20 years, SCN provided training for 4,134 people and offered more than 7,000 training opportunities. We are proud to have played a role in supporting our trainees and creating these opportunities and look forward to building on this success. In this area, our objective for 2022–2025 is:



OBJECTIVE

To train highly qualified personnel to be scientific and industry leaders able to position Canada at the forefront of regenerative medicine

To meet this objective, SCN's training program includes:

- **Core Skills for Academia** — This training covers the technical skills training needed to work in a wet lab and overall career skills such as grant writing, project management and hiring for successful teams.
- **The Art of Clinical Translation** — This training addresses requirements for manufacturing cell and gene therapies; writing, reading and following standard operating procedures; understanding Canada's regulatory environment; planning for a clinical trial; and thinking about design, patient engagement and clinical trial application (CTA) preparation.
- **Commercialization of Research** — This training covers topics including understanding the 'ins and outs' of intellectual property, working with a technology transfer office and the business of regenerative medicine (including attracting investment).
- **Foundational Skills for Industry** — This training addresses topics including project management skills for business, resourcing and budget management, communication skills, risk analysis and business validation.



“Training provided by the Stem Cell Network is critical for companies such as STEMCELL Technologies to support our future business needs and growth to serve the scientific community. In the coming years, we will significantly grow our workforce, and we need and want to recruit Canadian employees first. As such, we are pleased to be a partner with SCN in providing essential training opportunities that will better prepare trainees for careers in business.”

– DR. SHARON LOUIS, Senior Vice President,
Research and Development, STEMCELL Technologies

In collaboration with our training partners, we anticipate that Canadian talent will become further respected globally — not only for their scientific excellence and developing innovative and sound RM health solutions but for bringing therapies to the clinic or market where they can be accessed by those in need.

A key training component to be offered by SCN over the 2022–2025 period will focus on building regulatory competency. As such, we are teaming up with WeCANReg to develop unique educational programming and tools for our trainees. Trainees will receive experiential learning and coaching and will work within small teams over four- to six- month periods. They will focus on real-world case studies that aim to bring cell therapies out of the lab and into the clinic. Through this initiative, we hope to create a base of knowledgeable HQP who can leverage their learnings and support RM labs who wish to pursue translational research.



“Ultimately, the training I received over the years helped me co-found TissueX Technologies to commercialize a technology that was developed in the laboratory setting for commercial use in drug discovery.”

– DR. MOHSEN AFSHAR, Co-founder and CTO
at TissueX Technologies

Training will also be offered through a multi-pronged approach so trainees can better access internships, postdoctoral fellowships and international exchanges. Over the next three years, SCN intends to pilot such experiences in partnership with industry, the charitable sector and other national research networks. Trainees will also benefit from Network workshops and in-depth courses. **Our commitment is to offer at least 15 workshops/courses per year (45 over three years) and provide training for 500 annually.** These opportunities, combined with hands-on lab experience through direct participation in SCN-funded projects, will provide a well-rounded experience for the next generation, further igniting growth in Canada's regenerative medicine sector.

Building Translational Research Knowledge:

Education and training are a lifelong pursuit. We have heard from our investigators at all career stages about their interest in learning more about clinical translation and commercialization. As such, over the next three years, we will make select training offerings available to investigators at all career stages who wish to learn how to translate their work or 'spin out' a company based on their research programs. This will be achieved by offering courses to assist principal investigators (PIs) in addressing translational challenges. For PIs looking to create or grow a company, SCN will provide support through partners such as the Ontario Bioscience Innovation Organization (OBIO), which hosts an annual conference bringing investors and emerging companies together. At the intersection of research and business training, adMare BioInnovations will be another key skills partner for the SCN community going forward.

SCN'S RESOURCE TOOLS FOR COMMERCIALIZATION

In 2020, SCN and the Centre for Commercialization of Regenerative Medicine (CCRM) co-developed a practical guide to support investigators wishing to commercialize and translate their cell and gene therapies. This bilingual guide includes a case study, assessment tool, FAQs and a checklist of key topics to prepare for discussions with tech transfer offices. Easily accessible, this valuable resource is providing education and support to PIs on their timelines.

<https://stemcellnetwork.ca/research/resources/>

Empowering Early Career Researchers:

Consultations with SCN's community of early career researchers (ECR) yielded valuable insights that assisted in developing this strategic plan. ECRs noted they had benefitted from their time as trainees but were interested in seeing training continue through a more structured program specifically designed for them at the ECR stage. Our new ECR program will focus on the practical components of managing a lab, covering topics such as: human resources, budgeting, project management, grant writing and publication requirements. Additionally, the Network will work with the ECR community to develop tailored training and offer a biennial symposium to provide foundational support for succeeding in academia. SCN is also committed to offering greater visibility for ECRs through our annual Till & McCulloch Meetings and funding support to speak at other national and international conferences. To ensure the needs of this constituency are considered as fully as possible, we will establish an ECR committee to assist in program development.

We understand the future health and well-being of Canadians depends on a talented workforce able to take on jobs in emerging areas such as biomanufacturing, 3D bioprinting and synthetic biology. SCN and its partners also recognize the importance of retaining talent and seeing the therapies of tomorrow developed in Canada. SCN's training plan aims to equip our future scientific leaders with the knowledge, skills and know-how to ignite Canada's regenerative medicine sector for the future.

SPOTLIGHT: The Till & McCulloch Meetings



SCN's Till & McCulloch Meetings (TMM) have been a high point on the calendars of both Canadian and international stem cell and RM researchers for more than 10 years. The three-day meetings bring together the Canadian community from labs, big and small, to discuss the field's opportunities, challenges and trends. The meetings are known for synergizing new research partnerships and helping trainees identify potential supervisors and mentors. With a strong focus on developing talent, the meetings also provide opportunities for trainees to learn and shine on the national stage. In the coming years we will enhance the TMM experience with an annual talent exposé/showcase. It promises to bring trainees, employers and academics together, giving trainees the opportunity to meet with potential employers, and employers the chance to identify the right talent for their lab and company.

Pillar 3: Mobilizing Knowledge For RM Growth

Knowledge mobilization is the term commonly used to convey both the creation and use of research outputs. Supporting knowledge mobilization is SCN's third core pillar of activity.



OBJECTIVE

To deliver trusted and evidence-based information as Canada's foremost resource for stem cell and regenerative medicine science

As noted in the earlier pages of this strategic plan, the Network will pilot a new research awards program that will assist us in meeting our knowledge mobilization mandate. As described within Pillar 1: Research With Impact, our Knowledge Translation Awards will support academics conducting projects that will develop non-traditional research outputs, including digital, educational and cultural materials that will more widely enhance knowledge of stem cell and RM research. Beyond this specific program, all SCN-funded research projects will be required to design and implement a knowledge translation strategy relevant to the project and/or research area being supported. By embedding this requirement directly into our research programs, we continue to underscore the important role all researchers play in knowledge transfer — and in contributing to furthering the field and providing a better understanding of the importance and realistic therapeutic benefits of regenerative medicine for Canadian health.

SCN will also be creating and implementing a knowledge mobilization plan. The overarching goal will be to further position SCN as a trusted, public leader for evidence-based information about stem cell and regenerative medicine research. SCN will engage a cross-section of partners, Network members and patient champions to develop the programs, tools and initiatives needed to advance our knowledge mobilization goals. Our approach will focus on three key areas:

- **Policy Expertise and Insight** — SCN will assemble a Policy & Regulatory Advisory Committee (PRAC) to respond to federal policy and regulatory consultations, and parliamentary committees. Additionally, members of PRAC will receive media and social media training so they can serve as SCN spokespersons on issues of relevance to SCN and their field.
- **Educational Public Resources** — Each year, SCN fields calls and emails from the public about stem cell therapies and how to access them. However, such therapies have only been approved as the standard of care for a small number of indications. As such, we recognize there is need for greater public education and awareness about the field and how it will make a difference in the future. SCN will work to create an updated set of plain language products, available in English and French, for patient audiences, the media and public. SCN will work systematically with health charity partners, our patient champions and communication specialists to create new digital products and interactive events to provide fact-based, digestible and educational materials that highlight the field and its enormous potential for improving the health and well-being of Canadians.

➤ **Promoting Scientific Talent** — In 2021, SCN celebrated its 20th anniversary. Recognizing this milestone, we launched a special commemorative feature on our website entitled ‘20Q20.’ To provide insight into the people who make up our Network, we interviewed SCN investigators and trainees. We discovered that many of them immigrated to Canada as children or young adults. Beyond science, they also have a diverse set of interests and come from all regions of Canada. Overall, they are talented, passionate and committed to using science to improve health. Over the next three years, we will continue to profile our community by utilizing online platforms and a variety of communication tools and mediums. We will also work to ensure our scientific experts can shine on national and international research stages by strategically promoting them through conferences, symposia, workshops and other media and digital forums to showcase their expertise to the world.

Section 2.0 Summary

Independently and collectively, these three pillars and their programs and initiatives have been designed to ignite, empower and activate growth across the sector — putting real firepower into Canada’s regenerative medicine sector to ensure a full research pipeline that can continue delivering innovative therapies for all people.

In the months, years and decades ahead, the Stem Cell Network aims to further strengthen and position Canada and its scientists at the forefront of innovation and translational research. Through **IGNITE 2022–2025**, we are putting in place a solid foundation that will anchor our nation’s position in the RM sector for decades to come.

SCN Researcher Profile: Dr. Nika Shakiba

Tapping into the potential of stem cells



DR. NIKA SHAKIBA

Dr. Nika Shakiba is a promising early career researcher who supports the search for treatments for countless conditions thanks to her bio-engineering expertise. Through synthetic biology, she aims to control the fate of stem cells, which may help researchers develop improved cell manufacturing processes and better control stem cells in tissues and organs.

Originally from Iran, Dr. Shakiba moved to Canada at age two, grew up and studied in Toronto, and at MIT in Boston. Vancouver is now considered her home base as she opened her own lab at the School of Biomedical Engineering (SBME) at the University of British Columbia (UBC).

Her lab team is exploring the social lives of stem cells, seeking answers to questions such as: When do [stem cells] get along? When do they feel they need to bully each other? and What are the genetic rules, the genes that lead some stem cells to become bullies, actively killing off their neighbours? In Dr. Shakiba's view, "By better understanding these questions, we can program specific rules and give rise to new types of stem cells that can be cooperative or even competitive when the situation requires."

Stem cells captured her natural curiosity and how they could change healthcare for the better. As such, Dr. Shakiba is driven to find answers and follow her curiosity. She says, "How could it be that this one cell has so many amazing abilities and can transform into different cell types? How can we learn to speak its language? To convince it to become a particular cell for a regenerative medicine application." This is the great challenge for stem cell and regenerative medicine researchers.

When asked about the field's potential, she notes, "By learning how to isolate and control stem cells through research, we're unlocking potential therapies to fight degenerative diseases and treat previously incurable conditions like blindness, diabetes, spinal cord injuries and beyond. It's an exciting time. With support from SCN, I am honoured to dedicate my career to the pursuit of better health!"

"How could it be that this one cell has so many amazing abilities and can transform into different cell types? How can we learn to speak its language?"
This is the great challenge for stem cell and regenerative medicine researchers.

– DR. NIKA SHAKIBA



3.0 | Partnerships

Partnerships are an important focus for the Network and essential for delivering on SCN's three core pillars described in Section 2.0. SCN partners include industry, research institutions and hospitals, not-for-profit organizations and foundations. Going forward, over the 2022–2025 period, our objective is identified as follows:



OBJECTIVE

Engage in national and international partnerships that will benefit and accelerate growth of Canada's stem cell and regenerative medicine ecosystem

During the last strategic planning period (2019–2022) partnerships helped drive an additional and impressive \$20 million into the stem cell research ecosystem. Over the years, partnership support has steadily risen — with increased interest and engagement from the industry sector. For the last 2019–2022 period, SCN realized an 11 percent increase in industry partnerships.

For this strategic plan, partnership activity is broken down according to SCN's program pillars:



Research Partnerships — Across SCN's research programs, we require that funding applications include partner support through in-kind and cash contributions. This helps ensure others are invested and interested in moving the work forward. It is also considered an indicator of translational merit. We understand that early-stage research may not attract the

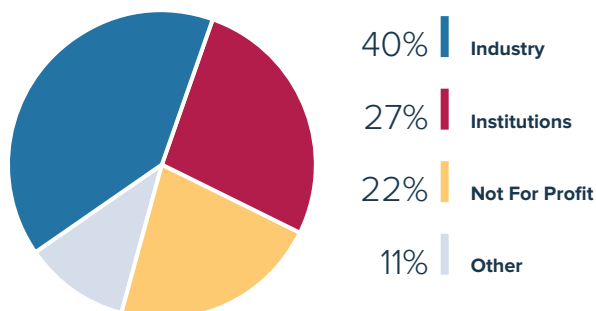



FIGURE 2: SCN's Partnerships Breakdown 2019-2022

same level of partnership as an advanced research program or clinical trial. We also know early career and ELSI researchers may be limited in their ability to attract significant partner contributions. These factors are considered during the strategic reviews conducted by the Research Management Committee (RMC). That said, SCN principal investigators (PIs) have a track record in identifying high-quality partnerships — including those with industry, charities and foundations — that provide in-kind or financial support for Network-funded projects.

Beyond seeking investigator-initiated research partnerships, SCN values organizational-level partnerships which contribute to advancing research knowledge and building new synergies and collaborations. By working with organizations such as the International Stem Cell Initiative (ISCI) and the International Stem Cell Banking Initiative (ISCBi), we hope to profile Canadian research excellence globally in areas such as rigour and reproducibility in stem cell research. Through efforts with our national partners at the Canadian Institutes of Health Research (CIHR) the National Research Council (NRC) and Genome Canada, we will scope a plan for joining an international consortium focused on gene therapies for rare disease. Led by the Foundation of the National Institutes of Health (FNIH), this emerging initiative seeks to address the development of gene therapies from development to regulatory approval. Notably, the consortium model offers an opportunity to bring affordable gene therapies for rare diseases to patients who would not otherwise be able access or benefit from them.

 **Training Partnerships** — Training partnerships will remain a hallmark for delivering quality and meaningful experiences for SCN's next generation of talent. We look forward to being part of initiatives such as the Canadian Organ Repair and Regeneration Training Program (CanORRG) which is an evolution of the Training Program in Regenerative Medicine (TPRM) managed by the University Health Network. CanORRG will tap into the expertise of SCN investigators as trainers and will provide leading-edge and interactive training for HQP wishing to develop careers in regenerative medicine. Additionally, partnerships with the Juvenile Diabetes Research Foundation (JDRF), the UK Regenerative Medicine Program and Mitacs provide opportunities to offer specialized fellowships, international lab exchanges and industry internships.

We will work with partners, such as CellCAN and its spinout the Canadian Advanced Therapies Training Institute (CATTI), BioTalent Canada and BioCanRx, on initiatives relevant to biomanufacturing and translating cell and gene therapies. We anticipate future collaborations with entities such as adMare BioInnovations, STEMCELL Technologies, and the Centre for the Commercialization of Regenerative Medicine (CCRM) to provide our trainees with the commercialization and business skills they need to move intellectual property forward and, ultimately, into the marketplace.

Going forward, SCN will also strengthen its partnerships with companies in the growing Canadian RM biotech sector such as BlueRock Therapeutics, Notch Therapeutics, and Aspect Biosystems, to prepare academic talent to fill industry career opportunities.

➤ **Knowledge Mobilization Partnerships** — To broaden our public reach in the coming years, SCN will seek out opportunities to collaborate with patient organizations to develop materials and provide interactive sessions between RM researchers and patients. We will also continue collaborating with Let's Talk Science and our trainee community to deliver the StemCellTalks program for high school-aged students. Beyond these efforts, SCN will seek out new partners wishing to collaborate on delivering content and programs to underrepresented or underprivileged groups that may not otherwise have access to the regenerative medicine field.

Section 3.0 Summary

Partnerships make our Network stronger and our impact more meaningful. The work we will advance over the next three years will set the stage for further growth over the coming decade and ensure Canada's RM community is well-positioned as a leader in the global research domain and for the benefit of all.

SCN Researcher Profile: Massimiliano Paganelli

Stem cells offer huge potential



DR. MASSIMILIANO PAGANELLI

Scientist, husband and lab partner, father and entrepreneur, Dr. Massimiliano (Max) Paganelli wears many hats. Originally from Italy, born and raised in Rome, he then moved to Belgium in 2008 before relocating to Canada in 2012 where he is an active member of our Network. We sat down with Max to discuss stem cell research and his career.

What are you researching right now?

I'm using stem cells to develop new treatments for liver disease, the broad aim of my research. We have several different diseases we're tackling. For example, we are studying Tyrosinemia type 1 — a rare disease more commonly found in Québec (in both children and adults) compared to the rest of the world. We're also researching other pediatric diseases, mostly congenital forms of liver fibrosis and cirrhosis.

We use stem cells to model diseases by growing small livers in the lab to reproduce what happens in the liver so we can understand how to improve treatments. The most important part of my research is oriented towards

treatment of liver failure, the final outcome of most liver diseases in children and adults. As the liver has more than 500 functions, liver failure has a big effect on the body; it causes major complications affecting critical organs, ultimately leading to death. We are developing a new cell therapy to treat liver failure at large. Without focusing on any specific disease, we are trying to address the hardest and most severe consequences of liver failure. This is the technology that triggered the birth of Morphocell Technologies, a regenerative medicine start-up company I founded with Dr. Claudia Raggi.

What attracted you to stem cells?

Basically, that they are an unlimited source of cells that come with huge potential to generate tissues in the lab without getting donor samples. This is a major tool for modelling diseases and developing new treatments. Since stem cells can become any tissue, they bring with them a patient's genetic material and information. So, when we don't know what causes a disease, we can use a patient's stem cells to recreate a 'liver-in-a-dish.' We can harbour the patient's genetic background and study the disease in the lab while assessing new and/or personalized treatments.

What's the most significant moment in your research career?

When I succeeded in convincing my wife (Dr. Claudia Raggi) to work with me in the lab. It wasn't easy to convince her, but it has been the key to our success. Claudia is a uniquely talented medical doctor and scientist who has been my equal partner in science, as in life, for the last 14 years. [Together] we managed to develop all the technologies we're using now for cell therapy and on which Morphocell Technologies was created.



4.0 | Governance, Operations, Equity, Diversity & Inclusion

The Stem Cell Network is managed by a professional staff focused on the efficient and effective delivery of SCN's mandate and programs. In this strategic planning period, SCN will review and scale the staff complement and governance structure to ensure it aligns with the rollout of this strategic plan, **IGNITE 2022–2025**. This will be achieved with expert external advice and adhering to SCN's obligations to the Government of Canada.

Members of our board of directors and management team act in accordance with the requirements of provincial and federal laws relevant to not-for-profit organizations in Canada, including the *Canada Not-for-Profit Corporations Act*. As a governance board, our directors provide oversight for strategic planning, annual budgets, performance management and risk mitigation. Our board is also responsible for confirming the research funding recommendations of SCN's Research Management Committee (RMC) and ensuring due diligence has been met in reviewing all research funding applications. The board meets up to four times per year. It provides required direction, insight and approvals — valuable assistance that will, going forward, continue guiding the Network's management team as SCN works to operationalize the elements included in this strategic plan.

Directors are permitted to sit for a maximum of six years over two three-year terms. Annually, members of the Network — universities, research institutions and hospitals — meet to confirm the board's membership. The majority of our directors are independent, with no material relationship to, or direct benefit from, Network activities.

As SCN pursues its growth strategy, we will also be assessing the required expertise for our RMC and will refresh the Terms and Conditions for this committee and its membership. This strategic refresh will assist SCN in ensuring critical research investments are directed to projects with the highest potential for meaningful impact and that align with the Network's overall translational mandate.

Additionally, SCN will establish up to four new advisory committees. These include a policy and regulatory advisory committee, an Equity, Diversity and Inclusion (EDI) committee, an industry advisory council and a patient champions team. As SCN continues evolving and growing its mandate, these new committees will be invaluable in helping ensure the needs of the Network's community continue being met. They will also help cement EDI values within all SCN operations and programs.

Equity, Diversity and Inclusion:

Since 2018, SCN has been actively integrating EDI principles into its programs and annual activities. For example, EDI plenary talks are now a standard offering at our annual Till & McCulloch Meetings where every effort is given to ensuring balanced plenary panels that consider gender balance and diversity.

SCN also requires that anyone seeking research funding build project plans that integrate sex and gender considerations into their work and employ a project team that is inclusive and diverse. These considerations are, in turn, evaluated during the scientific peer review process and factored into a project's final score. In other words, the Network's commitment to EDI is absolute.

Before COVID-19, SCN worked with its partners to host specialized regional events addressing specific equity, diversity and inclusion elements. These events were well-attended and an increasingly popular Network offering. As we move beyond the pandemic, SCN looks forward to re-introducing interactive EDI programs.

For example, we hope to bring a UK-based program, *Daring to Dare*, to Canada. This unique program is targeted at early career researchers, postdoctoral researchers and PhD students who may feel uncertain about their career paths due to bias, societal expectations, personal experience and/or confidence. The program's ethos is that through conversation, reflection and strategic goal-setting, women and underrepresented groups within the research field can strategically plan and act in their chosen direction in ways they would not have previously believed themselves capable. This programming will be offered for a subset of the Network community starting in 2022.

SCN will also be working to ensure all its funded investigators receive EDI training. In spring 2022, SCN will hold an in-person meeting for its funded investigators and collaborators. This will include a half-day of interactive training that will build skills and offer tools to further develop a research culture of inclusive excellence. Following this event, SCN will seek community input on specific topics they would like the Network to address going forward. We will integrate further education and training into annual planning.

At the governance level, SCN has made important strides to address gender and racial diversity on its board of directors. Today, women make up 62 percent of our board. As we look ahead, we will continue applying an EDI lens to board recruitment. The same holds true for the refresh of our Research Management Committee membership.

In the coming years, we believe a real opportunity exists to advance EDI and further develop a Network that embraces all people regardless of sex, gender, race, religion or ability. To that end, SCN will seek out champions to assist and advise the board and management about programs, guidelines and practices that can be implemented or developed. We believe this is paramount to ensuring EDI is embedded in all SCN activities.

SCN'S 2022 EDI STATEMENT

The best science is inclusive science. The Stem Cell Network is committed to cultivating and preserving a culture of inclusion, diversity, equity and accessibility. We value the individual differences, lived experiences, expertise and knowledge of those in our community. We welcome the unique contributions of partners, employees and community members regardless of age, ancestry, culture, gender identity, physical ability, race, religion and sexual orientation. Together, we are powering regenerative medicine for the benefit of all.



5.0 | Measuring Performance

In 2020, the Stem Cell Network underwent an extensive five-year evaluation by the Government of Canada to assess its relevance, performance and efficiency. This evaluation concluded that SCN remains a highly effective and efficient network that provides important value and benefit for Canada.

As we look to the future, SCN has updated its core objectives (listed in brief at the beginning of **IGNITE 2022-2025** and as follows in Table 1). These objectives are at the heart of this plan and will be carried forward into SCN's yearly corporate plans and annual reports. SCN will also maintain a performance management strategy that will serve as a high-level framework for addressing progress. As our performance management strategy is monitored and updated annually, it is not embedded in this document. Rather, it will be maintained by SCN management in conjunction with relevant government officials.

OBJECTIVES	EXPECTED THREE-YEAR OUTCOMES	EXPECTED LONG-TERM OUTCOMES
<p>WORLD-CLASS RESEARCH</p> <p>To fuel world-class stem cell and regenerative medicine research, across the research continuum, and enable its translation for the benefit of Canada</p>	<p>We will launch a suite of RM research programs that will spur innovative therapies and technologies to improve health outcomes in the years ahead</p>	<p>We are powering the development and translation of regenerative medicine therapies for people across Canada and around the world</p>
<p>TRANSLATIONAL RESEARCH</p> <p>To build world-leading expertise in the translation of regenerative medicine and stem cell research</p>	<p>We will establish greater knowledge and capacity for translational research activity in the RM field</p>	<p>We are leaders in translating RM and bringing novel cell and gene therapies to the bedside</p>
<p>TRAINING</p> <p>To train highly qualified personnel to be scientific and industry leaders able to position Canada at the forefront of regenerative medicine</p>	<p>We will provide leading-edge training that will give highly qualified personnel a leading edge for careers in academia and industry</p>	<p>Our HQP are globally respected, in demand and innovating the RM therapies and technologies of tomorrow</p>
<p>PARTNERSHIPS</p> <p>To engage in national and international partnerships that will benefit and accelerate growth of Canada's stem cell and regenerative medicine ecosystem</p>	<p>We will establish durable partnerships that will further grow the Network and accelerate RM-related activity</p>	<p>We are a respected and trusted partner that has delivered on meaningful partnerships that are fuelling RM activity across Canada and beyond</p>
<p>GO-TO RESOURCE</p> <p>To deliver trusted and evidence-based information as Canada's foremost resource for stem cell and regenerative medicine science</p>	<p>We will develop a suite of initiatives, products and practices that can be used to foster understanding and trust about regenerative medicine and inform policy and regulatory activities</p>	<p>We are regarded as a trusted resource for evidence-based information on the state and future potential of RM</p>



6.0 | The Road Ahead

Now is the time to launch the next chapter in the Stem Cell Network's storied history of catalyzing stem cell research, and positioning Canada and Canadian-based research and know-how at the forefront of the burgeoning field of regenerative medicine. **IGNITE 2022–2025** is about fuelling activity and tapping into that potential. It is about growing the Network, building on the solid foundations SCN has helped foster in its first 20 years, and setting our direction for the coming years.

Everywhere we look today — in online, traditional, and social media, and among patient groups, families and health care providers — stem cells are the promise of the future. Synonymous with the promise of better health, they are vital to unlocking effective treatments in areas such as Type 1 diabetes, retinal degeneration, muscular dystrophies, and neurodegenerative diseases such as Parkinson's and multiple sclerosis.

Across the Network, we steadfastly believe in the promise of stem cells and regenerative medicine. Though it will invariably take time, effort and knowledge before innovative new treatments are widely available, at SCN we believe in investing in research, training and knowledge mobilization — in other words, investing in the people doing the research. Only in so doing, will we rapidly accelerate treatments from the lab bench to the bedside.

At a time when countries across the globe are competing for the world's top talent, in the field of stem cells and regenerative medicine that talent is choosing Canada. Many of the scientists and researchers who initially come to Canada to study or undertake intensive research, including several featured in this strategic plan, elect to stay, viewing Canada as a place to grow their ideas and turn them into reality. In the global quest for better health and to advance knowledge-based economies, this 'made-in-Canada' know-how serves Canadians well. It also attests to why Canada is considered among the top three countries globally in the field.

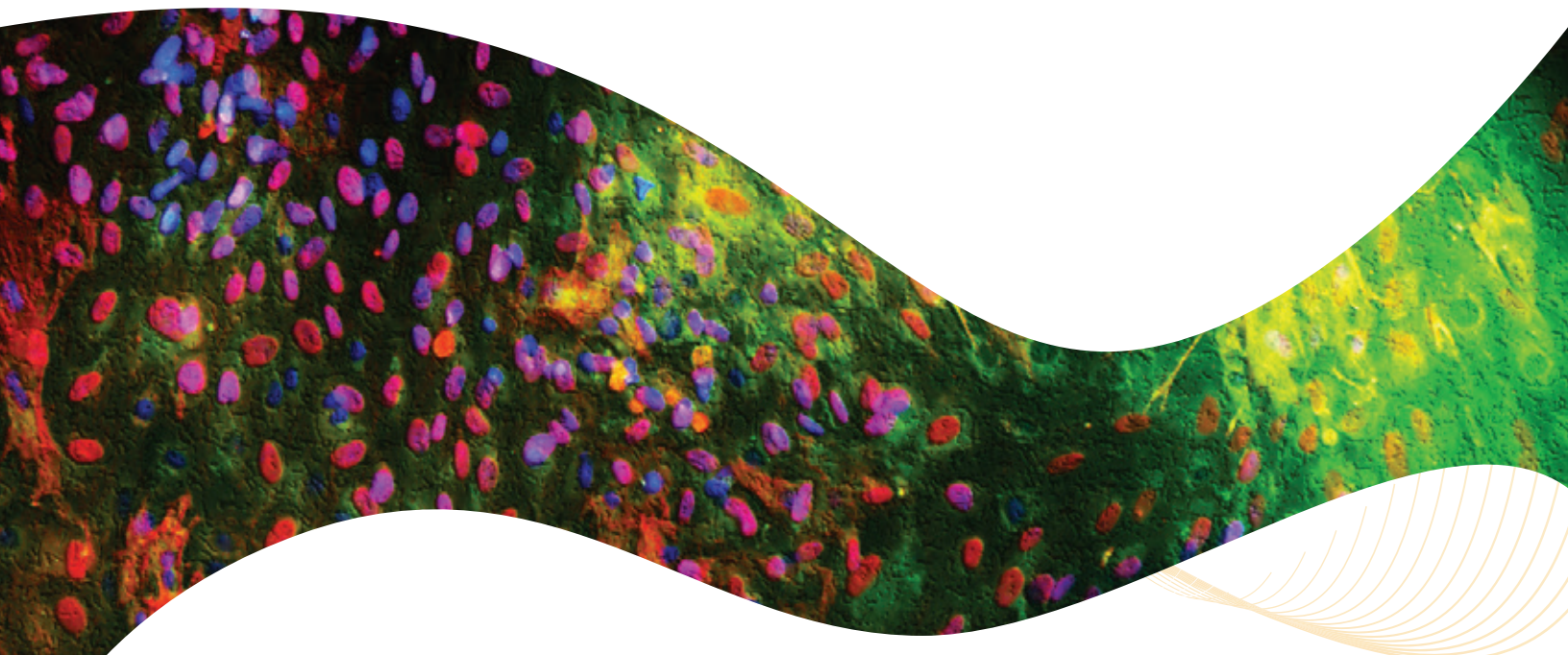
When SCN was first launched in 2001, the stem cell research community was scattered and siloed across the country. The Network began with a small group of investigators. Canada's stem cell science

enterprise was in its infancy and knowledge was only beginning to build. SCN's leaders knew that to be successful, partnerships and strong networks would be critical. Over the years, SCN has worked tirelessly to build a robust national network through programs that stressed collaboration and a multi-disciplinary approach for moving stem cell science forward.

IGNITE 2022–2025 is our roadmap for SCN's future. Equipped with a renewed vision and bolstered by three years of federal funding, we will continue building the Network based on hallmarks that have served us well — including a commitment to fostering community and collaboration, managing research and engaging stakeholders.

Along the entire research continuum, at all stages of the research pipeline, from innovation to translation, policy and society to commercialization, we will mobilize the knowledge, ideas and people that make research happen.

Whether you are a scientist, university student contemplating a career in science and stem cells, a patient taking part in one of our SCN-funded clinical trials or a member of the public interested in learning about where the future of health care is headed, we invite you to join us on this exciting journey — over the next three years and well into the Stem Cell Network's future.





**Stem Cell
Network**

**Réseau de
Cellules Souches**

Powering Regenerative Medicine.