

**STEM CELL
NETWORK**

Tomorrow's health is here.

TRAINING TOMORROW'S RESEARCH LEADERS

An Impact Analysis of the Stem Cell Network's
Training Program

Disclaimer

Every effort has been made to ensure the information in this document is accurate and current at the time of publishing.

Surveys were conducted, information gathered and report drafted before the world was fully aware of the implications of the SARS-CoV-2 (Coronavirus) pandemic. As a result of this international crisis, some information in this report regarding employment projections of the near future may need to be re-assessed.

All figures cited in this publication are in Canadian dollars unless otherwise stated.

Table of Contents

Executive Summary	3
1.0 Introduction	8
1.1 Background.....	8
1.2 Report Objectives.....	9
1.3 Methods	9
2.0 HQP Employment – Results and Analysis.....	10
2.1 Data Summary – An Overall Review	10
2.2 Results	13
2.3 Employment Trends	15
2.4 Employability	21
3.0 Training Value and Career Development.....	23
3.1 Methods	23
3.2 Results	23
3.3 Survey Responses	24
4.0 Conclusion.....	27
Appendices	28
Appendix A. Quotes.....	28
Appendix B. Table	31

Key Definitions

Biotechnology/pharmaceutical — An employment sector that includes individuals working in companies primarily identifying as contributing to the biotechnology, pharmaceutical or medical device industries. It also includes individuals working in contract research organizations (CROs). This sector represents highly qualified personnel (HQP) who pursued careers specifically in science-based research and development industries.

Employment sectors — Areas of the working economy that include various, inter-related occupations.

Government and legal — An employment sector that includes HQP working in governmental institutions, the public service or legal firms. Law and public service workers are grouped together to represent the SCN's ELSI community. ELSI stands for "Ethical, Legal and Social Implications" and play a large role in advancing stem cell research and development as it applies to public policy, society and the law in Canada. Individuals in this sector may, among others, be government scientists for the Public Health Agency of Canada, policy analysts for Global Affairs Canada or associate lawyers specializing in health law.

Highly qualified personnel (HQP) — Individuals with at least a bachelor level education or higher. These individuals are highly educated and skilled in a specific area of study. Through its training programs, the SCN seeks to support HQP by further developing their skills and increasing their employability and mobility across employment sectors. A **professional** HQP refers to individuals who have concluded their post-secondary education or training and are employed full time. Meanwhile, **continued training** refers to HQP whose post-secondary education or training is ongoing. This differentiation is important as a large group of SCN trainees are in continued training but not necessarily employed.

Medical practice — An employment sector employing HQP in some capacity to deliver health care or a related service. This includes physicians, pharmacists, dentists and medical doctors. Under this umbrella, HQP work in clinics, their own private practices or cooperative groups with like-minded colleagues. Their primary focus is not on medical research but health care service delivery to the public in a non-hospital setting.

Non-profit/charity — An employment sector that includes individuals identified as working for non-profit organizations or charities, in that their organizations' primary objective involves investing resources in a cause to effect change. The non-profits and charities employing Stem Cell Network HQP are committed to health and research issues surrounding, for example, cell therapies, palliative care and science policy.

Private sector — An employment sector comprised of individuals and companies running for-profit businesses not controlled by the government.

Self-employed — Refers to a select number of independently employed HQP in their own small-scale businesses. They may, for example, provide freelance consulting for institutions or individuals on technical or communicative matters. In this report, this group is considered its own employment sector.

Trainee — A highly qualified professional who has attended or participated in SCN-supported training programs. Trainees are identified as being **Canadian** or **International**. Canadian trainees hold Canadian citizenship or permanent residency in Canada whereas International trainees are temporary residents and include individuals holding classes of permits (such as Temporary Student and Temporary Worker permits).

Training programs and workshops — Include training supported by the Stem Cell Network, such as the annual Till & McCulloch Meetings (TMMs), the strategic Training Program in Regenerative Medicine (TPRM), SCN workshops, laboratory exchanges and hands-on laboratory training.

Universities, hospitals and research institutes — An employment sector that includes individuals employed in post-secondary institutions offering undergraduate, graduate and doctoral studies; hospitals delivering service and research; and research institutes primarily involved in producing scientific knowledge through research. The line that distinguishes universities, hospitals and research institutes is difficult to define, which is why this report regards them as one employment sector. Many, if not all hospitals and research institutes, are affiliated with universities that facilitate academic research in a translational health context.

EXECUTIVE SUMMARY

About the Stem Cell Network

The Stem Cell Network (SCN) is a national, not-for-profit organization that supports stem cell and regenerative medicine research, training and knowledge mobilization.

Stem cell research leads to increased understanding of how diseases occur and how future treatments could be developed. Stem cells are able to grow into other cell types, which could be used in regenerative applications to treat and possibly cure many diseases. As noted in a report by the Council of Canadian Academies in 2018, “The appeal of regenerative medicine lies in its curative approach, which involves treating the causes of a range of conditions by targeting the repair of damaged tissues or organs themselves.”¹ Today, the global market for regenerative medicine is predicted to reach \$81 billion by 2023.²

A primary goal of the Stem Cell Network involves translating science into broader ideas and applications that will benefit all Canadians — from the lab, to clinical applications, commercial products and public policy.

Another critical function of SCN’s mandate involves supporting the training of the next generation of highly qualified personnel (HQP) who will lead and grow Canada’s regenerative medicine sector. As they progress in their careers, they become the researchers developing new therapies, novel technologies and insightful research that will inform policy development in the years and decades ahead. To date, SCN training programs have focused on three key areas:

Advancing scientific and core skills, which involves providing advanced training in technical and soft skills, lab exchanges and workshops;

Commercialization and industry integration, which involves developing skilled scientists and technicians equipped with both the business and legal knowledge required to commercialize products; and,

Clinical translation, which supports trainees and researchers interested in transitioning a discovery into clinical trials as easily and rapidly as possible.

SCN delivers its training programs in conjunction with key partners, with the overall goal of supporting highly qualified personnel in the Canadian regenerative medicine industry.

¹ Council of Canadian Academies, 2017. Building on Canada’s Strengths in Regenerative Medicine, Ottawa (ON): Workshop Report, Council of Canadian Academies.

² Source: <https://www.globenewswire.com/news-release/2019/02/20/1738123/0/en/Global-81-Bn-Regenerative-Medicine-Market-Analysis-Forecast-to-2023.html>

About This Report

As Canada continues building a knowledge-based economy with a skilled workforce, evaluating the training opportunities provided through programs offered by universities and specialized networks such as SCN is vital. Accordingly, from November 2019 to the end of February 2020, SCN undertook a review that entailed tracking 1,500 of 3,000 HQP supported by Stem Cell Network training between 2001 and 2019.

This report explores how that training and SCN have impacted the career trajectories of those trainee cohorts with the goal of better understanding: what types of jobs they are attaining, where they are working, whether gender-based differences exist and their overall impressions of their training. Going forward, these findings will be beneficial — not only to the Stem Cell Network, but for industry, government and other key stakeholders interested in understanding labour market trends and the flow of highly qualified personnel into the stem cell and regenerative medicine fields in Canada.

Since 2001, SCN has offered an estimated 7,000 training opportunities to approximately 3,000 trainees. While these opportunities undoubtedly support highly qualified personnel in the stem cell and regenerative medicine field, the bigger question is how such opportunities affect career paths?

Approach

Answering this question called for adopting two different approaches. First, 1,500 SCN trainees (the majority being PhD level graduate students or graduates and post-doctoral fellows, and the minority holding master's and undergraduate level education) were tracked using publicly available online sources. This involved gathering employment-related information (current employer, job title, field of study, employment location). This information was subsequently organized in a comprehensive database and, in turn, used to discern employment statistics and trends. To identify employment trends, data was organized into four cohorts based on the years that HQP participated in SCN training (with each cohort consisting of a five-year period: 2001-2005, 2006-2010, 2011-2015, 2016-2019). Dividing the data into these cohorts reveals a relationship between time and employment. It also suggests how career paths and areas of employment may change over time.

Second, a survey was sent out to 55 current and former trainees. Personally contacted by email, they were invited to complete a survey that would yield qualitative data about their SCN training. Beyond asking trainees to provide some employment information, the survey offered them an opportunity to capture their thoughts in a short text (maximum 300 words) detailing their impressions about how SCN training had contributed to their careers. With a 100 percent response rate, surveys were then analyzed for common themes.

Beyond the survey responses, this study considered letters drafted by trainees to the former federal Minister of Science in late 2018 and early 2019 detailing the value of their SCN training. This correspondence proved especially valuable in shining a broader light on their general impressions of SCN, the organization's specific impact on their careers and its overall influence on the Canadian stem cell and regenerative medicine field.

Overview of Findings

Based on the materials gathered, this report finds trainees employed across various sectors in highly skilled positions.

The majority of HQP participating in SCN training, called SCN trainees, elected to pursue employment in universities, hospitals and research institutes in research roles. Fifty-eight percent of working SCN trainees currently work in universities and research hospitals, with 19 percent working in industry (including biotechnology and pharmaceutical companies). Findings show that other employment sectors include government, law and policy (7 percent); private sector companies unrelated to science, with careers in business, finance, communications and consulting (6 percent); and the not-for-profit and charity sectors (4 percent).

Among SCN trainees, gender balance has been relatively consistent since 2001; an average of 55 percent of trainees identified as women. This report also finds that both men and women generally move into the same employment sectors. Evidence suggests, however, that women are leaving academia for other sectors at a greater rate than men. Compared to men, women are much less likely to be employed in university faculty positions. It would be reasonable to conclude this would negatively impact Canada's research institutions — particularly the benefit of having a more diverse workforce.



The workshops and networking activities that are organized every year during the Till & McCulloch Meeting provide a wonderful opportunity to strengthen the soft skills that are integral to any successful career in academia, industry or communications, but that are sometimes lacking from graduate training programs.

— Erika Kleiderman, Academic Associate at the Centre of Genomics and Policy, McGill University / PhD Student (Bioethics), Université de Montréal

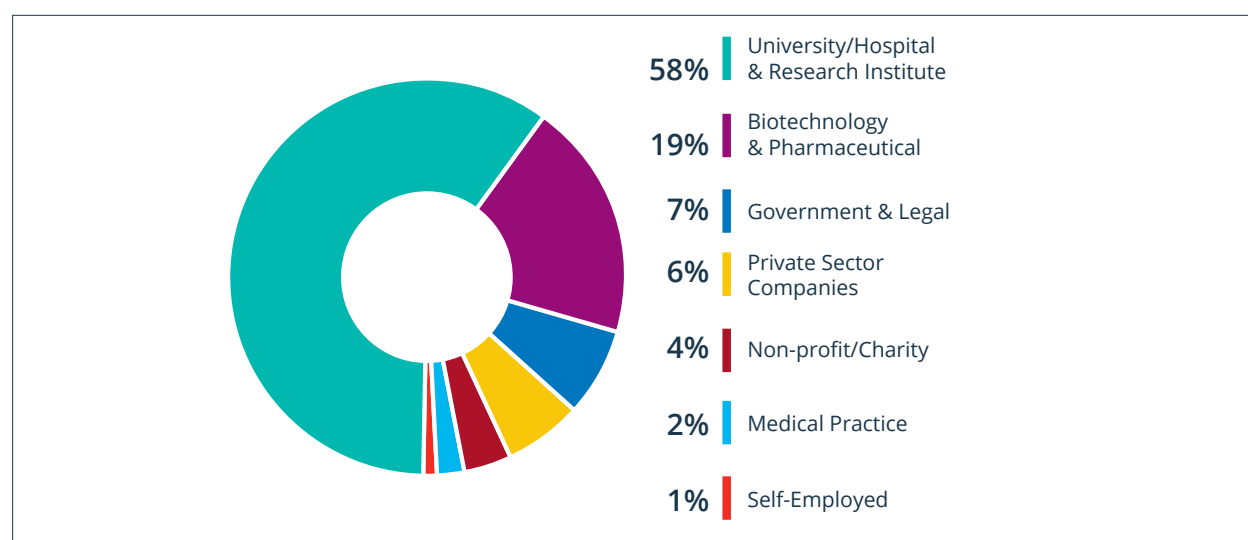


Figure 1. Employment sector breakdown: Employment sectors where SCN trainees currently work. Universities and research hospitals employ the largest number, followed by the biotech and pharmaceutical industry.

SCN’s records offer critical insights into trainee citizenship status. Eighty percent of trainees were Canadian citizens or permanent residents at the time of their SCN training, and approximately 82 percent of trainees have since opted to remain in Canada for work following their SCN training. This would suggest the skills, knowledge and expertise they acquired are: i) of high value to industry, and ii) lead to meaningful employment in Canada. It is also important to note that SCN trainees who were temporary residents during their training are more likely to work in Canada, having remained in the country following their training.³ The overall effect is that SCN trainees can and are contributing to and strengthening Canada’s knowledge economy.

To supplement this quantitative data, 55 trainees were invited to complete a survey about their SCN training. Of those 55 responses, all trainees suggested they would recommend SCN training to others.

Not only is this an excellent indicator for how trainees view SCN training and its benefits, but it also suggests the majority of trainees found meaningful value in their SCN training for career development and progression.

To better understand perceptions of their SCN training, trainees’ long-answer responses were carefully analyzed. Among the most common words cited in their answers were: research (42 mentions); training (38); opportunity (34); network, excluding Stem Cell ‘Network’ (27); and career (27). The word ‘helped’ appeared 23 times in responses, with ‘skills’ appearing 19 times and ‘valuable’ 15 times.

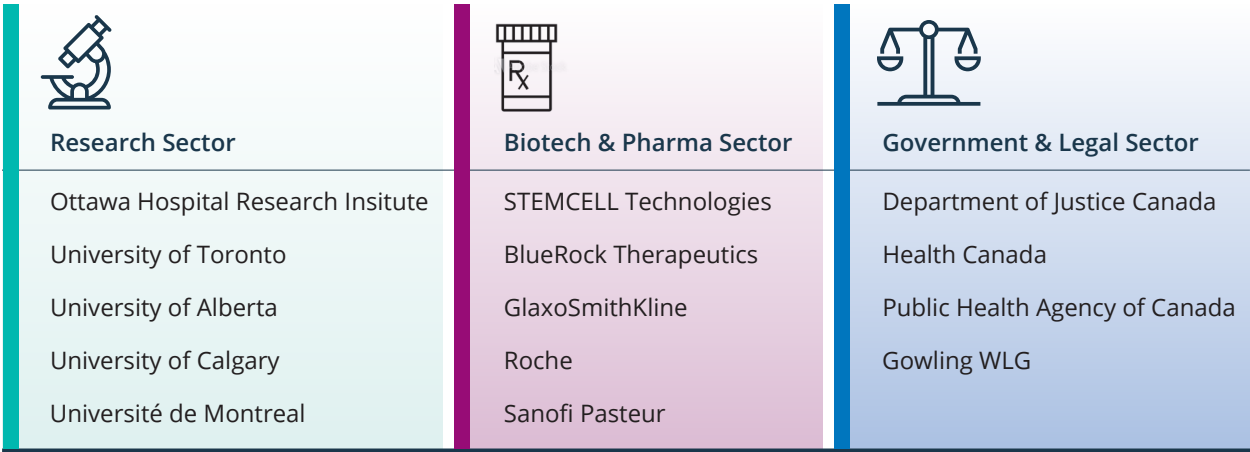


Figure 2. Top employers by sector: The top employers by sector that employ SCN trainees.

³This data was gathered from publicly available online sources and organized into a comprehensive database in order to quantitatively produce employment statistics.

Beyond seeing a common theme across responses, trainees viewed their SCN training as overwhelmingly positive. Their responses suggest they view professional networking, technical and soft skill development and career inspiration as the three most valuable takeaways from their overall SCN training experience — takeaways that have been especially vital to their career development.



These experiences have been invaluable in my career development and recently helped me to obtain a faculty position at McGill University.

— Natasha Chang, PhD, Assistant Professor,
Department of Biochemistry, McGill University

Conclusion

SCN trainees are largely finding employment in highly skilled positions in translational health research, industry and federal government agencies.

When asked about the value of SCN training, trainees credited it with significantly bolstering their career development by equipping them with applicable skills, a professional network and career direction. According to those surveyed, SCN training is unique and valuable, offering opportunities that would otherwise be unavailable.

Since 2001, when it welcomed its first cohort of trainees, the Stem Cell Network has contributed greatly to supporting young professionals and the next generation of regenerative medicine leaders. As SCN looks forward, into the century's second decade, that imperative remains unchanged.

1.0 INTRODUCTION

The Stem Cell Network (SCN) is a national, non-profit organization that supports stem cell and regenerative medicine research, training the next generation and public outreach across Canada. SCN is dedicated to enabling the translation of stem cell research into clinical applications, commercial products and public policy. Since 2001, SCN has directed an investment of more than \$100 million of strategic funding that has benefited approximately 175 world-class research groups and 3,000 trainees, catalyzing 24 clinical trials. Part of SCN's mandate involves supporting development of the next generation of highly qualified personnel (HQP) through multiple training programs. These HQP, supported by SCN, will lead and grow Canada's regenerative medicine sector by developing new therapies, novel technologies and insightful research to inform policy development.

1.1 Background

Since 2001, thousands of researchers have participated in SCN training programs. Many of these individuals remain involved with SCN, regularly taking part in the annual Till & McCulloch Meetings (TMM) and other events, workshops and training programs. Training programs that SCN supports include technical and professional skill development workshops, hands-on lab training, lab exchanges, communication and networking training at TMM, and the strategic Training Program in Regenerative Medicine (TPRM). Through these core training programs, SCN trainees develop their technical and professional skill sets and contribute meaningfully to the stem cell and regenerative medicine field.



2019 Till & McCulloch
Meetings, Montréal, QC

Currently, the picture of how training in the stem cell and regenerative medicine field impacts employment is incomplete. A recent University of Toronto study assessed the employment trends of its PhD graduates, including job titles and employment sector, to determine graduate employability and where they would most likely gain employment following graduation.⁴ A similar study conducted by Dr. Meghan McMahon, also from University of Toronto, included multiple universities and their

⁴University of Toronto School of Graduate Studies "10k PhDs Project." University of Toronto, 2016.

PhD graduates in health services and policy-related fields.⁵ Both studies sought to identify employment trends for PhD graduates in the field of health and life sciences; this included looking at the decreasing number of PhD graduates working in academia and the growing tendency to work outside academia despite a lack of professional training in graduate schools (McMahon et al, 2019). However, neither study specifically addressed the trajectory of trainees in the stem cell and regenerative medicine sector or graduates receiving supplementary training outside their academic programs.⁶

Recognizing this knowledge gap, SCN sought to identify the career outcomes of Stem Cell Network highly qualified personnel to better determine how exposure to SCN training affected the career development and employment prospects of its trainees. Additionally, this report explores how SCN support has directly impacted trainees' career paths and early career development.

1.2 Report Objectives

This report's objectives are:

to identify the primary employment areas and job titles of SCN trainees which will, in turn, help determine where trainees are most likely to become employed and identify employment trends in the regenerative medicine field since 2001;

to define the value SCN offers its trainees, skills developed and professional growth acquired through their training; and,

to better understand the extent to which Stem Cell Network training programs have impacted the Canadian stem cell and regenerative medicine field overall, and the broader Canadian economy, by supporting and developing highly skilled and employable individuals.

Taken together, this information will enable readers to draw some meaningful conclusions about the value of the Stem Cell Network training program and its impact over nearly two decades.

1.3 Methods

For this report, trainee information from the 2001-2019 period was considered and includes all trainee data SCN holds. Over a three-month period, two primary methods were used to gather information: i) quantitative data was collected to identify employment information, and ii) an email survey captured qualitative data from former trainees about their experiences and the overall value of the Stem Cell Network.

⁵ McMahon, Meghan, et al. "The Career Outcomes of Health Services and Policy Research Doctoral Graduates." *Healthcare Policy* Vol. 15 Special Issue, 2019.

⁶ Supplementary training in this case refers to training programs, workshops, and events organized by SCN.

To gather the quantitative data, existing SCN files were accessed that included trainee names, email addresses, affiliated institutions, training year, level of study during training and gender for approximately 3,000 trainees who participated between 2001 and 2019. Due to time constraints, 1,500 profiles were subsequently created using this information as a base. Public sources were then used to bolster those profiles, capturing information about trainees' current employers, job titles/description and education levels.⁷ Data was then inputted into a comprehensive database.

Of the 1,500 identified trainees, complete information for 1,259 individuals was available through publicly available online resources. Subsequently, the equivalent number of complete profiles were created to capture trainee data and current employment information. Complete profiles contain information such as current employer and position, field of study, location and employment sector.

This data was entered into the study database for analysis and to generate relevant data charts and figures found throughout this report.

For the qualitative portion of this report, dedicated to defining training values, 55 trainees were contacted by email and invited to participate in a survey to help SCN determine the value of its training programs and how they contribute to young professionals and their careers. Those surveyed were asked to provide their names, employers' names, position titles and types of training/workshops in which they had participated. In their own words, they were also asked to summarize their views on the Stem Cell Network's value in furthering their careers and whether they would recommend SCN training to others. This qualitative framework is intended to offer valuable perspective on SCN training and adds important context to the value of training identified in this report.

Beyond the survey responses, SCN obtained letters written by trainees in 2018 and 2019 addressed to former federal Minister of Science Kirsty Duncan extolling the value of their Stem Cell Network training.

Across these various methodologies, SCN's intent is to better understand the value it creates for its trainees and their career development. By examining trainees' post-training career trajectory and how SCN has impacted their career paths, this report demonstrates that SCN is benefiting Canada's knowledge economy by developing the complex scientific, ethical and business skills needed to succeed in Canada's emerging regenerative medicine sector.

⁷The primary sources for this data included LinkedIn, university and employer websites, Twitter, and ResearchGate.

2.0 HQP EMPLOYMENT – RESULTS AND ANALYSIS

This section examines the quantitative data to gain better understanding of: i) the types of employment SCN trainees are obtaining, ii) those employment sectors drawing the greatest number of trainees and iii) employment trends and potential conclusions.

To identify how employment prospects for SCN trainees may have changed over the last two decades, this analysis examined the overarching trends across four cohorts. From the data collected, profiles were created and divided based on the last year trainees attended an SCN training program or workshop (2001-2005, 2006-2010, 2011-2015, 2016-2019); the rationale was that different cohorts may indicate employment trends or how employment preference has changed over time.

For this paper, highly qualified personnel currently undertaking post-secondary training are considered HQP in continued training, versus HQP who have concluded their training — considered HQP professionals.

2.1 Data Summary — An Overall Review

The majority of trainees participating in SCN training or workshops have progressed to work in universities, hospitals or research institutes. The line that distinguishes universities, hospitals and research institutes is difficult to define, which is why this report regards them as one employment sector. Many, if not all hospitals and research institutes, are affiliated with universities which facilitate academic research in a translational health context. Over half (58 percent) of professional SCN trainees have become employed in this sector, holding titles such as professor, research associate and clinical research coordinator. Academic and translational research remains the most popular type of work pursued by SCN trainees. That said, SCN highly qualified personnel are more likely to find employment in hospitals and research institutes than university faculty positions. Among SCN HQP professionals, 19 percent have been identified as working in the biotechnology/pharmaceutical industry in various positions. Within this sector, the largest group are working at the entry/mid-level (53 percent) while 38 percent are at the managerial level and 9 percent hold executive leadership positions.

Regarding gender distribution, both genders tend to be divided evenly across all cohorts. Since 2001, when the training was launched, there have been slightly more women trainees (~55 percent) — a factor that has remained consistent over nearly two decades. Meanwhile, gender distribution in employment sectors is nearly even, with women and men pursuing jobs in the same sectors; this said, men tend to be employed slightly more frequently in universities than women (see Table 1).

The SCN pool of trainees is predominantly Canadian (80 percent), yet 20 percent identified as international. Findings show that, regardless of nationality, SCN trainees are likely to remain in Canada following their training. Indeed, 82 percent of all SCN trainees are currently employed in Canada.

A reasonable estimation is that trainees remain in Canada as they find valuable opportunities and employment options within the country. By extension, it can be concluded there is minimal 'brain drain'; in other words, SCN-trained professionals are choosing to remain in Canada and, in turn, are positively contributing to Canada's growing regenerative medicine sector. Consequently, the biotechnology and pharmaceutical industry is turning out new companies, including: BlueRock Therapeutics, Aspect Biosystems, ExCellThera and Morphocell Technologies. These companies are all seeking highly skilled individuals to fill roles in a wide range of areas including bioprocessing, GMP manufacturing and supply chain logistics. A one-day snapshot of job openings available at BlueRock Therapeutics in Toronto on March 26, 2020 showed more than 30 opportunities — all requiring advanced knowledge and training. This high demand is not only allowing SCN trainees to find high-quality jobs but to remain in Canada as those opportunities are in the Canadian marketplace.

Overall, this study finds that Stem Cell Network HQP find employment in various areas — the most popular being health research positions at universities, hospitals and research institutes. Former SCN trainees working in this area include noted industry professionals such as Dr. Julie Lessard, principal investigator and associate professor at the Université de Montréal; Jennifer Knudson, clinical research coordinator at the Ottawa Hospital Research Institute; and Dr. Bill Ayach, cardiologist at the Vancouver Island Health Authority (now known as Island Health).

SCN HQP are also spearheading development of the regenerative medicine industry, working in translational roles in research and development or executive leadership positions.

This includes professionals such as Dr. Aarthi Jayanthan, chief operating officer of Phoenix Molecular Designs, a Vancouver-based biotechnology company; Dr. Véronique Lecault, director and chief operating officer of AbCellera, another Vancouver-based biotech company; and Dr. Karim Ghani, vice president and chief scientific officer of BioVec Pharma, a Quebec-based biotech company.

A smaller number of HQP work in more diverse roles, including public health policy and ethics; not-for-profit organizations focused on health issues and research; and other private sector companies (large and small). For example, Maroussia Lévesque is a senior policy analyst at Global Affairs Canada; Dr. Kalina Kamenova is founder and research director of the Canadian Institute for Genomics and Society, a non-profit that promotes responsible research and innovation in the biomedical research and health care fields; and Dr. Sophie Chargé is associate director at Canadian Blood Services.

SCN highly qualified personnel are employed in various highly skilled positions at all levels. In these positions, they contribute significantly to academic research, public policy and developing innovative therapies.

For example, Dr. Florian Bentzinger, leads a lab at Université de Sherbrooke, and focuses his research on testing top candidate pharmaceuticals for their ability to activate muscle stem cells in models of

muscular dystrophy, a group of muscle diseases that slows the growth of and breaks down muscle tissue. His team is researching a small circulating hormone that is highly efficient at stimulating muscle stem cells in multiplying and forming new tissue. Other therapies being developed by SCN researchers aim to treat diseases such as multiple myeloma, breast cancer, type 1 diabetes and brain damage.

2.2 Results

The collected data demonstrates the varied nature of employment and career trajectories for HQP who participated in Stem Cell Network training. It also suggests which sectors predominantly attract trainees and the career types trainees are likeliest to pursue. The most evident finding is how populated the university, hospital and research institute sector is, with 43.1 percent of SCN HQP (Table 1). This sector includes individuals in faculty positions, leadership roles, senior researcher/scientist roles and more. As a clear majority, this may be an indicator of the number of opportunities hospitals and research institutions hold for young research and health professionals.

Among women, the sector employs 42.4 percent, while it employs 43.7 percent of men. However, when observing only highly qualified personnel identified as working as university professors (e.g., assistant, adjunct, full), 63 percent are men and 37 percent are women. While women are working in universities and hospitals at a similar frequency as men, they are not obtaining professorial positions at the same rate.

This may be related to systemic and societal issues, or lack of equal recruiting (as previously reported).⁸ Despite this, the findings clearly show that female HQP are finding employment elsewhere — more so than their male counterparts (Table 1).

The *continued training* category consists of 29.4 percent of SCN trainees (Table 1), meaning that a significant number of this study's individuals are pursuing academic training and presumably not yet employed in highly skilled positions. Despite this, Table 1 still indicates the most common sectors employing trainees following their education and training.

When considering all HQP, the third-most common employment area is the biotechnology and pharmaceutical category (Table 1). Fourteen percent of HQP work in the biotech and pharma industry. Breaking this down further, 15.4 percent of women and 12.2 percent of men are employed in this sector. Within this sector, trainees are working at various employment levels; they hold titles such as scientist, researcher, manager, director and chief scientific officer. Over half of SCN trainees employed in this area (53 percent) work at the entry/mid-level, where 38 percent are at the manager

⁸ The Council of Canadian Academies' report on women in university research titled *Strengthening Canada's Research Capacity: The Gender Dimension* explores this concern in detail, citing societal norms, stereotypes and biases as limiting to equal representation in university research and high-ranking administrative positions in universities. Council of Canadian Academies, 2012. *Strengthening Canada's Research Capacity: The Gender Dimension*. Ottawa (ON): The Expert Panel on Women in University Research, Council of Canadian Academies.

level and 9 percent are executive leaders holding titles such as chief executive officer, chief scientific officer and chief operations officer.

The government and legal category employs 4.8 percent of HQP, with women (at 5.5 percent) slightly more likely to be employed in this area than men (at 4.1 percent). Meanwhile, non-science businesses employ 4.4 percent of all HQP overall while the not-for-profit and charity category employs 2.1 percent. Employment distribution across these areas shows not only the employment versatility of HQP but also likely employers.

All this being said, this study finds HQP are most likely to work in stem cell and regenerative medicine. While this field is broad, what is also clear is that the Stem Cell Network is responsible for creating a large cadre of scientists, lawyers, academics and other professionals in related fields, enabling greater collaboration, understanding and innovation on such matters more broadly in Canadian society.

Table 1: Distribution of Gender Across Employment Sectors			
	Overall N (%)	Women n (%)	Men n (%)
University, Hospital & Research Institute	543 (43.1)	295 (42.4)	248 (43.7)
Continued training	371 (29.4)	189 (27.2)	182 (32.1)
Biotechnology/Pharmaceutical industry	176 (14.0)	107 (15.4)	69 (12.2)
Government & Legal	61 (4.8)	38 (5.5)	23 (4.1)
Private sector companies	55 (4.4)	31 (4.5)	24 (4.2)
Non-profit/Charity	26 (2.1)	15 (2.2)	11 (1.9)
Medical practice	23 (1.8)	14 (2.0)	9 (1.6)
Self-employed	8 (0.6)	7 (1.0)	1 (0.2)
This table displays the number of HQP employed by sector, also broken down by gender to distinguish the distribution across sectors. Relative to their male counterparts, there seems to be a slight tendency for women to work outside universities and research hospitals.			

2.3 Employment Trends

Dividing the data into four cohorts based on when trainees participated in SCN training reveals where HQP are likely to work at different stages of their careers. This information can be used to predict where employment opportunities might lie for HQP, where HQP are most likely to forge their careers and how their employment may shift over time from one sector to another.



Thanks to the Stem Cell Network's annual meeting (TMM) I was able to connect with representatives from STEMCELL Technologies about an employment opportunity. They were excited about my work and it led to me joining STEMCELL as a Product Manager. I credit SCN with providing trainees with important opportunities that help to build careers."

— Matthew Hildebrandt, PhD,
Associate Product Manager, STEMCELL Technologies

2.3.1 Employment in Universities and Hospitals

Thirty percent of SCN highly qualified personnel who completed their education/training now work in hospitals and research institutes, while 28 percent of SCN trainees are working in universities. When divided by cohort, findings show that more recent trainees seem less likely to be employed in universities and more likely to be employed in hospitals and research institutes (Figure 3). Cohort 1 includes HQP who participated in SCN training between 2001 and 2005, where Cohort 2 includes the period between 2006 and 2010; Cohort 3 covers the 2011-2015 period and Cohort 4 captures the 2016-2019 period.

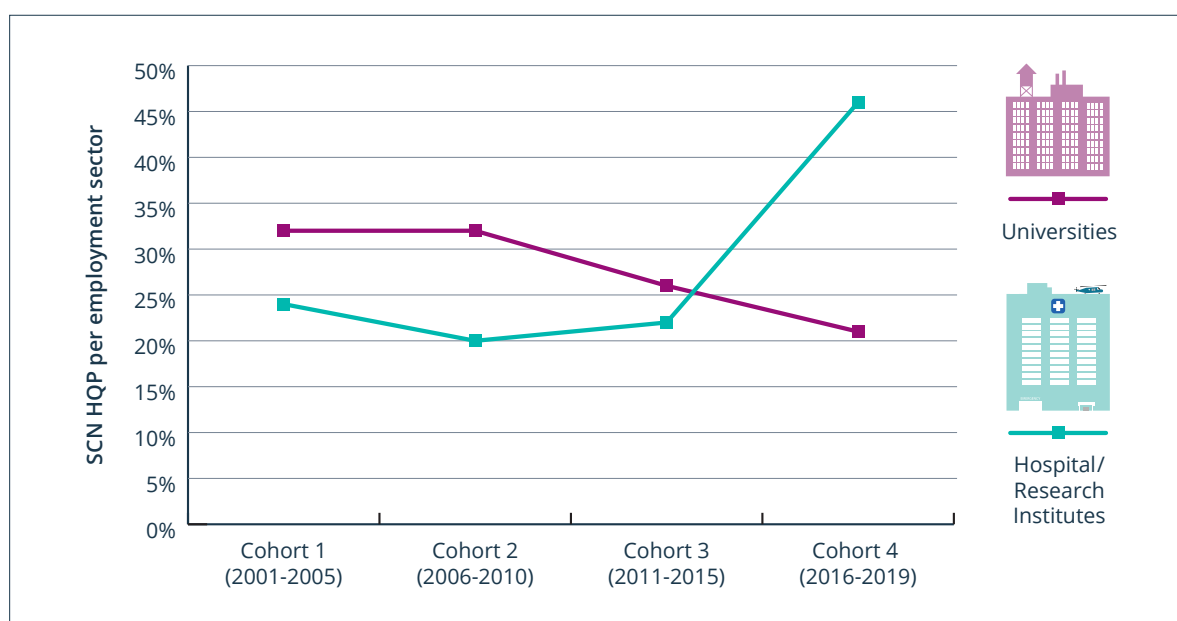


Figure 3. Employment in Universities and Research Hospitals over time: Percentage of HQP employed in Universities (red) and Hospitals/Research Institutes (green) between 2001 and 2019.

Between cohorts 3 and 4, employment in hospitals and research institutes increases while employment in universities decreases (Figure 3). While employment in universities has declined by 11 percent between cohorts 1 and 4, employment in hospitals and research institutes has increased by 24 percent since 2016. A simple explanation could be that HQP who completed their SCN training more recently (i.e., in Cohort 4, between 2016 and 2019) are less likely to be employed in faculty positions as they are young professionals with less academic experience than HQP from earlier cohorts; accordingly, they would appreciably have difficulty competing with established academics for funding.⁹ Another possible explanation is that translational and clinical research has become more popular in hospitals since 2016, which have subsequently increased investment in stem cell and regenerative medicine research and its translation from the lab to clinical applications.

2.3.2 Employment in the Biotech and Pharmaceutical Industry

Across all cohorts, a steady number of professional HQP (19 percent) have found employment in the biotech and pharma category. As the industry evolves additional career opportunities will appear, yet SCN trainees are leading the way. A study on the career outcomes of PhD graduates in health services and policy research found that 6.1 percent of PhD grads are employed in the private sector.¹⁰ Compared to this finding, SCN trained professionals are three times as likely to be employed by biotechnology and pharmaceutical companies alone.

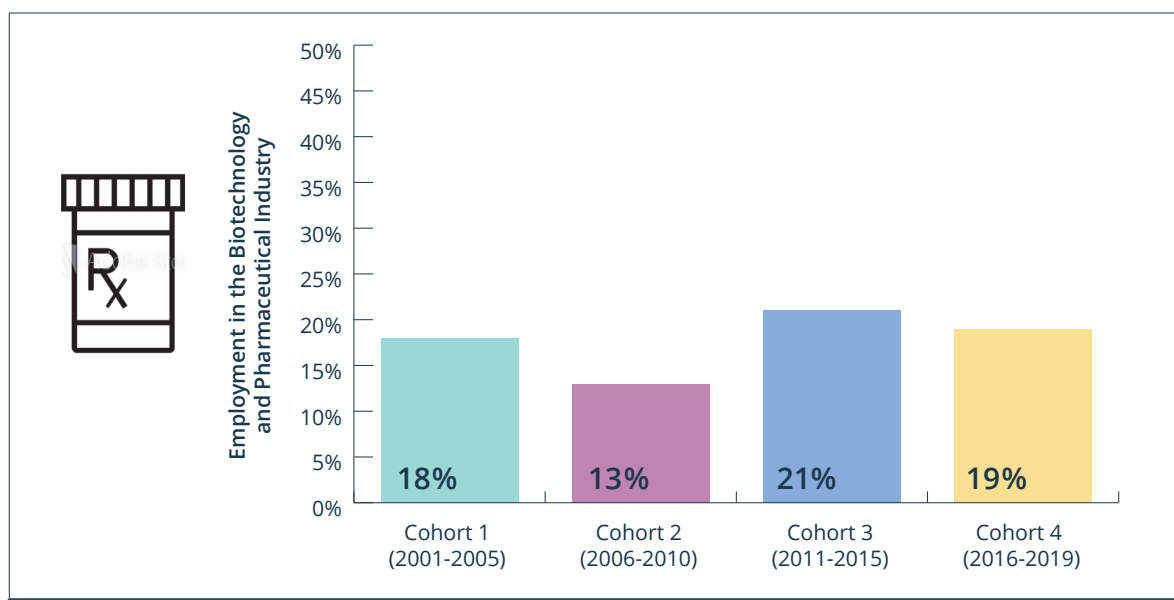


Figure 4. Employment in the Biotechnology and Pharmaceutical Sector: Employment in the Biotech/Pharma sector remains relatively constant across all four cohorts which could suggest this employment avenue is retaining HQP.

⁹ The Advisory Panel for the Review of Federal Support for Fundamental Science “Investing in Canada’s Future: Strengthening the Foundations of Canadian Research.” Canada’s Fundamental Science Review, 2017.

¹⁰ McMahon, Meghan, et al. “The Career Outcomes of Health Services and Policy Research Doctoral Graduates.” *Healthcare Policy* Vol. 15 Special Issue, 2019.

2.3.3 Cohort Comparison

When employment sectors are grouped together by cohort, it is easier to visualize employment trends. With the percentage of HQP in each cohort organized by employment sector, it is possible to see the number of HQP employed in certain sectors relative to when they participated in SCN training. In Figure 5, each cohort represents a group of HQP that completed its SCN training within a defined timeframe (in four-year increments, as previously noted).

In the university/hospitals and research institutes sector, we see that those who completed their training more recently (Cohort 4) are more likely to be working in universities and hospitals than trainees from other cohorts. Indeed, 67 percent of trainees from Cohort 4 are working in universities, hospitals or research institutes, while trainees from cohorts 1, 2 and 3 have a significantly lower number of trainees working in this sector (respectively at 56, 52 and 48 percent). This may suggest that since 2016 there have been greater opportunities in hospitals and research institutions, or that trainees from older cohorts have moved beyond the health research field to opportunities in sectors such as government or the private sector.

In the biotechnology and pharmaceutical sector, employment is generally even across all cohorts though with a slight increase in cohorts 3 and 4. Nineteen percent of Cohort 1 is employed in biotech/pharma where 16 percent of Cohort 2 is employed in the sector. Meanwhile, this sector suggests a slight increase in employment for those from cohorts 3 and 4 (at 22 and 21 percent respectively). Figure 5 offers a snapshot of employment, representing where each cohort is currently employed and juxtaposing cohorts — suggesting that employment trends may change over time.

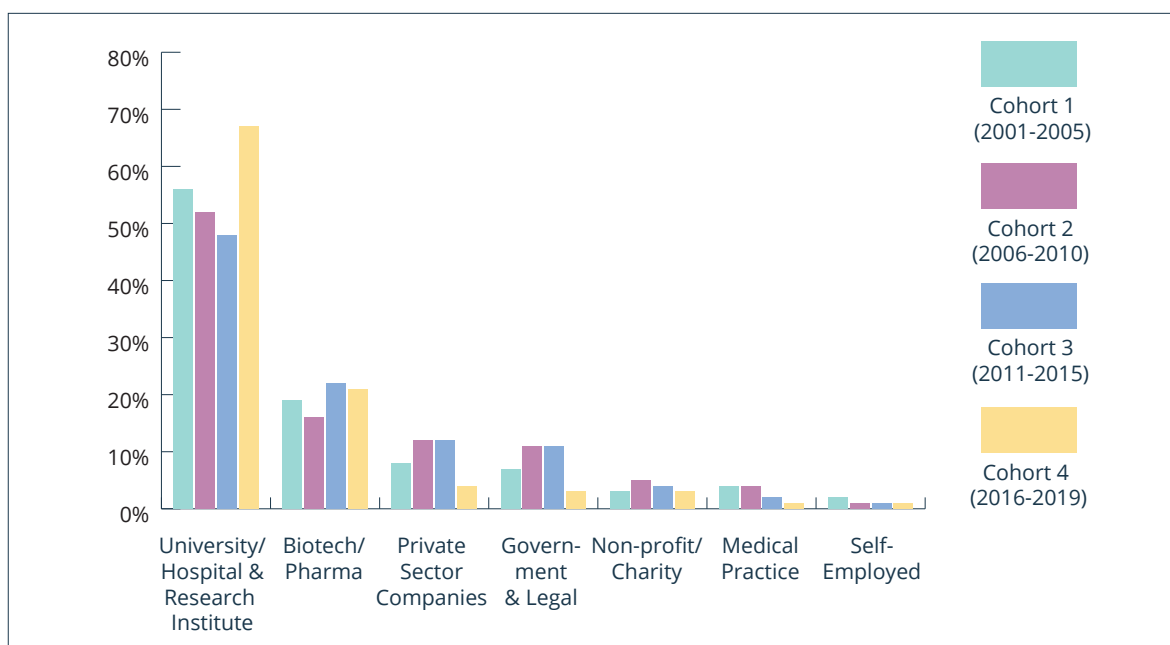
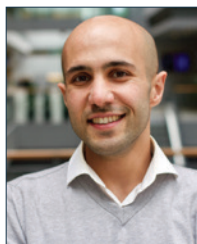


Figure 5. Comparing Employment Sectors by Cohort: Cohort statistics are juxtaposed to show where HQP are employed relative to when they completed SCN training. Findings show there is general consistency in where HQP are finding employment, however there is a large difference between cohorts in the University/Hospital & Research Institute sector where the most recent cohort shows a sharp increase. This may be because younger HQP gain experience in research before leaving for other sectors such as government and legal or the private sector.



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

— Mohsen Afshar, PhD, Co-founder and CTO at TissueX Technologies

2.3.4 Gender Analysis

Information on trainee gender came from existing SCN files where trainees had the option of declaring their gender. Overall, 55 percent of SCN trainees considered for this study identified as women with 45 percent identifying as men. This male-to-female ratio remains relatively constant across the four cohorts (2001-2019). In Cohort 2 (2006-2010), the gender split was most even with 49 percent women and 51 percent men (Figure 6).

Over employment categories, the gender distribution is generally equal — in that the percentage of women entering certain employment sectors approximates the percentage of men entering the same employment sectors. Data shows 44 percent of men are working in the university, hospital and research institute employment category compared to women (at 42 percent). Further, 32 percent of men are in continued training (i.e., currently full-time graduate students or post-doctoral fellows) relative to women (at 27 percent). Of HQP working in biotech and pharma, 12 percent of men and 15 percent of women are employed in this area.

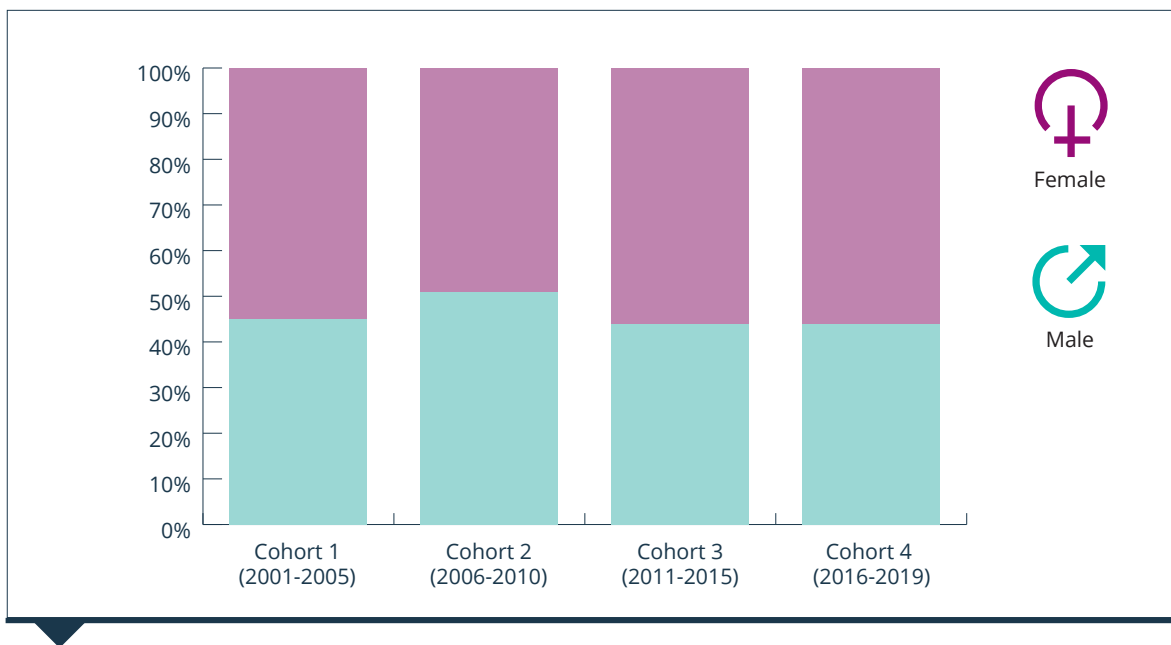


Figure 6. Distribution of Gender over all Cohorts: This figure demonstrates the relatively even distribution of gender in each cohort. On average, females consisted of 55 percent of trainees.

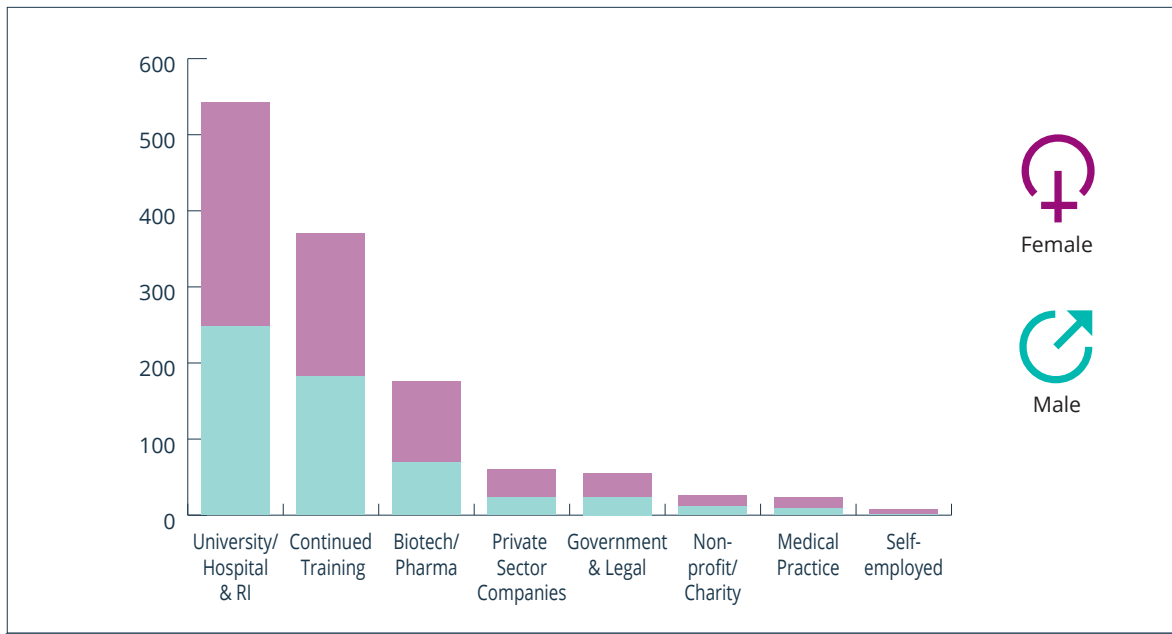


Figure 7. Gender Distribution over Employment Sectors: This figure displays the distribution of gender across all employment sectors. Male and female distribution is relatively even.

Figure 7 shows the relatively even split between genders across employment sectors. Overall, there are more women per sector but both genders enter each employment sector at the same frequency. Worth noting is that while slightly more women work in universities and hospitals in research positions, drastically fewer hold professorial titles compared to men. From the data sample, of those HQP with the ‘professor’ title (e.g., assistant, adjunct, full), 78 (63 percent) were men where only 46 (37 percent) were women. While numerous factors could inform this statistic, including unconscious bias in the recruitment process, it is clear that further efforts must be made to better understand why and how to address this disparity.¹¹

¹¹ Reports such as the Council of Canadian Academies’ *Strengthening Canada’s Research Capacity: The Gender Dimension* offer insight into the various factors influencing the university research careers of women as well as potential steps towards equal representation in academia. Reference: Council of Canadian Academies, 2012. *Strengthening Canada’s Research Capacity: The Gender Dimension*. Ottawa (ON): The Expert Panel on Women in University Research, Council of Canadian Academies.

2.3.5 Trainee Nationality

Among the research findings was that 80 percent of SCN trainees were either Canadian citizens or permanent residents at the time of training, while 20 percent were temporary Canadian residents (Figure 8). The data collected shows the current location of SCN trainees and the percentage remaining in Canada for work. Of former trainees providing complete information, 82 percent are employed in Canada where 18 percent are outside Canada. This suggests minimal 'brain drain' with SCN HQP who appear to be finding employment in Canada and opting to remain in the country. This is encouraging as the Canadian stem cell and regenerative medicine industry is growing. Companies such as BlueRock, Aspect, and STEMCELL are seeking highly skilled individuals, increasing demand in Canada for HQP in regenerative medicine.

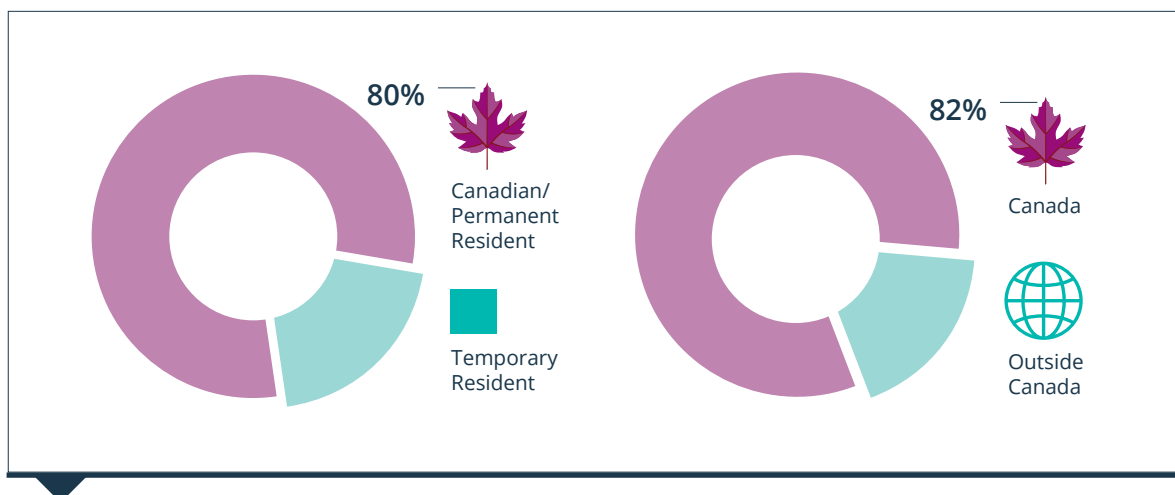


Figure 8. Canadian Citizenship at Time of Training and Current Location of Trainees: The figure on the left shows how many SCN trainees considered themselves Canadian citizens/Permanent Residents or Temporary Residents. Meanwhile, the figure on the right shows how many SCN trainees currently live and work in Canada and how many are working abroad.

2.4 Employability

Trainees continue moving into research roles in academic and health research institutions.

In this category, popular employers include University of Ottawa, McGill University, University of British Columbia, University of Alberta, the University Health Network, the Hospital for Sick Children (SickKids), and the BC Cancer Agency. Table 2 breaks down HQP employment by province¹² and illustrates that one-half of all employed HQP are in Ontario.



Table 2: Regional Breakdown of Employed HQP

Province	HQP per Province n (%)
Ontario	503 (49.5%)
Quebec	197 (19.4%)
British Columbia	166 (16.3%)
Alberta	127 (12.5%)
Saskatchewan	9 (1%)
Nova Scotia	8 (1%)
Prince Edward Island	2 (0.2%)
Manitoba	2 (0.2%)
Newfoundland and Labrador	1 (0.1%)
New Brunswick	1 (0.1%)

Table 2 represents the number of HQP employed in Canada, per province.

¹² Canadian territories are excluded from this table as data indicated that no SCN HQP are employed in any territory.

In these institutions, HQP hold highly skilled positions with titles such as professor, research officer, clinical research coordinator, laboratory manager, project coordinator and principal investigator.

A steady stream of trainees is being employed by the biotech/pharma industry, albeit a smaller group than in the university, hospital and research institute category. This field is still growing and HQP are contributing significantly to this growth. Some former trainees include founders, CEOs and chief technology officers (CTOs) of new and established companies.

In the biotech/pharma category, 102 companies employ SCN trainees. Industry employers with the largest number of SCN trainees include STEMCELL Technologies, BlueRock Therapeutics, GlaxoSmithKline, Roche, and Sanofi Pasteur (see Appendix B). At these companies, HQP hold titles such as research scientist, head of operations, medical advisor, director and CEO where they lead the way, operating and developing as industry leaders.

Overall, these areas of employment are instrumental to growing the stem cell and regenerative medicine sector in Canada with Stem Cell Network HQP leading the way in hospitals, universities and industry. Specifically, these are areas where academic research translates into clinical applications, therapies and policy. Within these sectors, HQP are employed in wide-ranging, highly skilled positions which, in turn, is helping shape the Canadian stem cell and regenerative medicine landscape overall. SCN HQP are working in Canada, participating and collaborating in a vibrant Canadian stem cell community to develop new therapies, novel technologies and academic research that is informing public policy development and asserting Canada's position as a world leader in regenerative medicine.

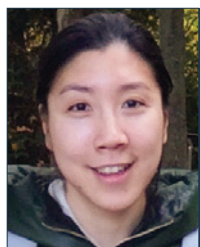
3.0 TRAINING VALUE AND CAREER DEVELOPMENT

Today, SCN HQP are employed in roles that are vital to the further development and expansion of stem cell research in Canada. But the question remains: how does SCN training impact its trainees and their career paths? The qualitative data gleaned from former SCN trainees across the various sources cited here have been highly beneficial in defining the value SCN offers its trainees — namely, professional networks, technical and soft skill development and career inspiration.

3.1 Methods

To obtain the best possible understanding about how SCN HQP viewed their training, the Stem Cell Network contacted all trainees with an email address on file. The email suggested SCN was seeking trainee opinions on the value of the organization's training programs and workshops. It included questions aimed at identifying each respondent, length of time as a trainee, types of training received and current employment information (job title, employer). The survey also invited respondents to share a written submission (maximum 300 words) detailing their impressions about the training they received and what career impact, if any, it has had.

The survey, active for four weeks beginning December 16, 2019, subsequently closed on January 10, 2020. By the end of this period, SCN had received 55 responses yielding satisfactory feedback that offered a suitable snapshot to draw some meaningful conclusions about trainee opinions in SCN training programs and their associated benefits. Beyond the survey, letters written in 2019 by trainees to former Minister of Science Kirsty Duncan highlighted the value of SCN programs and how SCN has contributed to trainee development. By extension, these letters also succinctly captured trainee views on SCN and its contribution to their overall careers.



Through its workshops, I have learnt many valuable professional skills including negotiation, and aspects of clinical translation. Undoubtedly, my involvement with the SCN has furthered my resolve to contribute to the expanding Canadian stem cell community.

— Miriel Ho, PhD, Researcher at CReATe Research Inc.

3.2 Results

The 55 respondents identified themselves as doctorate students, post-doctoral fellows, faculty members, research associates and project/research managers at biotechnology companies. Their employers included post-secondary institutions such as the University of Toronto, McGill University, and the University of Alberta; hospitals and research institutes, such as the Ottawa

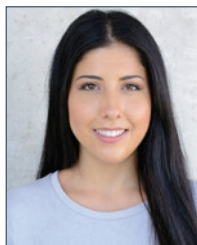
Hospital Research Institute, the Centre of Genomics and Policy, and the Hospital for Sick Children (SickKids); and biotechnology companies such as STEMCELL Technologies, TissueX Technologies, and BlueRock Therapeutics.

When asked, 83 percent of respondents reported they participated in training at the annual Till & McCulloch Meetings; 72 percent at SCN workshops; 45 percent in hands-on lab training; 23 percent in the strategic Training Program in Regenerative Medicine; and 9 percent in lab exchanges. All respondents said they would recommend SCN training to others, concluding that the training was extremely valuable in their career development as young professionals in the stem cell and regenerative medicine field.

3.3 Survey Responses

All survey responses were positive, crediting SCN training with enhancing career prospects and professional skills. Among the findings from the long-answer responses, trainees cited three clear benefits: networking and the scientific community, technical and soft skill development and career inspiration. Trainees cited these benefits as providing the greatest contribution to their careers.

Respondents referred to the benefit of excellent networking at training courses and workshops, with many crediting SCN events for being a catalyst to collaborations between and among researchers. Of the 55 respondents, 41 referenced networking as an especially valuable benefit of their SCN training. By way of example, Samantha Yammine, an SCN trainee, wrote:



The Till & McCulloch Meetings were critical for helping me meet other Canadian peers and build collaborations, and the intimate size of the conference created opportunities for networking with the invited external speakers that we cannot get at larger international meetings.

— Samantha Yammine, PhD, Founder of Science Sam Media

Yammine's feedback offers some insights into the importance of the Till & McCulloch Meetings, organized and run by SCN, within the greater context of developing and supporting young professionals and helping them establish professional networks early in their careers. Trainees singled out the intimate conference setting as a major advantage noting it provides access to established scientists and other professionals. Douglas Kondro, PhD Candidate at the University of Calgary, leveraged a networking opportunity at TMM to pitch his idea of a Mitacs internship to STEMCELL Technologies, pushing for commercialization of a project. Kondro is "in continued collaboration with STEMCELL with upcoming employment opportunities and a final push to get the product to market." (Appendix A.1).

Additional findings suggest trainees experienced a sense of community from annual events such as TMM, where contacts are forged and ideas shared. Such events serve to create a strong bond between and among highly qualified professionals — one that fosters a mindset of collaboration and camaraderie between and among researchers, technicians, stem cell and regenerative medicine

professionals. The SCN, wrote Nika Shakiba, enabled her to actively engage the stem cell community, supporting her growth as a scientist and science communicator (Appendix A.1).

Many survey respondents referred to specific skills developed through SCN training that directly led to career advancement and opportunity. Technical skills, such as flow cytometry or RNA sequencing analysis, are learned in courses or lab exchanges and significantly develop trainees' practical knowledge of regenerative medicine. Anastassia Voronova from the University of Alberta cites SCN training in helping her develop practical skills she regularly applies to her work; now with her own lab, she shares this same knowledge with her students. Voronova has also recommended SCN training to her students who, in turn, have gained new knowledge and skills — learnings that have not only positively impacted work in the lab, but benefited specific projects, entire teams and research programs (Appendix A.2).



I am tremendously grateful to the SCN and its many investigators and trainees whose expertise, creativity and collaborative spirit have helped shape my career.

— Amy Zarzeczny, PhD, Associate Professor,
Johnson Shoyama Graduate School of Public Policy,
University of Regina

Soft skills, intended to develop trainees professionally, were also referenced as factors that helped HQP in launching and establishing themselves as successful researchers. Taking this a step further, the soft skills cited most often by respondents as being most beneficial included general and scientific communication and translational business strategy, important skills used in grant writing and commercialization.



As a stem cell student in Canada, there are limited resources and training available. The Stem Cell Network has not only provided me with training in this niche and critical area but also helped me to connect with top experts for potential troubleshooting.

— Joshua Dierolf, PhD Candidate,
Schulich School of Medicine and Dentistry, Western University

The Stem Cell Network provides unique training not otherwise available to highly qualified personnel (see Appendix A.2 for commentary from Samantha Yammine.) SCN training also applies to industry development, as Mirel Ho noted; she learned “many valuable professional skills, including negotiation and aspects of clinical translation.” (Appendix A.2). Mohsen Afshar cited the skills he developed through his training, which helped him co-found TissueX Technologies (Appendix A.2).

All told, the skills acquired through SCN training seem to have directly influenced the career paths of trainees by opening doors to opportunities that may not otherwise have been accessible.

Among responses received, the word 'career' appears 27 times — suggesting the important link between training and career paths. Further, respondents credit SCN events and training as steering them towards their careers in regenerative medicine — be it in academic research, or industrial applications such as employment in biotechnology and pharmaceutical companies. Elizabeth Bulaeva, graduate student at BC Cancer Research Centre wrote that her training helped shape her career by inspiring her to explore new avenues and fields of study (Appendix A.3).



My interest in stem cell biology was initially sparked through this great network of scientists that are doing amazing research, helping drive different therapies to clinic and laying the foundation for years to come.

— Nilesch Sharma, graduate student,
Biernaskie Lab, University of Calgary

Overall, the key learning from the qualitative data and the feedback from survey respondents is that a professional network, technical and soft skill development and career direction or inspiration are the most valuable takeaways from their Stem Cell Network training, offering the most significant, positive impact on their careers.

4.0 Conclusion

The evidence is clear: SCN's training is enhancing the skills, knowledge and networks of the next generation of stem cell and regenerative medicine workers. The 1,500 professionals tracked through this study are engaged in highly skilled jobs within the stem cell and regenerative medicine field. Following their SCN training, many are remaining in the research domain while growing numbers are joining companies where their talents are in high demand.

Compared to other studies on career outcomes of PhD graduates in Canada, SCN HQP are significantly more likely to be working in the private sector. Indeed, among SCN HQP, this study finds that 28 percent are employed in the biotechnology and pharmaceutical sector and the private company sector. By contrast, only 6.1 percent of PhD graduates from the McMahon study are employed in the private sector¹³ while 21.8 percent of PhD graduates from the University of Toronto's 10k PhDs Project were found to be employed in the private sector.¹⁴



Today, SCN trainees are working in impactful positions and adding significant value to the production of academic knowledge and the development of new therapies and novel technologies — part of a strong Canadian community driving collaboration and innovation. We couldn't be more proud!

— Michael A. Rudnicki, OC, PhD, FRS, FRSC,
Scientific Director & CEO, Stem Cell Network

Based on the results of this study, those who have participated in SCN training activities attribute their career success to benefits they derived from being part of the SCN training system. This includes the specialized programs, networks and opportunities afforded by SCN — high-value propositions that cannot be accessed through regular post-secondary education channels.

What this study has also demonstrated, unequivocally, is that over nearly two decades of SCN training, the Stem Cell Network's efforts have had a vital impact at both the micro (i.e., individual) and macro (i.e., collective) levels in the Canadian regenerative medicine industry. Overall, SCN has successfully developed a pool of highly qualified talent — individuals who are not only choosing to remain in Canada following their training, but fuelling economic growth and ensuring that the country remains competitive on the global research stage.

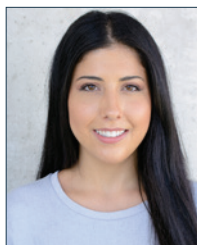
¹³ University of Toronto School of Graduate Studies "10k PhDs Project." University of Toronto, 2016.

¹⁴ McMahon, Meghan, et al. "The Career Outcomes of Health Services and Policy Research Doctoral Graduates." *Healthcare Policy* Vol. 15 Special Issue, 2019.

APPENDICES

Appendix A — Quotes

A.1. Network and Community



“Absolutely! The SCN is the backbone of the Canadian stem cell community, and participating in its programs enrich [sic] the scientific and professional training of all its members. Cohesion across the country has been foundational for the success of the Canadian stem cell research landscape, and I hope we don’t lose out on that for future generations.”

— Samantha Yammine, PhD, Founder at Science Sam Media



“It was at TMM where I pitched the idea of a Mitacs internship to STEMCELL Technologies to push for commercialization of the project. Currently we are in continued collaboration with STEMCELL with upcoming employment opportunities and a final push to get the product to market. Without the support and opportunities offered from the SCN this would not have been possible.”

— Douglas Kondro, PhD Candidate, University of Calgary



“Through the workshops, exchanges, funding in support of attending conferences, and the opportunity to take a leadership role in StemCellTalks and the Trainee Communication/Education Committee, the Stem Cell Network has catalyzed my growth as a scientist and science communicator. The opportunities that the Stem Cell Network have afforded me, through their commitment to trainee development, have not only established my network of collaborators and peers, but also provided an avenue for me to actively engage in the Canadian stem cell community. It has helped to shape my experience as a doctoral researcher in Canada and made me excited to return and join my fellow Canadian stem cell researchers following my postdoctoral training in the USA.”

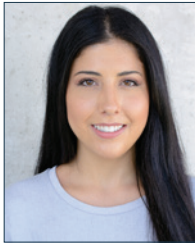
— Nika Shakiba, PhD,
Post-doctoral Fellow, Massachusetts Institute of Technology

A.2. Skill Development



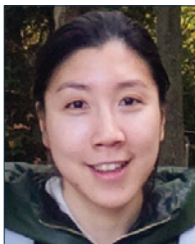
"The training gave me valuable hands-on and theoretical skills that I was able to apply to my own projects. Now that I have my own lab, I am imparting this acquired knowledge upon my own trainees. I believe this speaks volumes to the quality and value of the SCN training. Moreover, I have recommended SCN training program to my own trainees. In this light, my graduate student is now bringing new additional knowledge (e.g., flow cytometry), which was acquired through the 2019 SCN programs, into my research program. In summary, the SCN training directly helps to advance not only specific projects, but the entire research team and ultimately research program."

— Anastassia Voronova, PhD, Assistant Professor, University of Alberta



"The Stem Cell Network provided me with invaluable opportunities for soft skills training that I currently use in my career that I would not have been able to find elsewhere. The Stem Cell Network supported and encouraged communicating science effectively to our peers and the public, which helped me not only realize that was my passion but also gave me a head start turning it into a career. The Till & McCulloch Meetings were critical for helping me meet other Canadian peers and build collaborations, and the intimate size of the conference created opportunities for networking with the invited external speakers that we cannot get at larger international meetings."

— Samantha Yammine, PhD, Founder at Science Sam Media



"The Stem Cell Network (SCN) has enriched my postdoctoral experience in Canada by supporting my participation at both national and international conferences to present stem cell research. Through its workshops, I have learnt many valuable professional skills including negotiation, and aspects of clinical translation. Undoubtedly, my involvement with the SCN has furthered my resolve to contribute to the expanding Canadian stem cell community."

— Miriel Ho, PhD, Researcher, CReATe Research Inc.



"Both the workshops and the TPRM [the Training Program in Regenerative Medicine] were significantly influential in my career and helped me better understand the potential of my basic research in relation with industry and their translational potential. Ultimately, the trainings I received over the years helped me to co-found TissueX Technologies to commercialize a technology that was developed in the laboratory settings for commercial use in drug discovery."

— Mohsen Afshar, PhD, Co-founder and CTO at TissueX Technologies

A.3. Career Inspiration



"The TPRM course was fantastic — it allowed me to learn a lot about the regenerative medicine ecosystem in Canada and sparked my interest in this field. The flow cytometry course was key in making me an expert on this technique which I now use daily in my cell work, the industry workshop taught me much about product development in industry (and how much I didn't know about this!). Overall, all these courses really shaped my career development — enabling my progress in my research and stirring me into exploring interesting directions and opening my interest in fields that I am now pursuing as a career. I am very interested in regenerative medicine and biotech and I feel that much of this interest was sparked by these SCN programs."

— Elizabeth Bulaeva, Graduate Student at BC Cancer Research Centre



"The training I received during my time as a SCN trainee was invaluable in helping advance my career. The formal training I received through SCN-led workshops and other opportunities, including oral and poster presentation experience, helped deepen my understanding of the field and hone core academic abilities. I was also incredibly fortunate to receive phenomenal training in the lab of SCN-funded Principle Investigator Timothy Caulfield. Thanks to SCN funding, its focus on trainee development opportunities and Professor Caulfield's generous mentorship, I was able to gain experience with being part of successful large, interdisciplinary and collaborative research projects, develop project management skills, build my CV with meaningful roles in academic publications, and participate in other diverse approaches to stakeholder engagement and knowledge translation. I was also able to make connections across Canada's regenerative medicine research community and was encouraged to form independent collaborative relationships. These experiences and collaborations were of great benefit as I transitioned into an academic appointment and developed my own independent research program. I am tremendously grateful to the SCN and its many investigators and trainees whose expertise, creativity and collaborative spirit have helped shaped my career."

— Amy Zarzeczny, PhD, Associate Professor,
Johnson Shoyama Graduate School of Public Policy, University of Regina

Appendix B

Table 3. Industry Companies

Industry companies employing more than three SCN HQP	Number of HQP employed, by company
STEMCELL Technologies	12
BlueRock Therapeutics	5
GlaxoSmithKline	4
Roche	4
Sanofi Pasteur	4
AbCellera	3
Alberta Cell Therapy Manufacturing	3
Pfizer	3
PRA Health Sciences	3
This table shows which companies in the biotechnology and pharmaceutical sector have employed the most former SCN trainees. In total, there are 102 different biotech/pharma companies that employ former SCN trainees. This table represents the companies that have employed three or more HQP.	