

A microscopic view of cells, showing several blue, spherical cells with intricate internal structures and thin, connecting filaments.

REGENERATIVE MEDICINE IN CANADA

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BUILDING BACK BETTER IN A SECTOR POISED FOR GROWTH

As Canada's policy and decision makers work to consider how best to build back better and ensure economic recovery that will see strong productivity and prosperity for all Canadians, regenerative medicine (RM) offers a unique growth opportunity, which must be part of the foundational plan.

Traditionally powered by stem cells, RM focuses on replacing, repairing, or regenerating human cells, tissues and organs. It is considered by investors, economists and health policy experts to be the next frontier of modern medicine, providing opportunities for the treatment of chronic and rare genetic diseases, as well as life altering illness. The power of

RM is in its potential to halt or reverse disease, instead of simply alleviating symptoms. In some cases, RM may even have the potential of offering a cure.

Commissioned by the Stem Cell Network, in 2021, the Institute of Health Economics (IHE) released a report on the current state and future for stem cell research and RM in Canada. The IHE report is a comprehensive study of the current landscape and assesses the strengths, potential areas for improvement, and opportunities for growth.

The final report, entitled, *Stem Cell/Regenerative Medicine in Canada: Current State and Future Prospects*, highlights several key findings including a central economic projection statement.

\$5B^{CAD}
6,000
Jobs

Economic Contributions

If Canada were to capture only **5%** of the projected **\$77 billion USD** market, this could represent over **\$5 billion CAD** in potential growth, which in turn translates to over **6,000 jobs**.



CANADIAN WOMEN LEADING IN REGENERATIVE MEDICINE



Dr. Stephanie Willerth, from the University of Victoria is the co-founder of Axolotl Biosciences. This emerging biotech company has developed a powerful bio-ink, used in the 3D printing of human tissue models to advance the field of tissue engineering and regenerative medicine.

Stem Cells are Canada's Science

Canada has been a world leader in RM from the start. From the definitive confirmation of stem cells by Till and McCulloch in 1961, Canadian researchers have continued to make significant contributions in the global RM field. In 2020, the Alliance for Regenerative Medicine reported the strongest year in financing of the global sector to date (US\$19.9B raised). **To date, Canada's advanced therapeutics sector has 54 companies, 184 deals, 26 exits and a total of \$2.3B capital invested.** Canada is also home to a number of innovative companies in the RM field including **Morphocell Technologies, BlueRock Therapeutics, STEMCELL Technologies, Satellos Bioscience and Mesentech.**

As noted in the IHE report, Canada continues to lead globally in patent filings in RM, ranking second in the number of patents per capita from 2005-2015. These patent filings represent in many cases an untapped opportunity to commercialize innovation in Canada, leading to the creation of jobs, economic growth, and new innovative products and therapies for the Canadian market.

"When only the federal contribution is considered, the benefit-cost ratio in terms of patent yields becomes almost 3 dollars returned for every 1 federal dollar invested in SCN."

—IHE Report

While Canada is a global leader in patent filings in RM, we rank much lower in the commercialization of intellectual property. Canadian researchers and companies must be given the tools to better move laboratory discoveries to clinical trials and commercial products.

COVID19 and Clinical Trials

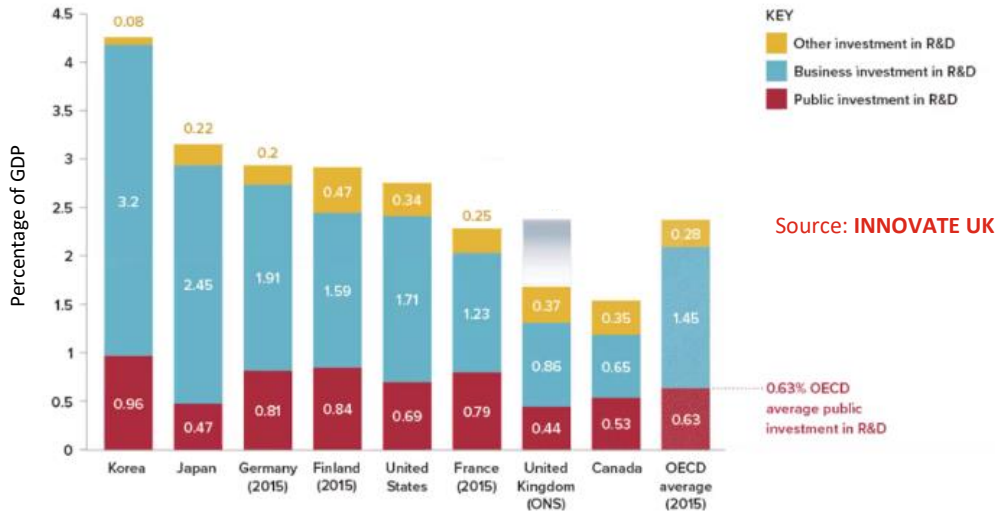
Given Canada's strength in generating IP, it is not a surprise to see that **clinical trials activity is also strong with nearly 100 clinical trials listed as active or planned for 2020 onwards.** These trials will test new cell, tissue and gene therapies in the fight against diseases like blood cancers, neurodegenerative diseases such as Parkinson's and multiple sclerosis, **including an SCN-funded trial for COVID-19.** This trial is focused on calming the immune system in patients suffering from COVID-19. The cytokine storm that takes place causes significant lung damage, and in some cases leads to death. Now preparing for Phase 2, this trial has the potential to offer a ground-breaking cell therapy that will save lives and restore patients' quality of life.

Capitalizing on Canada's Global Leadership

Canada is well positioned to realize the IHE's projection of **\$5B in RM generated economic growth and 6,000 highly skilled jobs**, and possibly surpass it. However, achieving this growth will take coordination, leadership and partnerships. The IHE report warns that Canada may lose its established position as a leader in the field if it does not adopt a coherent strategy – which includes long-term sustained funding – going forward.

Around the world, ambitious investments aimed at commercializing RM are taking place. Most recently California, whose population is similar to Canada's, USD\$5.5B committed to support regenerative medicine. In Australia, a national strategy valued at AUD\$150M has been confirmed, and the UK has invested billions for RM research, commercialization and clinical trials over the past decade. Comparatively, **public and private investments in Canada are lagging behind** (see graph, page 3).

Global investment in R&D comparisons



“Several countries are investing heavily in regenerative medicine and stem cell science. Canada has a real opportunity to stay ahead of the curve and remain at the forefront of this field, but it will require us to harness key opportunities now.”

—Dr. Janet Rossant,
CC, FRS, FRSC
President & Scientific
Director, Gairdner Foundation

As we look for ways to **rebuild an innovative, inclusive economy now is the time for Canada to take notice of the significant potential offered by the field of RM** – a field pioneered by Canadians and in which we have maintained our status as global leaders – and now poised to be a cornerstone of this nation’s economic recovery.

The IHE report concludes that Canada’s sustained global standing is in part due to the leadership efforts of SCN, and strategic government and partner funding. Combined, this has created an excellent environment for innovative and collaborative research.

The IHE report provides guidance to best position Canada’s RM sector for continued global leadership:

RM: Contributing to Canada’s Economic Recovery

Over the past 60 years, Canada has demonstrated itself to be a global leader in the field, a position that showcases the talent and accomplishments of our researchers and institutions. But to take these discoveries to the next level, and capture their economic potential, additional supports are needed now.

- Expand training for highly qualified personnel who will work within academic labs and industry and biomanufacturing;
- Support SMEs through regulatory and tax frameworks, and additional funding opportunities;
- Develop a balanced national plan that supports both commercial-scale biomanufacturing and point-of-care manufacturing, allowing for ‘Made in Canada’ cell and gene therapies to be accessible and affordable for patients; and
- Continue to provide funding for research across the research pipeline (e.g., innovative, translational, pre-clinical, early-stage clinical trials).

For 20 years, Canada’s Stem Cell Network has been a leader in the stem cell and RM space. It is the only federally funded national network with a track record for continued excellence and impact. Looking ahead to the next decade, **SCN has a strategic plan to grow its network to encompass the broader field of RM**. With the IHE insights in hand, SCN is excited to work with government and our partners to drive Canadian regenerative medicine and commercialization forward. **Together, we will build back better.**



In a 2020 survey of 153 stem cell international experts, 79% described Canada’s leadership as outstanding or considerable and listed in the top three most significant contributors to the stem cell field.