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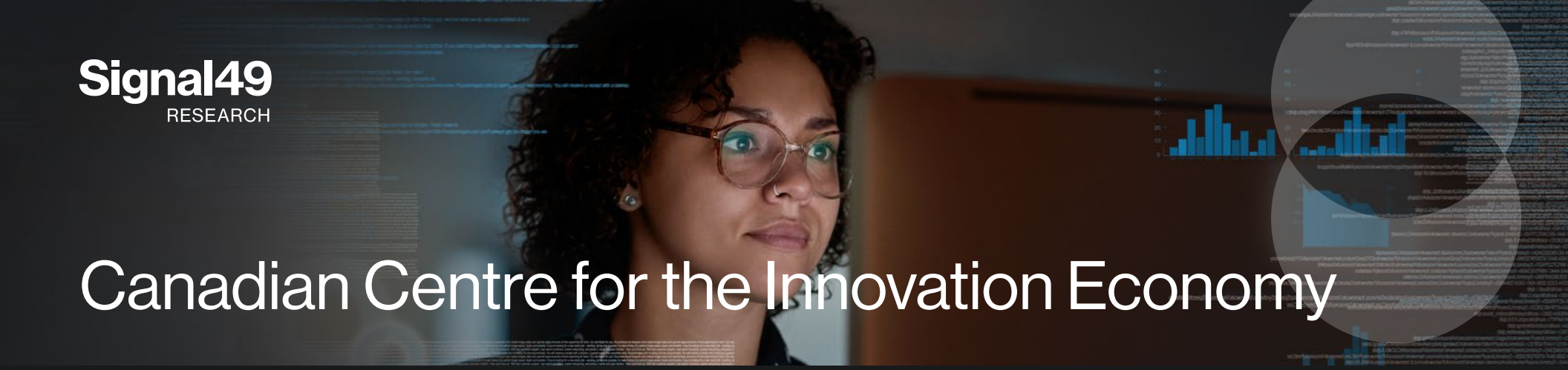
Innovation and Technology Spotlight

Artificial Intelligence for Drug Discovery



SPOTLIGHT | October 6, 2026

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Canadian Centre for the Innovation Economy

Canada has an innovation problem. We have a highly educated workforce and strong research capability, but consistently lack commercial success and innovation-based economic growth. This problem is known as Canada's innovation paradox, and it's the problem the Canadian Centre for the Innovation Economy is here to address.

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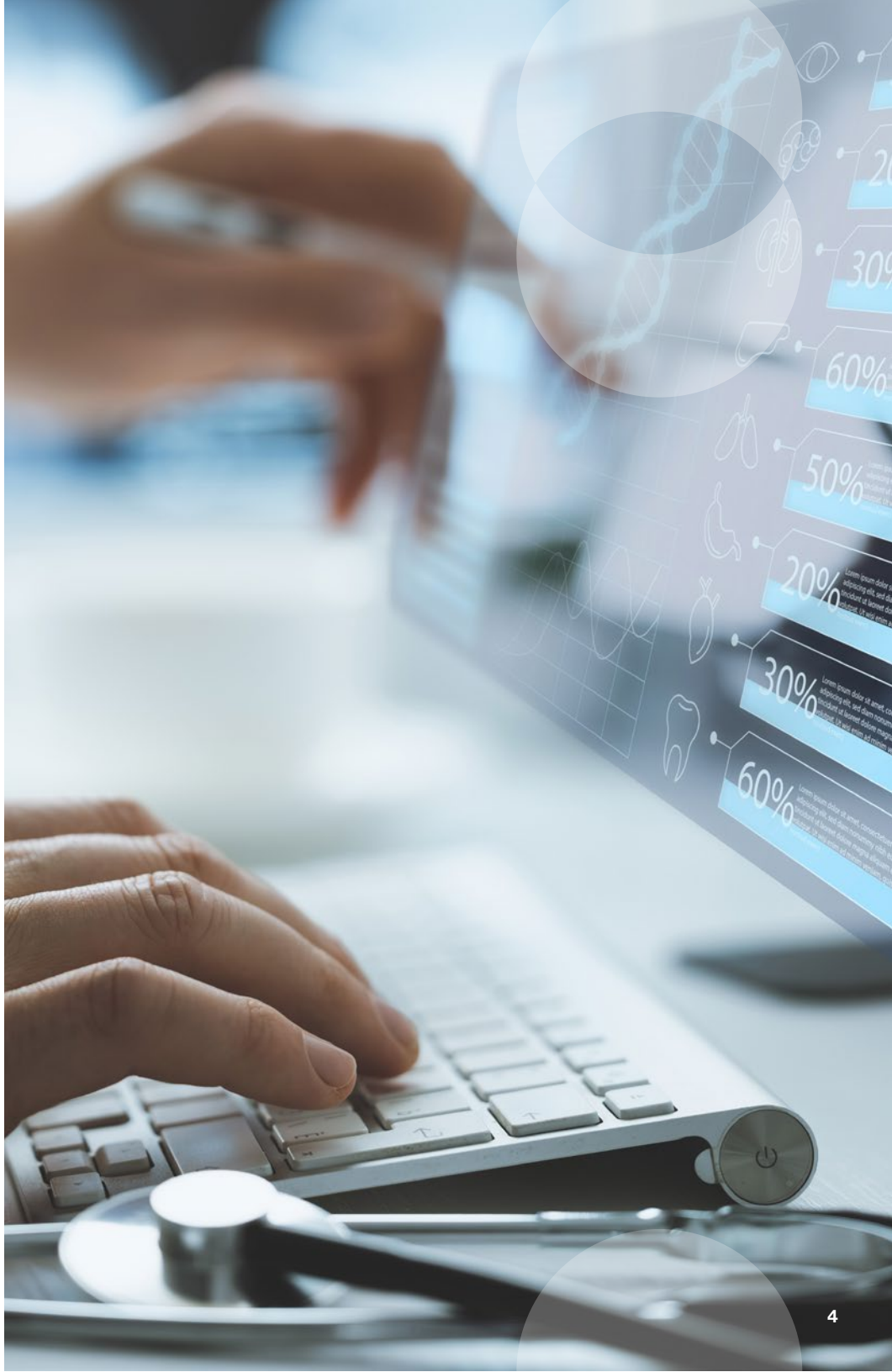
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Highlights

- Artificial intelligence (AI) for drug discovery may offer Canada an upstream specialization in global life sciences despite the absence of a Canadian-headquartered pharmaceutical giant.
- Innovators in this area claim that AI is improving the economics of discovery, shortening timelines, reducing exploratory costs, and creating more viable opportunities before expensive clinical development.
- Canadian firms are generating valuable intellectual property (IP), platforms, and partnerships, but weak scale-up pathways in the country mean ownership, headquarters, talent, and commercialization benefits may migrate elsewhere.
- The “seed-to-Series A gap,” where firms are able to secure seed funding but struggle to achieve Series A funding, was identified by interviewees as Canada’s most urgent bottleneck. Interviewees pointed to several initiatives that can act as important bridges in addressing this gap but argued that Canada would benefit from system-wide scale-up capital to retain firms, IP, and talent.
- Interviewees identified opportunities from shifting policy and capital to supporting strategic scale-up, concentrating support on high-potential firms, strengthening retention pathways, and focusing on recycling exit gains.





About the Innovation and Technology Spotlight Series

The Innovation and Technology Spotlight Series highlights emerging trends in technology and the organizations driving them in Canada. Through a series of case studies, we explore key themes such as:

- commercializing and scaling technology-driven innovations
- securing capital to support growth
- bridging the gap between innovation and market-ready solutions

Each case study highlights Canadian organizations that are achieving commercial success with advanced technologies. Their stories offer practical insights into how these companies are overcoming challenges to achieve market success.

The series also aims to support the next generation of entrepreneurs and innovators by sharing strategies, inspiration, and lessons learned from industry leaders and disruptors.

Read more from the series:

- *Navigating Scale-up Challenges: Innovation and Technology Spotlight–A Case Study*

How AI changes the drug discovery equation

Canada is making deliberate investments in life sciences.[1] These strategic bets reflect a growing recognition that our specializations[2] can be an important source of innovation, productivity, and economic growth.

One area of interest is the integration of AI in the drug discovery pipeline. The argument is that AI helps researchers identify promising therapeutic candidates faster and at lower cost. In doing so, AI is seen to be changing some of the fundamental economics of pharmaceutical innovation. For Canada, this presents an opportunity to build on our strengths in AI, scientific research, and biotechnology.[3]

To capture an insider view into this emerging ecosystem, we talked to six industry leaders.[4]

- Handol Kim, CEO at Variational AI
- Sam Cooper, CTO and Founder at Phenomic AI
- Padma Kodukula, CEO at ScopeSys, Board of Directors at Simmunome Inc., CBO at A-Alpha Bio
- Neil Aubuchon, CCO at Viking Therapeutics (formerly CCO at AbCellera)
- Dr. Maura Campbell, President and CEO, OBIO®
- Jon Stokes, Co-founder and CEO at Stoked Bio, Assistant Professor at McMaster University.

"AI has the potential to dramatically increase both the productivity and efficiency of drug discovery, but not necessarily just to save [...] money, but to create multiple shots on goal to develop a drug afterwards."

Handol Kim, CEO at Variational AI

While the promise of AI is attracting considerable attention, understanding its potential first requires understanding the challenge it is designed to address. Drug discovery has historically been one of the most expensive and uncertain stages of pharmaceutical innovation.

1 Business Development Bank of Canada, "BDC launches a $150-million Life Sciences Venture Fund"; and Innovation, Science and Economic Development Canada, "Government of Canada announces $127 million investment in Aspect Biosystems and Providence Health Care."
2 Zatylny, "Turning Innovation into impact"; and Sonmez, *Intellectual Property in Canada*.
3 Sonmez, *Intellectual Property in Canada*.
4 Chief Executive Officer is denoted as CEO; Chief Commercialization Officer is denoted as CCO; Chief Technology Officer is denoted as CTO; Chief Business Officer is denoted as CBO.

Increasing the odds

Drug discovery has always been a risky business. Developing a new drug is a lengthy, expensive, and uncertain process.[5] It can take more than a decade and cost billions of dollars from initial discovery to regulatory approval, with most candidates failing somewhere along the way.[6]

The drug discovery process is a critical first step in the broader drug development life cycle. Key elements in drug discovery include target discovery, hit generation, and lead optimization. These stages consume considerable time and resources before a candidate ever reaches clinical testing, making them a major focus for efforts to improve efficiency.[7]

By improving the speed, efficiency, and quality of decision-making during discovery, the leaders we spoke with see AI as having the potential to improve the economics of the entire drug development pipeline.

This raises an important question: What exactly is AI contributing to the discovery process that makes these gains possible? Interviewees pointed to several capabilities that distinguish AI-enabled approaches from traditional methods.

What AI does well

AI is attracting growing interest across the pharmaceutical sector because it helps researchers make faster and better-informed decisions during the discovery process.[8] Through structural prediction, pattern recognition, and the analysis of large datasets,[9] AI can identify promising therapeutic candidates more efficiently than traditional approaches. By improving candidate selection early in the pipeline, AI can reduce exploratory costs, accelerate development timelines, and increase the likelihood of identifying viable therapies. Padma Kodukula, CEO at ScopeSys, claims that AI augments human capacity for drug discovery.

> **"AI can process and predict data in a very intelligent fashion, which is not possible by humans. [Older methods such as] a hit and trial method [...] slow us down and the probability of success [for drug discovery] has been low."**
>
> **Padma Kodukula**, CEO at ScopeSys

5 Deloitte, "Navigating the GLP-1 boom"; IntuitionLabs, *The Drug Development Timeline*; Vision Lifesciences, "Drug Development Stages"; and Martinez, "Drug Discovery and Development."
6 Serrano and others. "Artificial Intelligence (AI) Applications in Drug Discovery and Drug Delivery: Revolutionizing Personalized Medicine."
7 Guibelondo, "From Serendipity to Strategy."
8 Yahoo Finance, "AI for Drug Discovery Market Insights Report."
9 THE CONVERSATION, "Will AI revolutionize drug development?"; and Washington Post, "AI & Tech Brief."

Canada's comparative advantage

If AI is reshaping the economics of drug discovery, the next question is whether Canada is positioned to benefit from this shift. Our literature review and interviewees identified several areas where Canada appears to possess important competitive advantages.

World-class talent and research

Signal49 has found that Canada benefits from a concentration of scientific and technical expertise in both the pharmaceuticals and biotechnology areas.[10] Our scientific community ranks among the world's best, placing seventh globally in the number of scientific publications in biological sciences and fifth in health sciences.[11] As an example, McMaster University regularly places within the top 50 global universities for medicine and health studies internationally,[12] and is home to The Stokes Lab, which focuses on applying AI to infectious diseases. Interviewees repeatedly highlighted the quality of Canadian graduate talent as a competitive advantage.

Jon Stokes, Co-founder and CEO at Stoked Bio, and Assistant Professor at McMaster University, said:

> **Most of my students are Canadian and they're the best students I've ever met. I've spent time studying abroad and I would take a [McMaster] grad student over a graduate student from any other institute any day of the week. This is why it's doubly painful when you see them go abroad because this is talent that should be here, and we should do everything we can to keep them here.**

Strong research institutions and highly skilled graduates provide the foundation for innovation. However, competitive advantage ultimately depends on how those capabilities are translated into commercial activity, and Canadian firms have developed a distinctive approach to doing so.

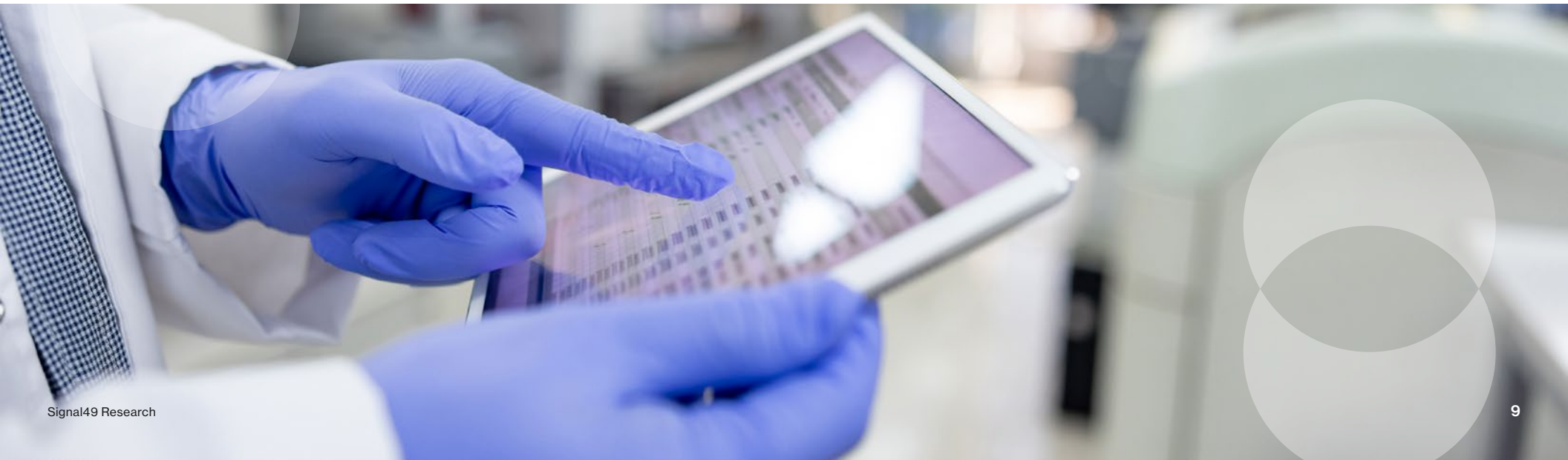
10 Sonmez, *Intellectual Property in Canada*.
11 nature index, "2025 Research Leaders."
12 Miatello, "McMaster's Faculty of Health Sciences ranks among the best in the world."

Owning the start

Rather than competing across the drug development life cycle, the companies we spoke with largely focus on the discovery, or exploratory, phase of the drug development pipeline. Specializing in this stage allows these firms to focus on discovery while avoiding the substantial capital requirements associated with later-stage clinical development and manufacturing. Instead of building vertically integrated pharmaceutical companies from discovery through manufacturing, Canadian firms we spoke to have adopted platform-based business models that generate value through partnerships, licensing agreements, and shared development programs. For example, Handol Kim, CEO at Variational AI, says since the company was founded in 2019, it has worked to pioneer small molecule drug discovery by leveraging generative AI. By combining AI capabilities with scientific expertise, Variational AI is attempting to identify novel antibodies, molecules, and therapeutic candidates that can later be advanced through partnerships with larger biotechnology and pharmaceutical companies.

> **"Our business model is not to develop our own pipeline. We work with biotech and pharma firms to use our AI to generate assets, and then we participate in the upside economics. So, we're purpose built for partnering or platform play—it's intrinsic to everything that we do."**
>
> **Handol Kim**, CEO at Variational AI

These business models allow Canadian firms to participate in high-value stages of the pharmaceutical value chain without assuming the costs of full-scale drug development and manufacturing. Yet the same firms that benefit from Canada's talent and research strengths often encounter barriers as they attempt to grow. As a result, many of the advantages identified above remain vulnerable to erosion.



An advantage at risk

Despite being primed for exploration and maintaining a collaborative approach, AI-enabled drug discovery companies face unusually long development timelines and large capital requirements, making access to scale-up funding important. In addition, firms often encounter challenges at multiple stages of their growth journey, from early financing to the availability of capital needed to scale.

Interviewees frequently described a tension between building companies in Canada and accessing capital abroad. As companies mature, they highlighted that many face pressure to seek growth opportunities outside of Canada. This creates a risk that valuable IP, firms, and highly skilled talent migrate to larger markets before their economic benefits can be fully realized domestically. Sam Cooper, CTO at Phenomic AI, argued that Canadian venture capital (VC) is generally more risk-averse and slower to engage than its American counterpart.

> **"The level [of] VC risk tolerance is at the very bottom of the list. Canada's a good spot, it's just not magic yet. It needs a bit more risk and more bold maneuvering. Imagine getting an investment and opening up from the big funds to invest domestically, even if there's a tax hit on that."**
>
> **Sam Cooper**, CTO at Phenomic AI

The experiences described by interviewees suggest that the well-documented issues facing Canada of retaining firms, talent, and IP are still key barriers.

To illustrate that challenge, Neil Aubuchon, CCO at Viking Therapeutics (formerly CCO at AbCellera), told us about that, although decisions at AbCellera are made in Canada, investment came from both within and outside of Canada. He told us that "As the company grew from 2012 to 2017, [AbCellera] sought funding through Series A in 2018, Series B in 2020, and eventually an Initial Public Offering later that year.... The ownership and all the decisions are made in Canada, but we had to go where the capital was available."

Although the company was able to secure some funding from Canadian sources, including the federal government, he highlighted most of it came from U.S. investors: "This is one of the challenges for the country if we want to be innovative, we've got to make sure that access to capital, that willingness to finance big bets is here, and we want that culture because it's only through those big bets that you get the big winners." AbCellera is using those investments to grow in Canada, including the biologics GMP manufacturing facility in Vancouver, British Columbia.

Recognizing these barriers, interviewees repeatedly emphasized that strengthening Canada's innovation ecosystem will require targeted mechanisms that help firms survive the transition from research success to commercial scale.

Building the foundation

Interviewees consistently described public funding as important for supporting early-stage research and IP development. They told us that aligning big funding bets to address spending challenges, such as in healthcare, is one way to overcome challenges. But it would need a mindset shift.

According to Dr. Maura Campbell, President and CEO, OBIO®, things are starting to change publicly, with BDC, Government of Canada, and Government of Ontario investments. She points to these "votes of confidence" in areas where Canada has demonstrated strength help to provide support early for emerging companies to help protect their IP.

She highlighted several federal and provincial funding programs such as Innovation, Science and Economic Development Canada's Elevate IP program, National Research Council's IP Assist Program, and Ontario's agency for IP protection called Intellectual Property Ontario as making a difference in helping small and medium enterprises in Canada to securing and developing IP.

While these programs help firms establish scientific and IP foundations, interviewees argued that a separate challenge emerges once companies begin preparing for growth. At that stage, access to larger pools of risk capital becomes increasingly important.

> **"The tall poppy syndrome is if any lab gets too much funding, it gets cut. So, everybody tries to grow together, but nobody can take off.... This syndrome seems to be a Canadian philosophy, but we've got to pick three things that we're going to be super good at—if healthcare is a huge expenditure, it should be healthcare, biotech, and drug discovery."**
>
> **Jon Stokes**, CEO at Stoked Bio



Bridging seed and scale

Canadian firms eventually need to get to market and gain traction. It's risk after risk, and each stage has different kinds of capital demands—but as is the case with constraints on the public side, firms need capital to make the next step.

Most notably, Canada's financing ecosystem appears weakest between seed funding and Series A investment.[13] It is often at this C$2–10 million stage that companies begin looking to American investors for the capital needed to scale.

> **"We get companies seed funded with like $1 or $2 million through friends and family and angel investors, and then we have to get them to a point where a VC will actually look at them, which is usually that $2–$10 million, and that's our gap right now."**
>
> **Dr. Maura Campbell**, President and CEO at OBIO®

For Maura, that gap leads to a slippery slope where funding comes from outside of Canada making it difficult to try to keep the company in Canada. She highlighted, "The more they have U.S. investment, the more tax issues start to mount for the U.S. investors, and then the only solution is to move the company into the United States." She also highlighted examples of successful exits, including Quebec-based Inversago being acquired by Danish global healthcare company Novo Nordisk in 2023, Quebec-based BELLUS Health being acquired by British pharmaceutical company GSK in 2023, Chinook Therapeutics from B.C. being acquired by Swiss company Novartis in 2023, and Ontario-based Fusion Pharmaceuticals being acquired by British company AstraZeneca in 2024. These acquisitions show that Canada holds its weight when it comes to exits, but also that it has an opportunity to incentivize people to reinvest that money back into Canada.

Taken together, these examples illustrate both the promise and the challenge of Canada's position in AI-enabled drug discovery. Canadian firms are generating valuable innovations, but realizing the full economic benefits depends on whether those innovations can be retained and scaled domestically.



13 GlobeNewswire, "$66 Billion in Lost Ecosystem Value."

Discovering value

The examples that interviewees shared suggest that while Canadian firms are creating value through AI-enabled drug discovery, they face a challenge of keeping its benefits in Canada. Success will depend on the country's ability to retain firms, talent, and IP while translating scientific breakthroughs into economic and public benefits.

Why timing matters

AI adoption in drug discovery remains at an early stage, but the pace of change is accelerating.[14] International pharmaceutical companies are increasingly looking to AI-enabled firms for new tools, platforms, and therapeutic candidates, and Canadian companies have already begun to establish themselves in this emerging landscape.[15]

Ultimately, the impact of this opportunity extends beyond firm growth or investment returns.

The public payoff

If AI succeeds in changing the economics of drug discovery, its impact could ultimately be felt through improved health outcomes and broader societal benefits. Beyond the economic benefits, using AI for drug discovery has the potential to deliver the promise of a better quality of life for citizens. Its ability to generate personalized therapeutics, reduce costs, improve patient outcomes, and speed up the time of development could literally be a lifesaver for both Canada and its people.

"AI will help drug discovery by giving us better drugs faster.... I am excited about that future where we will have drugs to all rare diseases today. Pharma cannot prioritize it for a rare disease because they don't have that ROI [return on investment], but if AI can do it efficiently and faster, why not? Who knows? Maybe, there is a rare disease for my grandchild or a great grandchild, and I could commission a whole drug development in a year's time with [only] $100,000. I love that future."

Padma Kodukula, CEO at ScopeSys

14 World Economic Forum, "Here's how AI is reshaping drug discovery."
15 Variational AI, "Variational AI Enters Collaboration with Merck to Apply Generative AI to Drug Discovery."

Questions for Canadian policy-makers

Throughout the interviews, participants highlighted both the opportunities created by AI-enabled drug discovery and the barriers that may prevent Canada from fully capturing their benefits. These observations raise several policy questions about competitiveness, capital formation, and long-term value retention. Consequently, policy-makers aiming to strengthen Canada's life sciences innovation ecosystem can consider the following questions raised by this story.

1. Where should Canada seek to compete in the emerging AI-enabled drug discovery process, and what capabilities are most critical to develop or strengthen for Canada to be successful?
2. What policy interventions would most effectively address the growth-capital gap facing Canadian firms that specialize in using AI for drug discovery?
3. How should Canada allocate life sciences innovation funding to maximize long-term economic and societal returns?
4. How can Canada encourage founders, investors, and experienced talent to reinvest in the ecosystem following successful life sciences exits?
5. What policy mix would best support the retention and scaling of globally competitive life sciences firms in Canada?

Appendix A

Methodology

About the research

This spotlight explores the emerging role of artificial intelligence (AI) in drug discovery and examines Canada's position within this rapidly evolving field.

The research focuses on three interconnected themes. First, it examines how AI is changing the drug discovery process and the extent to which it may improve the speed, efficiency, and economics of therapeutic development. Next, it investigates some of the challenges facing Canadian firms as they seek to commercialize and scale AI-enabled drug discovery technologies. Finally, it considers the role of capital, policy, and ecosystem supports in retaining firms, talent, and economic value in Canada.

Insights are derived from six semi-structured interviews with founders, executives, and industry leaders working at the intersection of biotechnology and AI. These interviews were supplemented by a review of relevant academic, industry, and policy literature.

Interviews

Interview recruitment

Potential interviewees were identified through our networks. Invites were sent via email and through social media channels (i.e., LinkedIn). The author followed up directly, providing details about the research project, outlining the interview goals, and inviting participation. Interested individuals scheduled a virtual interview with the author.

From October 2025 to March 2026, the author conducted interviews with six industry-related professionals:

- Handol Kim, CEO at Variational AI
- Sam Cooper, CTO and Founder at Phenomic AI
- Padma Kodukula, CEO at ScopeSys, Board of Directors at Simmunome Inc.
- Neil Aubuchon, CCO at Viking Therapeutics (formerly CCO at AbCellera)
- Dr. Maura Campbell, President and CEO, OBIO®
- Jon Stokes, Co-founder and CEO at Stoked Bio, Assistant Professor at McMaster University

Semi-structured interview questions

The author developed a versatile set of interview questions to accommodate interviewees at this unique intersection of Canadian biotechnology and AI.

The semi-structured interview guide was developed based on our background research and existing team expertise. The guide was reviewed and approved by our internal Research Office.

The questions were structured around a core set of topics including:

1. the talent pipeline
2. market differentiation
3. capital journey
4. the Canadian AI and drug discovery ecosystem

Sample interview questions

We asked respondents to comment on a broad variety of topics that are relevant to the ecosystem for drug discovery and AI in Canada. Below are some examples of the questions included in the interview guide:

- From your perspective, how well is Canada's talent pipeline working in this ecosystem? How strong is demand and supply? How would you describe the current availability of talent in your industry?
- What about opportunities for funding growth? Can you tell us about one or two key opportunities for growth that you actively pursued?
- In terms of market positioning, how does your company differentiate itself within this ecosystem? Is it a different mechanism/process? Business model? Industry application? Other?

Qualitative analysis

Interviews lasted approximately 30 minutes to one hour. Interviews were recorded and transcribed, yielding approximately 116 pages (35,042 words) of text.

The author used an inductive approach to analysis, informed by interview questions and a literature review. Codes were manually created from transcripts, and major themes were generated from intersecting codes aligning with research questions (e.g., capital journey). Since interviews were semi-structured, participants could steer the conversation into broader themes (e.g., Canadian innovation and productivity). A word-for-word approach has been maintained for inclusion of interviewee quotations, but they have been edited for clarity.

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