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CANADA

DOMESTIC MANUFACTURING CAPACITY FOR A COVID-19 VACCINE – PREVENTION IS BETTER THAN CURE

**Report of the Standing Committee on Industry
and Technology**

Joël Lightbound, Chair

**JUNE 2023
44th PARLIAMENT, 1st SESSION**

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**Joël Lightbound
Chair**

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NOTICE TO READER

Reports from committees presented to the House of Commons

Presenting a report to the House is the way a committee makes public its findings and recommendations on a particular topic. Substantive reports on a subject-matter study usually contain a synopsis of the testimony heard, the recommendations made by the committee, as well as the reasons for those recommendations.

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THE STANDING COMMITTEE ON INDUSTRY AND TECHNOLOGY

has the honour to present its

FOURTEENTH REPORT

Pursuant to its mandate under Standing Order 108(2), the committee has studied domestic manufacturing capacity for a COVID-19 vaccine and has agreed to report the following:

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LIST OF RECOMMENDATIONS

As a result of their deliberations committees may make recommendations which they include in their reports for the consideration of the House of Commons or the Government. Recommendations related to this study are listed below.

Recommendation 1

That the Government of Canada review the COVID-19 Task Force’s work and publish its recommendations for improving advisory groups’ transparency within one year. 32

Recommendation 2

That the Government of Canada assess the current state of development of the country’s biomanufacturing capacity to determine whether it meets its needs for a future health crisis and publicly disclose the status of this work within one year. 33

Recommendation 3

That the Government of Canada create a five-year domestic biomanufacturing capacity review process. This process could include consideration of pharmaceutical companies operating in Canada, the scope of their work and the vaccine manufacturing capacity of production facilities. 33

Recommendation 4

That the Government of Canada establish a follow-up mechanism for funding awarded through the various research support programs, including, but not limited to, the Canadian Institutes of Health Research (CIHR), the Social Sciences and Humanities Research Council (SSHRC) and the Natural Sciences and Engineering Research Council (NSERC), in order to consider other funding options for research organizations awarded funding through the networks of centres of excellence program so they do not suffer a funding shortfall after 31 March, 2023, and are able to continue their activities through another source such as the strategic science fund, as of 1 April, 2023. 33

Recommendation 5

That the Government of Canada consider ways to improve its funding structure at the interface between academic research and the pharmaceutical industry to both support research at universities and stimulate investment by pharmaceutical companies. 34

Recommendation 6

That the Government of Canada carry out a review of lessons learned during the pandemic as regards vaccine procurement and development and publish its findings within one year. The review could include, but is not limited to:

- **The work done by scientific experts to advise the government during this period;**
- **The investments in research infrastructure and vaccine production and the status of that work;**
- **The investments in organizations that developed a COVID-19 vaccine and the status of their work;**
- **The costs of the large-scale vaccine procurement strategy and the timelines for vaccinating all Canadians;**
- **Government of Canada contracts with pharmaceutical companies for COVID-19 vaccines procurement. 34**

Recommendation 7

That the Government of Canada increase investment in university research and fundamental sciences, bringing it in line with other advanced OECD nations in the world. 35

Recommendation 8

That the Government of Canada support the creation of high-value, well-paying positions in biomanufacturing and life sciences to attract and retain top talent and consider:

- increasing the value of graduate scholarships and the number of scholarships awarded at the master’s, doctoral and postdoctoral levels;
- ensuring that scholarships are internationally competitive and increase with the cost of living;
- addressing the underinvestment in a generation of Canada’s most promising young researchers;
- ensuring that graduates and workers have the skills Canada needs by increasing opportunities for lifelong learning and work-integrated learning; and
- encouraging the immigration of international talent to the country by strengthening Canada’s position as a destination for global talent by reducing processing times for study and work permits for students and faculty. 35

Recommendation 9

That the Government of Canada help strengthen Canada’s biomanufacturing ecosystem by funding diverse national expertise capable of withstanding future health crises, by taking a broad approach that includes research related not only to vaccine development but also to neuroscience, mental health and immunotherapy, and protecting the patents and intellectual properties..... 35

Recommendation 10

That, as part of the implementation and evolution of the Biomanufacturing and Life Sciences Strategy, the government develop a holistic approach to supporting Canada’s biomanufacturing industry and develop a framework for funding translational research organizations by supporting pre-clinical to clinical translation. 36



DOMESTIC MANUFACTURING CAPACITY FOR A COVID-19 VACCINE – PREVENTION IS BETTER THAN CURE

INTRODUCTION

On 1 December 2020, the House of Commons Standing Committee on Industry, Science and Technology (the Committee) adopted the following motion:

That, pursuant to Standing Order 108(2), the Standing Committee on Industry, Science and Technology commence a study on the emergency situation involving the domestic manufacturing capacity for a COVID-19 vaccine;

That this study examine the May 12, 2020 announcement by the Government of Canada regarding \$44-million to refit a National Research Council facility in Montreal for the purposes of the production of a vaccine in collaboration with CanSino Biologics, and review and examine all related issues, including:

the investment of \$44-million into the facility and the necessary upgrades to space, technology, equipment and personnel that would need to be made as a result,

- (a) the potential impact of this initial announcement on the government's plans to procure other vaccines;
- (b) the facility's prior capacity to manufacture vaccines, including past delivery orders and schedules;
- (c) the dissolution of the announced partnership between the National Research Council and CanSino Biologics on August 26, 2020, and its impact on the planned upgrades to the facility; and
- (d) the evolution of Canada's domestic vaccine manufacturing capacity and the steps Canada can and should take to address it.



That, in order to fully study this emergency situation, the Committee invite the Minister of Health, the Minister of Public Services and Procurement, the Minister of Innovation, Science and Industry, and the President of the Public Health Agency of Canada, each to appear before the committee for one and a half hours, provided that:

- (a) in respect of each of the ministers who does not agree, within one week of the adoption of this motion, to accept this invitation for the length of time prescribed, the Chair shall be instructed to report to the House forthwith a recommendation that this committee be empowered to order his or her appearance from time to time, and
- (b) in respect of the President of the Public Health Agency of Canada, if he does not agree, within one week of the adoption of this motion, to accept this invitation for the length of time prescribed, a summons do issue for his appearance before the Committee at a date and time determined by the Chair but no later than three weeks following the adoption of this motion.

The Committee held five meetings and heard from 26 witnesses in February 2021 for this study. In addition, on 8 April 2022, the Committee heard from several witnesses, including government stakeholders and pharmaceutical companies, to get an update on the vaccine situation in Canada. This report only reflects testimonies heard during this period.

INITIAL CONTEXT

Witnesses explained why Canada’s biomanufacturing capacity—particularly for vaccine production—was limited at the start of the pandemic. Alain Lamarre, Full Professor, said that Canada was a world leader in the development and production of vaccines in the 1980s, but that its production capacity gradually eroded as the industry globalized. He added that “Canada's small share of the international market certainly also contributed to the exodus of vaccine manufacturers as early as the 1980s.”¹ For example, Joel Lexchin, Associate Professor, claimed that the sale of Connaught Laboratories to Mériex

1 House of Commons, Standing Committee on Industry, Science and Technology [INDU], [Evidence](#), 16 February 2021, 1125 (Alain Lamarre, As an individual).

(now part of Sanofi) in the 1980s and the sale of Quebec company Biochem Pharma to GlaxoSmithKline in 2006, weakened Canada’s biomanufacturing capacity.²

Witnesses pointed out that there were warning signs in recent years that a health crisis could occur at any time and that Canada needed to expand its biomanufacturing capacity. Dr. Lexchin pointed out that Canadian governments ignored the following signs:

- the severe acute respiratory syndrome (SARS) crisis in 2003;
- the 2003 report of the National Advisory Committee on SARS and Public Health, *Learning from SARS: Renewal of Public Health in Canada*,³ in which the committee recommended that Canada develop a vaccine strategy and secure a vaccine supply;
- the H1N1 flu crisis of 2009, during which vaccine production at a Quebec plant was delayed; and
- the Ebola crisis of 2014, even though Canada was not directly affected.⁴

According to Ken Hughes, Chair of the Board of Providence Therapeutics, in recent years Canada has not invested enough or used its strategic capacity to assess its future vaccine and therapeutics needs.⁵

Other stakeholders also weighed in on the situation. The Honourable François-Philippe Champagne, Minister of Innovation, Science and Industry, said that when the COVID-19 pandemic began, “Canada had no flexible large scale biomanufacturing capacity that was suitable for a COVID-19 vaccine.”⁶ Minister Champagne noted that, in 1973, about 19% of domestic demand for vaccines and therapeutic drugs was satisfied by imports, while that figure sits at 85% in 2021.⁷ Mona Nemer, Chief Science Advisor, Office of the Chief

2 INDU, *Evidence*, 16 February 2021, 1125 (Joel Lexchin, As an individual).

3 Government of Canada, *ARCHIVED: Learning from SARS: Renewal of Public Health in Canada—Report of the National Advisory Committee on SARS and Public Health*.

4 INDU, *Evidence*, 16 February 2021, 1125 (Joel Lexchin).

5 INDU, *Evidence*, 16 February 2021, 1135 (Ken Hughes, Providence Therapeutics [PT]).

6 INDU, *Evidence*, 4 February 2021, 1115 (François-Philippe Champagne, Innovation, Science and Economic Development Canada [ISED]).

7 INDU, *Evidence*, 4 February 2021, 1115 (François-Philippe Champagne).



Science Advisor, also cited the decline in Canada’s capacity to produce vaccines over the past 40 years.⁸

The Honourable Anita Anand, Minister of Public Services and Procurement, pointed out that when the COVID-19 pandemic started, the federal government tried to reach agreements with the major manufacturers to ensure they used production capacity in Canada. However:

The manufacturers reviewed the identified assets here in Canada and concluded that biomanufacturing capacity in this country at the time of contracting, which was last August and September, was too limited to justify the investment of capital and expertise to start manufacturing in Canada. To be clear, PSPC [Public Services and Procurement Canada] frequently, forcefully, and aggressively brought this issue to the table and raised it with the manufacturers at every turn.

The reality is that standing up new manufacturing of a vaccine requires expertise, and it requires resources from the supplier. Given the scarcity of resources, suppliers emphasized locations that had existing capacity and that would be able to manufacture quickly on a global scale.⁹

The federal government opted for a procurement strategy rather than a production strategy in order to vaccinate Canadians against COVID-19. Mark Lievonon, Co-Chair of the COVID-19 Vaccine Task Force (the Task Force), stated that “[I]icensing in, tech transfer and Canadian production all make sense to pursue, particularly in the medium term, but they would not be part of the solution for 2021.”¹⁰

CURRENT SITUATION

Overview of the Vaccine Procurement Strategy

Since the pandemic began, a number of government stakeholders have been involved in managing the production and procurement of vaccines. Health Canada was responsible for approving vaccine candidates, but not for purchasing or producing the vaccines themselves. Public Services and Procurement Canada played a key role in acquiring vaccines, while Innovation, Science and Economic Development Canada (ISED) was tasked with making investments to expand the country’s biomanufacturing sector. Dr. Nemer advised the federal government on various aspects of the COVID-19 pandemic. Dr. Nemer’s work was supported by a multidisciplinary scientific advisory

8 INDU, [Evidence](#), 25 February 2021, 1110 (Mona Nemer, Office of the Chief Science Advisor).

9 INDU, [Evidence](#), 4 February 2021, 1140 (Anita Anand, Public Services and Procurement Canada [PSPC]).

10 INDU, [Evidence](#), 18 February 2021, 1120 (Mark Lievonon, COVID-19 Vaccine Task Force).

group.¹¹ Following discussions with her international counterparts, she concluded that Canada would be better off creating a group of independent experts to advise the federal government on vaccine procurement and development. She therefore suggested establishing the Task Force.¹²

The Task Force described its work to the Committee. It met for the first time on 16 June 2020, which was more than one month after the National Research Council (NRC) announced their collaboration with CanSino to develop a vaccine candidate for COVID-19. The Task Force met 39 times between June 2020 and February 2021. The Task Force consisted of 11 experts, including 10 Canadians, all volunteers. At its meetings, the Task Force examined domestic and international vaccine candidates and biomanufacturing opportunities. Joanne Langley, Co-Chair of the Task Force, said that the Task Force based its recommendations to the federal government on the most recent available information.¹³ According to Roger Scott-Douglas, Secretary of the Task Force, at every possible opportunity, the Task Force considered pairing up international candidates with Canadian biomanufacturing capacity. He noted, however, that Canada did not have the capacity for mass biomanufacturing (production of billions of doses) to form such partnerships early in the pandemic.¹⁴ Following its assessment, the Task Force concluded that it would be quicker to import COVID-19 vaccines rather than manufacture them.¹⁵

After its review, the Task Force shared its recommendations with the federal government in the summer of 2020. According to Dr. Langley, the Task Force considered various types of vaccines, including the adenovirus vector and messenger RNA (mRNA) vaccines.¹⁶ She claimed that, for each technology, the Task Force examined its results at all the stages usually considered in clinical development and the manufacturing expertise of the organizations developing it.¹⁷ The Task Force recommended a portfolio of experimental vaccines, given the risk that some vaccine candidates would not complete all approval stages. Canada could donate excess doses if necessary.¹⁸ Members of the Task Force

11 INDU, [Evidence](#), 25 February 2021, 1105 (Mona Nemer).

12 INDU, [Evidence](#), 25 February 2021, 1110 (Mona Nemer).

13 INDU, [Evidence](#), 18 February 2021, 1105 (Joanne Langley, COVID-19 Vaccine Task Force).

14 INDU, [Evidence](#), 18 February 2021, 1150 (Roger Scott-Douglas, COVID-19 Vaccine Task Force).

15 INDU, [Evidence](#), 18 February 2021, 1120 (Mark Lievonon).

16 INDU, [Evidence](#), 18 February 2021, 1205 (Joanne Langley, COVID-19 Vaccine Task Force). For more information on the various types of vaccines, see Government of Canada, [Vaccines for COVID-19: Authorized vaccines](#).

17 INDU, [Evidence](#), 18 February 2021, 1205 (Joanne Langley).

18 INDU, [Evidence](#), 18 February 2021, 1105 (Joanne Langley).



pointed out on several occasions that they were only providing recommendations to the federal government, not making decisions.¹⁹

The federal government opted for a diversified vaccine procurement strategy. Vaccine purchasing decisions were heavily informed by the Task Force's recommendations.²⁰ By late summer 2020, the federal government had signed agreements with seven organizations, reserving over 400 million doses of vaccine candidates in total (some of these vaccines require two doses), with an option to increase those orders later.²¹ Table 1 shows the figures for each of those agreements. In addition, Minister Anand said that, through the COVAX initiative, Canada expected to receive 1.9 million doses of the AstraZeneca vaccine.²² The COVAX program is a multilateral group-procurement mechanism that enables developed countries to obtain vaccine doses. In exchange, they fund the donation of doses to developing countries.²³ One witness noted that Health Canada is monitoring approved vaccines as virus variants emerge to ensure they remain effective.²⁴

19 INDU, [Evidence](#), 18 February 2021, 1225 (Roger Scott-Douglas); and INDU, [Evidence](#), 18 February 2021, 1115 (Joanne Langley).

20 INDU, [Evidence](#), 2 February 2021, 1110 (Patty Hajdu, Health Canada); and INDU, [Evidence](#), 4 February 2021, 1110 (Anita Anand).

21 INDU, [Evidence](#), 2 February 2021, 1110 (Patty Hajdu); and INDU, [Evidence](#), 4 February 2021, 1110 (Anita Anand).

22 INDU, [Evidence](#), 4 February 2021, 1110 (Anita Anand).

23 INDU, [Evidence](#), 4 February 2021, 1205 (Anita Anand).

24 INDU, [Evidence](#), 2 February 2021, 1225 (Stephen Lucas, Health Canada).

**Table 1—COVID 19 Vaccines and Vaccine Candidates Reserved
 by the Federal Government**

Organization Name	Number of Doses Reserved (millions)	Development Stage as of March 2021
AstraZeneca	20	Approved by Health Canada
Janssen-Johnson & Johnson	38	Approved by Health Canada
Medicago	76	Phase 2 clinical trials
Moderna	40	Approved by Health Canada
Novavax	76	Awaiting approval from Health Canada
Pfizer-BioNTech	76	Approved by Health Canada
Sanofi-GlaxoSmithKline	72	Phase 2 clinical trials

Source: Table prepared by Library of Parliament analysts using data from INDU, [Evidence](#), 2 February 2021, 1105 (Patty Hajdu, Health Canada); Government of Canada, [Drug and vaccine authorizations for COVID-19: List of applications received](#); Medicago, [COVID-19: Medicago’s Development Programs](#); and GSK, [Sanofi and GSK initiate new Phase 2 study of their adjuvanted recombinant protein-based COVID-19 vaccine candidate](#).

Stakeholders explained the steps the federal government took to speed up vaccine distribution. Minister Hajdu said that Health Canada had taken measures to “safely” expedite its authorization process. To do so, it allowed manufacturers to submit clinical data as they become available rather than wait until all studies are completed.²⁵ In addition, the teams working on vaccine approvals worked rotating shifts around the clock.²⁶ Minister Hajdu explained that, while Health Canada works with international regulatory bodies, it must still approve vaccine data that are specific to where the vaccines are produced. Finally, Iain Stewart, President of the Public Health Agency of Canada (PHAC), reported that, in early 2021, to help the provinces and territories distribute vaccines, PHAC provided them with enough medical supplies to administer the vaccines they would receive in the first quarter of the year.²⁷

25 INDU, [Evidence](#), 2 February 2021, 1105 (Patty Hajdu).

26 INDU, [Evidence](#), 2 February 2021, 1125 (Patty Hajdu).

27 INDU, [Evidence](#), 2 February 2021, 1110 (Iain Stewart, Public Health Agency of Canada (PHAC)).



Witness Comments and Proposals

Witnesses expressed various concerns about the federal government's vaccine procurement strategy. For instance, some criticized the Task Force's lack of transparency. They pointed out that its work plan and meeting minutes should have been public.²⁸ They also regretted the lack of transparency regarding the Task Force members' conflicts of interest. Dr. Lexchin noted that half the members had conflicts of interest, including the co-Chairs.²⁹ Amir Attaran, Professor in the Faculty of Law and the School of Epidemiology and Public Health at the University of Ottawa, stated that compared with task forces in other countries, such as the United Kingdom (U.K.), "our vaccine task force is shockingly secretive."³⁰ According to Gary Kobinger, Professor, one major problem is that there was no independent review of the conflicts of interest that were declared.³¹ He added that there is a "lack of independence and political neutrality of advisory committees across the country."³² He proposed establishing an advisory board that is independent of government.³³

In response to these criticisms, Task Force members explained the steps they took to promote transparency and manage the risk of conflicts of interest. Dr. Langley explained that the Task Force secretariat set up "a rigorous protocol to declare, manage and record potential conflicts of interest."³⁴ Under this protocol, the Task Force members had to recuse themselves from providing advice on projects for which they had a conflict of interest. Dr. Langley reported that all the Task Force members' conflicts of interest are public and disclosed on the website of the NRC.³⁵ Mr. Scott-Douglas added that the Task Force does not publish the agenda or minutes of its meetings, but it does provide every detail to the Minister of Innovation, Science and Industry and the Minister of Health.³⁶ In

28 INDU, [Evidence](#), 16 February 2021, 1115 (Amir Attaran, As an individual); and INDU, [Evidence](#), 16 February 2021, 1145 (Joel Lexchin).

29 INDU, [Evidence](#), 16 February 2021, 1215 (Joel Lexchin).

30 INDU, [Evidence](#), 16 February 2021, 1120 (Amir Attaran).

31 INDU, [Evidence](#), 25 February 2021, 1205 (Gary Kobinger, As an individual).

32 INDU, [Evidence](#), 25 February 2021, 1150 (Gary Kobinger).

33 INDU, [Evidence](#), 25 February 2021, 1240 (Gary Kobinger).

34 INDU, [Evidence](#), 18 February 2021, 1105 (Joanne Langley).

35 INDU, [Evidence](#), 18 February 2021, 1105 (Joanne Langley).

36 INDU, [Evidence](#), 18 February 2021, 1155 (Roger Scott-Douglas).

addition, he said that Task Force members had met with the media or given interviews on 135 occasions.³⁷

Some witnesses also criticized the government’s lack of transparency in making vaccine purchasing decisions. They pointed out that not only are the Task Force’s recommendations inaccessible, but the vaccine procurement contracts are confidential as well.³⁸ Professor Attaran noted that jurisdictions such as the United States (U.S.), Brazil and the European Union had disclosed their contracts.³⁹ He explained that government contracts and decisions should be transparent, because:

If you take high stakes decisions secretly, behind closed doors, without peer review, without peers in the field able to view what’s happening and offer constructive criticism, you end up in a dead end after bad decisions are made. Science turns on peer review. That is its lifeblood.⁴⁰

Dr. Kobinger noted that the confidentiality of these contracts demonstrated that: “As long as we Canadians don’t produce more of those tools—drugs and vaccines—we are in the little seat in these negotiations.”⁴¹

The ministers responded to the witnesses’ critical remarks. Minister Anand explained that contract negotiations were different for every country. She pointed out that, under its agreements, Canada must comply with certain legal provisions and the confidentiality clauses in every contract. Minister Anand underlined that, if the federal government were to disclose the contents of its agreements with suppliers, “we would risk receiving those vaccines, because we would be in a potential breach of contract.”⁴² Furthermore, Minister Hajdu stated that to provide more transparency, the federal government is sharing a great deal of information online, including on virus transmission, case numbers and vaccine distribution.⁴³

The witnesses also discussed the federal government’s strategy to purchase vast amounts of COVID-19 vaccines. Professor Attaran wondered what the government will

37 INDU, [Evidence](#), 18 February 2021, 1155 (Roger Scott-Douglas).

38 INDU, [Evidence](#), 16 February 2021, 1220 (Amir Attaran); INDU, [Evidence](#), 16 February 2021, 1125 (Joel Lexchin); and INDU, [Evidence](#), 25 February 2021, 1245 (Gary Kobinger).

39 INDU, [Evidence](#), 16 February 2021, 1220 (Amir Attaran).

40 INDU, [Evidence](#), 16 February 2021, 1220 (Amir Attaran).

41 INDU, [Evidence](#), 25 February 2021, 1245 (Gary Kobinger).

42 INDU, [Evidence](#), 4 February 2021, 1235 (Anita Anand).

43 INDU, [Evidence](#), 2 February 2021, 1205 (Patty Hajdu).



do with so many excess doses if all the agreements it signed are fulfilled. He said that Canada had signed more contracts than any other country. In his view, the federal government seems to have panicked rather than acted strategically.⁴⁴ However, Andrew Casey, President and Chief Executive Officer of BIOTECanada, argued that the government “did some very strategically smart things in terms of looking at the technologies that were out there, investing in some of the Canadian technologies and trying to advance them a bit more quickly than they would have normally advanced.”⁴⁵

Other witnesses highlighted the value of this large scale purchasing. Dr. Langley explained that the Task Force had recommended buying more doses than necessary because it knew that some vaccine candidates would not make it through the development process.⁴⁶ Minister Hajdu reported that the federal government agreed with that recommendation and preferred to ensure it would quickly have enough doses for all Canadians.⁴⁷ The federal government also invested in multiple technologies to minimize the risk of delays and to have different types of vaccines for different populations.⁴⁸ Minister Hajdu noted that, if Canada has too many doses, it can make a larger contribution to the COVAX program.⁴⁹

The announced partnership with CanSino Biologics Inc. (CanSino), a Chinese vaccine manufacturer, without input from the Task Force, raised many questions from the witnesses. Mr. Stewart explained that the NRC had already partnered with CanSino for several years prior to this agreement, including on work to develop different kinds of vaccines.⁵⁰ On 12 May 2020, the NRC announced a collaboration with CanSino to develop a vaccine candidate for COVID-19. Under the agreement, CanSino would use one of the NRC’s proprietary cell lines to develop a vaccine called “Ad5-nCoV.” In return, CanSino would enable the NRC to manufacture the Ad5-nCoV vaccine for clinical trials in Canada, in cooperation with the Canadian Center for Vaccinology.⁵¹ Mr. Stewart said the

44 INDU, [Evidence](#), 16 February 2021, 1115 (Amir Attaran).

45 INDU, [Evidence](#), 16 February 2021, 1115 (Andrew Casey, BIOTECanada).

46 INDU, [Evidence](#), 18 February 2021, 1105 (Joanne Langley).

47 INDU, [Evidence](#), 2 February 2021, 1135 (Patty Hajdu).

48 INDU, [Evidence](#), 2 February 2021, 1110 (Iain Stewart).

49 INDU, [Evidence](#), 2 February 2021, 1135 (Patty Hajdu).

50 INDU, [Evidence](#), 2 February 2021, 1125 (Iain Stewart).

51 National Research Council of Canada, [*The National Research Council of Canada and CanSino Biologics Inc. announce collaboration to advance vaccine against COVID-19.*](#)

NRC was ready to begin clinical trials in the summer of 2020, but the CanSino shipment never arrived.⁵²

Task Force members discussed the steps leading to the recommendation to establish a partnership with CanSino. Mr. Scott-Douglas stated that CanSino was one of the international candidates reviewed by the Task Force, independent of its prior relationship with the NRC. He said that CanSino was initially recommended, as it was one of the most promising vaccines early in the pandemic. In fact, it had started Phase 3 clinical trials well before the other candidates.⁵³ Moreover, Mr. Scott-Douglas said that while the Task Force members initially recommended this partnership, after receiving additional data, “their advice to ministers was that new science suggested not backing CanSino further.”⁵⁴ However, Dr. Kobinger, who was an early member of the Task Force, stated that:

The first written recommendation I saw from the task force was about CanSino. I remember it vividly, because my first reflex was to think that we had not discussed CanSino, as we had the other one, wherein we had an exchange with the company.

I didn’t know where this recommendation came from.⁵⁵

For her part, Minister Hajdu said the federal government had established this partnership following the Task Force’s recommendation.⁵⁶ As for Minister Champagne, he said the government had considered the partnership for three months and then decided to end the discussions.⁵⁷

Lastly, in February 2021, the federal government was harshly criticized for the delayed delivery of doses of the Pfizer-BioNTech and Moderna vaccines. Professor Attaran said that Canada had been too slow in purchasing vaccines, taking weeks or even months longer than its peers.⁵⁸ He also asserted that the government should have a mass vaccination strategy to speed up vaccination, including by mobilizing the Red Cross.⁵⁹ Professor Attaran claimed that part of the problem is that Health Canada is playing too

52 INDU, [Evidence](#), 2 February 2021, 1145 (Iain Stewart).

53 INDU, [Evidence](#), 18 February 2021, 1200 (Roger Scott-Douglas).

54 INDU, [Evidence](#), 18 February 2021, 1130 (Roger Scott-Douglas).

55 INDU, [Evidence](#), 25 February 2021, 1240 (Gary Kobinger).

56 INDU, [Evidence](#), 2 February 2021, 1135 (Patty Hajdu).

57 INDU, [Evidence](#), 4 February 2021, 1125 (François-Philippe Champagne).

58 INDU, [Evidence](#), 16 February 2021, 1115 (Amir Attaran).

59 INDU, [Evidence](#), 16 February 2021, 1250 (Amir Attaran).



small a role in the vaccination strategy. He said that, since this department has the scientific expertise, it should have been in charge of vaccine strategy, as is the case in countries that have managed vaccination effectively.⁶⁰ However, according to Mr. Casey, the government moved quickly to prepare itself to deal with the vaccination issue by creating the Task Force.⁶¹

Stakeholders explained the reasons for the vaccine delivery delays. Mr. Stewart told the Committee that deliveries were delayed in February 2021 because Pfizer was working on improvements to its production lines. The company nonetheless expected to keep its commitment to provide 4 million doses in the first quarter of 2021. Moderna was also behind on its deliveries, but it also expected to deliver the doses promised by the end of the first quarter.⁶² Minister Anand stated that the government had negotiated the earliest possible delivery dates.⁶³ Mr. Scott-Douglas explained that Canada had a lower vaccination rate than most of its peers in February 2021 because the vaccines were approved later, as they were not produced there.⁶⁴ Table 2 shows the total confirmed distribution of COVID-19 vaccines as of 19 April 2021.

**Table 2—Total Confirmed Distribution of COVID 19 Vaccines,
as of 19 April 2021**

Vaccine	Doses Distributed
AstraZeneca	2,316,020
Pfizer-BioNTech	8,198,562
Moderna	2,856,880
Total	13,371,462

Source: Table prepared by the Library of Parliament using data from Government of Canada, [Vaccines for COVID-19: Shipments and deliveries](#).

Despite the vaccination delays, the federal ministers were confident that Canada will be able to meet its vaccination timelines. They were all confident that all Canadians who

60 INDU, [Evidence](#), 16 February 2021, 1115 (Amir Attaran).

61 INDU, [Evidence](#), 16 February 2021, 1140 (Andrew Casey).

62 INDU, [Evidence](#), 2 February 2021, 1110 (Iain Stewart).

63 INDU, [Evidence](#), 4 February 2021, 1110 (Anita Anand).

64 INDU, [Evidence](#), 18 February 2021, 1210 (Roger Scott-Douglas).

wanted the vaccine could be vaccinated by the end of September 2021.⁶⁵ Furthermore, Mr. Stewart highlighted that these predictions reflected only the Moderna and Pfizer-BioNTech vaccines, meaning that new vaccine approvals would surely lead to even faster vaccination in Canada.⁶⁶ Minister Hajdu stated that Canada would receive more doses between April and June and then mass vaccination campaigns would begin.⁶⁷ In her view, these delays and difficulties show that Canada needs to build a strong domestic biomanufacturing capacity.⁶⁸

FUTURE DIRECTION

Development of a Domestic Biomanufacturing Capacity

During the Committee's study, the witnesses agreed that building a strong domestic biomanufacturing capacity is important. Mr. Hughes pointed out that, with the emergence of variants, COVID-19 will likely be present for a long time. In his view, the variants could be contained if Canada further develops its domestic expertise.⁶⁹ Minister Champagne said that the immunity conferred by the vaccines may be short-lived and Canadians may need to be vaccinated again.⁷⁰ The witnesses also highlighted that the current situation has shown the value of developing a domestic biomanufacturing capacity, particularly for vaccine production, so that Canada no longer needs to rely on other countries in future health crises.⁷¹ Finally, Associate Professor Brian Lichty said that having a "robust domestic manufacturing capacity for vaccines is pivotal for Canada not only to ensure Canadians have timely access to lifesaving vaccines, but also from an intellectual property, innovation and national security point of view."⁷²

The Task Force also played a key role in developing the strategy to build Canada's domestic biomanufacturing capacity. Mr. Lievonon explained that, within the Task Force, a joint

65 INDU, [Evidence](#), 2 February 2021, 1105 (Patty Hajdu); and INDU, [Evidence](#), 4 February 2021, 1110 (Anita Anand).

66 INDU, [Evidence](#), 2 February 2021, 1110 (Iain Stewart).

67 INDU, [Evidence](#), 2 February 2021, 1105 (Patty Hajdu, Health Canada).

68 INDU, [Evidence](#), 2 February 2021, 1130 (Patty Hajdu, Health Canada).

69 INDU, [Evidence](#), 16 February 2021, 1105 (Ken Hughes); and INDU, [Evidence](#), 25 February 2021, 1210 (Mona Nemer).

70 INDU, [Evidence](#), 4 February 2021, 1135 (François-Philippe Champagne).

71 INDU, [Evidence](#), 4 February 2021, 1135 (François-Philippe Champagne, ISED); INDU, [Evidence](#), 16 February 2021, 1205 (Volker Gerdts, VIDO-Intervac); INDU, [Evidence](#), 16 February 2021, 1115 (Andrew Casey); and INDU, [Evidence](#), 25 February 2021, 1120 (Andrew Booth, Precision NanoSystems).

72 INDU, [Evidence](#), 25 February 2021, 1115 (Brian Lichty, As an individual).



biomanufacturing subcommittee was mandated to make recommendations to the government on various issues relating to the procurement and production of vaccines, including the development of a strategy to boost the country's biomanufacturing capacity. The group met for the first time on 23 June 2020 and subsequently met 22 times between June 2020 and February 2021. In the course of its work, the subcommittee invited international experts from countries such as the U.S. and U.K. to learn about their strategies. The subcommittee made recommendations on immediate investments to respond to the COVID-19 pandemic and on medium- and long-term investments. The subcommittee followed the same rules for disclosing conflicts of interest as the Task Force.⁷³

Additionally, the joint biomanufacturing subcommittee assessed the projects proposed to the government through the Strategic Innovation Fund (SIF). Dr. Langley explained that it considered 24 domestic vaccine candidates under the SIF. The most promising candidates in the early going, including those of Medicago and Precision NanoSystems, were funded. The most promising businesses over the medium term, such as Providence Therapeutics, were funded through the NRC and the Industrial Research Assistance Program.⁷⁴

As part of the Committee's study, a number of Canadian organizations working on COVID-19 vaccines made presentations on the status of their efforts. Table 3 summarizes the status of their work in 2021. In addition to developing a COVID-19 vaccine, the Vaccine and Infectious Disease Organization (VIDO) is building a pilot-scale manufacturing facility that will be large enough to work with animals of various sizes. The facility will be ready in October 2021 and will be able to produce vaccines by 2022.⁷⁵ Precision NanoSystems is building facilities to produce genetic therapeutics.⁷⁶ Minister Champagne reported that the federal government has invested \$792 million through the SIF to develop vaccines and therapeutics in Canada.⁷⁷

73 INDU, [Evidence](#), 18 February 2021, 1110 (Mark Lievonon).

74 INDU, [Evidence](#), 18 February 2021, 1105 (Joanne Langley).

75 INDU, [Evidence](#), 16 February 2021, 1110 (Volker Gerdts).

76 INDU, [Evidence](#), 25 February 2021, 1120 (James Taylor, Precision NanoSystems).

77 INDU, [Evidence](#), 4 February 2021, 1115 (François-Philippe Champagne).

Table 3—COVID 19 Vaccine Development at Various Canadian Organizations, 2021

Organization	Type of Vaccine	Development Stage as of March 2021	Expected Annual Production of COVID-19 Vaccine Doses
McMaster University biomanufacturing facility	Adenovirus	Clinical trials to begin in 2021	Not available
Medicago	Virus-like particle	Phase 2 clinical trials	80 million (2021) 1 billion (2023)
Providence Therapeutics	mRNA	Phase 1 clinical trials	50 million (2021) 120 million (2022)
VIDO-Intervac	Protein subunit	Phase 1 clinical trials	Not available

Source: Table prepared by the Library of Parliament using data from INDU, [Evidence](#), 4 February 2021, 1115 (François-Philippe Champagne, ISED); INDU, [Evidence](#), 16 February 2021, 1110 (Volker Gerds, VIDO-Intervac); INDU, [Evidence](#), 16 February 2021, 1225 (Brad Sorenson, Providence Therapeutics); and Medicago, [COVID-19: Medicago's Development Programs](#).

Finally, Minister Champagne told the Committee about the federal government's investments to enhance Canada's biomanufacturing capacity and improve the country's resilience to future health crises. One example is the federal government's \$126-million investment in building NRC vaccine production facilities in Montréal. Minister Champagne explained that the centre would be completed by the end of summer 2021, certified a few months later and then be ready for production.⁷⁸ These facilities will have a production capacity of up to 2 million vaccine doses per month.⁷⁹ They will be able to produce the Novavax vaccine, as the federal government signed a memorandum of understanding with that company in February 2021.⁸⁰

Minister Champagne explained that, in addition to building the NRC production centre, the federal government is supporting other organizations in order to improve Canada's resilience, including Medicago and VIDO-Intervac.⁸¹ For instance, it provided \$12 million to VIDO-Intervac to bring its facility up to the standards required to produce human

78 INDU, [Evidence](#), 4 February 2021, 1125 (François-Philippe Champagne).

79 INDU, [Evidence](#), 4 February 2021, 1115 (François-Philippe Champagne).

80 INDU, [Evidence](#), 4 February 2021, 1115 (François-Philippe Champagne).

81 INDU, [Evidence](#), 4 February 2021, 1125 (François-Philippe Champagne).



vaccines. According to Minister Champagne, the federal government wants Canada to have production capacity for every step in the vaccine supply chain so that it can be self-sufficient.⁸²

Witness Comments and Proposals

During the Committee's study, witnesses were critical of several aspects of the government's strategy to develop domestic biomanufacturing capacity. They also made various recommendations to improve Canada's research and innovation capabilities.

Some witnesses argued that the federal government has not invested enough in domestic biomanufacturing capacity since the pandemic began. Mr. Hughes stated that the federal government has not marshalled the scientific, medical, and business expertise in the public and private sectors since the pandemic started. In his view, the federal government focused solely on purchasing vaccines and has invested little in preparing for the future.⁸³ Dr. Kobinger asserted that the federal government did not move quickly enough in either January or February 2020 to implement strategies to develop and produce vaccines in Canada.⁸⁴ He claimed that with adequate support, Canada could have produced at least two vaccines by February 2021.⁸⁵ However, according to Mr. Casey, the federal government adopted an appropriate strategy, reviewing the most promising vaccine technologies in order to deliver an immediate solution while investing in certain Canadian technologies to help them advance.⁸⁶

A number of organizations making vaccines in Canada reported that they need more funding to continue their work.⁸⁷ Karen Mossman, Vice-President of Research at McMaster University, and Brad Sorenson, Chief Executive Officer of Providence Therapeutics, said that more federal government support would have helped them develop their COVID-19 vaccines much more quickly.⁸⁸ Mr. Sorenson explained that Providence Therapeutics waited all spring and summer in 2020 for a response to its

82 INDU, [Evidence](#), 4 February 2021, 1135 (François-Philippe Champagne).

83 INDU, [Evidence](#), 16 February 2021, 1105 (Ken Hughes).

84 INDU, [Evidence](#), 25 February 2021, 1130 (Gary Kobinger).

85 INDU, [Evidence](#), 25 February 2021, 1240 (Gary Kobinger).

86 INDU, [Evidence](#), 16 February 2021, 1115 (Andrew Casey).

87 INDU, [Evidence](#), 25 February 2021, 1110 (Karen Mossman, As an individual); INDU, [Evidence](#), 25 February 2021, 1120 (Andrew Booth); and INDU, [Evidence](#), 25 February 2021, 1130 (Takashi Nagao, Medicago).

88 INDU, [Evidence](#), 16 February 2021, 1235 (Brad Sorenson, PT); and INDU, [Evidence](#), 25 February 2021, 1110 (Karen Mossman).

funding application under the SIF as timelines were repeatedly extended.⁸⁹ Volker Gerdts, Director and Chief Executive Officer of VIDO-Intervac, said that his organization needs more funding to continue clinical trials of its COVID-19 vaccine.⁹⁰

Moreover, according to Dr. Kobinger, the federal government should follow up on the support it gave to the various organizations. He explained that his group received \$1 million in funding, but that the federal government failed to provide further support as its vaccine development progressed. He noted that:

Nobody on this planet can bring a vaccine through any clinical study in humans with \$1 million, so we can ask whether this \$1 million was well spent considering the lack of follow-up support. How many more like this in Canada also used funding and then were left behind? How far could my group and others be today if we had had early support like in the U.K., the U.S. or other countries?⁹¹

Dr. Kobinger advocated for the federal government to follow up with every project that receives funding so that it can boost support to those that are making progress and pause funding for those falling behind.⁹²

Various stakeholders addressed these comments. Mr. Lievonon stated that he did not think that “we could have done it faster with any type of licensing in or tech transfer agreements.”⁹³ Andrew Booth, President of Precision NanoSystems, concurred.⁹⁴ Mr. Lievonon explained that science has been paramount in decision-making and that Canada would clearly receive vaccines more quickly by buying them than by producing them. Furthermore, he said that the domestic investment strategy was implemented at the same time as the purchasing strategy, not afterward.⁹⁵ Both Dr. Nemer and Mr. Booth emphasized that Canada needs to start investing in building its biomanufacturing capacity right away, as it takes years or even decades to develop strong and resilient capabilities.⁹⁶

89 INDU, [Evidence](#), 16 February 2021, 1235 (Brad Sorenson).

90 INDU, [Evidence](#), 16 February 2021, 1205 (Volker Gerdts).

91 INDU, [Evidence](#), 25 February 2021, 1135 (Gary Kobinger).

92 INDU, [Evidence](#), 25 February 2021, 1215 (Gary Kobinger).

93 INDU, [Evidence](#), 18 February 2021, 1120 (Mark Lievonon).

94 INDU, [Evidence](#), 25 February 2021, 1215 (Andrew Booth).

95 INDU, [Evidence](#), 18 February 2021, 1200 (Mark Lievonon).

96 INDU, [Evidence](#), 25 February 2021, 1225 (Mona Nemer); and INDU, [Evidence](#), 25 February 2021, 1215 (Andrew Booth).



Minister Champagne stated that the federal government has provided significant funding to develop domestic biomanufacturing capacity since the start of the COVID-19 pandemic. For example, he said that “within 12 days of the World Health Organization’s declaring a pandemic, we were investing \$192 million in biomanufacturing here in Canada. Within a month, we had invested close to \$792 million.”⁹⁷

One witness compared Canada’s vaccine manufacturing capacity with that of the U.K. Professor Attaran said that the U.K. made a major effort to improve its production capacity from the outset of the pandemic. As of February 2021, it was one of the leading vaccine manufacturing countries, while Canada ranked 40th.⁹⁸ He added that, when the pandemic began, the U.K. had the capacity to produce 200 litres of cell culture in order to make the Oxford-AstraZeneca vaccine, while Canada could make 500 litres. Professor Attaran argued that Canada could have made the Oxford-AstraZeneca vaccine under licence. He also noted that, as of 2019, the NRC laboratory was the only one in the world to have made and commercialized an adenovirus vaccine, the same technology used in the AstraZeneca and Johnson & Johnson vaccines.⁹⁹

ISED officials responded to the comparisons with the U.K.’s production capacity. According to Minister Champagne, when the COVID-19 pandemic started, Canada had a much smaller manufacturing base than the U.K.¹⁰⁰ Simon Kennedy, Deputy Minister of ISED, explained that, at the time, the U.K. already had large contract manufacturing operators that could quickly shift to mass production of COVID-19 vaccines. He added that, in 2017, the U.K. had launched a rebuilding strategy and had started work in 2019 on one of their large vaccine production facilities, which will be ready by the end of 2021.¹⁰¹ Lastly, Mitch Davies, President of the NRC, said that while NRC researchers have expertise in the technology used for the AstraZeneca vaccine, what matters is the company with which one reaches an agreement. In Canada’s case, that agreement is with Novavax.¹⁰²

The witnesses offered strategies for building Canada’s domestic biomanufacturing capacity. Dr. Mossman stated that “[i]nvesting in domestic biomanufacturing capacity is

97 INDU, [Evidence](#), 4 February 2021, 1120 (François-Philippe Champagne).

98 INDU, [Evidence](#), 16 February 2021, 1115 (Amir Attaran).

99 INDU, [Evidence](#), 16 February 2021, 1155 (Amir Attaran).

100 INDU, [Evidence](#), 4 February 2021, 1200, 1220 (François-Philippe Champagne).

101 INDU, [Evidence](#), 4 February 2021, 1215 (Simon Kennedy, ISED).

102 INDU, [Evidence](#), 4 February 2021, 1300 (Mitch Davies, National Research Council of Canada (NRC)).

certainly part of the solution.”¹⁰³ Witnesses also pointed out that government investments need to support a variety of technologies in the vaccine manufacturing industry.¹⁰⁴ Dr. Lexchin suggested that the government implement a national strategy to publicly fund vaccine research in the public sector. In his opinion, the federal government should invest in a publicly owned vaccine manufacturing facility to ensure Canadian facilities are never sold to foreign interests.¹⁰⁵

To prepare for future health crises, Dr. Gerdts proposed that the federal government fund organizations and centres that focus on emerging diseases that affect both humans and animals. He also suggested establishing emergency organizations that can respond immediately to emerging diseases.¹⁰⁶ Multiple witnesses emphasized the many opportunities for public-private partnerships in the biomanufacturing sector.¹⁰⁷

Some witnesses said that scientists are not adequately supported in Canada. Dr. Gerdts stated that Canada should have more research capacity.¹⁰⁸ Professor Attaran argued that the Canadian scientific establishment is inferior to that of peer countries. He said that, during the pandemic, the Chief Science Advisor has produced just three reports, while Switzerland—a much smaller country—has produced 70.¹⁰⁹ In his view, the government lacks scientific expertise.¹¹⁰ Dr. Lexchin noted that the federal government spends \$1 billion per year on medical research, about four times less per capita than the U.S.¹¹¹ Dr. Lamarre explained that the number of researchers in Canada has increased, as researchers from around the world are attracted by the good working conditions and access to research infrastructure in Canada. Yet, he said that, despite these greater numbers, funding for basic research has stagnated for decades, with the result that

103 INDU, [Evidence](#), 25 February 2021, 1110 (Karen Mossman).

104 INDU, [Evidence](#), 16 February 2021, 1150 (Alain Lamarre); INDU, [Evidence](#), 16 February 2021, 1250 (Volker Gerdts); and INDU, [Evidence](#), 25 February 2021, 1120 (James Taylor).

105 INDU, [Evidence](#), 16 February 2021, 1125 (Joel Lexchin); and INDU, [Evidence](#), 16 February 2021, 1150 (Alain Lamarre).

106 INDU, [Evidence](#), 16 February 2021, 1205 (Volker Gerdts).

107 INDU, [Evidence](#), 16 February 2021, 1225 (Andrew Casey); INDU, [Evidence](#), 25 February 2021, 1120 (James Taylor); and INDU, [Evidence](#), 25 February 2021, 1130 (Takashi Nagao).

108 INDU, [Evidence](#), 16 February 2021, 1250 (Volker Gerdts).

109 INDU, [Evidence](#), 16 February 2021, 1115 (Amir Attaran).

110 INDU, [Evidence](#), 16 February 2021, 1140 (Amir Attaran).

111 INDU, [Evidence](#), 16 February 2021, 1155 (Joel Lexchin).



researchers' funding application "success rates have dropped dramatically in recent years."¹¹²

Other witnesses rebutted these criticisms. Dr. Nemer said that Canadian researchers have been very active in helping deal with the COVID-19 pandemic. She said that "science has guided decision-making in real time like I have never seen before." The COVID-19 expert panel, made up of researchers and practitioners from across the country, met over 40 times to discuss various issues.¹¹³ In response to a question on this topic, Dr. Mossman asserted that Canada has scientific experts in all of its universities and that, "in many ways and in many aspects, Canadian scientists lead."¹¹⁴ James Taylor, Chief Executive Officer of Precision NanoSystems, agreed.¹¹⁵

Finally, one witness proposed ways of supporting the growth of a stronger Canadian science ecosystem in the years ahead. Mr. Lamarre argued that the federal government should keep investing significant amounts "in the coming years to rebuild a rich and diverse ecosystem at all levels of the vaccine development chain."¹¹⁶ He encouraged the federal government to boost investment in the following two areas:

- basic research, because it is a vital part of the development of new immunization technologies. Innovation does not always require targeted investments, as it often emerges from broader investments that deliver unexpected benefits; and
- leading-edge research infrastructure through the Canada Foundation for Innovation (CFI). Canada needs cutting-edge infrastructure to support the development of vaccines, but this infrastructure entails significant operating costs for researchers and universities.¹¹⁷

Dr. Lamarre further proposed establishing a government funding structure for vaccine development that bridges academic research and the pharmaceutical industry. He pointed out that Canada has world leaders in vaccine development in its universities, but it is extremely costly to develop vaccines. Universities often lack the funding to complete their projects. Such a structure would help these projects advance to a stage where they

112 INDU, [Evidence](#), 16 February 2021, 1210 (Alain Lamarre).

113 INDU, [Evidence](#), 25 February 2021, 1110 (Mona Nemer).

114 INDU, [Evidence](#), 25 February 2021, 1255 (Karen Mossman).

115 INDU, [Evidence](#), 25 February 2021, 1255 (James Taylor).

116 INDU, [Evidence](#), 16 February 2021, 1125 (Alain Lamarre).

117 INDU, [Evidence](#), 16 February 2021, 1125 (Alain Lamarre).

would attract the interest of the large pharmaceutical companies. According to Dr. Lamarre, this could even encourage these companies to build facilities in Canada.¹¹⁸

April 2022 Update on the Vaccine Situation

In April 2022, Government officials explained to the Committee what initiatives the Canadian government had put in place to increase Canada’s biomanufacturing capacity since March 2020. Eric Costen, Senior Assistant Deputy Minister, said: “From the very outset of the pandemic, the government immediately set to the task of addressing these biomanufacturing gaps through a series of strategic investments.”¹¹⁹ Mr. Costen said that, since the spring of 2020, the federal government had invested approximately \$1.6 billion in new vaccine, therapeutic and biomanufacturing projects across Canada. Organizations that received federal government funding include the following:

- the University of Saskatchewan’s VIDO, to support the clinical trials of its two COVID-19 vaccine candidates, as well as an expansion of its facilities;
- BioVectra, in Prince Edward Island, to build up mRNA capabilities and supply chains;
- AbCellera and Precision NanoSystems, both based in Vancouver, to support their research and production activities; and
- Sanofi Pasteur and Resilience Biotechnologies, to support end-to-end vaccine manufacturing capabilities across a range of technology platforms.¹²⁰

The NRC collaborated with many of the companies that received federal funding over the course of the pandemic to support them in their work.¹²¹

As mentioned above, the Government of Canada also invested in the Quebec company Medicago. In March 2022, the World Health Organization (WHO) rejected Medicago’s vaccine because of its ties to cigarette manufacturer Philip Morris, a minority shareholder in the company. In response to questions, Mr. Costen explained that the Government of Canada funded Medicago in 2020 in an emergency context; after assessment, it was one

118 INDU, *Evidence*, 16 February 2021, 1125 (Alain Lamarre).

119 INDU, *Evidence*, 8 April 2022, 1305 (Eric Costen, Innovation, Science and Economic Development Canada).

120 INDU, *Evidence*, 8 April 2022, 1305, 1310 (Eric Costen).

121 INDU, *Evidence*, 8 April 2022, 1335 (Lakshmi Krishnan, National Research Council of Canada).



of the most promising options in Canada. He added that other countries, such as the United States, also saw Medicago as a reliable vaccine manufacturer, one of the most scientifically proven in Canada. He also noted that cigarette manufacturer Philip Morris held only a minority share in the company, and therefore the Canadian government had not considered it to be a contravention of the *WHO Framework Convention on Tobacco Control*.¹²²

Federal investment is needed to build a strong biomanufacturing sector in Canada for the long term. Mr. Costen explained that it is important to invest in a range of platforms to build a resilient sector, because no one knows what form the next public health crisis will take.¹²³ He added that government investment has taken Canada from a position where it had very little capacity to fill and finish vaccines to one where it can fill and finish approximately 300 million to 400 million doses per year across platforms, which would serve both domestic and global vaccine needs.¹²⁴ He said that Canada will have this capacity in a few years, once work on the vaccine production facilities has been completed. Finally, Mr. Costen added that

we're very aware that the company is looking with some urgency at the question of its ownership structure, and we continue to be in close contact with the company, understanding that they recognize the seriousness of the WHO decision and are moving to make decisions to address the challenges they face.¹²⁵

Canada must also attract foreign investment to ensure the sustainability and growth of its biomanufacturing sector.¹²⁶ For instance, Mr. Costen pointed out that, in August 2021, the Government of Canada signed a memorandum of understanding with Moderna to build a state-of-the-art vaccine production facility in Canada. He said that the Government of Canada hoped that its investments and discussions with Moderna would ensure Canada has a diversified production capacity in the months and years ahead.¹²⁷

Mr. Costen said that the federal government had introduced its Biomanufacturing and Life Sciences Strategy in the summer of 2021 to establish a long-term plan to “ensure an

122 INDU, [Evidence](#), 8 April 2022, 1320 (Eric Costen). See also World Health Organization, [WHO Framework Convention on Tobacco Control](#).

123 INDU, [Evidence](#), 8 April 2022, 1325 (Eric Costen).

124 INDU, [Evidence](#), 8 April 2022, 1325 (Eric Costen).

125 INDU, [Evidence](#), 8 April 2022, 1355 (Eric Costen).

126 INDU, [Evidence](#), 8 April 2022, 1310 (Eric Costen).

127 INDU, [Evidence](#), 8 April 2022, 1310 (Eric Costen).

innovative, responsive and resilient sector.”¹²⁸ Mr. Costen explained that the strategy has two broad objectives: (i) to grow a strong and competitive domestic life sciences sector with cutting-edge biomanufacturing capabilities, and (ii) to fundamentally enhance Canada’s preparedness in order to respond to future health emergencies. The strategy to achieve these objectives has five pillars: ensuring strong, coordinated governance; strengthening research systems and the talent pipeline; growing world-leading companies in the sector; building public assets and public capacity; and enabling innovation through world-class clinical trial systems and the regulatory environment.¹²⁹ Darryl C. Patterson, Director General of the Life Sciences and Biomanufacturing Branch at ISED, explained that building a resilient ecosystem entails providing support from start to finish, from basic research to commercial production. He added that Canada wants to develop flexible manufacturing capacity that can be put to other uses in non-pandemic times.¹³⁰

As part of its strategy, the Government of Canada invested in building the NRC’s Biologics Manufacturing Centre in Montreal. This centre is an end-to-end production facility capable of producing a wide range of vaccines and other biologics.¹³¹ Construction was completed in June 2021. The centre’s production capacity is approximately 4,000 litres, which could translate into approximately 2 million doses of a vaccine per month, depending on the type of vaccine produced.¹³² In the winter of 2022, the NRC was completing the commissioning, qualification and validation process for the centre to demonstrate its compliance with good manufacturing practices.¹³³

Maria Aubrey, Vice-President of Strategic Initiatives at the NRC, provided additional details about the centre. She said that, in February 2021, the Government of Canada had signed a memorandum of understanding with Novavax to pursue the option of producing its own COVID-19 vaccine at the NRC’s Biologics Manufacturing Centre. Health Canada approved the vaccine in February 2022 for adults 18 years of age and older.¹³⁴ In April 2022, the NRC was working with Novavax on the technology transfer. Ms. Aubrey explained that, once Novavax received approval for production at the NRC’s centre,

128 INDU, [Evidence](#), 8 April 2022, 1305 (Eric Costen).

129 INDU, [Evidence](#), 8 April 2022, 1305 (Eric Costen).

130 INDU, [Evidence](#), 8 April 2022, 1330 (Darryl C. Patterson, Innovation, Science and Economic Development Canada).

131 INDU, [Evidence](#), 8 April 2022, 1305 (Eric Costen); INDU, [Evidence](#), 8 April 2022, 1310 (Maria Aubrey, National Research Council of Canada); and INDU, [Evidence](#), 8 April 2022, 1335 (Lakshmi Krishnan).

132 INDU, [Evidence](#), 8 April 2022, 1310 (Maria Aubrey).

133 INDU, [Evidence](#), 8 April 2022, 1310 (Maria Aubrey).

134 INDU, [Evidence](#), 8 April 2022, 1310 (Maria Aubrey).



production could continue on a commercial scale.¹³⁵ She added that the centre has a public-good mandate. Accordingly, in health emergency situations, the centre will be made available to produce vaccines. Outside of those times, it will focus on projects of public interest, such as the production of drugs for rare diseases.¹³⁶

Mr. Costen also spoke about a number of initiatives the federal government put in place to develop a strong end-to-end biomanufacturing ecosystem in Canada to develop vaccines and other therapeutic and biologic products. These initiatives include the following:

- the Canada Foundation for Innovation will deliver a bio-innovation research infrastructure fund to support infrastructure needs at post-secondary institutions and research hospitals;
- the new Canada Biomedical Research Fund will support high-risk applied research, as well as training and talent development;
- Health Canada is working to enhance and modernize the relevant regulatory systems; and
- the Canadian Institutes of Health Research is preparing to launch a new clinical trials fund that will support clinical studies for new drug candidates.¹³⁷

Ms. Aubrey said that the NRC had also developed programs to establish a sustainable and thriving biomanufacturing and life sciences ecosystem in Canada. For example, it established the Challenge programs and the Industrial Research Assistance Program (IRAP). Through the IRAP, the Government of Canada invested \$81 million to support 14 small and medium-sized enterprises developing made-in-Canada vaccines and therapeutics. Ms. Aubrey added that, through IRAP, the NRC had also supported over 2,200 innovative businesses, helping them weather the pandemic and preserving over 26,000 jobs in Canada.¹³⁸

The witnesses who appeared provided several perspectives on federal investments since 2021. Some noted that the federal government had made significant investments

135 INDU, [Evidence](#), 8 April 2022, 1315 (Maria Aubrey).

136 INDU, [Evidence](#), 8 April 2022, 1310 (Maria Aubrey).

137 INDU, [Evidence](#), 8 April 2022, 1310 (Eric Costen).

138 INDU, [Evidence](#), 8 April 2022, 1310 (Maria Aubrey).

in recent years.¹³⁹ M. Casey said that Canada has a strong foundation upon which to build. He added that Canada is in a good position because it has established partnerships with a number of companies, such as Sanofi Pasteur and Moderna.¹⁴⁰ Dr. Lamarre agreed, but added that these investments are only the first step and that Canada must make an even greater effort in the next few years to restore its domestic production capacity and support the biomanufacturing ecosystem at all stages of the vaccine development chain.¹⁴¹

Witnesses agreed on the importance of building a resilient biomanufacturing ecosystem over the long term, one that can respond to future health crises, and they proposed ideas for achieving this goal.¹⁴² Oliver Technow, President and Chief Executive Officer of BioVectra Inc., said that the key to being competitive with other nations and attracting investments from pharmaceutical companies is to make ambitious investments.¹⁴³ According to Mr. Casey, Canada must also diversify its skills and establish a plan of action during and between pandemics. He added that Canada must have a collective vision to move forward.¹⁴⁴

To build an ecosystem that is resilient over the long term, Dr. Lamarre noted the importance of bolstering investments in basic research. He said that Canada ranks last among G7 countries in research and development spending.¹⁴⁵ He was disappointed that there were no significant budget increases for the granting councils, even though costs are rising. In his view, the Government of Canada must boost its investments in basic research by 10% per year over 10 years to return to its role as a global leader.¹⁴⁶ He also proposed increasing investments in advanced research infrastructure through the Canadian Foundation for Innovation.¹⁴⁷ Dr. Lamarre further proposed implementing a vaccine development funding structure that would bridge the gap between academic

139 INDU, [Evidence](#), 8 April 2022, 1430 (Andrew Casey); and INDU, [Evidence](#), 8 April 2022, 1425 (Alain Lamarre).

140 INDU, [Evidence](#), 8 April 2022, 1430 (Andrew Casey).

141 INDU, [Evidence](#), 8 April 2022, 1425 (Alain Lamarre).

142 INDU, [Evidence](#), 8 April 2022, 1415, 1500 (Oliver Technow, BioVectra Inc.); and INDU, [Evidence](#), 8 April 2022, 1430 (Andrew Casey).

143 INDU, [Evidence](#), 8 April 2022, 1415, 1500 (Oliver Technow).

144 INDU, [Evidence](#), 8 April 2022, 1430 (Andrew Casey).

145 INDU, [Evidence](#), 8 April 2022, 1425 (Alain Lamarre).

146 INDU, [Evidence](#), 8 April 2022, 1450 (Alain Lamarre).

147 INDU, [Evidence](#), 8 April 2022, 1425 (Alain Lamarre).



research and the pharmaceutical industry to support academic innovations until they are mature enough to attract the interest of pharmaceutical companies.¹⁴⁸

Some witnesses also highlighted the importance of retaining and attracting talent to build a resilient ecosystem in Canada. Several said that talent is crucial to be ready for another health crisis, because it is a catalyst for a robust and globally competitive biomanufacturing sector.¹⁴⁹ Some witnesses said that Canada does not have the talent it needs to deliver on its biomanufacturing strategy.¹⁵⁰ To develop and retain top talent in Canada, Mr. Technow mentioned the importance of collaboration and partnerships between the public and private sectors to create employment opportunities for students at all levels. Furthermore, he said that, to attract talent to Canada, the federal government should adopt policies that streamline and speed up the immigration process, or follow the example of other countries and create other incentives, such as personal income tax incentives. Mr. Technow added that, in his experience, to attract international talent, Canada needs to offer an attractive place to live.¹⁵¹

Witnesses also commented on Canada's vaccine response. Mr. Casey noted that, in March 2020, the predicted time frame for developing a COVID-19 vaccine was three to five years. In his view, the fact that COVID-19 vaccines were already being administered in the spring of 2021 was "a remarkable scientific feat."¹⁵² He added that the Canadian biotechnology industry played an important role in delivering on some of these vaccines.¹⁵³ However, John R. Fulton, Spokesperson and Representative for Biolyse Pharma Corporation, said that the work of the Vaccine Task Force was not transparent enough. In his opinion, the federal government should maintain that type of group in the future, but should ensure that its work and its discussions are public.¹⁵⁴

Lastly, pharmaceutical companies explained what they had done since 2020 to develop their biomanufacturing capacity:

- Dr. Gerdts explained that his organization was building an in-house manufacturing facility for making both human and animal vaccines. VIDO

148 INDU, [Evidence](#), 8 April 2022, 1425 (Alain Lamarre).

149 INDU, [Evidence](#), 8 April 2022, 1420 (Volker Gerdts); INDU, [Evidence](#), 8 April 2022, 1415 (Oliver Technow); and INDU, [Evidence](#), 8 April 2022, 1430 (Andrew Casey).

150 INDU, [Evidence](#), 8 April 2022, 1500 (Oliver Technow), INDU, [Evidence](#), 8 April 2022, 1455 (Alain Lamarre).

151 INDU, [Evidence](#), 8 April 2022, 1415, 1420 (Oliver Technow).

152 INDU, [Evidence](#), 8 April 2022, 1430 (Andrew Casey).

153 INDU, [Evidence](#), 8 April 2022, 1430 (Andrew Casey).

154 INDU, [Evidence](#), 8 April 2022, 1405 (John R. Fulton, BioNiagara).

anticipated that it could start production in the fourth quarter of 2022. Once it is up and running, the facility could make as many as 40 million doses a year, depending on the type of vaccine;¹⁵⁵

- Mr. Fulton explained that, in May 2020, Deloitte had contacted Biolyse Pharma on behalf of the Vaccine Task Force, which led the company to repurpose one of its facilities to produce vaccines. He said that Biolyse Pharma’s main advantage was that it already had all the equipment and expertise necessary to make biologics, and the Health Canada licences to produce vaccines were available on site. According to Mr. Fulton, given its existing capacities, if the federal government had invested \$4 million, Biolyse Pharma could have hired the necessary staff to accelerate the repurposing of its facilities for vaccine production and, within four to six months, been in a position to attract one of the manufacturers of the vaccine candidates and establish a partnership;¹⁵⁶ and
- Mr. Technow explained that BioVectra received federal and provincial investments in November 2021 to expand its facilities to produce mRNA vaccines and therapeutics. In the spring of 2022, he expected that the work would be completed in 2023 and that BioVectra would be able to produce up to 160 million doses of mRNA vaccines per year, with the capability to commercially package, or fill and finish, 70 million doses.¹⁵⁷

OBSERVATIONS AND RECOMMENDATIONS

The Committee recognizes that the COVID-19 pandemic has been unprecedented in scope. It applauds the hard work of Canadian governments—federal, provincial, and territorial—to protect Canadians during this challenging time.

Based on the large amount of evidence it heard, the Committee believes that warning signs that a health crisis could happen at any moment were ignored in recent years. Canada should have assessed the erosion of its biomanufacturing capacity sooner and taken action to rebuild it. If Canada had had enough biomanufacturing capacity to quickly produce COVID-19 vaccines, it would have been able to avoid some of the problems it encountered during the pandemic, in areas such as vaccine procurement and distribution. The Committee understands the concerns witnesses expressed in

155 INDU, [Evidence](#), 8 April 2022, 1420 (Volker Gerdts).

156 INDU, [Evidence](#), 8 April 2022, 1500 (John R. Fulton).

157 INDU, [Evidence](#), 8 April 2022, 1415 (Oliver Technow).



February 2021 regarding the delayed deliveries of Pfizer-BioNTech and Moderna vaccine doses. However, it is relieved that the delivery of millions of doses in March 2021 has made up for these delays.

In the summer of 2020, the federal government signed numerous agreements to reserve various types of vaccines from multiple companies. The Committee understands why the federal government took this approach but wonders about the associated costs. For example, while Canada can donate excess doses if necessary, if it ends up with tens of millions of surplus doses, the cost of these unused doses will likely be substantial. Accordingly, the Committee is of the view that, for transparency, once all Canadians are vaccinated, the federal government should publish the final data on the number of doses received relative to the agreements that were signed and the costs incurred.

The Committee salutes the members of the Task Force, who volunteered to advise the federal government on its vaccine procurement and production strategy. However, it also acknowledges the concerns of multiple witnesses regarding the importance of ensuring the advisory group's activities are transparent from the start. To maintain Canadians' trust in the work of such groups, the Committee believes the federal government should publicly disclose most of the details about them, such as their composition, the conflicts of interest of their members and the progress of their work, from the moment they are created. As some witnesses noted, a lack of transparency hurts accountability and peer review to properly understand and assess the chosen strategy. The Committee therefore recommends:

Recommendation 1

That the Government of Canada review the COVID-19 Task Force's work and publish its recommendations for improving advisory groups' transparency within one year.

The Committee is pleased with the federal government's current efforts to develop domestic biomanufacturing capacity and build a more resilient Canada. With an adequate biomanufacturing capacity, Canada would be better equipped to deal with future health crises. Like a number of witnesses, the Committee believes that other health crises may occur, and Canada needs to be ready for them. As multiple witnesses pointed out during the study, it takes a lot of time to build a strong domestic biomanufacturing capability. Consequently, the federal government must continue investing in this sector after the pandemic. However, to ensure these investments are effective, the federal government needs to follow up on them periodically to assess the development of Canada's biomanufacturing capacity and ensure it does not erode once again. The Committee therefore recommends:

Recommendation 2

That the Government of Canada assess the current state of development of the country's biomanufacturing capacity to determine whether it meets its needs for a future health crisis and publicly disclose the status of this work within one year.

Recommendation 3

That the Government of Canada create a five-year domestic biomanufacturing capacity review process. This process could include consideration of pharmaceutical companies operating in Canada, the scope of their work and the vaccine manufacturing capacity of production facilities.

The Committee commends the various Canadian universities and pharmaceutical organizations on their work to develop COVID-19 vaccines. As a number of witnesses explained, vaccine development costs can be very high, which can hinder their development. As a result, the Committee is of the opinion that the federal government must continue supporting these organizations' efforts if it wants to build a strong domestic biomanufacturing capability. However, to properly support the wide variety of research work, the Committee believes the federal government needs to follow up on the funding it awards to assess the status of the work and identify needs. The Committee therefore recommends:

Recommendation 4

That the Government of Canada establish a follow-up mechanism for funding awarded through the various research support programs, including, but not limited to, the Canadian Institutes of Health Research (CIHR), the Social Sciences and Humanities Research Council (SSHRC) and the Natural Sciences and Engineering Research Council (NSERC), in order to consider other funding options for research organizations awarded funding through the networks of centres of excellence program so they do not suffer a funding shortfall after 31 March, 2023, and are able to continue their activities through another source such as the strategic science fund, as of 1 April, 2023.

The Committee recognizes that partnerships between the private and public sectors may help foster the development of vaccines and therapeutics. As a number of academic researchers told the Committee, multiple universities have a great deal of expertise in vaccine development but lack the funds to bring their projects to fruition. To address this problem, Dr. Lamarre recommended establishing a funding mechanism at the interface between academic research and the pharmaceutical industry. Like Dr. Lamarre, the Committee is of the view that such a mechanism could accelerate vaccine



development and encourage private sector investment. The Committee therefore recommends:

Recommendation 5

That the Government of Canada consider ways to improve its funding structure at the interface between academic research and the pharmaceutical industry to both support research at universities and stimulate investment by pharmaceutical companies.

Because the COVID-19 pandemic has been an unprecedented health crisis for Canada, the Committee believes the federal government should take stock of its actions and decisions. For example, the federal government has awarded a great deal of funding and undertaken a large number of vaccine manufacturing projects since the pandemic began. Accordingly, the Committee believes the federal government should review the actions it has taken during the pandemic to determine what has worked and what has not. The Committee notes that, in her testimony, Minister Hajdu said the federal government was conducting a review of lessons learned during the pandemic.¹⁵⁸ The Committee is of the opinion that it is critical for the government to complete this review in order to learn from the COVID-19 pandemic and prepare for future health crises. The Committee therefore recommends:

Recommendation 6

That the Government of Canada carry out a review of lessons learned during the pandemic as regards vaccine procurement and development and publish its findings within one year. The review could include, but is not limited to:

- **The work done by scientific experts to advise the government during this period;**
- **The investments in research infrastructure and vaccine production and the status of that work;**
- **The investments in organizations that developed a COVID-19 vaccine and the status of their work;**
- **The costs of the large-scale vaccine procurement strategy and the timelines for vaccinating all Canadians;**

158 INDU, *Evidence*, 16 February 2021, 1240 (Patty Hajdu).

- **Government of Canada contracts with pharmaceutical companies for COVID-19 vaccines procurement.**

Recommendation 7

That the Government of Canada increase investment in university research and fundamental sciences, bringing it in line with other advanced OECD nations in the world.

Recommendation 8

That the Government of Canada support the creation of high-value, well-paying positions in biomanufacturing and life sciences to attract and retain top talent and consider:

- **increasing the value of graduate scholarships and the number of scholarships awarded at the master's, doctoral and postdoctoral levels;**
- **ensuring that scholarships are internationally competitive and increase with the cost of living;**
- **addressing the underinvestment in a generation of Canada's most promising young researchers;**
- **ensuring that graduates and workers have the skills Canada needs by increasing opportunities for lifelong learning and work-integrated learning; and**
- **encouraging the immigration of international talent to the country by strengthening Canada's position as a destination for global talent by reducing processing times for study and work permits for students and faculty.**

Recommendation 9

That the Government of Canada help strengthen Canada's biomanufacturing ecosystem by funding diverse national expertise capable of withstanding future health crises, by taking a broad approach that includes research related not only to vaccine development but also to neuroscience, mental health and immunotherapy, and protecting the patents and intellectual properties.



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Recommendation 10

That, as part of the implementation and evolution of the Biomanufacturing and Life Sciences Strategy, the government develop a holistic approach to supporting Canada's biomanufacturing industry and develop a framework for funding translational research organizations by supporting pre-clinical to clinical translation.

APPENDIX A

Table 1—Timeline of Selected Events about Vaccine Procurement and Biomanufacturing Capacity Development, March 2020 to February 2023

Date	Event	Data/Additional Information
11 March 2020	The World Health Organization declares COVID-19 is a pandemic	N/A
23 April 2020	Funding announcement to support a national medical research strategy to fight COVID-19	The Government of Canada announced over \$1 billion in funding for this strategy.
12 May 2020	The National Research Council of Canada (NRC) and CanSino Biologics Inc. announce a collaboration to advance a vaccine against COVID-19	The NRC issued a statement in November 2021 to provide more information about this collaboration, which did not work out.
16 June 2020	First meeting of the COVID-19 Vaccine Task Force	Mona Nemer recommended striking this task force. It met 39 times between June 2020 and February 2021.
23 June 2020	First meeting of the COVID-19 Joint Biomanufacturing Subcommittee	It met 22 times between June 2020 and February 2021.
24 July 2020	Agreement with Moderna	Number of doses secured in the initial agreement: 44 million Doses delivered as of 15 February 2023: 61 million
31 August 2020	NRC funding announcement to build the Biologics Manufacturing Centre on Royalmount Avenue in Montreal	On 2 February 2021 , the Government of Canada announced that it had signed a memorandum of understanding with Novavax to pursue the production of its COVID-19 vaccine at the Biologics Manufacturing Centre. Construction was completed in June 2021.

Date	Event	Data/Additional Information
11 September 2020	Agreement with Sanofi	Number of doses secured in the initial agreement: Up to 72 million Doses delivered as of 15 February 2023: 0 Sanofi and the government of Canada are in the process of terminating the contract by mutual consent.
23 October 2020	Agreement with Medicigo	Number of doses secured in the initial agreement: Up to 76 million Doses delivered as of 15 February 2023: 0
26 October 2020	Agreement with Pfizer	Number of doses secured in the initial agreement: 51 million Doses delivered as of 15 February 2023: 89 million
21 November 2020	Agreement with AstraZeneca	Number of doses secured in the initial agreement: 20 million Doses delivered as of 15 February 2023: 20 million
30 November 2020	Agreement with Johnson & Johnson	Number of doses secured in the initial agreement: Up to 38 million Doses delivered as of 15 February 2023: 9.98 million
19 January 2021	Agreement with Novavax	Number of doses secured in the initial agreement: Up to 76 million Doses delivered as of 15 February 2023: 9.7 million
27 July 2021	The Government of Canada announces that Canada has received enough doses to vaccinate every eligible person in Canada	Over 66 million doses received

Date	Event	Data/Additional Information
28 July 2021	Canada's Biomanufacturing and Life Sciences Strategy is announced	Budget 2021 provided \$2.2 billion to implement this strategy.
23 November 2021	The Government of Canada announces that the first shipments of pediatric vaccine doses have been received	Initial delivery: 2.9 million doses
2 March 2022	The WHO published a guidance document indicating that the Medicago vaccine candidate was not accepted	In April 2022, an article in the Canadian Medical Association Journal reported that some experts argued that if the WHO approved the vaccine it would violate the spirit of the WHO Framework Convention on Tobacco Control .
23 February 2023	Mitsubishi Chemical Group announced its decision to cease its operations at Medicago.	N/A

Source: Table prepared by the Library of Parliament using data from: Government of Canada, [Procuring vaccines for COVID-19](#), Office of the Auditor General of Canada, [Rapport 9 – COVID-19 Vaccines](#), Office of the Prime Minister of Canada, [New support to produce COVID-19 vaccines and treatments in Canada](#), Government of Canada, [Backgrounder – Government of Canada investments in the biomanufacturing, vaccine and therapeutics ecosystem](#), Public Services and Procurement Canada (PSPC), PSPC responses to questions taken on notice – Standing Committee on Public Accounts – Report 9, COVID-19 Vaccines, of the 2022 Reports 9 and 10 of the Auditor General of Canada, February 2023.

APPENDIX B

Tables 1 and 2 provide an overview of the funding announced and granted for COVID-19 initiatives. The contracts signed by the Government of Canada with COVID-19 vaccine manufacturers are not publicly available, but in its [report](#) on COVID-19 vaccines, the Office of the Auditor General of Canada explained that it had “used publicly available information and unclassified information to estimate that at 31 May 2022, the average cost of 1 dose was approximately \$30, excluding taxes.” The report also notes that, between 1 January 2020 and 31 May 2022, “the Government of Canada had spent approximately \$5 billion on vaccines for the 169 million doses paid for between December 2020 and May 2022.”

Table 1—Overview of Investments Announced by the Government of Canada in the Biomanufacturing, Vaccine and Therapeutics Ecosystem, 2020 to 2022

Program/Agency Through Which the Funding Was Committed	Initiative	Date	Funding Announced (\$)
Regional Development Agencies	Funding committed to IMV (Dartmouth) through the Atlantic Canada Opportunities Agency to support the pre-clinical activities necessary to meet the requirements for a clinical trial application to Health Canada.	July 2020	1 million
Regional Development Agencies	Funding committed through Western Economic Diversification Canada to the University of Saskatchewan's Vaccine and Infectious Disease Organization (VIDO) to accelerate development of its COVID-19 vaccine candidate and enhance its vaccine manufacturing facilities to the good manufacturing practices standards required for human vaccines.	11 December 2020	35 million
Regional Development Agencies	Funding committed through Western Economic Diversification Canada to VIDO to support the development of its vaccine candidates and expand its facility in Saskatoon.	23 April 2021	59.2 million
National Research Council of Canada	Funding committed through NRC for its Pandemic Response Challenge program to fast-track research and development aimed at accelerating the development of diagnostic tools and medical countermeasures.	23 March 2020	15 million
National Research Council of Canada	Funding committed through the National Research Council of Canada Industrial Research Assistance Program (NRC-IRAP) and Innovative Solutions Canada to fund COVID-19 specific challenges.	23 March 2020	15 million
National Research Council of Canada	Construction of a Good Manufacturing Practices (GMP) compliant clinical trial material facility at its Royalmount site in Montreal.	23 March and 23 April 2020	44 million
National Research Council of Canada	Construction of the Biologics Manufacturing Centre at its Royalmount site in Montreal.	31 August 2020	126 million

Program/Agency Through Which the Funding Was Committed	Initiative	Date	Funding Announced (\$)
National Research Council of Canada	<p>Funding and advisory services through NRC IRAP to help advance the early-stage research and development of six vaccine candidates and seven therapeutics candidates, as follows:</p> <p>Vaccine candidates</p> <ul style="list-style-type: none"> • Up to \$5.4 million to IMV (Dartmouth) for phase 2/3 clinical trials of its DPX-COVID19 vaccine candidate; • Up to \$5.0 million to Entos Pharmaceuticals (Edmonton) for phase 1 clinical trials of its Covigenix VAX-001 vaccine candidate; • Up to \$4.9 million to Providence Therapeutics (Toronto) for phase 1 clinical trials of its PTX-COVID19-B mRNA vaccine candidate; • Up to \$4.0 million to Glycovax Pharma (Montreal) for phase 1 clinical trials of its COVID-19 vaccine candidate; • Up to \$2.8 million to Symvivo (Burnaby) to advance its bacTRL-Spike oral DNA vaccine candidate in preclinical and phase 1 clinical trials; and • Up to \$1.3 million to Biodextris (Laval) for preclinical development of its nasal COVID-19 vaccine candidate. <p>Therapeutic Candidates</p> <ul style="list-style-type: none"> • Up to \$289,000 to Bold Therapeutics (Vancouver) for a project to prepare preclinical efficacy data in live SARS-CoV-2 (COVID-19) and support preparation for clinical trials and manufacturing of its BOLD-100 investigational therapy to treat patients with viral infections, including COVID-19; • Up to \$4.6 million to JN Nova Pharma (Montreal) to assist in the development of a proprietary drug to block coronavirus infection, while reducing the impacts of the disease in patients exhibiting COVID-19 symptoms so they may recover faster; • Up to \$4.1 million to Laurent Pharmaceuticals (Montreal) for the clinical development of its LAU-7b antiviral and inflammation controlling therapy for COVID-19 infections; • Up to \$109,000 to Qu Biologics (Vancouver) for a project to provide proof-of-concept evidence for the safety and efficacy of a preventive treatment, as well as therapeutic use of a treatment, to protect the lungs and prevent serious COVID-19 infection; • Up to \$1.9 million to HyperMabs Inc. (Toronto) to support the development of their FB100 therapeutic, a novel treatment for COVID-19 survivors with lung fibrosis; • Up to \$1.7 million to Mannin Research Inc. (Toronto) to support the development of methodology for purification and pre-clinical testing of a therapeutic to prevent vascular leakage in Acute Respiratory Distress Syndrome; and • Up to \$1.2 million to Vasomune Therapeutics Inc. (Toronto) to support phase 1 clinical trials of its AV-001 drug candidate which will be used to treat patients with Acute Respiratory Distress Syndrome resulting from COVID-19. 	23 October 2020	37 million

Program/Agency Through Which the Funding Was Committed	Initiative	Date	Funding Announced (\$)
National Research Council of Canada	Funding committed through stage 2 NRC IRAP funding to help the most promising of the stage 1 funding recipients advance to the next phase of clinical developments.	16 March 2021	Up to 113 million
Canada Foundation for Innovation	Operation funding to support COVID-19 research to the University of Saskatchewan's VIDO.	March 2020	Over 11 million
Canada Foundation for Innovation	Funding committed to cover the urgent need for equipment for ongoing research related to COVID-19 for 79 research infrastructure projects at 52 universities and research hospitals, colleges, polytechnics and CEGEPs across Canada.	6 November 2020	Over 27.6 million
Canada Foundation for Innovation	Funding to support the bio-science capital and infrastructure needs of post-secondary institutions and research hospitals.	Budget 2021	500 million over four years, beginning in 2021–2022
Strategic Innovation Fund	Funding for coronavirus research and medical countermeasures from the Plan to Mobilize Science	23 March 2020	192 million
Strategic Innovation Fund	<p>Funding to support COVID-19 vaccine and therapy clinical trials led by the private sector, and for Canadian bio-manufacturing opportunities as part of the Plan to Mobilize Science:</p> <ul style="list-style-type: none"> • \$175.6 million to support AbCellera (Vancouver) (3 May 2020). • Up to \$56 million to support Variation Biotechnologies Inc. (VBI) (Ottawa) (5 August 2020). • Up to \$173 million to support the work of Medicago (Quebec City) (23 October 2020). An additional contribution of \$27 million was provided in March 2022. • Up to \$18.2 million to support the work of Precision NanoSystems (Vancouver) (23 October 2020) and an additional \$25.1 million in Precision NanoSystems in February 2021 (Vancouver). • Up to \$6.7 million to Arch Biopartners (Toronto) to advance its work (15 December 2020). • Up to \$14 million to Edesa Biotech (Markham), (2 February 2021). • Up to \$54.2 million to support the work of KABS Laboratories Inc., (Saint-Hubert) (16 March 2021). • Up to \$32.7 million to support the work of Novocol Pharmaceutical of Canada (Cambridge) (16 March 2021). • Up to \$13.44 million to support the work of Immune Biosolutions (Sherbrooke) (16 March 2021). • Up to \$199.16 million to Resilience Biotechnologies Inc. (RBI) (Mississauga) (18 May 2021). • Up to \$39.8 million to support the work of BIOVECTRA (Charlottetown) (18 November 2021). 	Between 2020 and 2021	600 million
Strategic Innovation Fund	Funding committed to Sanofi Pasteur Limited (Toronto) to support building an end-to-end influenza vaccine manufacturing facility.	31 March 2020	Up to 415 million

Program/Agency Through Which the Funding Was Committed	Initiative	Date	Funding Announced (\$)
Strategic Innovation Fund	Funding for promising domestic life sciences and bio-manufacturing firms.	Budget 2021	1 billion over seven years starting in 2021–2022
Canada's Advanced Manufacturing Cluster	Funding committed to IMV (Dartmouth) to advance clinical development of its vaccine candidate for the prevention of COVID-19 infection.	August 2020	2.5 million
Canada's Advanced Manufacturing Cluster	Funding committed to Providence Therapeutics and Northern RNA to expand their operations in Calgary to design and manufacture COVID-19 vaccines.	21 January 2021	Up to 5 million
Canada's Advanced Manufacturing Cluster	Funding committed to a project led by OmniaBio Inc. (Hamilton) and partners ExCellThera (Montreal), Morphocell Technologies (Montreal), Aspect Biosystems (Vancouver) and CATTI (Montreal).	September 2022	10.5 million
Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council (NSERC) and Social Sciences and Humanities Research Council (SSHRC)	Funding committed through CIHR to support 47 research teams from across Canada that will focus on accelerating the development, testing, and implementation of measures to deal with the COVID-19 outbreak.	6 March 2020	Nearly 27 million
CIHR, NSERC and SSHRC	Funding committed through CIHR for research projects that will accelerate the development, testing and implementation of medical and social countermeasures to mitigate the rapid spread of COVID-19 as well as its social and health impacts.	23 April 2020	114.9 million
CIHR, NSERC and SSHRC	Funding committed through CIHR for 100 research projects across the country, followed in June 2020 by an additional investment of \$111.1 million to support a further 140 research projects.	25 June 2020	55.3 million
CIHR, NSERC and SSHRC	Funding committed through NSERC, in collaboration with SSHRC and CIHR, to leverage the expertise of researchers in natural sciences and engineering and their partners across Canada to address this unprecedented crisis. This investment will support nearly 370 COVID-19 research projects, including work related to vaccines.	5 August 2020	Over 19 million
CIHR, NSERC and SSHRC	Funding committed through CIHR in 52 research projects to further improve our understanding of COVID-19 and tackle persistent evidence gaps.	12 March 2021	25.2 million

Program/Agency Through Which the Funding Was Committed	Initiative	Date	Funding Announced (\$)
CIHR, NSERC and SSHRC	Funding committed through CIHR to scale up the Canadian arm of the Solidarity trial named Canadian Treatments for COVID-19 (CATCO).	28 May 2020	3.5 million
CIHR, NSERC and SSHRC	Funding committed through CIHR to create a COVID-19 Knowledge Synthesis Network support collaboration and rapid response to the need for synthesized Canadian knowledge and evidence across the full breadth of Canada's COVID-19 pandemic response.	13 January 2021	1 million
CIHR, NSERC and SSHRC	Funding committed through CIHR to create the Canadian Network of COVID-19 Clinical Trials Networks.	20 January 2021	6 million
CIHR, NSERC and SSHRC	Funding committed through CIHR to scale up research to increase our understanding of emerging variants, support research coordination in Canada and with partners globally, and provide decision makers with rapid guidance regarding drug therapy, vaccine effectiveness, and other public health strategies.	February 2021	Up to 25 million in the 2020–2021 fiscal year
CIHR, NSERC and SSHRC	Funding committed through the new Canadian Institutes of Health Research Clinical Trials Fund.	Budget 2021	250 million over three years, starting in 2021–2022

Source : Table prepared by the Library of Parliament using data from: Government of Canada, [Backgrounder – Government of Canada investments in the biomanufacturing, vaccine and therapeutics ecosystem.](#)

Table 2—Estimated Expenditures by COVID-19 Measure

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Safe Restart Agreement Federal Investments in Testing, Contact Tracing, and Data Management	\$533.26 M	\$578.01 M	\$163 M
Procurement of vaccine and personal protective equipment	N/A	N/A	\$694.06 M
Canada Emergency Response Benefit Administration Costs	\$309.38 M	N/A	N/A
Consular Assistance for Canadians Abroad	\$56.50 M	N/A	N/A

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Canada Emergency Commercial Rent Assistance (CECRA) for Small Businesses	\$2.15 B	N/A	N/A
Helping our Health Care Systems Recover	N/A	\$4.00 B	N/A
Financial Relief for First Nations through the First Nations Finance Authority	\$17.10 M	N/A	N/A
Improving Ventilation in Schools and Community Buildings – Safe Return to Class Fund	N/A	N/A	\$100.00 M
Enhancing Digital Access to our Heritage	N/A	N/A	\$8.20 M
Indigenous Public Health Investments	\$387.43 M	\$504.52 M	N/A
Improving Ventilation in Public Buildings	N/A	N/A	\$15.60 M
Enhancing Public Health Measures in Indigenous Communities	\$278.98 M	N/A	N/A
Enhancing Digital Access to our Heritage	N/A	\$2.4 M	N/A
Improving Food Security	N/A	\$131.13 M	N/A
Improving Ventilation in Public Buildings	N/A	\$24.20 M	\$11.00 M
Improving our ability to reach Canadians	N/A	\$15.79 M	\$12.60 M
Additional COVID-19 Therapeutics Procurement	N/A	\$89.90 M	\$1.57 B
Additional PPE Procurement and Support for the Storage and Warehousing of PPE	N/A	\$731.43 M	\$83.96 M
Supporting Indigenous Post-secondary Education during COVID-19	N/A	\$25.36 M	N/A
Supporting the Ongoing Delivery of Key Benefits	\$17.80 M	\$4.43 M	N/A
Supporting Canadians struggling with Substance Use Disorder	N/A	\$23.91 M	\$20.28 M
Supporting Distress Centres, the Wellness Together Canada Portal	\$41.72 M	\$7.21 M	\$6.25 M

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Supporting Indigenous Communities in the Fight Against COVID-19	\$1.03 B	\$740.09 M	\$223.95 M
Supporting Provincial and Territorial Job Training Efforts as Part of COVID-19 Economic Recovery	\$1.50 B	N/A	N/A
Supporting Public Health Measures in Correctional Institutions	\$155.79 M	\$15.03 M	N/A
Supporting Canada’s Arts, Heritage, and Cultural Workers and Institutions	N/A	\$224.07 M	\$111.77 M
Ensuring Access to Canada Revenue Agency Call Centres	\$127.24 M	N/A	N/A
Bio-Manufacturing Capacity Expansion – National Research Council Royalmount Facility	\$43.47 M	\$62.14 M	\$25.67 M
Advertising Campaign: Government of Canada’s COVID-19 Economic Response Plan	\$10.00 M	N/A	N/A
COVID-19 Communications and Marketing	\$43.07 M	\$25.99 M	N/A
Essential Workers Wage Top-up	\$2.88 B	N/A	N/A
New Horizons for Seniors Program Expansion	\$19.97 M	N/A	N/A
Safe Restart Agreement	\$15.88 B	\$1.59 M	\$1.52 M
Extension of the Mandatory Isolation Support for Temporary Foreign Workers Program	N/A	\$10.03 M	N/A
Canada Revenue Agency Funding for COVID-19 Economic Measures	\$242.90 M	\$190.87 M	\$139.87 M
Funding for Personal Protective Equipment and Supplies	\$1.80 B	N/A	N/A
Funding for VIA Rail Canada Inc.	\$90.43 M	\$67.43 M	N/A
Regional Relief and Recovery Fund	\$1.87 B	\$314.91 M	N/A
Granville Island Emergency Relief Fund	\$10.44 M	N/A	N/A

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Emergency Community Support Fund	\$349.70 M	N/A	N/A
Emissions Reduction Fund for the Oil and Gas Sector	\$31.71 M	\$134.99 M	\$13.82 M
COVID-19 Response Fund	\$430.46 M	\$52.75 M	\$27.58 M
Safe Return to Class	\$2.00 B	N/A	N/A
Strategic Innovation Fund	N/A	\$8.94 M	\$17.88 M
Personal Support Worker Training and Other Measures to Address Labour Shortages in Long-Term and Home Care	\$12.73 M	\$24.70 M	N/A
Addressing Financial Impacts on Atomic Energy of Canada Limited	N/A	\$27.60 M	N/A
Regional Air Transportation Initiative	\$1.10 M	\$149.72 M	\$10.58 M
Rapid Housing Initiative	\$870.44 M	\$139.40 M	N/A
Quarantine Facilities and COVID-19 Border Measures	\$228.50 M	\$1.21 B	\$352.31 M
Public Services and Procurement Canada Program Integrity	N/A	\$16.67 M	N/A
Immediate Public Health Response	\$12.50 M	N/A	N/A
Investments in Long-Term Care and other Supportive Care Facilities	\$4.65 M	\$1.01 B	\$359.33 K
Investing in the Wellness Together Portal	N/A	\$61.90 M	N/A
Addressing the Outbreak of COVID-19 among Temporary Foreign Workers on Farms	\$50.61 M	N/A	N/A
Addressing Gender-Based Violence during COVID-19	\$48.86 M	N/A	N/A
Maintaining Federal Court Services During COVID-19	N/A	N/A	\$1.88 M
Health and Social Support for Northern Communities	\$179.60 M	N/A	N/A

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Implementing Proof of Vaccination Credentials for International Travel	N/A	\$18.22 M	N/A
Cleaning up Former Oil and Gas Wells	\$1.72 B	N/A	N/A
National Standards for Mental Health Services	N/A	\$3.50 M	\$41.81 M
Virtual Care and Mental Health Support	\$137.32 M	\$93.22 M	N/A
Canada Student Loan Moratorium	\$2.49 M	\$4.97 M	N/A
Canada's COVID-19 Immunization Plan	N/A	\$1.00 B	N/A
Policy on COVID-19 Vaccination for the Core Public Administration Including the Royal Canadian Mounted Police	N/A	\$3.88 M	\$2.02 M
Canada Emergency Response Benefit (CERB)	\$65.23 B	\$52.17 M	\$1.78 M
Canada Emergency Student Benefit (CESB)	\$2.95 B	\$47.81 M	\$402.71 K
Canada Emergency Student Benefit – Administration Costs	\$17.62 M	\$13.13 M	\$4.94 M
Canada Recovery Benefits	\$14.47 B	\$13.21 B	N/A
Canada Recovery Sickness Benefit	\$419.84 M	\$1.03 B	\$153.31 M
Canada Recovery Caregiving Benefit	\$1.97 B	\$2.34 B	\$138.02 M
Canada Worker Lockdown Benefit	N/A	946.13 M	\$16.84 M
Preventing the Spread of COVID-19 in Correctional Institutions	N/A	\$80.17 M	N/A
Airports Capital Assistance Program	N/A	\$74.02 M	\$59.34 M
Enhancing Student Financial Assistance for Fall 2020	\$1.35 B	\$614.47 M	N/A
Expanding Existing Federal Employment, Skills Development, Student and Youth Programming	\$879.99 M	\$6.47 M	N/A

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Extending the Canada Emergency Business Account	N/A	\$76.25 M	N/A
Targeted Extension of the Innovation Assistance Program	\$127.29 M	N/A	N/A
Granville Island Emergency Relief Fund Extension	N/A	\$7.08 M	N/A
Innovative Research and Support for New Testing Approaches and Technologies for COVID-19	\$1.41 M	\$387.19 M	\$34.44 M
Support for COVID-19 Medical Research and Vaccine Developments	\$239.29 M	\$187.95 M	\$88.99 M
Labour Market Impact Assessment Refund	\$2.78 M	N/A	N/A
Parks Canada Revenue Replacement and Rent Relief	\$57.29 M	N/A	N/A
Safe Return to School on Reserve	N/A	\$109.69 M	N/A
International COVID-19 Response	N/A	\$375.00 M	N/A
Additional Health Human Resources	N/A	\$3.69 M	N/A
Revitalizing Tourism	N/A	\$154.89 M	\$322.63 M
Canadian Digital Service	\$3.59 M	\$6.94 M	N/A
Supportive Care in Indigenous Communities	N/A	\$122.98 M	\$22.95 M
Support for the Canadian Book Industry	N/A	\$7.15 M	\$6.62 M
Supporting the Mental Health of Those Most Affected by COVID-19	N/A	\$3.40 M	\$16.02 M
Support Essential Air Access to Remote Communities	\$68.58 M	\$79.05 M	\$137.96 K
Supporting Safe Air Travel	N/A	\$6.65 M	N/A
Supporting and Sustaining the Public Health Agency of Canada and Health Canada's Pandemic Operations	\$132.53 M	\$328.25 M	N/A

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Supporting Indigenous Economies	N/A	\$149.49 M	N/A
Indigenous Mental Wellness Support	\$82.43 M	N/A	N/A
Supporting Temporary Foreign Workers while they Quarantine	N/A	\$45.13 M	N/A
Support for the Canadian Broadcasting Corporation / Radio-Canada	N/A	\$21.00 M	N/A
Supporting a Safe Restart in Indigenous Communities	\$314.77 M	\$274.07 K	N/A
Support for the Audiovisual Industry	\$795.07 K	\$5.73 M	N/A
Support Canada Emergency Response Benefit Program Integrity	N/A	\$126.08 M	\$63.68 M
Support for the National Film Board	\$4.74 M	N/A	N/A
Support for Proof of Vaccination	N/A	\$5.67 M	N/A
Support for Safe Operation in the Forest Sector	\$30.08 M	N/A	N/A
Support for the Federal Bridge Corporation Limited	\$5.76 M	N/A	N/A
Support for Health Canada and the Public Health Agency of Canada	\$83.74 M	\$699.52 K	N/A
Support for Canada's National Arts Centre	\$18.20 M	N/A	N/A
Support for Economic Development in the North	N/A	\$2.25 M	N/A
Support for the On-Reserve Income Assistance Program	\$262.18 M	N/A	N/A
Support for the Broadcasting Industry	\$31.59 M	N/A	N/A
Support for Food Banks and Local Food Organizations	\$170.94 M	\$93.93 K	N/A
Support for Indigenous Communities	N/A	\$332.28 M	N/A
Support for Local Indigenous Businesses and Economies	\$133.00 M	N/A	N/A

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Support for Children and Youth	\$4.20 M	\$4.75 M	N/A
Support for Black Entrepreneurs and Business Owners	N/A	\$37.93 M	\$24.13 M
Support for Indigenous Businesses and Aboriginal Financial Institutions	\$228.80 M	N/A	N/A
Support for Main Street Businesses	\$7.82 M	\$37.63 M	N/A
Support for Food System Firms that hire Temporary Foreign Workers	\$74.04 M	N/A	N/A
Support for Canada's National Museums (as of 2021–2022, addition of the National Battlefields Commission)	\$25.70 M	\$44.28 M	\$8.05 M
Supporting Court Operations and Access to Justice	\$70.16 K	\$13.96 M	N/A
Support for Cultural, Heritage and Sport Organizations	\$497.87 M	N/A	N/A
Support for Veterans' Organizations	\$20.00 M	N/A	N/A
Support for International Partners	\$698.77 M	N/A	N/A
Support for Persons with Disabilities	\$810.30 M	\$33.41 M	N/A
Support for the Homeless (through Reaching Home)	\$394.08 M	\$293.81 M	N/A
Support for Women's Shelters and Sexual Assault Centres, including in Indigenous Communities	\$49.96 M	N/A	N/A
Support for Fish and Seafood Processors	\$45.19 M	N/A	N/A
Supporting Workers in the Live Events and Arts Sectors	N/A	\$174.05 M	N/A
Canadian Armed Forces Support for the COVID-19 Response	\$292.37 M	N/A	N/A
PPE and Related Equipment Support for Essential Workers	\$254.22 M	\$68.83 M	\$11.78 M
Support for the National Capital Commission	\$1.94 M	N/A	N/A

COVID-19 Measure	2020–2021	2021–2022	2022–2023
Support for the Canadian Red Cross	\$99.34 M	\$47.23 M	N/A
Support for Canada’s Academic Research Community	\$434.46 M	N/A	N/A
Support for Airport Authorities	N/A	\$64.81 M	N/A
Supporting Canada’s Farmers, Food Businesses, and Food Supply	\$157.52 M	N/A	N/A
Support for Critical Infrastructure at Large Airports	N/A	\$26.92 M	\$110.69 M
Support for Fish Harvesters	\$144.82 M	\$41.71 M	N/A
Support for Food Inspection Services	\$19.40 M	N/A	N/A
Support for Workers in the Newfoundland and Labrador Offshore Energy Sector	\$320.00 M	N/A	N/A
Further Support for Medical Research and Vaccine Developments	\$3.18 B	\$4.17 B	\$411.93 M
Women Entrepreneurship Strategy – Ecosystem Top-up	\$15.03 M	N/A	N/A
Rapid Tests	N/A	\$2.37 B	\$990.66 M
Vaccine Mandates – Making Travel Safer	N/A	N/A	\$11.72 M
One-Time Payment for seniors eligible for Old Age Security (OAS) and the Guaranteed Income Supplement (GIS)	\$2.46 B	N/A	N/A
Total	\$134.85 B	\$40.13 B	\$5.98 B

Note: For the 2022–2023 fiscal year, data was collected from 1 April 2022 to 28 February 2023.

Source: Table prepared by the Library of Parliament using data from: Government of Canada, [Infographic for Government of Canada – COVID-19](#).

APPENDIX C LIST OF WITNESSES

The following table lists the witnesses who appeared before the committee at its meetings related to this report. Transcripts of all public meetings related to this report are available on the committee’s [webpage for this study](#).

Organizations and Individuals	Date	Meeting
<p>As an individual</p> <p>Dr. Alain Lamarre, Full Professor, Institut national de la recherche scientifique</p>	2022/04/08	17
<p>BioNiagara</p> <p>John R. Fulton, President, Spokesperson and Representative for Biolyse Pharma Corporation</p>	2022/04/08	17
<p>BIOTECanada</p> <p>Andrew Casey, President and Chief Executive Officer</p>	2022/04/08	17
<p>BioVectra Inc.</p> <p>Dr. Marc Sauer, Vice-President, Process Science and Development Services</p> <p>Oliver Technow, Chief Executive Officer</p>	2022/04/08	17
<p>Department of Industry</p> <p>Rodrigo Arancibia, Senior Director, Life Sciences and Biomanufacturing Branch</p> <p>Eric Costen, Senior Assistant Deputy Minister, Industry Sector</p> <p>Darryl C. Patterson, Director General, Life Sciences and Biomanufacturing Branch</p> <p>Daniel Quinn, Director, Research Infrastructure and Outreach, Science and Research Sector</p>	2022/04/08	17

Organizations and Individuals	Date	Meeting
National Research Council of Canada Maria Aubrey, Vice-President, Strategic Initiatives Lakshmi Krishnan, Vice-President, Life Sciences	2022/04/08	17
Vaccine and Infectious Disease Organization - International Vaccine Centre Dr. Volker Gerdts, Director and Chief Executive Officer	2022/04/08	17

APPENDIX D LIST OF WITNESSES

The following table lists the witnesses who appeared before the committee at its meetings related to this report. Transcripts of all public meetings related to this report are available on the committee's [webpage for this study](#).

43rd Parliament – 2nd Session

Organizations and Individuals	Date	Meeting
Department of Health Hon. Patty Hajdu, Minister of Health Stephen Lucas, Deputy Minister	2021/02/02	14
Public Health Agency of Canada Iain Stewart, President	2021/02/02	14
Department of Industry Hon. François-Philippe Champagne, Minister of Innovation, Science and Industry Simon Kennedy, Deputy Minister, Innovation, Science and Economic Development Canada	2021/02/04	15
Department of Public Works and Government Services Hon. Anita Anand, Minister of Public Services and Procurement Bill Matthews, Deputy Minister	2021/02/04	15
National Research Council of Canada Mitch Davies, President	2021/02/04	15

Organizations and Individuals	Date	Meeting
<p>As an individual</p> <p>Amir Attaran, Professor, Faculty of Law and School of Epidemiology and Public Health, University of Ottawa</p> <p>Dr. Alain Lamarre, Full Professor, Institut national de la recherche scientifique</p> <p>Joel Lexchin, Associate Professor, Department of Family and Community Medicine, Emergency Medicine Division, University of Toronto</p>	2021/02/16	17
<p>BIOTECanada</p> <p>Andrew Casey, President and Chief Executive Officer</p>	2021/02/16	17
<p>Providence Therapeutics</p> <p>Ken Hughes, Chair of the Board</p> <p>Brad Sorenson, Chief Executive Officer</p>	2021/02/16	17
<p>Vaccine and Infectious Disease Organization - International Vaccine Centre</p> <p>Dr. Volker Gerdts, Director and Chief Executive Officer</p>	2021/02/16	17
<p>COVID-19 Vaccine Task Force</p> <p>Joanne Langley, Co-Chair</p> <p>Mark Lievonen, Co-Chair</p> <p>Roger Scott-Douglas, Secretary</p>	2021/02/18	18
<p>As an individual</p> <p>Gary Kobinger, Professor, Université Laval</p> <p>Brian Lichty, Associate Professor, McMaster University</p> <p>Karen Mossman, Vice-President, Research, McMaster University</p>	2021/02/25	20
<p>Medicago Inc.</p> <p>Takashi Nagao, President and Chief Executive Officer</p> <p>Nicolas Petit, Vice-President, Commercial Operations</p>	2021/02/25	20
<p>Office of the Chief Science Advisor</p> <p>Mona Nemer, Chief Science Advisor</p>	2021/02/25	20

Organizations and Individuals	Date	Meeting
Precision Nanosystems Andrew Booth, Chairman James Taylor, Chief Executive Officer	2021/02/25	20

REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the committee requests that the government table a comprehensive response to this report.

A copy of the relevant *Minutes of Proceedings* ([Meetings Nos. 17, 63 and 68](#)) from the 44th Parliament, 1st Session and ([Meetings Nos. 14, 15, 17, 18 and 20](#)) from the 43rd Parliament, 2nd Session is tabled.

Respectfully submitted,

Joël Lightbound
Chair

Report on the Domestic Manufacturing Capacity for a COVID-19 Vaccine: Conservative Dissenting Report

This Supplemental Report reflects the views of the Conservative Members of Parliament who serve on the Standing Committee of Industry and Technology (“INDU”): MP Rick Perkins (Vice Chair of the Committee, South Shore – St. Margaret’s), MP Ryan Williams (Bay of Quinte), MP Brad Vis (Mission-Matsqui-Fraser Canyon), and MP Bernard Généreux (Montmagny–L’Islet–Kamouraska–Rivière-du-Loup).

Introduction

As referenced in the report, this study examined the May 12, 2020 announcement by the Government of Canada to conduct a \$44-million refit of a National Research Council (NRC) facility in Montreal to produce a domestic vaccine in collaboration with CanSino Biologics. This study further reviewed the announcements-related issues including the eventual dissolution of the planned partnership with CanSino on August 26, 2020.

The Conservative members of this committee supported and actively participated in the pursuit of this study given its critical importance to Canada’s domestic vaccine manufacturing sector as well as to ensure lessons were learned in guaranteeing that Canada would be able to produce a safe and timely supply of domestically produced vaccines in the event of another global health emergency. The Conservative interest in this study also stemmed from a need to review the Government of Canada’s rollout of its domestic vaccine manufacturing program to ensure it was making the best use of taxpayer resources with the information it had available.

Observations

While we appreciate the work of the committee in the pursuit of this study, this report fails to address many of the shortcomings faced by the Government of Canada through its vaccine rollout program in areas concerning the CanSino Agreement, Canada’s vaccine procurement strategy, and how these programs compared in terms of results through international metrics.

CanSino Agreement

With regard to the CanSino agreement, while Conservatives are receptive to developing Canada’s biomanufacturing sector, we are dismayed that the failures of the CanSino agreement are not fully understood nor adequately reflected in this report. The report fails to establish the specifics of how the recommendations for the CanSino partnership came to be and provides no reason nor any explanation as to why the CanSino vaccine shipments never arrived.

While the report explains that the Government of Canada’s vaccine procurement strategy was based upon the input received from the COVID-19 Vaccine Task Force, members of this task force like Dr. Kobinger explained to the committee that it had made no such recommendation concerning the CanSino agreement and further added that he “didn’t know where this

recommendation came from.”¹ We also note that it is unclear how the task force could arrive at any recommendation for a partnership with CanSino when considering the NRC facility announcement came prior to the task force's first meeting on June 16, 2020. Given this, we are frustrated that the report does not sufficiently explain how the CanSino agreement was reached, and which group specifically recommended the establishment of the partnership.

The absence of this information is incredibly concerning given the numerous risks associated with this agreement from the outset. During witness testimony, committee members heard evidence on several occasions of risks associated with partnering with CanSino. For instance, Dr. Kobinger noted that Canada was the “only western country to identify [the Ad5-nCoV-S] vaccine as a possible candidate” and that the decision to use that vaccine candidate was “not scientifically sound.”²

We also observe that the decision to partner with a Chinese-based company is highly concerning, given the potential influence it could be subject to by Beijing. The thought that Canadians would trust a vaccine from CanSino over those being administered by other western countries from brand name pharmaceutical companies defines logic or understanding of our population’s willingness to subject themselves to a vaccine from the Chinese Communist Party.

Vaccine Procurement Strategy

With regards to the Government of Canada’s vaccine procurement strategy, following the dissolution of the CanSino agreement in the summer of 2020, Canada entered into agreements with seven organizations reserving over 400 million doses of vaccine candidates with options to increase those orders later for Canada’s estimated population of 38 million.³ This massive vaccine procurement strategy was based upon the recommendations outlined by the task force and was adopted following the failure of the CanSino agreement.

Concerning this strategy, we observe that the report fails to adequately clarify that the CanSino agreement was the first effort by the federal government to procure vaccines for Canadians and that the adoption of the vaccine procurement strategy was a consequence of the failures of the CanSino agreement and inability to produce a create domestic biomanufacturing sector.

While conservatives do not oppose a vaccine procurement strategy, we are concerned with how it was handled after hearing several testimonies criticizing the rollout. For instance, Professor Amir Attaran highlighted that the government’s sudden switch in strategy was marked by numerous shortcomings. He argued that Minister responsible signed any vaccine procurement deal at a premium despite none of the companies being able to deliver upon vaccine commitments by February 2021. Professor Attaran argued that the federal government

¹ INDU, [Evidence](#), February 25, 1240 (Gary Kobinger).

² INDU, [Evidence](#), February 25, 1130 (Gary Kobinger).

³ INDU, Draft Report v2, paragraph 12.

actions did not appear as though they were strategic and resembled as though it was panicking.⁴

Conservatives note that the United States signed its first Advanced Agreement for COVID vaccines on March 27, 2020 and had concluded all its Advanced Agreements by July 2020. All with brand name pharmaceutical companies. Canada's COVID-19 Vaccine Task Force did not hold its first meeting until June 16, 2020 and made its recommendations June 29, 2020. Canada then proceeded to negotiate advance purchase agreements signing the first in July 2020 and the final seventh contract in January 2021.

The United States has concluded all its advanced purchase agreements before the Government of Canada had even received any scientific advice on vaccines. The United States concluded its agreements fully seven months before the Government of Canada. Conservatives can only conclude from the evidence that this delay relative to our neighbour the United States, occurred because the Government of Canada made a political decision to sign an agreement with China-based CanSino before receiving any scientific advice. This decision delayed access to efficacious vaccines over the China option and costed lives because of the delay in access to vaccines and cost Canadians financially as well.

We also observe that Canada's raid of the World Health Organization's COVAX initiative as further evidence of the Government of Canada's mishandling of the COVID-19 vaccination rollout. As highlighted in the report, the COVAX program aimed to distribute vaccines equitably to low-income countries to establish vaccine equity internationally. Canada's need for the COVAX program as a high-income country to vaccinate its citizens highlights the shortcomings of the federal government's rollout by demonstrating that it needed international aid in order to meet the country's vaccine needs.

When the need for COVAX vaccine doses no longer became necessary, the Government of Canada committed to donate over 200 million doses back to the COVAX program. As of May 2022, the federal government has only managed to donate 15.3 million of the estimated 200 million doses initially promises. This falls far short of their public commitment to help low-income countries and has further resulted in the expiration of tens of millions of vaccine doses without them being sent to the COVAX program.⁵

The Global Context

The report further fails to provide adequate context regarding the timeline of the COVID-19 pandemic, specifically regarding Canada's vaccine procurement strategy in comparison to the rest of the world. During drafting instructions, Conservative committee members requested that a more detailed contextual section be included in the report to provide future readers with a solid understanding of just how deadly the COVID-19 pandemic had been in Canada.

⁴ INDU, [Evidence](#), February 16, 1115 (Amir Attaran).

⁵ Auditor General, [Report 9: COVID-19 Vaccines](#), May 2022.

While several federal public servants commended Canada's ongoing vaccine rollout plan during witness testimony, we observe that individual witnesses often sang a different tune. For instance, Dr. Kobinger highlighted that by the end of January 2021, Canada ranked 58th in the world in terms of per capita vaccinations. Dr. Kobinger attested that Canada's lack of COVID-19 vaccines in comparison to other countries resulted in a greater number of fatalities that could have been prevented had Canada's vaccine rollout been quicker.⁶ Poor international rankings concerning per-capita vaccination highlight that Canada failed to procure vaccines quickly enough for its citizens.

We observe that this point is not adequately reflected in the committee's report. Nowhere does the study make a mention of Canada's ranking on the international stage with regards to per capita vaccinations despite numerous mentions in witness testimony. The Government of Canada's slow vaccine procurement strategy and inability to produce vaccines quickly enough for our citizens delayed the receiving of life-saving medicine during a time when thousands of Canadians were dying of COVID-19. While Canadians did eventually receive vaccine doses in large quantities by April 2021, by this time approximately 5,000 Canadians had died of COVID-19 since the time vaccines first became available in December 2020.⁷ We observe that the sluggishness of the rollout in comparison to the international community does not reflect well on Canada's status as a G7 member.

Acquiring more than ten times the vaccines needed compared to our population while paying a premium per dose appears to have been the only way for Canada to have jumped the line after at least a three-month delay with the government's sole contract with CanSino. This delay had severe financial impacts directly on the Government of Canada's spending as well as the economic costs of additional lockdowns because of the delay caused in Canadians having effective vaccines available. It also had consequential impacts on the health of Canadians because of the delay in the vaccine rollout availability.

The report also inadequately deals with the issue of over purchasing and vaccine expiry and waste. According to the Auditor General's report on COVID-19 Vaccines, approximately 32.5 million doses were set to expire at the end of 2022 with an estimated value of one billion dollars. The report indicates that this was the direct result of over-purchasing by the federal government specifically the purchases of optional vaccines from Pfizer and Moderna.

Supplementary Recommendations

Given these observations, the conservative members of this committee recommend that the following two recommendations be added to the committee's report:

⁶ INDU, [Evidence](#), February 25, 1250 (Gary Kobinger).

⁷ Health Canada, [COVID-19 Epidemiology](#), Dec. 2020 – April 2021.

Recommendation 11: To prevent the delay caused by the Government of Canada's sole source contracting for a vaccine with CanSino without the advice of the COVID-19 Vaccine task force, in planning for future pandemic vaccination strategies, the Government of Canada should only contract to acquire vaccines on the scientific advice of the National Vaccine Taskforce set up to advise the government on the appropriate, and effective vaccines for Canadians during a pandemic.

Recommendation 12: That the Government of Canada work to ensure that it never has to acquire vaccines from the World Health Organization COVAX vaccine stockpile depriving low-income countries of access to critical vaccines in a timely manner.

Conclusion:

In providing our observations and supplementary recommendations, the Conservative committee members would like to thank the House of Commons analyst and clerks for their hard work in adding to the completion of this report. This supplemental report is by no means a way to cast doubt upon their work but rather to highlight the shortcoming of the report adopted by a majority of committee members. Despite the committee failing to address many of our observations, we hope that this minority report provides the Government of Canada with insight as it moves forward with policy to prepare us for the next global health emergency.

Respectfully,

Rick Perkins, MP, Vice-Chair
South Shore – St. Margaret's

Bernard Généreux, MP
Montmagny–L'Islet–Kamouraska–Rivière-du-Loup

Brad Vis, MP
Mission-Matsqui-Fraser Canyon

Ryan Williams, MP
Bay of Quinte

