

EDITORIAL

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75 million syringes but nothing to put in them: what is Canada's plan for a COVID-19 vaccine?

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ABSTRACT

The Canadian government recently announced, to much fanfare, that they have begun procuring the supplies that will be essential for mass vaccination against COVID-19, beginning with an agreement for 75 million syringes, alcohol swabs, and bandages. This is certainly good news, and it is absolutely worthwhile to think about these potentially overlooked items when planning to vaccinate the population. But what will we vaccinate them with? Dankner and Michell-Robinson argue that in the current political climate, the Canadian Government must act now to invest in securing early vaccine doses from promising trials as well as make long term plans to bolster the Canadian biomedical sector in order to avoid future issues with drug development in times of international crisis.

KEYWORDS

Vaccine, Drug Development, Clinical Trials, Corona Virus, Public Health

The Canadian government recently announced, to much fanfare, that they have begun procuring the supplies that will be essential for mass vaccination against COVID-19, beginning with an agreement for 75 million syringes, alcohol swabs, and bandages. (1) This is certainly good news, and it is absolutely worthwhile to think about these potentially overlooked items when planning to vaccinate the population.

But what will we vaccinate them with?

The United States has "Operation Warp Speed," an initiative to rapidly test and manufacture multiple vaccine candidates in clinical trials that they expect to be ready by the end of 2020 or early 2021. (2) Early data suggests that this timeline may be realistic. (3) Given that manufacturing of any effective vaccine will be initially limited, European nations have lined up contracts with AstraZeneca and Pfizer to distribute their vaccine candidates, which are already approaching final-phase clinical trials, with negotiations with Johnson & Johnson in the works as well. (4, 5) Asian countries also have a number of candidates that are rapidly progressing through clinical trials in China. (6, 7) Even Australia and Russia have vaccine candidates in advanced human clinical trials, (7) and nations such as Israel, Egypt, and India, among others, have signed agreements for early doses of promising vaccines. (8-10)

Where does this leave Canada?

There are a number of promising Canadian COVID-19 vaccine candidates, but they are all much further behind. Manitoba-based researchers are testing a candidate in animals, University of Laval has a vaccine candidate in the preclinical stages, and the Quebec-based biotech firm Medicago has just recently begun testing humans with its candidate that does not have the financial backing required to move as quickly as international candidates. (7, 11) Together, this means that it is unlikely for a made-in-Canada COVID-19 vaccine to be proven safe and effective before the fall of 2021 at the earliest.

If international vaccine candidates are indeed successful and begin mass vaccination in the next 6 months, where will that leave Canadians? There is roundabout talk of sharing of vaccines between nations, but it seems increasingly likely that countries will vaccinate their own first in order to restore their economies and way of life. Canada missing the boat on being an early country to vaccinate could result in thousands of Canadian deaths and more economic turmoil caused by a prolonged pandemic. Enduring a cold Canadian winter indoors while being unable to see friends and family will be particularly difficult for Canadians watching their neighbours to the south getting vaccinated and resuming a new normal way of life.

The Canadian government has reached an agreement with the Chinese company CanSino Biologics to develop and eventually manufacture its vaccine candidate that just published results from its phase 2 clinical trials in China and was approved for emergency use in the Chinese military in the absence of phase 3 trial data. (6, 12) This agreement was announced in the press on May 12th, but according to updated trial information on clinicaltrials.gov, the Canadian phase 1/2 trial has yet to begin enrolling patients. (13, 14) It has been recently reported that the hold-up is due to the Chinese government preventing shipments of vaccines coming to Canada. (15) This emphasizes the issues inherent to partnering with the Chinese government to ensure access to a vaccine and the importance of having multiple "shots on goal"—increasing our odds of success by having multiple vaccine candidates in the pipeline at the same time. This is the recipe being pushed by the United States, Europe, and China, and will likely be successful in one way or another.

Prime Minister Justin Trudeau recently published an op-ed with leaders of several other countries that have also failed to procure early doses of promising vaccine candidates, including Ethiopia, Sweden, and South Korea, wherein they argue that COVID-19 vaccines should be a global good not subject to hoarding. (16, 17) This may be true, but the reality is that the US, the European Union, China, India *et al.* have already accumulated these early doses, so such a strategy is already an impos-

sibility and a moot point.

Certainly, the aggressiveness of the American approach to both the negotiations and clinical development of vaccines has invited criticism from Canadian pundits. Even the name “Operation Warp Speed” seems satirical, given the Trump administration’s undermining of scientific authorities and simultaneous demands for a humanity-saving intervention from them in time for the November election. Yet, Warp Speed’s multi-billion-dollar investment program looks poised to deliver a vaccine product to US citizens far sooner than anyone would have initially thought possible. And in this context, we must dare to ask ourselves: what can Canadian science learn from the international response to COVID-19?

Among the many opining about masks, pandemic preparedness, and the role and importance of public health in our national response to transmissible illness, there is a larger point about Canadian innovation that few people have set their critical sights on. We Canadians are entirely reliant on international investment for clinical development of the numerous vaccines, drugs, and other types of medical inventions that originate here. Like many of our natural resources, Canada extracts a primary intellectual resource and sells it to be refined, only to buy the final product back at a premium in order to supply it to Canadians. We have never developed the type of robust biomedical science sector that would see translational medicine flourish outside of academia, and see our own inventions developed within its infrastructure.

Until now, that hasn’t been a very big problem. Our proximity to the US—the largest economy and innovation engine in the world—has always guaranteed a level of interest in Canadian inventions. So, our clinical development strategy has always relied upon US investment and industry to purchase or license the rights to develop those inventions. The idea that Canadian medicines will be invented here and developed for the US market is so ingrained in us that we rarely question it. But, in times of crisis the importance of supply chains is magnified and our reliance on other nations to provide resources has a higher cost. Now, Canada is facing an unprecedented

intellectual property supply chain problem, and its cost may transcend mere dollars and cents.

While we may provide a great deal of intellectual property to the international scientific community, we cannot rely on others to give back as freely in the midst of pandemics. However, it seems as though our government’s current plan for a COVID-19 vaccine relies entirely upon generosity of other nations given that we are not investing in advance doses of any therapeutic candidates. Furthermore, the option to do so may not even be on the table for a prolonged period of time, given our allies’ accountability to their own voters. Eliminating the risk of the pandemic and restoring their economies as soon as possible is an important priority indeed.

In our current situation, Prime Minister Trudeau has left us hoping that the terms of the agreement with CanSino Biologics will be honored by the Chinese government despite discouraging early warnings. Since this is our only agreement for rapidly obtaining a vaccine candidate, a failure of any kind means we could be left with little more than hope until we come together to accomplish testing a Canadian vaccine in Canada. However, this will come at the cost of thousands of Canadian lives and livelihoods given the prolonged timeline.

Had we prioritized developing our biomedical science sector prior to the pandemic, perhaps our own vaccine development response would have been able to ramp up and meet the challenge of the pandemic more effectively. Maybe we would have been able to establish timely access to multiple vaccine candidates (including our own) as other leading scientific nations have done. In this series of hypotheticals, perhaps Canada would have even taken a leadership role in rapidly distributing vaccines to less advantaged nations, rather than writing about it in the *Washington Post*. (17)

It is clear that Canada is behind the rest of the developed world in the search for securing doses of an effective COVID-19 vaccine, while it is becoming increasingly likely that the endgame of the pandemic will be vaccination. COVID-19 has taught us that now is the time to strengthen our scientific infrastructure, so that we can more effectively bring therapeutics from bench to bedside in case other nations—our supposed

partners—turn inward in times of crisis. Given that it is too late to strengthen this infrastructure for a COVID response, we call upon the Canadian government to make the required investments in vaccine candidates and increase our likelihood of securing the health of Canadians beginning in 2020, and onward. We must make sure that we do not cause unnecessary Canadian deaths by extending the pandemic, while ensuring that we are not left behind as the rest of the world restores normalcy in the post-pandemic period. Strengthening the Canadian biomedical science sector will guarantee that Canada has the infrastructure to more effectively safeguard its own population, and even those of other countries, in future health crises. 75 million syringes are fine and dandy, but only if there is an effective vaccine to put in them.

REFERENCES

1. Rabson M. Federal government orders supplies to give two doses of COVID-19 vaccine when it's ready [Online Article]. CBC News2020 [Available from: <https://www.cbc.ca/news/politics/feds-preparing-for-covid-vaccine-1.5654801>].
2. HHS. Fact Sheet: Explaining Operation Warp Speed 2020 [Available from: <https://www.hhs.gov/about/news/2020/06/16/fact-sheet-explaining-operation-warp-speed.html>].
3. Jackson LA, Anderson EJ, Roupael NG, Roberts PC, Makhene M, Coler RN, et al. An mRNA Vaccine against SARS-CoV-2 - Preliminary Report. *N Engl J Med*. 2020.
4. AstraZeneca. AstraZeneca to supply Europe with up to 400 million doses of Oxford University's vaccine at no profit 2020 [Available from: <https://www.astrazeneca.com/media-centre/press-releases/2020/astrazeneca-to-supply-europe-with-up-to-400-million-doses-of-oxford-universitys-vaccine-at-no-profit.html>].
5. Smout A. U.K. secures 90 million potential COVID-19 vaccine doses from Pfizer and BioNTech alliance and Valneva The Globe and Mail2020 [Available from: <https://www.theglobeandmail.com/business/international-business/european-business/article-uk-secures-90-million-potential-covid-19-vaccine-doses-from-pfizer/>].
6. Zhu F-C, Guan X-H, Li Y-H, Huang J-Y, Jiang T, Hou L-H, et al. Immunogenicity and safety of a recombinant adenovirus type-5-vectored COVID-19 vaccine in healthy adults aged 18 years or older: a randomised, double-blind, placebo-controlled, phase 2 trial. *The Lancet*. 2020.
7. WHO. Draft landscape of COVID-19 candidate vaccines 2020 [Available from: <https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines>].
8. Reuters. Israel signs agreement with Moderna for potential COVID-19 vaccine: Reuters; 2020 [Available from: <https://financialpost.com/pmn/business-pmn/israel-signs-agreement-with-moderna-for-potential-covid-19-vaccine>].
9. EgyptToday. Egypt signs deal to receive Oxford University's COVID-19 vaccine 2020 [Available from: <https://www.egypttoday.com/Article/1/88839/Egypt-signs-deal-to-receive-Oxford-University-s-COVID-19>].
10. IndiaToday. Oxford Covid vaccine trials to be conducted in India soon, Serum Institute seeks DGCI nod 2020 [Available from: <https://www.indiatoday.in/science/story/coronavirus-oxford-covid-vaccine-india-human-trial-serum-institute-dgci-lancet-study-1702675-2020-07-21>].
11. Medicago. Medicago begins Phase I clinical trials for its COVID-19 vaccine candidate 2020 [Available from: <https://www.newswire.ca/news-releases/medicago-begins-phase-i-clinical-trials-for-its-covid-19-vaccine-candidate-803210228.html>].
12. Reuters. CanSino's COVID-19 vaccine candidate approved for military use in China 2020 [Available from: <https://www.reuters.com/article/us-health-coronavirus-china-vaccine/cansinos-covid-19-vaccine-candidate-approved-for-military-use-in-china-idUSKBN2400DZ>].
13. NRCC. The National Research Council of Canada and CanSino Biologics Inc. announce collaboration to advance vaccine against COVID-19: National Research Council Canada; 2020 [Available from: <https://www.canada.ca/en/national-research-council/news/2020/05/the-national-research-council-of-canada-and-cansino-biologics-inc-announce-collaboration-to-advance-vaccine-against-covid-19.html>].
14. Clinicaltrials.gov. Phase I/II Clinical Trial of Recombinant Novel Coronavirus Vaccine (Adenovirus Type 5 Vector) in Canada 2020 [Available from: <https://clinicaltrials.gov/ct2/show/NCT04398147>].
15. Pinkerton C. Canada yet to receive vaccine candidate from Chinese developer it reached an agreement with in May iPolitics.ca2020 [Available from: <https://ipolitics.ca/2020/07/06/canada-yet-to-receive-vaccine-candidate-from-chinese-developer-it-reached-an-agreement-with-in-may/>].
16. Jones R. Trudeau pens op-ed with world leaders calling for equal access to coronavirus vaccine CBC News2020 [Available from: <https://www.cbc.ca/news/politics/op-ed-world-leaders-vaccine-access-1.5650939>].
17. Justin Trudeau S-WZ, Moon Jae-in, Jacinda Ardern, Cyril Ramaphosa, Pedro Sánchez Pérez-Castejón, Stefan Lofven and Elyes Fakhfakh. The international community must guarantee equal global access to a covid-19 vaccine. *Washington Post*. 2020.