



CITF MONTHLY REVIEW

How long does **immunity to SARS-CoV-2 last?**

The latest research

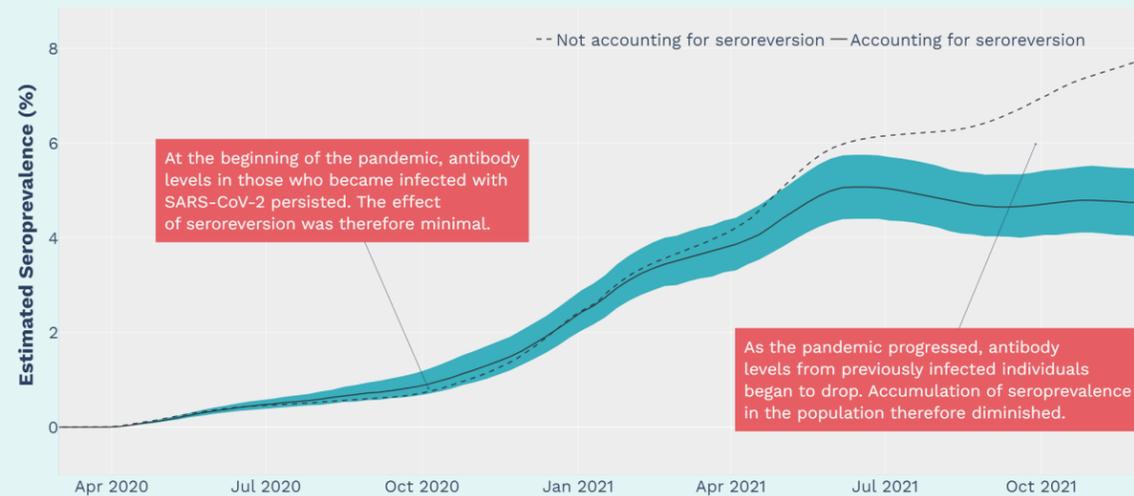
The safety of **COVID vaccines**

The impact of COVID-19 disease and vaccination on **pregnancy and newborns**



JANUARY REPORT

Natural antibody wane reinforces importance of vaccination



In this month's analysis, we modelled the effect of waning antibodies, known as seroreversion, to account for the natural loss of antibodies that occurs through time. Our calculations, based on the most recent research on time to antibody wane, found that as of November 30, 2021, an estimated 1 in 21 Canadians (4.7%) still had detectable antibodies due to a previous infection. This proportion ranged from a low of 1 in 69 (1.5%) in the Atlantic provinces to a high of 1 in 13 (7.7%) in Alberta. The data were prior to widespread exposure to the Omicron variant.

Notably, this estimate is lower than our previous month's estimate of seroprevalence (7.8%), which did not incorporate seroreversion rates, suggesting that antibody wane has a profound effect on the accumulation of people with detectable antibodies in the Canadian population. This being the case, it is evident that vaccination is crucial to increase the level of immunity throughout the population.

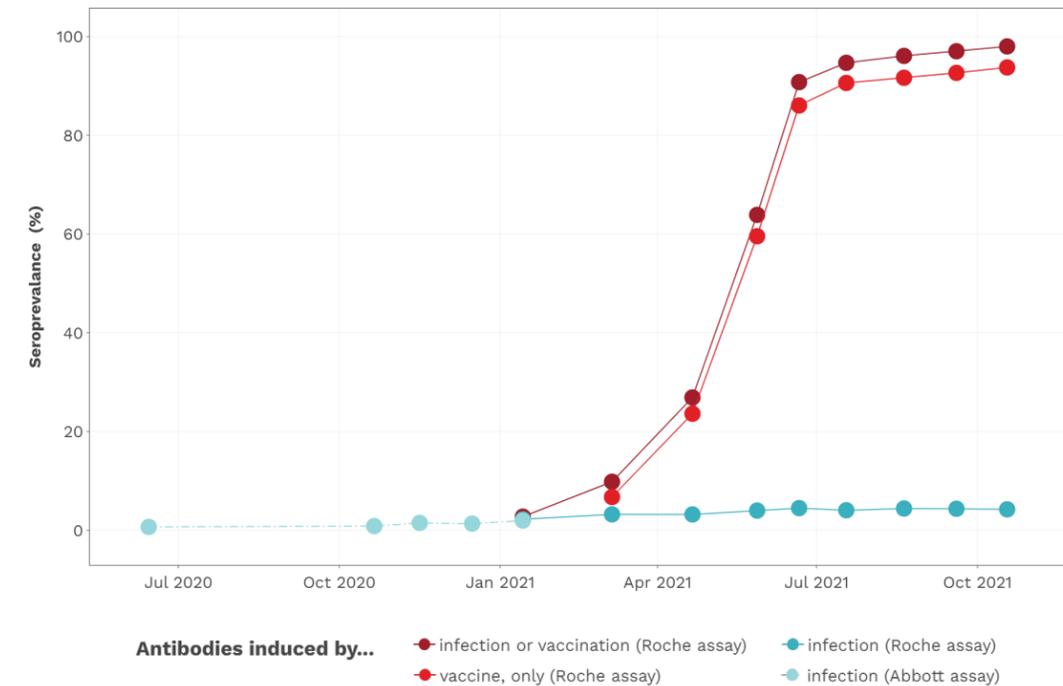
Accounting for seroreversion also made it possible to estimate the number of true infections in the population prior to Omicron. We assumed that seroprevalence due to infection results from infections 7 to 10 days before the serosurvey or earlier. Although 1.8 million cases of COVID-19 had been reported by November 21, 2021, our modelling estimates that there had been 3.1 million infections in Canada.

Our analysis combined seroprevalence results from 35 studies with data on confirmed cases of SARS-CoV-2 infection to determine the proportion of Canadians infected with COVID-19.

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OCTOBER REPORT

Data reveal evidence of waning antibody concentrations



The latest Canadian Blood Services report shows that while nearly all blood donors have immunity to SARS-CoV-2 – with the vast majority being acquired through vaccination – the concentration of their antibodies has begun to decline. This does not come as a surprise since spike antibody concentrations are expected to diminish over time following vaccination. A continued downward trend in mean levels of antibodies, however, supports the need of a third (booster) dose. While breakthrough infections of vaccinated people were infrequent according to this report, it is important to note that the data predated the current surge in the Omicron variant and were collected prior to when most donors were eligible for a booster.

KEY RESULTS IN OCTOBER 2021:

- ▶ Antibodies to SARS-CoV-2 from vaccines or infection were present among 98.0% of blood donors, up 1% compared to September and were largely acquired through vaccination.
- ▶ Antibodies due only to prior SARS-CoV-2 infection among blood donors was 4.3%, similar to the previous four months: September (4.4%), August (4.4%), July (4.1%), and June (4.5%).

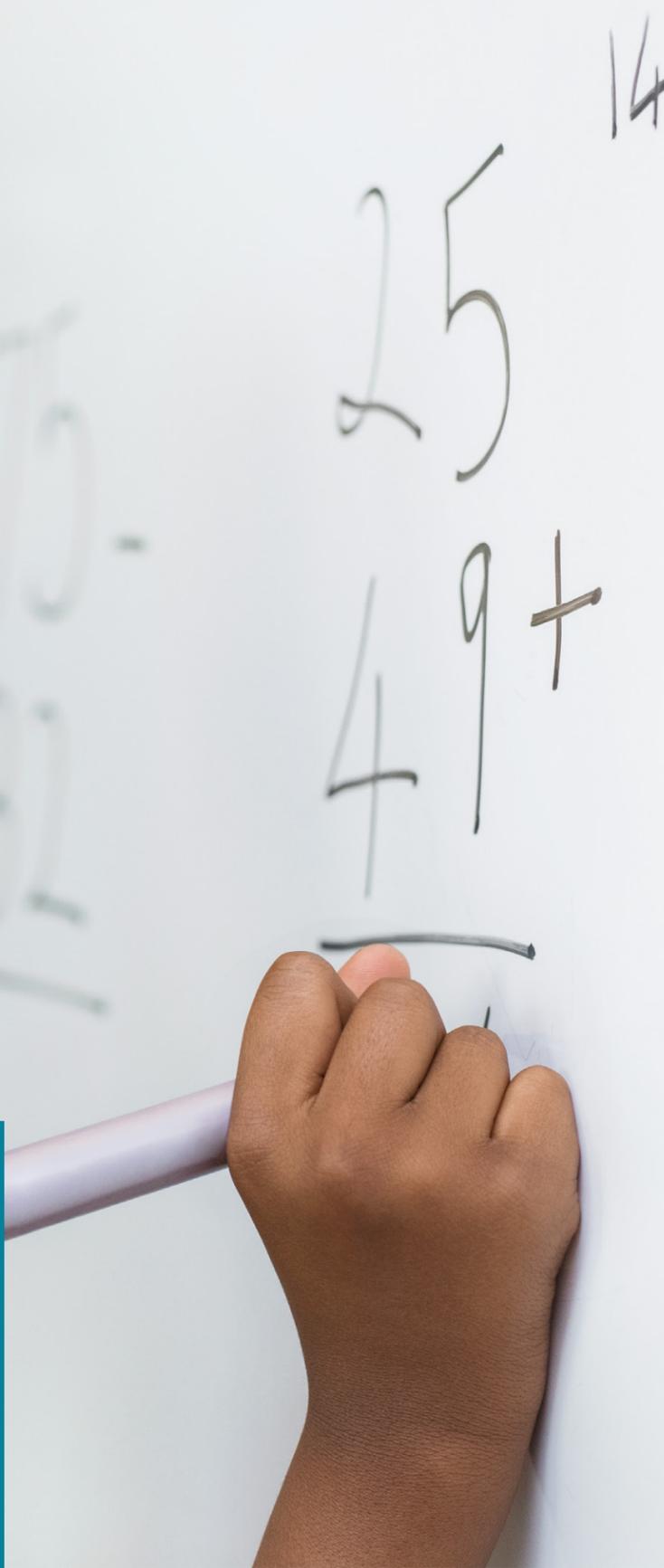
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Global seroprevalence of SARS-COV-2

A study in preprint, therefore not yet peer reviewed, by SeroTracker (a CITF-funded project) in partnership with the World Health Organization, found global SARS-CoV-2 seroprevalence (due to infection or vaccination) was 26% in April 2021. Depending on the region, seroprevalence was as low as 1.6% and as high as 57%. In low- and middle-income countries, the ratio of seropositive blood samples to identified cases varied from 30:1 to 185:1, meaning that many infections go undetected.

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Low transmission of SARS-CoV-2 observed in kindergarten to grade 12 schools in British Columbia

Drs. Pascal Lavoie and Louise Mâsse from the University of British Columbia and their team have found that despite the presence of variants of concern last spring, before Omicron, there was low transmission of SARS-CoV-2 in Vancouver schools from kindergarten to grade 12 where appropriate disease prevention measures were in place. The results are in preprint, therefore not yet peer reviewed.

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Increased risk of acquiring COVID-19 in Quebec correctional facilities

Congregate settings allow for the rapid spread of COVID-19. As part of her study in three provincial prisons in Quebec, Dr. Nadine Kronfli from the Research Institute of the McGill University Health Centre found that of the 1,100 incarcerated men sampled, 22% were seropositive for a previous SARS-CoV-2 infection between January and September 2021. The manuscript, accepted in *Clinical Infectious Diseases* and currently in press, stresses the importance of incorporating multiple preventative measures and the promotion of vaccination within correctional facilities.

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Ongoing **vaccine surveillance** is critical to ensuring the continued health and safety of Canadians. Monitoring reports of adverse effects to measure their frequency and determine whether there is a causal relationship between events and COVID-19 vaccines is a continuous effort. Research into vaccine safety is supported by the CITF, including the following recent studies:

Researchers identify features associated with heightened risk of myocarditis/pericarditis following mRNA vaccination

Between December 14, 2020 and September 4, 2021, during which 19.7 million doses of mRNA vaccine were administered in Ontario, approximately 0.002% of vaccinated individuals met the inclusion criteria for myocarditis (inflammation of the heart muscle) or pericarditis (inflammation of the sac holding the heart). A team including CITF-funded researcher Dr. Jeff Kwong from ICES and Public Health Ontario found that 70% of cases of myocarditis and pericarditis following COVID-19 vaccination in Ontario occurred after the second dose, and the vast majority were in males with a median age of 24. Dose interval, vaccine product, and use of mix-and-match also played a role. The study is in preprint and therefore not yet peer reviewed.

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Severe adverse effects following immunization with COVID-19 vaccines exceedingly rare: CANVAS-COVID

With more than a million participants enrolled in its study, the Canadian National Vaccine Safety Network (CANVAS-COVID) shows that more than 90% of those who are vaccinated do not experience any side effects other than temporary and localized pain at the injection site. Dr. Julie Bettinger, from the British Columbia Children's Hospital Research Institute and University of British Columbia, presented some of the latest results from the CANVAS-COVID vaccine safety survey at the Canadian Immunization Conference on December 8, 2021.

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The impact of COVID-19 disease and vaccination on pregnancy and newborns

The evidence indicates that COVID-19 in pregnant people is more severe than among the general population, and that newborns of those who are infected face greater health challenges, while the vaccines have proven to be safe and effective. The Society of Obstetricians and Gynaecologists of Canada and all provinces in Canada therefore advise pregnant and breastfeeding people to get vaccinated against COVID-19. This recommendation is based on Canadian and international research to date, including from the four CITF-funded studies presented at our third **CITF/CanCOVID Seminar: Research Results & Implications Series**.

KEY FINDINGS:

- 1 100% of pregnant people hospitalized with COVID-19 were **unvaccinated or incompletely vaccinated**, according to information from early analysis to the end of September 2021.
- 2 Although pregnant people are usually between 20- and 49-years-old, they have **similar risk profiles** as people between the ages of 55 and 59 when they get COVID-19.
- 3 Pregnant people with COVID-19 are two times more likely to have a **premature birth** and four times more likely to have an **extremely premature baby** than those without the disease.
- 4 Increased risk **was not observed** after a first or second dose of vaccine, nor was there increased risk when the vaccine was received in mid-pregnancy (second trimester) or later pregnancy (third trimester).
- 5 Pregnant people who received at least one dose of COVID-19 vaccine during pregnancy **did not have any increase** in a range of pregnancy and birth outcomes investigated.
- 6 There was **no increase in risk** of any adverse outcomes whether the pregnant person had taken Pfizer or Moderna for dose 1.
- 7 **Human milk is still the healthiest option** for newborns, as the SARS-CoV-2 virus is unlikely to be transmitted into human milk.
- 8 Human milk is known for its antiviral properties in general and **can transmit vaccine-induced antibodies** to newborns.
- 9 Vaccine hesitancy is an issue among pregnant people and **confidence needs to be built**.

» FULL SUMMARY & VIDEO



How long does immunity to SARS-CoV-2 last? The latest research from around the world

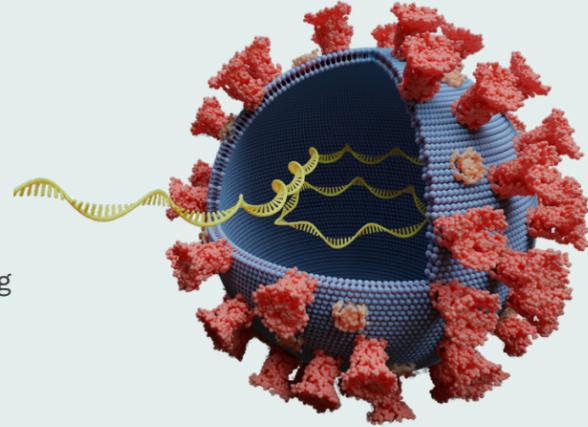


Kristin Davis, Research Assistant, CITF Secretariat

Bruce Mazer, Associate Scientific Director - Strategy, CITF Secretariat

With the arrival of Omicron and the looming threat of other emerging variants of concern, the crucial question on everyone's mind is: how long does immunity to SARS-CoV-2 last? The evidence will be essential to plan for, and mitigate, future waves of infection and keep the population safe.

Because SARS-CoV-2 is still a relatively new virus, the duration of immunity continues to be an evolving research question. Data are being collected and analyzed in real-time. Experts from Canada's CITF are among those grappling with this issue and, herein, we offer a current overview of where the science stands to date.



Multiple studies supported by the CITF have shown that antibodies against SARS-CoV-2 diminish as time passes following infection and vaccination. While we know that antibodies naturally wane over time, re-exposure to a virus increases the level of antibodies that a person has at their disposal, strengthens the immune response, and improves the capacity to fend off illness. In addition, it is well recognized that after exposure to the virus, the immune system develops memory cells which have the capacity to recognize the virus against which they were primed.

Preliminary evidence indicates that a vaccine booster, given following a two-dose regimen of a COVID-19 vaccine, reinvigorates waning immunity. Boosters also help protect against emerging variants, such as Omicron, which threaten to evade the immune response triggered by current vaccines. This has driven many CITF-funded researchers and experts to recommend booster doses for adults.

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Vaccine responses in solid organ transplant recipients

Varun Anipindi, Senior Research Advisor, CITF Secretariat

Solid organ transplant recipients (SOTRs) face profound disturbances to their immune system due to prolonged exposure to immunosuppressive drugs, which make them generally more susceptible to infections such as SARS-CoV-2. Data shows that nearly 78% of transplant patients affected by COVID-19 required hospitalization and up to 30% may succumb to infection.

CITF-funded researcher Dr. Deepali Kumar and her team from the University Health Network in Toronto have published a number of articles evaluating immune responses to SARS-CoV-2 infection and vaccination in this vulnerable population.



KEY FINDINGS:

- 1 A randomized double-blind study conducted in 120 SOTRs who received two doses of the Moderna mRNA vaccine demonstrated that an additional booster (third dose) can be safe and effective at enhancing protective anti-RBD antibodies.
- 2 This booster dose was also found to be effective at significantly increasing the levels of protective neutralizing antibodies against SARS-CoV-2, including variants such as Alpha, Beta and Delta. This research was done prior to the arrival of Omicron.

A number of studies have demonstrated that the standard two-dose vaccine regimen may induce suboptimal immune protection against SARS-CoV-2 in SOTRs, thus the majority of these patients need further follow-up to ensure adequate protection against breakthrough infections.

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COVID-19
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CanCOVID



Seminar Series | Research Results & Implications

How long does immunity to COVID-19 last?

Waning immunity, boosters, and dosing intervals

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Monday, January 24, 2022

12:30 p.m. to 2:00 p.m. EST

With the arrival of Omicron and the looming threat of other emerging variants, one important question to be answered is: how long does immunity to SARS-CoV-2 last? At our next *Research Results & Implications* seminar, CITF experts will explain the reasons behind waning antibody levels, the importance of other features of the immune system, the need for vaccine boosters, and the best dosing intervals to achieve maximum protection.

Moderator

Speakers



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Victor H.
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