



COVID-19
IMMUNITY
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GROUPE DE TRAVAIL
SUR L'IMMUNITÉ
FACE À LA COVID-19

FEBRUARY
2023

CITF MONTHLY **REVIEW**

Hybrid immunity most
effective against latest
Omicron variants

27 million Canadians
– **mostly young adults** –
have had Omicron.

Diagnosis and
management
of **long COVID**

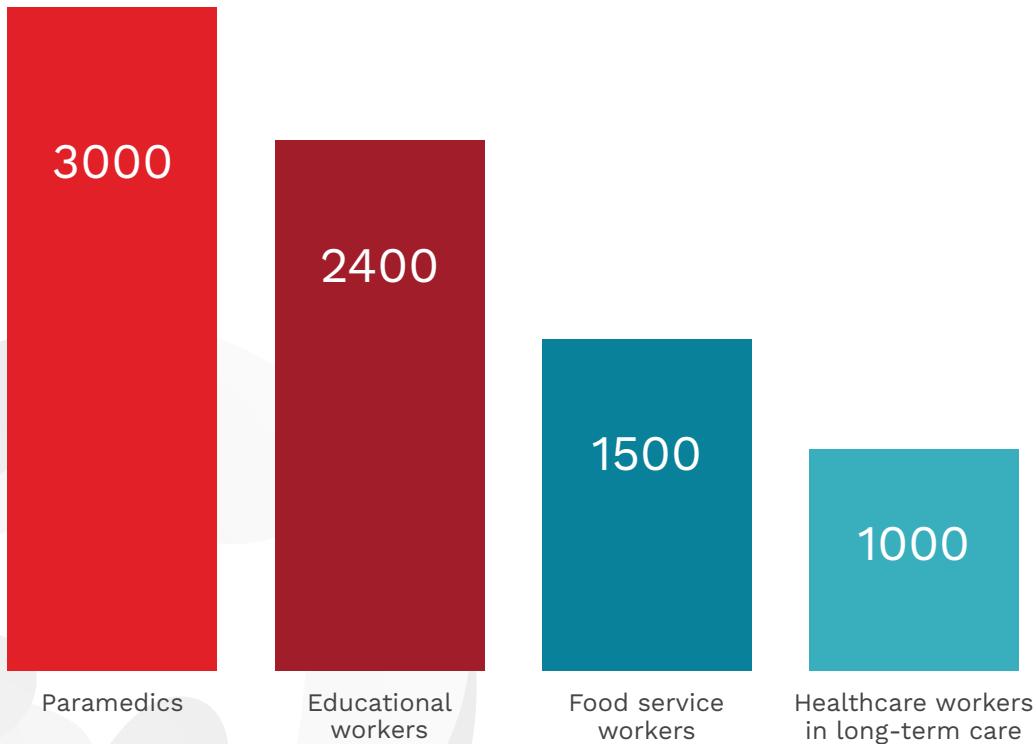


Data incorporated into CITF Databank allow more researchers to study risk from frontline work

Since the beginning of the pandemic, it has been widely recognized that some people are at greater risk of SARS-CoV-2 infection because of their occupation. About 16 of CITF’s funded studies have focused on specific occupational groups, and many others have asked participants to report their occupation to identify those who worked closely with the public or among large groups of people.

The teams studying occupational groups have been among the quickest to deposit data in the CITF Databank. Of the more than 100,000 study participants with data currently in the databank, several thousand work in the healthcare, education, or food services sectors. These participants have given their consent for their data to be used for future research, making their data’s integration into the databank possible.

NUMBER OF PARTICIPANTS FROM STUDIES FOCUSED ON OCCUPATIONAL GROUPS WITH DATA CURRENTLY IN THE CITF DATABANK



STUDIES THAT HAVE CONTRIBUTED TO THESE OCCUPATIONAL GROUP DATASETS

Occupational group	Principal investigator, institution	Study title	Geographic coverage
Paramedics	Dr. Brian Grunau University of British Columbia	COVID-19 occupational risks, seroprevalence and immunity among paramedics in Canada (CORSIP Canada)	AB, BC, MB, ON, SK
Educational workers	Dr. Brian Dixon University of Waterloo	Monitoring Waterloo Region hotspots: University of Waterloo campus	ON
	Dr. Pascal Lavoie University of British Columbia	Tracking COVID-19 to inform interventions and help make our schools safer	BC
Food service workers	Dr. Amit Oza University Health Network Toronto	Research platform to screen and protect individuals who work within a food production, healthcare, research or clinical organization (RESPECT)	ON
	Dr. Denis Boudreau Université Laval	Cellular immunity and antibody seroprevalence to SARS-CoV-2: Characterization of three food worker populations	QC
Healthcare workers in long-term care	Dr. Sharon Straus Unity Health Toronto	IPAC+ evaluating intervention impact using serological and cellular assays as correlates of SARS-CoV-2 exposure among long-term care homes (LTCH) staff, residents, and transmission networks	ON
	Dr. Marc Romney University of British Columbia	Integrating longitudinal epidemiologic, virologic and immunologic analyses to understand COVID-19 immunity and infection outcomes in long-term care	BC

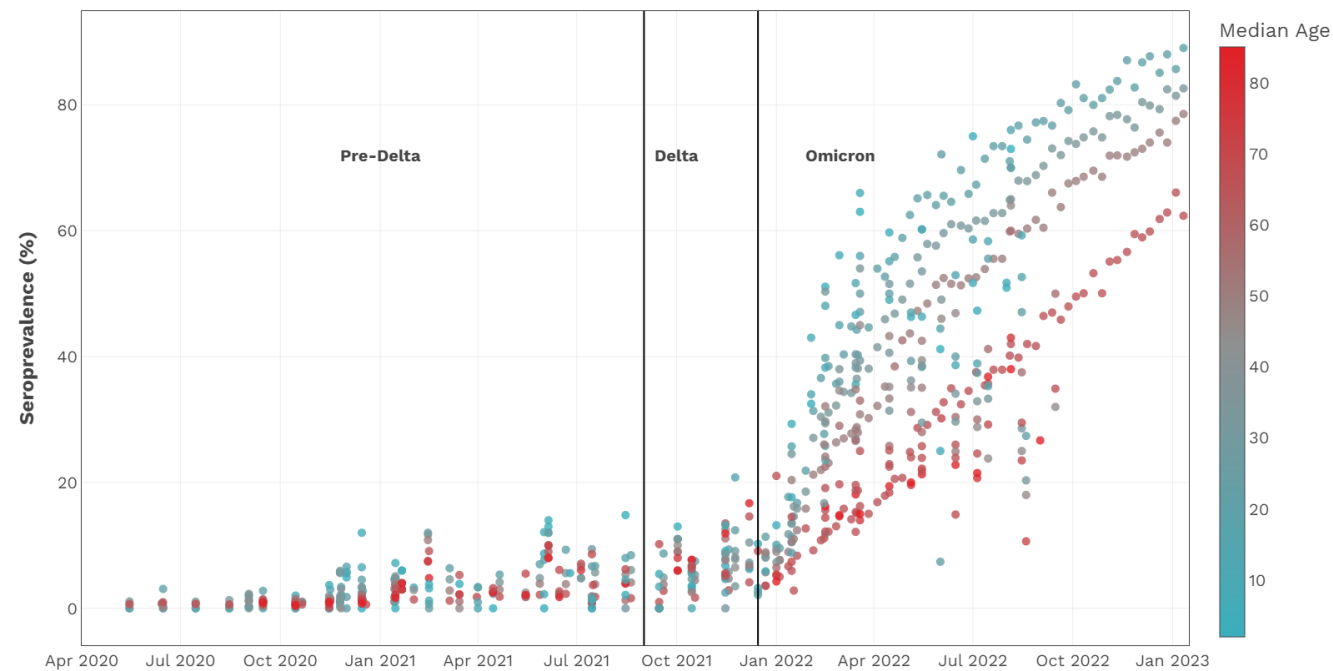
- » [VIEW LIST OF FUNDED STUDIES FOCUSED ON OCCUPATIONAL GROUPS](#)
- » [DISCOVER STUDIES WHICH HAVE CONTRIBUTED DATA TO THE DATABANK](#)

Other researchers expected to share data over the coming months are studying the following occupational groups: education workers, dentists and dentistry students, and healthcare workers.

- » [DISCOVER](#)

SEROPREVALENCE IN CANADA | MID-JANUARY 2023 RESULTS

At least 27 million Canadians – many young adults – have been infected with Omicron

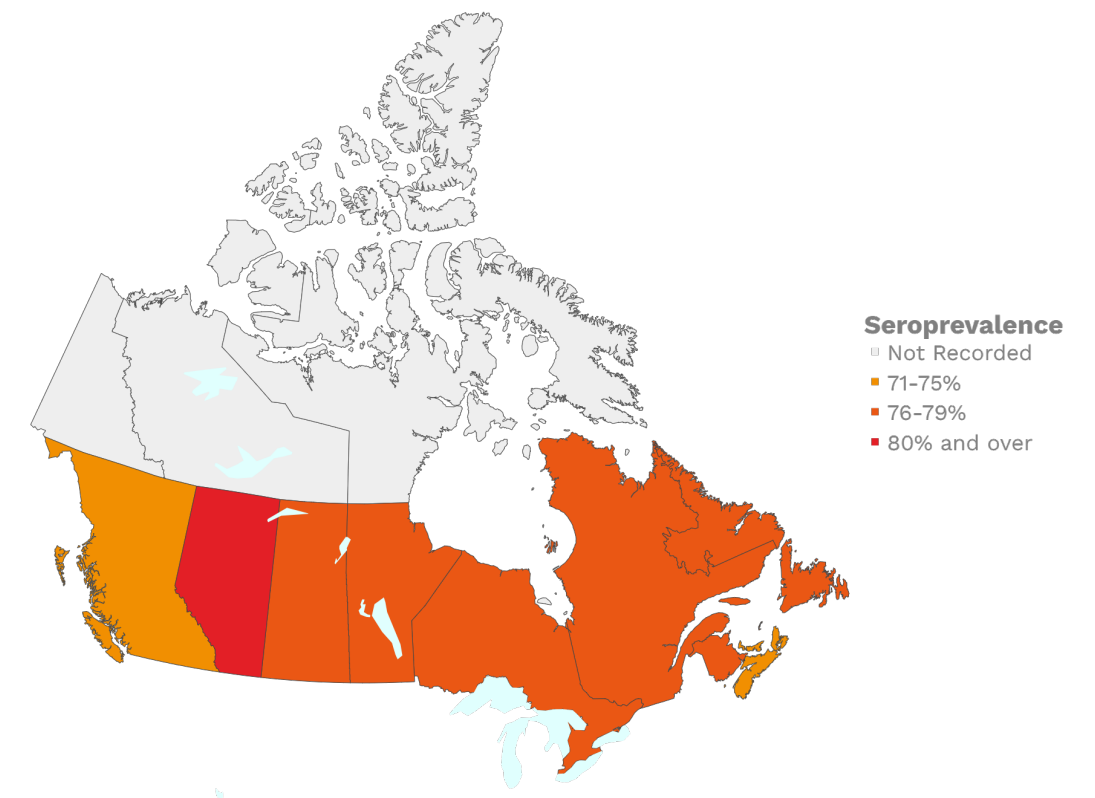


We estimate that the rise in seroprevalence during the Omicron phase of the pandemic corresponds to **at least 27 million Canadians** (95% CrI: 26.2 to 29.2 million) being infected between December 1, 2021, and January 1, 2023. The actual number of newly infected (or reinfected) Canadians may have been higher because some people infected early in the Omicron phase may no longer have detectable anti-N antibodies.

Overall, infection-acquired seroprevalence in Canada rose dramatically between August 2021 and January 15, 2023: from 4.6% (95% credible interval [CrI]: 3.5 to 5.6%) in the pre-Delta wave to **77.2%** (95% CrI: 73.0 to 80.9%) by mid-January 2023 – after over a year with circulating Omicron variants. In blood donors, the highest levels of seropositivity due to infection were observed in **young adults** (17–24 years), with approximately 89% seropositivity by mid-January.

The average infection rate over the past year is equivalent to about **70,000 infections per day**.

Atlantic Canada seroprevalence now comparable to the rest of Canada



By January 15, 2023, Atlantic Canada's level of infection-acquired seroprevalence equaled – and in some cases surpassed – that of other provinces in Canada. This is a change from previous months, when the region had lower rates of seropositivity due to infection than did other areas of the country.

The findings from several seroprevalence studies across Canada showed that in the second week of January:

- **Western Canada's** estimated mean seropositivity due to infection was 78.1% (95% CrI: 74.8 to 81.4%), ranging from 75.0% (95% CrI: 69.1 to 80.4%) in British Columbia to 81.1% (95% CrI: 76.0 to 85.7%) in Alberta.
- Estimated seropositivity due to infection was 76.4% (95% CrI: 70.9 to 81.4%) in **Ontario** and 77.5% (95% CrI: 64.0 to 87.7%) in **Quebec**.
- **Atlantic Canada's** estimated infection-acquired seropositivity was 77.2% (95% CrI: 73.5 to 80.7%).

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Researchers at the Université de Montréal, Héma-Québec, and the Institut national de santé publique du Québec have been studying vaccine effectiveness against the different subvariants of Omicron, as well as the antibody response generated by hybrid immunity. Their studies, two of which are presented here, provide insight into the evolving state of immunity in the context of how the pandemic has evolved.

Third vaccine doses have different efficacy against Omicron subvariants depending on a person's infection history

A study partially funded by the CITF, published in *Cell Reports*, demonstrated that people infected with SARS-CoV-2, whether before or after vaccination, have better antibody responses than vaccinated individuals who were never infected (SARS-CoV-2 naïve). This indicates that hybrid immunity generates better immune responses against the wild-type virus, its variants and subvariants. The researchers also observed that BA.4/5 and BQ.1.1 spike glycoproteins are more resistant to neutralization than other Omicron subvariants, even with three doses of SARS-CoV-2 vaccine. The study was a collaboration between Drs. Andrés Finzi (Université de Montréal) and Renée Bazin (Héma-Québec), along with Dr. Daniel Kaufmann (Université de Montréal).

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Antibody responses against the BQ.1.1 subvariant elicited following SARS-CoV-2 mRNA vaccination and breakthrough infection

A study partially funded by the CITF, published in *Vaccines*, demonstrated that hybrid immunity, generated by vaccination and recent infection, induces higher humoral responses than vaccination alone against wild-type and the BQ.1.1 subvariant of the Omicron BA.5 variant regardless of which mRNA vaccine is administered. This study is a collaboration between Drs. Gaston de Serres (Institut national de santé publique du Québec), Renée Bazin (Héma-Québec) and Andrés Finzi (Université de Montréal).

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Third dose of vaccine enhances antibody response, particularly among older adults

A CITF-funded study now published in *Open Forum Infectious Diseases* by Drs. Marc Romney (University of British Columbia), Zabrina Brumme and Mark Brockman (Simon Fraser University), demonstrated that a third dose of an mRNA vaccine significantly enhanced the magnitude and durability of antibody responses against SARS-CoV-2. This included adults over the age of 70 (median age of 78 years) who remained COVID-naïve (never infected with SARS-CoV-2). Their antibody concentrations were comparable to those found in younger healthcare workers (median age of 40 years) who were triple vaccinated. The findings also suggest that COVID-naïve individuals, particularly older adults, would benefit from a fourth dose within six months of the third.

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Vaccination during pregnancy effective at protecting infants

In a study published in *BMJ*, CITF-funded researchers Drs. Kumanan Wilson (University of Ottawa), Jeffrey Kwong (University of Toronto), and Deshayne Fell (CHEO Research Institute) revealed that COVID-19 vaccination during pregnancy is effective at protecting newborns from SARS-CoV-2 infections and hospitalizations, particularly during the first two months of life. Vaccination was more effective against Delta than Omicron infections. A third dose substantially increased vaccine effectiveness against the immune-evasive Omicron variant.

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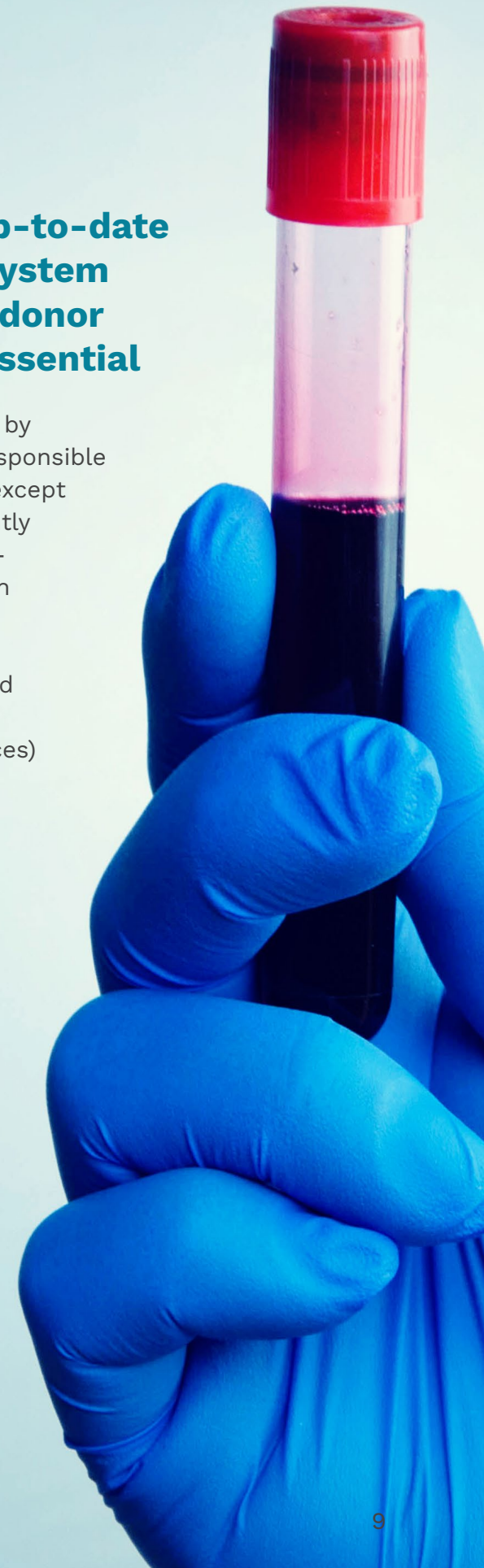


A comprehensive and up-to-date pathogen surveillance system is needed, where blood donor surveillance would be essential

Blood donor surveillance undertaken by Canadian Blood Services, which is responsible for blood collection across Canada (except Quebec and the Territories), is currently providing ongoing estimates of SARS-CoV-2 seroprevalence in the Canadian population, through a collaboration with the CITF (see our [website](#)). In a letter published in *CMAJ*, CITF-funded researchers Drs. Sheila O'Brien and Steven Drews (Canadian Blood Services) argue that blood donor surveillance would make a valuable contribution to public health efforts to monitor emerging pathogens.

Serosurveillance of blood donors can provide regular and representative measures of the proportion of the population that is infected with a pathogen.

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COVID-19 and social determinants of health

Racialized and lower-income populations have consistently had higher rates of SARS-CoV-2 infection and lower rates of vaccination than the general population. A group of CITF-funded researchers recently participated in a seminar to discuss the impacts of social determinants of health on Canadians during the COVID-19 pandemic. While presenting their findings, they offered suggestions on how to narrow the gaps between disparate groups within Canadian society.

Reducing excess risk of infection and disease within at-risk communities will be facilitated by the following initiatives:

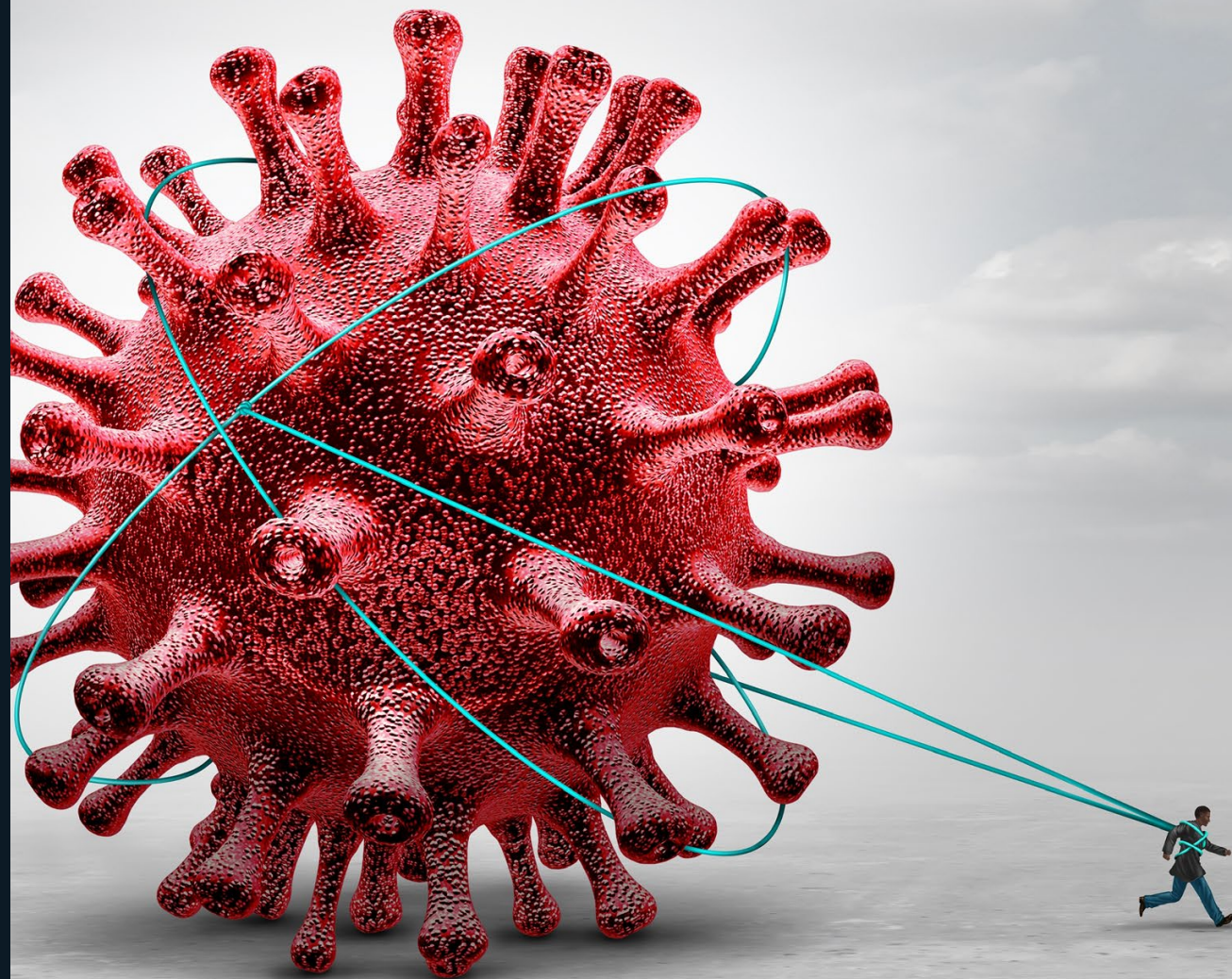
- ▶ **Partnering with communities** to tailor programs to their socio-cultural and economic realities.
- ▶ Fostering **sustained relationships and interaction** between researchers and community members.
- ▶ **Co-creating custom materials and guidance** that address concerns about tests and increase study participation.
- ▶ **Addressing upstream determinants and mitigating barriers** to healthcare, housing, education and employment opportunities.

Improving vaccine coverage and uptake within at-risk communities depends on:

- ▶ Collaborating with community leaders and key opinion leaders to **co-develop strategies** to identify issues and address concerns.
- ▶ Partnering with **community advocacy groups** to disseminate tailored information effectively.
- ▶ Providing information about vaccines in **people's own language** and in **accessible formats**.

» **FULL SUMMARY & VIDEO**





Better understanding of long COVID

More than 100 symptoms have been associated with long COVID, making diagnosis and treatment challenging. Recent studies published in *CMAJ* by CITF-affiliated expert Dr. Angela Cheung (University of Toronto) and her team discussed how post COVID-19 condition, otherwise known as long COVID, could be diagnosed in adults. They further discussed some of the potentially modifiable symptoms of long COVID and their treatment strategies.

According to the World Health Organization (WHO), long COVID has the following characteristics:

1. Symptoms continuing (or starting again) three months after the initial SARS-CoV-2 diagnosis;
2. Symptoms lasting at least three months; and
3. Symptoms not explained by an alternative diagnosis.

According to a meta-analysis published in the *Journal of infectious Diseases*, nearly 15% of adults in Canada with a suspected or confirmed SARS-CoV-2 infection had symptoms lasting more than three months.

Dr. Cheung and team summarized the findings from multiple studies and highlighted fatigue and general malaise among the most common symptoms of long COVID. They further mentioned how through symptom guided programs, people with this condition can mitigate the effects by managing their levels of activity and adopting sleep practices to maximize their rest. The team's articles quoted prior studies and mentioned that in time, many people recover, but the actual mechanisms that may contribute to long COVID – including cellular damage, persistent inflammation or the presence of virus in the body, autoimmunity and blood clotting disorders – remain uncertain.

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11:30 a.m. to 1:00 p.m. EST

At the beginning of the pandemic, COVID-19 was generally very mild in young children, creating a sense that most were not at risk. Once Omicron struck, the millions of people infected led to vastly increased numbers of serious cases in children, as well as rare, serious, lingering complications. Furthermore, the rigorous approval process before vaccines were approved for children caused delays in pediatric vaccination. Coupled with poorer vaccine uptake in young children, this has led to gaps in immune protection against COVID-19.

The CITF has funded several studies examining the impact of SARS-CoV-2 on pediatric populations, as well as vaccine efficacy and the durability of immune responses in children. Join our CITF-funded experts for an informative discussion about the current state of research on COVID-19 and pediatrics in Canada.

Panelists

Host



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