

The Role of Different Types of Tests in the COVID-19 Pandemic

Why is testing for COVID-19 important, and what are the different types of tests?

We hear a lot about testing for COVID-19, but the exact role testing has to play in different situations can sometimes be unclear, as can the different types of tests available. Because there are currently no proven effective drug treatments or vaccines available for COVID-19, testing to see who has the virus, as well as who may have been exposed to the virus, becomes a key tool in better managing and mitigating the pandemic.

There are two broad categories of tests: tests that detect the virus itself (such as polymerase chain reaction [PCR]-based tests) and tests that detect a person's immune response to the virus (a person's immune response occurs later in the course of infection, typically one to two weeks after a person has had COVID-19; and the antibodies produced by the immune system may last for a long time).

What is the role of PCR-based testing in the COVID-19 pandemic?

PCR-based testing identifies the COVID-19 virus by detecting its genetic material (RNA). PCR-based testing is the current gold standard for the diagnosis of COVID-19 in Canada as it's the best way to see if someone has COVID-19. There are a variety of different PCR-based tests available, though typically, a nose or throat swab is collected and then sent to a lab for analysis. PCR-based tests can diagnose active cases of COVID-19 and therefore help to facilitate case identification, isolation, treatment, and contact tracing.

What is the potential role of serological testing in the COVID-19 pandemic?

Serological testing measures the level of COVID-19 antibodies in the blood. Antibodies are the proteins produced by the immune system to protect the body from infection. Unlike PCR-based tests, serological tests are not useful for the early-stage diagnosis of active cases of COVID-19; this is because antibodies are not present until later in the course of infection. However, serological tests could show who has been exposed to COVID-19 at a population level, and this information could be helpful in informing policy decisions regarding return to work, use of personal protective equipment, loosening of social distancing practices, and more.

Will everyone who has been exposed to COVID-19 develop antibodies?

The vast majority of people exposed to COVID-19 will develop a detectable antibody response. However, the strength of the antibody response depends on several factors, including age, nutritional status, severity of disease, and certain medications or infections like HIV that suppress the immune system.

What do we know about potential immunity to COVID-19?

The scientific understanding of COVID-19 immunity after infection is limited and evolving. It is unclear how long antibodies last (and if it will be the same for everyone), how much antibody is required to protect the immune system, the role of immunity in interrupting transmission, the degree to which the COVID-19 virus may mutate in the future, and if individuals who have recovered from COVID-19 can be reinfected. A better understanding of potential immunity to COVID-19 will help to clarify the role of serological testing in helping to manage and mitigate the COVID-19 pandemic moving forward.

Table 1: Summary of PCR-Based and Serological Testing for COVID-19

Type of test	Mechanism of action	Strengths	Limitations	Future directions
PCR-based tests	Detects the genetic material (RNA) of the virus	Can detect active cases of COVID-19, thus facilitating case identification, isolation, treatment, and contact tracing Current gold standard for COVID-19 diagnosis in Canada	Cannot shed light on who has been exposed to the virus once the active illness has passed Some barriers to the implementation of widespread PCR-based testing include reagent availability, cost, and time to receive results	Rapid diagnostic tests that can be used at the point of care (versus in a lab) are being researched to potentially address some of the barriers to more widespread testing for COVID-19 infection
Serological tests	Detects the host's response to the virus by measuring antibody levels in the blood	Can shed light on who has been exposed to COVID-19 at the population level May help to inform policy decisions regarding return to work, use of personal protective equipment, loosening of social distancing measures, and more	Not useful for the early-stage detection of active COVID-19 infection Whether or not antibody detection results in immunity to COVID-19 (and if so, for how long) is still unknown	An increased understanding of the relationship between COVID-19 antibodies and potential immunity will shed light on the role that serological testing can play in mitigating the COVID-19 pandemic moving forward Additional potential uses of serological testing include for convalescent plasma (as a possible treatment) and to potentially aid in vaccine development

PCR = polymerase chain reaction; RNA = ribonucleic acid.

Note: There are times when PCR-based testing and serological testing may also be used in complementary ways. An example would be using one to cross-check the accuracy of the other; for example, comparing an early-stage PCR result to a subsequent serological test and looking at the agreement between the two tests to help quantify test sensitivity and specificity. Comparing the two test results at various points in time may also shed light on the length and strength of the antibody response in different patients, and whether or not reinfection can occur.



What COVID-19 tests are currently available in Canada?

The list of tests that have been approved by Health Canada is being updated continually on [Health Canada's website](#).

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