

THE PATHCARE NEWS

THE ROLE OF ANTIBODY TESTING IN THE MANAGEMENT AND DIAGNOSIS OF SARS-COV-2



When will antibody testing be available?

SAHPRA, the South African Health Products Regulatory Authority, granted Section 21 approval for laboratory-based COVID-19 antibody testing on 14 August. The use of these tests will be governed by a Department of Health national testing algorithm, which is not yet available. PathCare will offer these tests as soon as permitted, in accordance with the national algorithm once received, and will communicate the availability thereof to all supporters.

In preparation for your use of this tool, we would like to offer you the following information:

The Coronavirus disease 2019 (COVID-19) has posed many challenges and demanded swift actions from the scientific and medical professions. Each aspect of this disease has evolved rapidly as knowledge and experience in dealing with all the facets of the management of this viral condition has unfolded. This Update will focus on pertinent issues involving the serological diagnosis of COVID-19. Antibody testing which is becoming more readily available, continues to raise many questions and we need to understand the value as well as limitations of the current toolbox to assist in limiting and controlling the impact of the disease.

What types of COVID-19 testing are available?

Reverse transcriptase-polymerase chain reaction (RT-PCR) is the current gold standard for the diagnosis of SARS-CoV-2 infections (causing COVID-19). This assay detects the **viral RNA gene targets** in clinical specimens. The interpretation of these test results poses challenges but is not the focus of this update.

SARS-CoV-2 infection can also be detected indirectly by means of the **host's immune response** to the virus. Different types of antibodies are produced (IgA, IgM and IgG) and the dynamics of production may differ among different types and also individually.

How is antibody testing done?

The patient's serum or plasma is used to detect either the IgM, IgG, IgA or various combinations of these antibodies directed against SARS-CoV-2.

What does a positive antibody test represent?

Prior exposure and possible immunity to SARS-CoV-2.

What are the reasons for a negative antibody test?

No previous exposure.

Test done too early in course of the disease.

Patient did not produce antibodies at all or may have had a past infection with loss of antibodies (These dynamics are still under investigation for SARS-CoV-2).

What is the estimated variation over time of diagnostic tests for the detection of SARS-CoV-2 infection?

Figure 1 that follows gives a graphic representation of the relevant time points during infection at which different diagnostic tests may be positive.

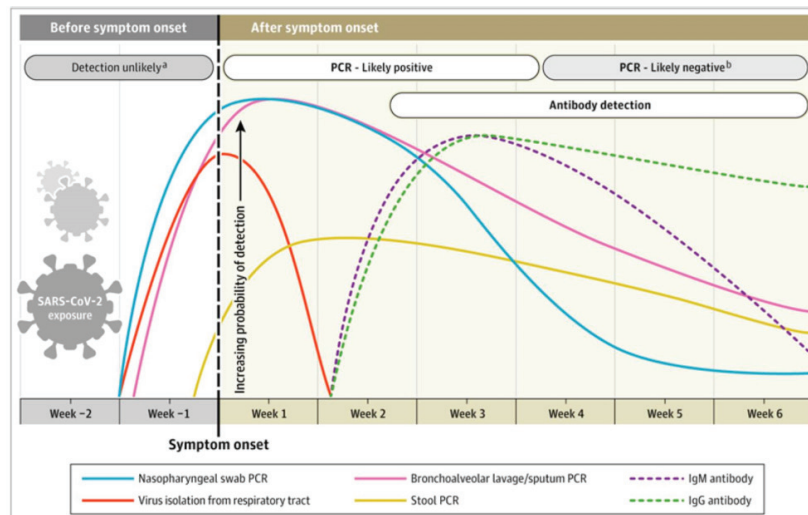


Figure 1: Estimated variation over time in diagnostic tests for detection of SARS-CoV-2 infection relative to symptom onset. (Downloaded from <https://jamanetwork.com> on 31 May 2020.)

The lag time (“window period”) before the IgM and IgG antibodies appear is approximately 2 weeks, but may vary from patient to patient. Owing to the delay, antibody tests are not recommended when deciding if a patient has an acute SARS-CoV-2 infection or not.

How can antibody testing be utilised in the current pandemic?

Determining past exposure in persons that were not diagnosed at the time of active infection.

Diagnostic aid in a patient presenting late where RT-PCR fails to detect SARS-CoV-2.

Diagnostic aid in suspected acute infection where RT-PCR fails to detect SARS-CoV-2. Paired samples 2 weeks apart will be needed to demonstrate seroconversion.

Public health practice tool to identify clusters of cases and other epidemiological variables (e.g. case fatality rate).

Identification of possible donors for plasma therapy strategies.

Can antibody testing be used to determine which individuals are safe to return to the workplace?

As a positive antibody test indicates previous exposure and possible immunity to SARS-CoV-2, it may in future support the strategy around deployment and return-to-workplace policies of previously exposed workers to minimize exposure and transmission to susceptible individuals. The evidence base for this approach is not yet established.

How long do the antibodies last and how long can the individual be protected from infection?

The long-term persistence and duration of protection conferred by the antibodies against SARS-CoV-2 remain unknown. However, the pathogenicity of SARS-CoV-2 seems to be similar to SARS-CoV (of about 17 years ago). Antibody protection against SARS-CoV offered protection of at least 2 years. The potential immune protection against reinfection with SARS-CoV-2 may share some common features with convalescent SARS-CoV but more studies and research need to be conducted to answer this question.

Is there cross-reactivity with SARS-CoV and other Coronaviruses?

Antibody assays are designed to have no or very limited cross-reactivity to other circulating viruses and validation data confirms this. As testing experience is limited at this stage, the exact specificity of these tests will be informed over time.

Does the immune response differ in immunocompromised patients and children?

Most of the available data was obtained in adult populations who are not immunocompromised. Many questions still remain and need to be studied in these different patient groups.

Compiled by Dr Louis Marcus and the virologists from PathCare.

Further Reading

Centers for Disease Control and Prevention. 2020. Serology Testing for COVID-19 at CDC. <https://www.cdc.gov/coronavirus/2019-ncov/lab/serology-testing.html>.

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Hagen, A. 2020. Tests for SARS-CoV-2/COVID-19 and Potential Uses. *American Society for Microbiology*. <https://mbio.asm.org/content/11/2/e00722-20>.

Sethuraman, N et al. 2020. Interpreting Diagnostic Tests for SARS-CoV-2. *JAMA*. <https://jamanetwork.com> May 6, 2020.