

「 COVID-19 tests: crisis? Turning point? 」

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The World Health Organization (WHO) said: “Our key message is: test, test, test.”

During the COVID-19 pandemic, the director general of WHO has urged all countries to test every suspected case to fight the spread of coronavirus. It is generally agreed that ramping up testing is key to knowing how far the virus has spread and getting back to normal. [1]

At present, polymerase chain reaction (PCR) and antibody testing are the dominant ways that global healthcare systems are testing citizens for Covid-19. [2] PCR-based tests are the current gold standard for diagnostic tests. Meanwhile, researchers and public health officials are also moving toward antibody tests (or known as serology test) that can help uncover people who have been exposed to the virus. [3]

1. PCR-based tests

The COVID-19 RT-PCR test is a real-time reverse transcription polymerase chain reaction test for the qualitative detection of nucleic acid from SARS-CoV-2 in upper and lower respiratory specimens. [2] By detecting viral RNA, which will be present in the body before antibodies form or symptoms of the disease are present, the tests can tell whether or not someone has the virus very early on. On 27 March 2020, the FDA approved an "automated assay" from Abbott Diagnostics that uses an isothermal nucleic acid amplification method.[4]

2. Serology tests

According to the FDA, IgM antibodies to SARS-CoV-2 are generally detectable in blood several days after initial infection, although levels over the course of infection are not well characterized.[5] IgG antibodies to SARS-CoV-2 generally become detectable 10–14 days after infection although they may be detected earlier, and normally peak around 28 days after the onset of infection.[6][7] Serology testing for SARS-CoV-2 is at increased demand in order to better quantify the number of cases of COVID-19, including those that may be asymptomatic or have recovered. The test can also help screen plasma for restorative plasma therapy and also help vaccine development. Below are different types of antibody test:

Type of test	Time to results	What it tells us
Rapid diagnostic test (RDT)	10-30 minutes	The presence or absence (qualitative) of antibodies against the virus present in patient serum.
Enzyme linked immunosorbent assay (ELISA)	1-5 hours	The presence or absence (quantitative) of antibodies against the virus present in patient serum.

Neutralization assay	3-5 days	The presence of active antibodies in patient serum that are able to inhibit virus growth ex vivo, in a cell culture system. Indicates if the patient is protected against future infection.
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The best antibody tests are both highly sensitive — detecting a wide range of IgM or IgG antibodies that recognize different parts of a viral protein — and highly specific, meaning the detected antibodies are for only that virus. Coronaviruses that cause colds, for example, also circulate around the globe. Antibody tests with low specificity and high sensitivity might detect antibodies against cold viruses and give a false positive. But a test with high specificity and low sensitivity could miss antibodies, resulting in a false negative. Timing is also crucial, as patients who have not been infected long enough to develop antibodies would test negative. [8]

“At this point, there isn’t enough evidence to confirm that recovered people are protected from the disease” the World Health Organization said in a statement on April 24. However, for those who have these virus-fighting antibodies could raise hopes of immunity and a return to normal life.

Knowing how many people have already been exposed to the virus is also a step toward understanding when the pandemic might end. High numbers of immune people can protect the population as a whole from outbreaks, creating what’s called herd immunity. Researchers estimate that around one-third to two-thirds of a population would need to be infected with SARS-CoV-2 to reach herd immunity. People all sincerely hope that the war against the virus will end soon.

Reference:

1. World Health Organization: WHO: www.who.int
2. ["Developing Antibodies and Antigens for COVID-19 Diagnostics"](#). Technology Networks. 6 April 2020. Retrieved 30 April 2020.
3. ["How is the COVID-19 Virus Detected using Real Time RT-PCR?"](#). IAEA. 27 March 2020. Retrieved 5 May
4. ["Letter from FDA"](#). FDA. 27 March 2020. Retrieved 2 April 2020.
5. ["Cellex Emergency Use Authorization"](#). FDA. 1 April 2020. Retrieved 10 April 2020.
6. ["Will an Antibody Test Allow Us to Go Back to School or Work?"](#). New York Times. 10 April 2020. Retrieved 15 April 2020.
7. ["Mount Sinai Emergency Use Authorization"](#). FDA. 15 April 2020. Retrieved 18 April 2020.
8. ["Study Raises Questions About False Negatives From Quick COVID-19 Test"](#). NPR. 21 April 2020. Retrieved 1 May 2020.

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