

Antigen Testing for COVID-19

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Coronavirus is a single-stranded positive-sense RNA virus with an envelope of about 80 to 120 nm in diameter. Its genetic material is the largest of all RNA viruses and is an important pathogen of many domestic animals, pets and human diseases. The gold standard test for diagnosing the COVID-19 was RT-PCR, but it was time consuming, expensive and laboratory expertise is needed for diagnosing the condition. There are alternate methods to diagnose the COVID-19 like antigen and antibody tests. Antigen test will detect the active phase of infection and antibody tests will detect the past infection. So, to detect COVID-19 in active phase of infection antigen are better alternative for RT-PCR, as it is rapid and cost effective.

Antigen tests are immunoassays that detect the presence of a specific viral antigen, which implies current viral infection. Antigen tests are currently authorized to be performed on nasopharyngeal or nasal swab specimens placed directly into the assay's extraction buffer or reagent. Rapid antigen tests are particularly helpful if the person is tested in the early stages of infection with COVID-19 when viral load is generally highest. Rapid antigen tests can also be used for screening in high-risk congregate settings to quickly identify individuals with COVID-19 infection for preventing transmission of disease.

There are limited data to guide the use of rapid antigen tests as screening tests on asymptomatic persons to detect or exclude COVID-19, or to determine whether a previously confirmed case is still infectious.

Indications:

- If you have symptoms suggestive of COVID-19
- If you have been in close contact (within 6 feet) of a person with a COVID-19 infection for at least 15 minutes but do not have symptoms
- If you work in a nursing home or a long-term care facility

- If you are a critical infrastructure worker, health care worker, or first responder
- If you are a vulnerable individual and living in a high COVID-19 transmission area and have attended a public or private gathering of more than 10 people (without widespread mask wearing or physical distancing).

Collection of specimen

A sterile swab is inserted in to the posterior part of the nasal cavity touching the nasopharynx. The swab is inserted into an extraction buffer solution. 3 drops of the extraction specimen is instilled into the antigen test kit. The results are read after 15 - 30 seconds (Figure 1).



Figure 1: A: Picture showing nasopharyngeal swab collection from patient. B: Picture showing the swab mixed into a extraction buffer solution. C: Picture showing the buffer solution taken for installation into antigen kit. D: Picture demonstrating the positive and negative result after 15 minutes.

Precautions to be taken while testing

- Wear personal protective equipment, such as gloves and lab coats when handling kit reagents.
- The collected specimen should be tested as soon as possible after collection. If testing is delayed, the specimens can be stored at room temperature for up to 1 hours or at 2 - 8°C for up to 4 hours prior to testing.
- Clean up spills thoroughly using an appropriate disinfectant.
- Handle all specimens as if they contain infectious agents.
- Observe established precautions against microbiological hazards throughout testing procedures.
- Dispose of all specimens and materials used to perform the test as bio-hazard waste.

Sensitivity and specificity

The sensitivity of antigen test ranges from 84 - 97% compared to RT-PCR. There were chances of false negatives with antigen tests. The antigen levels in patients who were symptomatic for more than 5 days may drop below the level of detection, so antigen tests which were done after 5 days results in false negatives but the PCR gives positive result. The person with negative results and highly suspicious of COVID-19 should undergo confirmatory RT-PCR testing within 2 days of antigen testing. The specificity of the test reaches nearly 100%. The false positives results were unlikely with antigen testing. So, if a patient proves to be positive with antigen testing, the chances of disease positive for the particular individual is 100%.

Pitfalls of antigen testing

- Antigen test detect only active infection cases, it won't give any information about previous infection with COVID-19.
- The antigen quantitative value is not detected in the antigen detection test.
- The result will be negative if the level of antigen is below the limit of detection or if the specimen quality is poor.
- The test procedure, precautions and interpretation of results for this test must be followed strictly when testing.

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