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Newsletter

Factors Affecting Laboratory Testing for SARS-CoV-2

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SARS-CoV-2 is the virus responsible for COVID-19. Molecular testing (PCR) for infection with SARS-CoV-2 is performed on a respiratory sample (nasopharyngeal or oropharyngeal swabs, sputum, tracheal aspirates, bronchoalveolar lavage).

There are several factors that may influence a laboratory result and lead to a difference in results on two separate samples from the same patient.

Specimen type

A good laboratory result is dependent on the adequacy of the submitted sample.

Nasopharyngeal vs throat swab

Studies suggest that an oropharyngeal swab detects SARS-CoV-2 less frequently than a nasopharyngeal swab. One study indicated that the difference between nasopharyngeal and oropharyngeal sampling was more marked from 8 days after the onset of symptoms.[1] While a nasopharyngeal swab is preferred, an oropharyngeal swab may be submitted if a nasopharyngeal swab is not available due to limitations on supply.

Lower respiratory tract specimens

The preferred specimen when dealing with a lower respiratory tract (LRT) infection is expectorated sputum. Induction of sputum is not recommended due to infection risk. If a patient is intubated, a tracheal aspirate or bronchoalveolar lavage is recommended.

False negative tests may occur. If suspicion of infection remains high following an initial negative result, especially if the specimen was from the upper respiratory tract (URT) of a patient with LRT symptoms, repeat testing should be considered, preferably on a LRT specimen.[2]

Timing of specimen collection

Virus may be detected 1-2 days before the onset of symptoms.
Following symptom onset, viral RNA may be detected for variable periods. A study from Singapore suggests that the viral load in nasopharyngeal samples peaks within the first few days after the onset of symptoms and then starts to decline.[3] A large study from China indicated that viral shedding was detected for 8 - 37 days amongst symptomatic survivors. Viral shedding tended to continue for longer amongst those with severe disease compared to those with mild disease.[4] It is important to note that detection of viral RNA by PCR does not equate to infectiousness as PCR detects viral RNA which is not necessarily viable virus. A study group that cultured virus from respiratory samples reported that infectiousness may decline significantly by 10 days post-symptom onset.[5, 6]
Towards the end of viral shedding, virus may be intermittently detected. This may be due to either biological factors or sampling variability that will occur when a low amount of virus is present.[7]

Laboratory testing

There are many different PCR assays currently available for SARS-CoV-2 detection. The assays target different genes, different parts of the same gene and different combinations of genes, with variable sensitivity. Testing should be conducted with an assay from a reputable manufacturer that has passed a validation process conducted by the laboratory utilising the assay. Testing through a SANAS-accredited laboratory is recommended to ensure that quality assurance is applied to the testing process.

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