Overview of COVID-19 PCR tests

Partnership for Supply Chain Management

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What is a PCR test?

PCR stands for polymerase chain reaction (PCR). It is a test to detect genetic material from a specific organism, such as a virus. The test detects the presence of a virus in an individual at the time of the test. PCR tests are also referred to as nucleic acid amplification tests (NAATs). PCR tests are effective because of their ability to detect very small concentrations of the virus that other tests might miss.

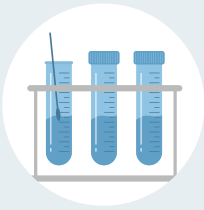
What is a COVID-19 PCR test?

The PCR test for COVID-19 analyses upper respiratory specimen (samples), looking for genetic material (ribonucleic acid or RNA) of SARS-CoV-2, the virus that causes COVID-19. Scientists use the PCR technology to amplify small amounts of RNA from specimens into deoxyribonucleic acid (DNA), which is amplified (replicated) until SARS-CoV-2 is detectable if present. In other words, PCR tests create copies of specific strands of DNA to detect even the smallest possible amounts of virus in a sample.

What are the key steps in COVID-19 PCR testing?

1 Sample collection

A healthcare provider uses a swab to collect respiratory material found in the nose. A swab is a soft tip on a long, flexible stick that goes into the nose. There are different types of nose swabs, including nasal swabs that collect a sample immediately inside your nostrils and nasopharyngeal swabs that go further into the nasal cavity for collection. Either type of swab is sufficient for collecting material for the COVID-19 PCR test. After collection, the swab is sealed in a tube and sent to the laboratory for testing.



2 Extraction

In the laboratory, the scientist receives the sample and isolates (extracts) SARS-CoV-2 virus's genetic material from the rest of the material in the sample. Extraction of SARS-CoV-2 virus's genetic material can be performed manually or automatically. Nucleic acid extraction kits are used in this step, with automated extraction requiring the use of an analyzer.

3 PCR

Special chemicals and enzymes and a PCR machine called a thermal cycler or Thermocycler are used to make millions of copies of a small portion of the SARS-CoV-2 virus's genetic material (amplification) in the test tube. One of the chemicals in the tube produces a fluorescent light if SARS-CoV-2 is present in the sample. Once amplified enough, the PCR machine can detect this signal. Scientists use special software to interpret the signal as a positive test result.

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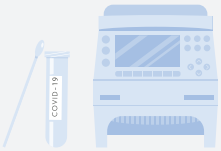
What are the types of COVID-19 PCR test kits?

Broadly, there are two types of COVID-19 PCR test kits, namely automated and manual test kits.



Automated test kits

These are kits packaged with reagents for both nucleic acid extraction and PCR (amplification). These reagents are placed in a PCR machine together with samples to be tested. The testing process occurs on the machine and results are made available by the machine at the end of the process.

Manual test kits

These are kits packaged with reagents for PCR (amplification). Separate reagent kits for extraction are needed to be used together with the manual test kits to complete the process of PCR testing. Even in manual testing, the amplification step in PCR testing is still performed using a Thermocycler.

What are the main considerations when requesting COVID-19 PCR test kits?

1. Select COVID-19 PCR test kits that are available in the Global Fund's Wambo ordering system.
2. Check the compatibility of the COVID-19 PCR test kit selected with the nucleic acid extraction kit/equipment and PCR analyzer. These three components should match the Global Fund's guidance on the List of SARS-CoV-2 diagnostic test kits and equipment eligible for procurement according to Board Decision on Additional Support for Country Responses to COVID-19 (GF/B42/EDP11).
3. When requesting for manual COVID-19 PCR test kits, ensure that you have enough extraction kits to match the number of COVID-19 PCR tests requested.
4. Check that you have all the other consumables, which will be required for testing to be performed.

References

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