

DIAGNOSTICS FOR COVID-19

COVID-19 DIAGNOSTICS ARE TESTS USED TO DETECT INFECTION WITH THE SARS-COV-2 VIRUS

TYPES OF DIAGNOSTIC TESTS

	Molecular test	Immunoassay		Non-disease specific tests
		Antibody based	Antigen based	
How does it work?	Detects the presence of viral genetic material in a sample	Detects the presence of anti-viral antibodies in a sample	Detects the presence of viral proteins (antigens) in a sample	Detects signs and symptoms of disease
What technique is used?	Usually based on a technique called polymerase chain reaction (PCR), which makes millions of copies of a specific section of the viral genome, amplifying small amounts to detectable levels	Usually based on a technique called enzyme-linked immunosorbent assay (ELISA), in which molecules attach to the antibodies or antigen in the sample and produce a detectable signal		Techniques include thermal scanning to identify people with a fever (higher than normal temperature) and computed tomography (CT) chest scans to distinguish from other chest infections
Where does testing take place?	Usually performed in a laboratory due to equipment requirements	May be laboratory based or performed at point of care, depending on test design		Usually performed outside of the laboratory, in clinic or at point of care, depending on equipment needs
What is the most common use?	Testing people suspected of having COVID-19	Assessing overall infection and immunity rates in a community	Testing people suspected of having COVID-19 or screening/triage to identify candidates for further testing (depending on test design)	Screening/triage to identify candidates for further testing
A positive result...	Confirms a current SARS-CoV-2 infection	Indicates a recent or past infection, and could be used to screen for current infection (tests may not be reliable in early phase of infection)	Confirms a current SARS-CoV-2 infection or suggests a potential infection (depending on test design)	Suggests a potential infection and indicates that further testing is needed

<h2>SAMPLE TYPES</h2>	<ul style="list-style-type: none"> • Nasopharyngeal swabs are commonly taken for COVID-19 diagnostic testing • Other sample types that may be tested include: <ul style="list-style-type: none"> - Sputum (if you are coughing it up) - Blood - Stool and/or urine - Bronchoalveolar lavage (fluid that has been used to wash the lungs)
<h2>TESTING PROCEDURE</h2>	<ul style="list-style-type: none"> • Samples may be taken: <ul style="list-style-type: none"> - At home, by a visiting healthcare professional - At a drive-thru centre (where a nasopharyngeal swab is taken through your car window) - At a hospital or clinic • Samples are then sent to a laboratory for testing • It will usually take around 72 hours to receive a result
<h2>SARS-COV-2 VERSUS OTHER CORONAVIRUSES</h2>	<ul style="list-style-type: none"> • SARS-CoV-2 is part of the coronavirus family • Molecular tests for COVID-19 are based on genetic sequences from the SARS-CoV-2 viral genome • Tests can use sequences that are unique to SARS-CoV-2 to distinguish from infections with other human coronaviruses • There are currently two known strains of SARS-CoV-2, which are thought to have different infection rates and severity of disease <ul style="list-style-type: none"> - Tests can use sequences common to both strains to ensure that they can both be detected
<h2>MOLECULAR TESTS</h2>	<ul style="list-style-type: none"> • Molecular tests are diagnostics that detect viral genetic material, usually performed in a laboratory • A molecular test requires a number of basic ingredients: <ul style="list-style-type: none"> - The enzymes and short DNA sequences (known as primers) that copy the genetic material - The building blocks of DNA (nucleotides) - A buffer solution - The viral genetic material (if present), extracted from the sample using a separate kit • The tests are run in a machine that uses repeated cycles of heating and cooling to drive the amplification of the viral genetic material until it reaches detectable levels
<h2>'POINT OF CARE' TESTS</h2>	<ul style="list-style-type: none"> • Point of care tests are diagnostics that can be performed outside of the laboratory • They are required for wide-scale global testing <ul style="list-style-type: none"> - Some companies are attempting to develop 'rapid diagnostic tests', which are quick, inexpensive and easy to perform without laboratory facilities <ul style="list-style-type: none"> ➔ Rapid diagnostic tests are often based on immunoassays - Some companies are adapting molecular tests for use in mobile laboratories
<h2>COVID-19 DIAGNOSTIC TEST QUALITY</h2>	<ul style="list-style-type: none"> • Diagnostic tests are evaluated in validation studies to ensure that they are accurate and reliable • Validation studies assess: <ul style="list-style-type: none"> - Sensitivity (ability to detect SARS-CoV-2 in samples known to be positive) - Specificity (ability to avoid falsely detecting SARS-CoV-2 in samples known to be negative) • FIND is conducting independent evaluations of COVID-19 molecular tests and immunoassays, in collaboration with WHO and other partners • Results from these studies will help governments and health authorities decide which tests are most suitable for use in their populations