



2021 Infection Prevention & Control for General Practice

October – e newsletter # 9 – Various antigen tests to detect SARS – CoV - 2 (COVID-19)

This does not include antibody tests - they demonstrate past infection but not current infection or protective immunity

But first an overview of both our innate and adaptive immune response

1. The innate cellular response - this is where the body responds to particles recognised as foreign i.e. antigens. This occurs fairly soon i.e. within hours or a day and is what we already possess to inactivate the antigen and is non specific. It consists of white cells in our blood and tissue, various chemical e.g. lysozyme, and mechanical e.g. vomiting, coughing means. It does not produce immunity but is critical for recovery from infection. It diminishes with age. A sore arm or tiredness after vaccination are due to this response.
2. The adaptive response is specific to an antigen and may be activated at the same time as the above but does not necessarily aid in recovery because it takes a couple of weeks to be detected. It produces specific immunity and has two arms involving T and B cells with one tending to dominate according to viral or bacterial infection - T cell response tends to dominate with viral infection and results in production of T helper, killer, suppressor and effector cells that destroy the antigen and develop memory while the B cell response is associated with antibody production which inactivates antigen. Both will be stimulated to different degrees and memory cell production means that re-exposure to that antigen prompts a protective response so rapidly that the person is usually unaware or has very mild symptoms.

Both responses occur whether stimulated by infection or vaccination

Antigen tests - there are two types

1. PCR test (polymerase chain reaction) to detect viral RNA from respiratory swabs/secretions and wastewater. This molecular test is considered the gold standard because it is extremely specific i.e. very few false positives, and very sensitive i.e. will detect very low concentration of SARS-CoV-2 RNA. In this test, which can be done in large batches by experienced laboratory staff, the viral RNA is mixed with other ingredients: enzymes (DNA polymerase and reverse transcriptase), DNA building blocks, cofactors, probes and primers that recognize and bind to SARS-CoV-2. Then the viral RNA is converted to a DNA copy, and that single copy is then amplified into millions of copies using PCR for easier detection from swabs or waste water. The Cycle Threshold (CT) is the number of cycles it took to detect the RNA. A highly infectious person will have a low CT. There is a cut off to determine a negative result.
2. Rapid antigen tests – these detect viral protein and are not as sensitive as PCR
Rapid antigen testing involves a nasal/throat swab treated with chemicals either in a machine or on a card – they are done one at a time with a result within 15 to 30 minutes. There are two types of rapid antigen tests
 - a. POCT (Point of Care Test). Only those approved by the TGA (list on web) are used and are only to be performed by approved health professionals. They are not as sensitive as the PCR test because they do not detect low levels of virus. Testing involves placing the swab into a machine to mix chemicals with and provide a result. They are done one at a time and can be part of regular surveillance in a workplace. A positive result is reported and a PCR swab taken for laboratory testing.
 - b. Self tests – the TGA announced on Sept 28th that companies can apply for approval to legally supply these for use at home in Australia after 1 November (70% of eligible people will be fully vaccinated). Not all tests originally available detected delta variant so are now unsuitable for use in Australia.

The clinical utility of rapid antigen tests in screening asymptomatic persons has not been established.