

Testing for Covid-19: Science and Politics

Rapid and timely testing is key to current policies for returning to normal activities in commerce and sport. I will describe the biochemical basis of the current tests, innovations that will speed those tests and the reporting required for doing tens of thousands of them. Testing for this virus is based on specifically detecting a unique nucleotide sequence (20-30 bases) coding for the N protein that is contained within the SARS-coV-2 virus. Specific detection of this RNA currently is most effectively carried out using a technique called RT-PCR or Polymerase Chain Reaction using Reverse Transcriptase. I will explain why this method is both specific and why it takes a relatively long time (3 hours) to carry out. Current researchers are attempting to both automate positive/negative results and speed up obtaining those results. The second method of testing looks for specific antibodies developed by the patient in response to viral infection to report the presence of the virus in samples. Development of color reports antibody binding to virus protein. The location of that color reports whether the antibody is an M or G antibody. The color can be observed directly by eye (like rapid pregnancy tests) or measured and recorded by machine. The results are visible within 15 minutes of application of the sample (blood, or serum). However, because antibodies for the virus are the result of infection, their development can take a week or more. The M antibodies (IgM) can appear within 3-5 days of infection and are superseded by G antibodies (IgG), appearing within 2 weeks of infection. IgG persist for months or even years once they are developed, so this test provides evidence for past infection, but may not show up quickly for current infection. Two of the largest laboratories involved in testing are [Quest Diagnostics, Inc.](#) and [LabCorp](#). But if you want to be tested, you should check first with your personal physician. I will discuss why in February the CDC was slow developing tests here in the USA and why there have been considerable lags in making testing widely available. I will discuss why there were further bottlenecks in obtaining test results and look ahead to what we can expect as testing technology develops.

How PCR works [DNA can be obtained from RNA using Reverse Transcriptase=RT]

https://www.youtube.com/watch?v=c07_5BfIDTw

Detection of SARS-coV-2 using RT-PCR

https://www.youtube.com/watch?v=Vd38iS_W7ww

How an antibody detection kit for Covid-19 works

<https://www.youtube.com/watch?v=008JEBixLfw>

Comparison of RT-PCR and Serological or Antibody tests

https://www.youtube.com/watch?v=pkI_KPUWyZw

Processing of Covid-19 test samples (Syngene in Singapore)

<https://www.youtube.com/watch?v=HvB8EkLtcss&t=78s>