## COVID-19 VIRUS SEEMS TO HAVE UPPER HAND FOR NOW

Relevant for: Developmental Issues | Topic: Health & Sanitation and related issues

The struggle for survival between microbes, like viruses and bacteria, and humans is as old as humankind itself.

Microbes, particularly viruses, have only one goal — to find a suitable host and multiply. Viruses, however, do not multiply by themselves. They need the cell machinery of the host for replication. Around two-thirds of all infections in humans are caused by viruses. The current <u>COVID-19</u> outbreak caused by a <u>coronavirus</u>, SARS-CoV2, has brought this struggle to light once again. As of now, the virus appears to have an upper hand. It seems highly successful because it spreads rapidly from human to human and has a lower rate of mortality. Humans have faced new viruses at regular intervals. These include the Ebola, <u>Zika</u>, HIV, the Flu virus H1N1, the Middle East Respiratory Syndrome (MERS), and Severe Acute Respiratory Syndrome (SARS) — the latter two are from the coronavirus family. It is noteworthy that these viruses have all appeared in the last few decades, having jumped from their animal reservoirs to humans. Many of these viruses have a much higher mortality rate than the SARS-CoV2 that caused COVID-19. Like before, humans will come out of the present crisis as winners but that will happen at a huge cost, in every sense of the word — untimely loss of human lives, economic losses and a general loss of confidence in the human ability to deal with a tiny unknown enemy.

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The first step in dealing with any new viral outbreak is to be able to accurately test, detect and track the spread of the virus, and isolate the infected persons to stop further spread. To do this, it is important to obtain information on the genetic makeup of the virus, which forms the basis of developing highly specific diagnostic tests. Currently, the most reliable and widely-used test is based on a technique called RT-PCR (Reverse Transcription Time Polymerase Chain Reaction). This test aims to detect the viral RNA, the genetic material of SARS-CoV2. The testing begins with the careful collection of swabs taken from the nose or the back of the throat of the patient and extraction of the viral RNA. However, this extracted viral RNA from the swab is too tiny an amount for direct detection. The RT-PCR, through many different reactions that include the conversion of viral RNA to DNA — its amplification and detection — makes it possible to confirm the presence or absence of the virus. The testing kits contain all chemicals and materials required for carrying out the RT-PCR based tests, which are performed by governmentapproved laboratories such as India's National Institute of Virology. However, many more testing centres, including those run by private players, have now been allowed to carry out the tests in many countries to bridge the huge demand and supply gap. It is now clear that countries which were able to scale up the testing of the virus in patients at an early stage were able to control the spread of the disease far better than those which did not. Given that there is no cure or vaccine for the control of COVID-19, testing of infected patients much more quickly and tracking their contacts to isolate them till they clear off the virus is currently the only viable control measure.

Fortunately, there is good news of a relatively new but powerful technology called CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats), which is highly specific in directly detecting viral RNA and confirming the presence or absence of the virus. Interestingly, viruses also attack bacteria and the discovery of CRISPR itself was based on understanding how bacteria cut off the viruses. The CRISPR-based test is quick and circumvents the need for both

expert handling as well as PCR machines and can be done at multiple locations in about half an hour. It can also fend off delays and other logistic problems in collection and transportation of test samples. These tests are being validated and readied for approval. Two companies, separately founded by the two scientists who discovered the CRISPR technique, have also announced that they are ready with their CRISPR-based test for validation and approval. They have claimed that these tests can be performed within 10 minutes and can be conducted by using a paper strip format. Another company, Abbott Laboratories, has recently announced the results in five minutes. Such a point of care test will not only greatly enhance the speed of large-scale testing but will also relieve the tremendous pressure faced by frontline healthcare providers.

## **Opinion | Success of lockdown will depend on implementation**

These above described RT-PCR and the newly developed CRISPR based tests are needed for scaling up the testing but many individuals infected with the virus do not show symptoms of the disease and recover completely. How to test these cases to gather realistic information on the spread of the virus? Such information will be necessary for designing future control strategies. This is done with serological tests, which are carried out in blood samples collected from a large population and are based on the detection of antibodies that are produced in response to the viral infection. These tests are relatively easier to develop and use, less expensive, and also do not need much sophisticated infrastructure or highly trained manpower. Serological tests for COVID-19 have already been developed by many groups and are already in use. India also plans to carry out serological tests to examine the actual spread of the disease in different parts of the country.

The world is still grappling with the present unprecedented public health crisis. It is imperative that large-scale testing is implemented at the earliest in as many locations as possible. Lockdowns are essential to control the disease but long-term strategies to deal with the disease would be based on the knowledge of its actual spread. The newly-developed point of care tests should be successfully able to bridge the existing gap in the testing of the virus. This will also assist in gearing up facilities to treat the severely sick as well as relieve and protect frontline health providers. Meanwhile, hopefully, efficient drugs therapies and efficacious vaccines against COVID-19 will also be discovered soon.

This article first appeared in print edition on April 3 under the title "Man versus Microbe". The writer is former chairman UGC and former director of the International Centre for Genetic Engineering and Biotechnology, where he currently holds the Arturo Falaschi Chair.

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