

ICMR approves a simple low cost method of detecting novel coronavirus

The Indian Council of Medical Research (ICMR) has recently approved the dry swab direct RT-PCR method which is faster and more convenient than the existing gold standard Reverse transcription-polymerase chain reaction (RT-PCR) test. The method has been devised by a team of researchers from the Centre for Cellular and Molecular Biology (CCMB).

The dry swab method is a modification of the RT-PCR test by cutting down a few steps. For RT-PCR, nasal swabs are collected and transported in a tube containing the viral transport medium (VTM) to ensure the stability of the viruses. However, the dry swab method developed by the CCMB research team does not require a VTM. Instead, the swab is collected and sealed in a tube and transported to the laboratory in a dry state. Thus, this method facilitates easy handling of the sample without spillage, avoiding the risk of the spread of infection to the lab personnel. Further, the method also reduces the cost associated with VTM.

About the stability of the viral RNA in the dry swab method, Dr. Rakesh K Mishra, Director, CCMB said, "The dry swab is put in a tube and transported at 40C. The samples that are collected are suitable for testing for up to 3 days. You can even put them at room temperature for 24 hours. Therefore, there is no problem in detecting the viral RNA in this method".

The existing RT-PCR test is sensitive but time-consuming. Extraction of the genetic material (RNA) of the virus is a major bottleneck that slows down the detection process. The dry swab-direct RT-PCR method bypasses the RNA extraction step without compromising accuracy. The viral RNA is separated by a simple process of heating at a high temperature which is followed by a direct RT-PCR. Therefore, the new method is cost-effective with a quick turnaround time and could help ramp up mass-testing in the country.

"RNA extraction, even with automation, takes 4 hours for roughly 500 samples. VTM and RNA extraction both add a significant burden on money and time required for mass testing for coronavirus. We believe the technique's merit holds for all kinds of settings and has the potential of bringing the costs and time of testing by 40-50%", said Dr. Mishra in a press release by the Ministry of Science and Technology.

To study the efficiency of this method, the team analysed the cycle threshold (Ct) values, which is the number of cycles required to detect the viral RNA in the sample. They found that the Ct values for the dry swab method were at par with that of the RT-PCR test.

The diagnostic tests for the novel coronavirus detection are always associated with a certain degree of false-negatives, which occurs when the test fails to detect an existing COVID-19 infection in the patient's body. According to recent reports, even the gold standard RT-PCR test delivers false-negative results at a rate of 2% to 29%.

Speaking about false-negatives, Dr. Mishra said, "The problem of false-negative results is always inherent to any test and it happens when the virus titre is less. However, we found

that the average Ct values for the dry swab direct RT-PCR method were comparable to that of the currently employed RT-PCR test, thus matching its efficacy” added Dr. Mishra.

The team consisted of Uday Kiran, C. G. Gokulan, Santosh Kumar Kuncha, DhiviyaVedagiri, KarthikBharadwajTallapaka, Rakesh K Mishra, and Krishnan HarinivasHarshan from CCMB and Academy of Scientific and Innovative Research.

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