OPEN ACCESS Freely available online

ISSN: 2319-5584
Global Journal of Biology, Agriculture & Health Sciences

Perspective

Coronavirus SARS-CoV-2 and Electrochemical Biosensor Detection

Yu Jie Gao*

Department of Biomedical Engineering, Ramkhamhaeng University, Ramkhamhaeng, Hua Mak, Bang Kapi, Thailand

ABOUT THE STUDY

The rapid spread of severe acute respiratory syndrome coronavirus 2 is the root cause of the global outbreak of Coronavirus Disease (COVID-19) (SARS-CoV-2). SARS-CoV-2 has been identified as a beta coronavirus with strong nucleotide sequence similarity to two coronaviruses from bats that are similar to the Severe Acute Respiratory Syndrome (SARS) and moderate similarity to the Middle East Respiratory Sisease Coronavirus (MERS) CoV. The virus genome is a single positive stranded RNA that is about 30,000 bases long. It encodes 10 genes, including the replicase complex (orf1ab), Spike (S), Envelope (E), Membrane (M), and Nucleocapsid (N) structural proteins, as well as the 3 untranslated region, 5 untranslated region, and several unidentified non-structural open reading frames.

The virus can be disseminated through droplet, contact, aerosol, fomite, fecal-oral, and blood-borne routes, all of which hasten its spread. A person with SARS-CoV-2 infection may either not exhibit any symptoms or exhibit generalised clinical signs including fever, coughing, or shortness of breath. An infected person is extremely contagious and can spread the virus to a non-infected person even during the incubation period. Therefore, quick diagnostic SARS-CoV-2 testing on a broad scale is essential for virus detection, surveillance, and prompt epidemic control.

COVID-19 diagnostic tests come in two flavours: viral nucleic acid and serological assays. Serological testing determines whether an individual has antibodies created as a result of virus exposure or whether antigenic proteins have been found in those who have been infected. Lateral flow immunoassays and Enzyme-Linked Immunosorbent Assays (ELISA) are examples of serological tests. However, the World Health Organization (WHO) does not advise using these assays to identify an active COVID-19 infection because they have been proven to provide false-positive and false-negative results.

Therefore, viral nucleic acid testing should be used for the precise diagnosis of an active COVID-19 infection. Quantitative Reverse Transcription PCR (qRT-PCR) is currently the gold standard for determining whether or not a person has SARS-CoV2 infection. The Xpert Xpress SARS-CoV-2 test, CDC 2019-Novel Corona- virus Real-Time RT-PCR Diagnostic Panel, ExProbeTM SARS-CoV-2 Testing Kit, Abbott RealTime SARS-CoV-2 RT-PCR Kit, PerkinElmer® New Coronavirus Nucleic Acid Detection Kit, and TaqPath COVID-19 Combo Kit are a few examples of commercially available qRT-PCR test kits. These techniques do have drawbacks, though, as they take time and necessitate a specialised laboratory setting with pricey equipment and qualified workers.

Many isothermal nucleic acid amplification assays, including Recombinase Polymerase Amplification (RPA), loop-mediated isothermal amplification, DNA nanoscaffold-based hybrid chain reaction, and Nucleic Acid Sequence-Based Amplification (NASBA), have been created to get around these limitations. These assays do away with the need for complex thermal cycling equipment necessary for qRT-PCR. Testing for nucleic acids has also frequently utilised Rolling Circle Amplification (RCA), an isothermal amplification technique. In the RCA assay, DNA or RNA primers are amplified after being annealed to a circular DNA template by DNA or RNA polymerases. The circular template's complementary sequences are repeated numerous times in the RCA amplicon, which is a concatemer.

The RCA's high amplification capacity and the electrochemical detection method's sensitivity allowed for the detection of the viral N and S genes in both clinical samples and synthesised linear targets. The entire test, from RNA extraction to the detection phase, was finished in less than 2 hours without the need for a heat cycler. The assay's performance with clinical samples was on par with that of RT-qPCR, the current gold standard for detecting SARS-CoV-2, and it produced zero false positive results. This method might be very effective in areas where early detection is necessary to curtail SARS-CoV-2 epidemics.

Correspondence to: Yu Jie Gao, Department of Biomedical Engineering, Ramkhamhaeng University, Ramkhamhaeng, Hua Mak, Bang Kapi, Thailand, E-mail: gaojie@protonmail.com

Received: 01-Jul- 2022, Manuscript No. GJBAHS-22-17532; **Editor assigned:** 04-Jul-2022, PreQC No. GJBAHS-22-17532(PQ); **Reviewed:** 18-Jul-2022, QC No GJBAHS-22-17532; **Revised:** 25-Jul-2022, Manuscript No. GJBAHS-22-17532(R); **Published:** 01-Aug-2022. DOI: 10.35248/2319-5584.22.11.140

Citation: Gao YJ (2022) Coronavirus SARS-CoV-2 and Electrochemical Biosensor Detection. Glob J Agric Health Sci. 11:140.