IUPAC I CCCE 2021
August 13-20, 2021
Solving Global Challenges with Chemistry
Endorsed by: INTERNATIONAL UNION OF PURE AND APPLIED CHEMISTRY

Permalink

(Society/Health) - Chemistry in the Fight against the COVID-19 Pandemic

Development of a saliva-based lateral flow COVID-19 screening test for nonintrusive, rapid results

Tue, August 17
Virtual Meeting Room 119
Symposium Discussion Time (Live)

Part of:
(Society/Health) - Chemistry in the Fight against the COVID-19 Pandemic (Tuesday AM)

Info

Affiliation:
Academia - Faculty / Staff

Symposium:
(Society/Health) - Chemistry in the Fight against the COVID-19 Pandemic

Abstract:
The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused a global pandemic, which has led to over two million deaths worldwide[1]. Our research focuses on diagnostic testing for this virus, which has become increasingly more important due to the broad range of clinical manifestations and prevalence of asymptomatic cases[2,3]. In addition to the standard RT-PCR diagnostic test, there is a need for accurate and accessible tests that offer rapid results at home or in point-of-care settings[4]. In this study, a lateral flow assay was developed for the rapid screening of SARS-CoV-2 using saliva as the sample of interest. The colorimetric detection was carried out using gold nanoparticles (AuNP). S1 and S2 are specific protein sub-units on the surface of the virus. The AuNP were modified using passive absorption with anti-S1 antibodies. A nitrocellulose strip was used with immobilized anti-S2 antibodies forming a test line. Similarly, anti-IgM antibodies were immobilized to form a negative control line. Factors such as antibody concentration, running buffer components, blocking agent and saliva dilution factors were studied and optimized to maximize specific binding to the test line and minimize nonspecific binding to the control line and nitrocellulose strip. Positive assay results are indicated by the coloration of the test line on the nitrocellulose. Results consistently appear in under 15 minutes and preliminary results indicate that there is a limit of detection of 0.625 ng/mL with the antigen suspended in PBS. Research continues to determine the limit of detection with real saliva samples. ImageJ was used to quantify and

analyze visual results. Next steps include testing the specificity of this assay against other viruses and coronaviruses. This saliva-based lateral flow immunoassay shows promise for the possibility of inexpensive and nonintrusive rapid testing for COVID-19.

1. Dong, E.; Du, H.; Garner, L. COVID-19 Map https://coronavirus.jhu.edu/map.html (accessed Mar 10, 2021).
2. Baj, J.; Karakuła-Juchnowicz, H.; Teresiński, G.; Buszewicz, G.; Ciesielka, M.; Sitarz, E.; Forma, A.; Karakuła, K.; Flieger, W.; Portincasa, P.; Maciejewski, R. COVID-19: Specific and Non-Specific Clinical Manifestations and Symptoms: The Current State of Knowledge. *JCM* **2020**, *9* (6), 1753. https://doi.org/10.3390/jcm9061753.
3. Byambasuren, O.; Cardona, M.; Bell, K.; Clark, J.; McLaws, M.-L.; Glasziou, P. Estimating the Extent of Asymptomatic COVID-19 and Its Potential for Community Transmission: Systematic Review and Meta-Analysis. *Journal of the Association of Medical Microbiology and Infectious Disease Canada* **2020**, *5* (4), 223–234. https://doi.org/10.1101/2020.05.10.20097543.
4. Nguyen, T.; Duong Bang, D.; Wolff, A. 2019 Novel Coronavirus Disease (COVID-19): Paving the Road for Rapid Detection and Point-of-Care Diagnostics. *Micromachines* **2020**, *11* (3), 306. https://doi.org/10.3390/mi11030306.

Authors

Pearl Thompson
University of Victoria

Ana Lívia Bovolato
University of Victoria

Gisela Ibáñez-Redín
University of São Paulo

Alexandre Guimaraes Brolo
University of Victoria, Department of Chemistry