CoronaSys Innovation sheet 18

SARS-CoV-2 RapidPlex

Background

Upscaling testing capacities is one of the major challenges with regard to the pandemic[1]. Overburdened laboratories and health care facilities are still a reality in many parts of the world. Researchers from the California Institute of Technology[2] and the Lundquist Institute for Biomedical Innovation[3] have developed a testing device that they claim can be used by laymen at home, therefore eliminating the need to visit a health facility to get tested and providing several further advantages.

Features

The SARS-CoV-2 Rapidplex is a portable, wireless electrochemical platform that can identify a patient´s past and present infection status by using blood or saliva samples[4]. The sensors contain a graphene surface with tiny pores. Due to this large surface area, the sensor is sensitive enough to detect substances that are only present in very small amounts with high accuracy[5]. It detects viral antigen nucleocapsid protein, IgM, and IgG antibodies, as well as C-reactive protein (CRP). The sensor also contains antibodies and proteins that enable it to detect the virus itself. It can track the infection progression by diagnosing the stage of the disease, allowing for the clear identification of individuals who are infectious, vulnerable, or immune according to the developers[6]. The test takes less than 10 minutes.

State of information: 10/13/2020

Publication: October 2020

Country: USA

Focus area: Testing

Developers:

- California Institute of Technology
- Lundquist Institute for Biomedical Innovation (USA)

Beneficiaries: General public, clinicians

Potentials

Since the platform detects IgM and IgG antibodies and CRP it can not only diagnose the disease but also help to determine how serious the infection might become and how contagious a person is. The parts of the platform are easily available so that the device can be mass-produced at low costs[7]. Since it can be done at home, it can help to treat patients remotely by monitoring them via telemedicine devices.

Points to consider

It remains to be seen if the platform can live up to those high expectations and how it compares to pre-existing tests in broad use. With the pilot study now completed, it is now planned to test how long the sensor lasts and to test its efficacy in Covid- 19 patients. More research is also needed to determine sensitivity and specificity in real-life conditions. After this the device will need to receive regulatory approval so it might still take some time before it is available[8].

Conclusion

The platform might help scale up testing capacities and determine infection status after it´s effectiveness has been proven and it has completed the approval process required.

[1] Statista.com. "COVID-19 Testing Rate by Country." Statista, October 13, 2020. https://www.statista.com/statistics/1104645/covid19-testing-rate-select-countries-worldwide/.

[2] California Institute of Technology. California Institute of Technology. Accessed October 13, 2020. https://www.caltech.edu/.

[3] The Lundquist Institute. "Home | The Lundquist Institute." lundquist.org. Accessed October 13, 2020. https://lundquist.org/.

[4] Torrente-Rodríguez, Rebeca M., Heather Lukas, Jiaobing Tu, Jihong Min, Yiran Yang, Changhao Xu, Harry B. Rossiter, and Wei Gao. "SARS-CoV-2 RapidPlex: A Graphene-Based Multiplexed Telemedicine Platform for Rapid and Low-Cost COVID-19 Diagnosis and Monitoring." Matter, October 2020, S2590238520305531. https://doi.org/10.1016/j.matt.2020.09.027.

[5] California Institute of Technology. "SARS-CoV-2 RapidPlex: New Sensor Rapidly Detects COVID-19 Infection." SciTechDaily (blog), October 4, 2020. https://scitechdaily.com/sars-cov-2-rapidplex-new-sensor-rapidly-detects-covid-19-infection/.

[6] Torrente-Rodríguez, Rebeca M., Heather Lukas, Jiaobing Tu, Jihong Min, Yiran Yang, Changhao Xu, Harry B. Rossiter, and Wei Gao. "SARS-CoV-2 RapidPlex: A Graphene-Based Multiplexed Telemedicine Platform for Rapid and Low-Cost COVID-19 Diagnosis and Monitoring." Matter, October 5, 2020. https://doi.org/10.1016/j.matt.2020.09.027.

[7] Torrente-Rodríguez, Rebeca M., Heather Lukas, Jiaobing Tu, Jihong Min, Yiran Yang, Changhao Xu, Harry B. Rossiter, and Wei Gao. "SARS-CoV-2 RapidPlex: A Graphene-Based Multiplexed Telemedicine Platform for Rapid and Low-Cost COVID-19 Diagnosis and Monitoring." Matter, October 2020, S2590238520305531. https://doi.org/10.1016/j.matt.2020.09.027.

[8] California Institute of Technology. "SARS-CoV-2 RapidPlex: New Sensor Rapidly Detects COVID-19 Infection." SciTechDaily (blog), October 4, 2020. https://scitechdaily.com/sars-cov-2-rapidplex-new-sensor-rapidly-detects-covid-19-infection/.

Background on Innovation Sheet Series

As part of a real-time evaluation of the SARS CoV 2 pandemic (with focus on epidemiological, medical, economical, societal, technical, and cultural developments in Germany and Armenia) the CoronaSys research team, under the leadership of Prof. Dr. Martin Voss, is conducting a continuous monitoring of developments and medical, technical, and social innovations concerning Covid-19.

Multiple national and international media outlets, research platforms, and scientific and organizational guidelines, briefs, and updates are screened to feed into this outlet. The rationale behind this is to support the projects' network partners in Armenia and Germany with short summaries of key developments and promising innovations that are shaping the global, German, and Armenian outbreak response and recovery.

The aim of these short briefs is to give condensed and structured information on selected innovations emerging out of the conducted horizon scanning. This could be mainstream big-ticket items or fringe subjects that are easily overlooked in the global flood of information. Some innovations will be followed through their evolution in time while others may only appear once. While subjectively selected, the briefs are descriptive in nature and leave analysis and critical interpretation to the reader. Network partners in both countries are invited to provide feedback on their interest areas and suggest particularly relevant topics for the CoronaSys Workshop series.

The CoronaSys Innovation Sheet Series is published by the Academy of the Disaster Research Unit, which is, as a non-profit limited liability company, a spin-off of the Disaster Research Unit at the Free University of Berlin. The series is part of the research project "CoronaSys: Addressing the corona pandemic in Armenia through systemic risk management", sponsored by the German Federal Ministry of Education and Research.

If you have any questions, suggestions, or if you wish to be taken on (or off) the project mailing list for CoronaSys updates, innovation sheets, and workshop invitations, please send a message to Janina Schäfer (schaefer@a-kfs.de). For general project inquiries, you may contact the team lead Sara Merkes (merkes@a-kfs.de) or the project lead Martin Voss (voss@a-kfs.de).

Previous CoronaSys Innovation Sheets

1 “New” Antiviral Face Masks
2 ” Dyphox” Surface Coating
3 MOVES SLC Portable ICU
4 Portable TRI- KLEEN 500UV
5 Convalescent Plasma Therapy
6 ASIC- App
7 BinaxNOW Antigen Test
8 Corona Traffic Light
9 Aproof at Home Antibody Test
10 IVAT Hygiene Tower
11 LY-CoV555 Antibody Treatment
12 4C Mortality Score
13 Regional Corona Prediction Model
14 Computer-designed Mini- Proteins
15 Covid-19 Simulator
16 Trimodulin
17 BNT162b2-Vaccine

All previous CoronaSys Innovation Sheets are available online:
http://coronasys.a-kfs.de/category/innovation-stream/

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