

Analytical tools for the multiplex rapid detection of SARS-CoV-2

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There is a high demand for analytical tools that can readily be applied to effectively diagnose the Covid-19 but also to carry out screening and surveillance detection with enough frequency to get the transmission rates under control and thus help to timely tackling the disease. On the one hand, high throughput analytical benchtop approaches are still highly demanding for accelerating diagnostics. Such platforms are required to show multiplexed capabilities while in turn reducing the turnaround times of currently applied techniques such as the RT-PCR gold standard. On the other hand, massive screening and surveillance protocols still require for effective tools at the point of need that could reliably detect the virus in individuals after being exposed or the likelihood of being immunized after suffering from the disease.

The rapid detection of coronavirus biomarkers, including RNA as well as spike and nucleocapsid proteins in nasopharyngeal and oropharyngeal samples, together with host biomarkers such as immunoglobulins and cytokines in serum has been addressed in this work. We aim to produce tools that provided with a global response to the diagnosis, prognosis and follow-up of the disease (Figure 1). All the biocomponents and corresponding bioassay protocols required for measuring these biomarkers have been tailored made and implemented in three different platforms. A calorimetric device based on a lateral flow assay format [1, 2] and a multiplex electrochemical platform comprising an electrochemical transducer array and a paper microfluidic component [3] have been adapted to produce tools to be used at the point of care. Likewise, a fluorescence microarray platform has been set up with the potential for high-throughput screening by recording molecular signatures thanks to the its multiplexing and miniaturization capabilities.

REFERENCES

[1] E. Polo et al. PCT, ES2013/070549

[2] E. Polo et al. Chem. Commun., 49 (2013) 3676

[3] C. Fernández-Sánchez et al. Application no. EP20382721.7

FIGURES

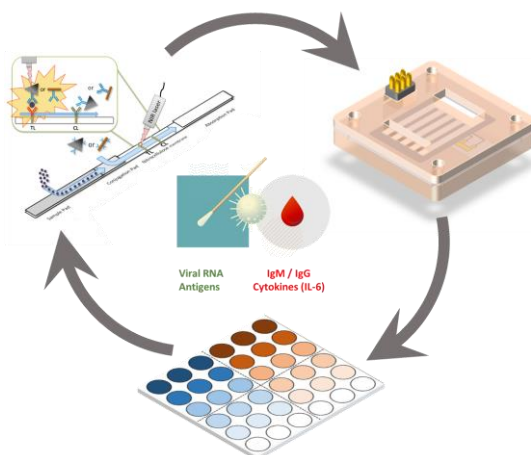


Figure 1: Scheme of the three developed analytical platforms applied to the detection of different SARS-CoV-2 related biomarkers