AuNP-based lateral flow assay for detection of SARS-CoV-2 nucleoprotein: implicit design challenges in a new pandemic

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ABSTRACT

2020 was marked by a SARS-CoV-2 outbreak that has claimed more than 2 million lives around the world [1], pushed healthcare systems to their limits, shaken the economy at all levels and greatly affected people's daily life. Roughly one year after the appearance of the first case of COVID-19, although there are vaccines available, the eradication of the pandemic is an enduring challenge due to the extremely rapid infectivity and the emergence of new strains of the virus. Therefore, there is the need of diagnostic devices dedicated to each situation: general screening, herd immunity, strain identification, etc.
Lateral flow assays make ideal point-of-care testing platforms due to their simplicity, low cost and user friendliness [2]. Moreover, paper can be easily functionalized with different kind of bioreceptors (e.g., antibodies, DNA, etc.). Herein, we present a AuNP-based lateral flow device for the detection of SARS-CoV-2 nucleoprotein, from the screening of antibodies to the preliminary testing of the device [3].
In the scenario of a new pandemic, the initial lack of bioreceptors for the development of diagnostic platforms creates the conditions for a race towards the launch of the first commercially available products. Therefore, the performance of these new bioreceptors is unbeknownst to researchers during the first stages of the pandemic. Here we will show and discuss the standardization procedures and previous validation of receptor as guidelines to be used for urgent design and application of LFA. ELISA tests were carried out to determine the most efficient set of antibodies for its later transfer to a paper-based format. However, changing the environment on which antibodies work doesn't always translate well, thus we take the opportunity to raise this issue in the context of a congress devoted to biosensors for pandemics.

REFERENCES

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