

SARS-CoV-2 detection using isothermal amplification in genetic point-of-care

The SARS-CoV-2 outbreak has required a strong effort in many areas, including the development of molecular point-of-care tests (POCTs) for rapid diagnosis. The method considered as the gold standard for detecting COVID-19 is reverse transcription-polymerase chain reaction (RT-PCR), especially at early stage of infection. However, this method as well as other methods currently in use, such as gene sequencing, are mainly suitable for centralized facilities, where skilled personnel take care of samples until the analysis readout, resulting in a costly and time-consuming process, with a possible delay in diagnosis. In this context, rapid and sensitive POCTs are urgently needed. This need pushed and still pushes the release of several POCTs on the market. POCTs can be divided in three main categories: nucleic acid tests, immunoassays and novel biosensors, each with peculiar advantages. In this work, we present the development of a microfluidic test device for the detection of SARS-CoV-2. The test comprises virus isolation from clinical specimens, genomic RNA purification and amplification by a loop-mediated isothermal amplification (RT-LAMP). This work benefits from the collaboration between Politecnico di Torino, Consiglio Nazionale delle Ricerche and Fondazione Bruno Kessler, which allows innovative and interdisciplinary approaches involving microfluidics, nanomaterials and smart biointerfaces. This research activity was partially funded by the National grant VIRAD-C19 (Rilevazione Virale RApiDa del COVID-19) FISR 2020 COVID (FISR2020IP_00044).