SARS-CoV-2 detection in clinical samples: Comparative analysis of different RNA extraction methods

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the etiologic agent of the COVID-19 pandemic. Although other diagnostic methods have been introduced, detection of viral genes on oro- and nasopharyngeal swabs by reverse-transcription real time-PCR (rRT-PCR) assays is still the gold standard. Efficient viral RNA extraction is a prerequisite for downstream performance of rRT-PCR assays. Currently, several automatic methods that include RNA extraction are available. However, due to the growing demand, a shortage in kit supplies could be experienced in several labs. For these reasons, the use of different commercial or in-house protocols for RNA extraction may increase the possibility to analyze high number of samples. Herein, we compared the efficiency of RNA extraction of three different commercial kits and an in-house extraction protocol using synthetic ssRNA standards of SARS-CoV-2 as well as in oro-nasopharyngeal swabs from six COVID-19-positive patients. It was concluded that tested commercial kits can be used with some modifications for the detection of the SARS-CoV-2 genome by rRT-PCR approaches, although with some differences in RNA yields. Conversely, EXTRAzol reagent was the less efficient due to the phase separation principle at the basis of RNA extraction. Overall, this study offers alternative suitable methods to manually extract RNA that can be taken into account for SARS-CoV-2 detection.

Keywords: RNA extraction; SARS-CoV-2; rRT-PCR; Oro- nasopharyngeal swabs

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