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COVID-19 Carrier or Pneumonia: Positive Real-Time Reverse-Transcriptase Polymerase Chain Reaction but Negative or Positive Chest CT Results

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Dear Editor,

We have read the articles published in the *Korean Journal of Radiology* with great interest concerning the real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) amplification of the viral deoxyribonucleic acid (DNA) and chest computed tomography (CT) results for screening or detection of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection (1, 2). We would like to share our opinions on the diagnosis of coronavirus disease 2019 (COVID-19) or pneumonia that physicians should apply in clinical practice. We think that patients with positive rRT-PCR and negative chest CT results are virus carriers.

Currently, rRT-PCR amplification of the viral DNA is considered as the gold standard test to screen or diagnose patients with suspected COVID-19. However, rRT-PCR is not always initially positive in patients with COVID-19 (3). Chest CT plays an essential role in detecting lesions in patients with suspected COVID-19 pneumonia. However, abnormalities cannot always be observed on CT while rRT-PCR is positive (4, 5). Therefore, chest CT and rRT-PCR results should mutually confirm the precise diagnosis in patients with suspected COVID-19 to make clinical decisions beyond radiological features.

Based on the aforementioned situation, patients with positive rRT-PCR but negative chest CT results should be classified as SARS-CoV-2 carriers. They may transmit the infection to healthy individuals. Therefore, they should be isolated but not necessarily treated. However, patients with positive rRT-PCR and chest CT results are diagnosed with COVID-19 pneumonia. Consequently, these patients should be both isolated and treated to avoid infecting medical workers or their family members.

In conclusion, the SARS-CoV-2 infection is screened and diagnosed by detection of rRT-PCR amplification of the viral DNA. It shall apply to SARS-CoV-2 carriers with positive rRT-PCR but negative chest CT results. However, COVID-19 pneumonia is confirmed by positive rRT-PCR amplification of the viral DNA and positive chest CT results.

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Letter to the Editor

Response

Reply: COVID-19 Carrier or Pneumonia: Positive Real-Time Reverse-Transcriptase Polymerase Chain Reaction but Negative or Positive Chest CT Results

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To the Editor,

Thank you for your comments on our online article focusing on the false-negative results of real-time reverse-transcriptase polymerase chain reaction (rRT-PCR) and the possible complementary approaches for screening coronavirus disease 2019 (COVID-19). With the rapid and extensive spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), patients with positive rRT-PCR but negative chest CT results emerged. Considering the infectivity, they underwent medical isolation to prevent cross-infection of SARS-CoV-2. Simultaneously, we paid attention to patients who presented with no symptoms, such as fever, cough, or fatigue. In our opinion, patients with positive rRT-PCR results but an asymptomatic presentation should be considered as hidden carriers. Some of them could develop mild symptoms (hidden carriers in the incubation period) or present with no symptoms at all (true hidden carriers) during the quarantine period, and the true carriers are extremely dangerous because of the completely unknown existing infectivity (1, 2). Moreover, we think that hidden carriers should also be treated with anti-viral medicine to eliminate the virus in patients.

Of note, we previously reported the drawbacks of rRT-PCR in terms of false-negative results and suggested an effective complementary approach based on chest abnormalities using the deep learning (DL) technique tandem CT examination (3). Obviously, increasingly emerging asymptomatic hidden carriers, particularly the true hidden carriers, posed greater challenges for the containment of the COVID-19 pandemic (4, 5). By analyzing the current studies on asymptomatic cases, some subclinical chest abnormalities were reported, including ground-glass lung opacities and even consolidation (2, 6, 7), which could further serve as a potential indicator to screen SARS-CoV-2 hidden carriers. Given that the DL-based diagnostic system for detecting ground-glass opacities has been developed and deployed in clinical practice, the DL technique tandem CT examination might play a role in assisting the screening of SARS-CoV-2 hidden carriers. However, several questions need to be answered to support the proposed hypotheses: 1) the potential infectivity of true hidden carriers; 2) if the subclinical chest abnormalities present in true hidden carriers; 3) the value and feasibility of CT examination compared to rRT-PCR in screening hidden carriers from perspectives of patients and social resources; 4) the proportions of hidden carriers and hidden carriers with subclinical chest abnormalities; 5) the composition of subclinical chest abnormalities; 6) the performance of a deployed DL-based AI system in detecting these subclinical chest abnormalities; and 7) distinguishing the mild natural symptomatic presentation and subclinical CT abnormalities.

In summary, asymptomatic hidden carriers are a potential concern for the containment of the COVID-19 pandemic. The rRT-PCR test is currently the preferred approach for screening hidden carriers. Considering the rare understanding of asymptomatic hidden carriers and potential false-negative results in rRT-PCR tests, more studies on hidden carriers and validation on other possible screening approaches are worth exploring.

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