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Response of Clinical Laboratories to the Ongoing COVID-19 Pandemic

Korean Society of Laboratory Medicine (KSLM) and the Korea Disease Control and Prevention Agency effectively responded to the coronavirus disease 2019 (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [1]. Within two months of the first confirmed COVID-19 case in Korea, up to 20,000 diagnostic testing was being performed each day and extensive epidemiological investigations were being conducted [1–3]. However, the number of confirmed COVID-19 cases in December 2020 exceeded 1,000 a day with public fatigue related to anti-COVID-19 restrictions, and the crisis is still ongoing [4]. Although the situation in Korea is better than that in many other countries, group infections with unknown transmission routes are occurring within local communities [4]. Therefore, there is an increasing need for diagnostic testing to identify people infected via unknown routes and to monitor patients.

Different diagnostic methods have different characteristics, and each method has its strengths and weaknesses. Selection of an appropriate method should be based on the characteristics of the pathogen and patients, the intended purpose of testing, and the laboratory resources available in each region. This issue focuses on papers demonstrating the characteristics of various COVID-19 diagnostic methods [5–8]. The study by Lee, *et al.* [5] shows large differences in SARS-CoV-2 antigen testing most likely attributed to different sample group characteristics.

In this study, the antigen testing sensitivity determined from the initial test results of 33,294 cases in Korea diagnosed as COVID-19 by real time RT-PCR is estimated to be 41.8%. This study shows the importance of selecting a proper diagnostic method that is suitable to local conditions. Yun, *et al.* [6] show that 12 different commercial SARS-CoV-2 antibody assays are reliable in detecting seroconversion. Meanwhile, Aoki, *et al.* [7] demonstrate the usefulness of combining antibody testing with molecular testing for COVID-19 in patients 10 days after symptom onset. With vaccines being distributed globally, additional studies on the usefulness of antibody testing will be needed. To evaluate COVID-19 treatment response and prognosis, biomarkers have also been studied. Bivona, *et al.* [8] review the potential clinical usefulness of various biomarkers. Although studies have shown that some biomarkers, such as C-reactive protein, prothrombin time, and D-dimer, are promising for determining severity, the authors note that more prospective studies are needed to evaluate the usefulness of biomarkers in patient management [8].

To date, clinical laboratories in Korea have been able to efficiently respond to the COVID-19 pandemic by establishing and implementing a testing system based on the most accurate molecular diagnostic method available, enabling rapid testing with a peak daily capacity of 34,193 tests by May 2020 [9]. In March 2021, the capacity was expanded up to 230,000 tests per day [10]. The laboratories should continue to have the ability to re-



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spond quickly to any potential surge in the number of cases. Meanwhile, KSLM will continue to provide accurate and rapid diagnostic testing through various efforts and will do its best to successfully respond to the ongoing COVID-19 pandemic.

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REFERENCES

1. Kim I, Kang B, Seo SH, Park YE, Kim GJ, Lee SW, et al. Early laboratory preparedness and response of the Korea Centers for Disease Control and Prevention to unknown pneumonia from Wuhan, China, in January 2020. *Ann Lab Med* 2021;41:532-9.
2. Hong KH, Lee SW, Kim TS, Huh HJ, Lee J, Kim SY, et al. Guidelines for laboratory diagnosis of coronavirus disease 2019 (COVID-19) in Korea. *Ann Lab Med* 2020;40:351-60.
3. Sung H, Roh KH, Hong KH, Seong MW, Ryoo N, Kim HS, et al. COVID-19 molecular testing in Korea: practical essentials and answers from experts based on experiences of emergency use authorization assays. *Ann Lab Med* 2020;40:439-47.
4. Seong H, Hyun HJ, Yun JG, Noh JY, Cheong HJ, Kim WJ, et al. Comparison of the second and third waves of the COVID-19 pandemic in South Korea: importance of early public health intervention. *Int J Infect Dis* 2021;104:742-5.
5. Lee J, Kim SY, Huh HJ, Kim N, Sung H, Lee H, et al. Clinical performance of the Standard Q COVID-19 rapid antigen test and simulation of its real-world application in Korea. *Ann Lab Med* 2021;41:588-92.
6. Yun S, Ryu JH, Jang JH, Bae H, Yoo S, Choi A, et al. Comparison of SARS-CoV-2 antibody responses and seroconversion in COVID-19 patients using twelve commercial immunoassays. *Ann Lab Med* 2021;41:577-87.
7. Aoki K, Takai K, Nagasawa T, Kashiwagi K, Mori N, Matsubayashi K, et al. Combination of a SARS-CoV-2 IgG assay and RT-PCR for improved COVID-19 diagnosis. *Ann Lab Med* 2021;41:568-76.
8. Bivona G, Agnello L, Ciaccio M. Biomarkers for prognosis and response to treatment in COVID-19 patients. *Ann Lab Med* 2021;41:540-8.
9. Huh HJ, Hong KH, Kim TS, Song SH, Roh KH, Lee H, et al. Surveillance of coronavirus disease 2019 (COVID-19) testing in clinical laboratories in Korea. *Ann Lab Med* 2021;41:225-9.
10. Building quarantine and medical capabilities capable of responding to the occurrence of 2,000 patients a day http://ncov.mohw.go.kr/tcmBoard-View.do?brdId=&brdGubun=&dataGubun=&ncvContSeq=363968&contSeq=363968&board_id=&gubun=ALL (Updated on March 7, 2021).

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