

## LETTER TO THE EDITOR

# Detection of SARS-CoV-2 by RT-PCR in anal from patients who have recovered from coronavirus disease 2019

To the Editor,

An outbreak of coronavirus disease 2019 (COVID-19) pneumonia caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), started in Wuhan City, Hubei Province, China. The real-time reverse transcriptase polymerase chain reaction (RT-PCR) method can be used for the detection of SARS-CoV-2 in oral swabs.<sup>1</sup> Now, results have confirmed the presence of the live virus in stool samples from patients with COVID-19.<sup>2</sup> Recently, several reports of RT-PCR in fecal to diagnose COVID-19 have increased.<sup>3-5</sup> Therefore, this is important of the detection of SARS-CoV-2 in oral and anal swabs for the discharge patients. We followed up the discharge patients in Wuxi city, a total of 69 patients who have recovered from COVID-19 were discharged from the hospital as of 15 March 2020.

After hospital discharge, the patients were instructed to continuously follow the quarantine protocol at a centralized isolated area for at least 14 days, and RT-PCR tests were repeated in nasopharyngeal and anal swabs at the certain days, following a previously described method. The RT-PCR test kits (BioGerm) were recommended by the Chinese Center for Disease Control and Prevention. Similar brand of test kit was used for all RT-PCR tests reported, and RT-PCR tests were performed by a single laboratory technician. Both internal controls and negative controls were routinely performed with each batch of tests. Patients' demographic information, epidemiological history, laboratory findings, and radiological features were collected based on epidemiological investigation reports and electronic medical records.

In the follow-up after discharge, a total of four patients were tested positive for SARS-CoV-2 infection 4 to 12 days after their recovery from COVID-19 (Ct values shown in Table 1). Among these four patients, three had positive RT-PCR test results in nasopharyngeal swabs, and the positive results on the respiratory tract were observed before the digestive tract. We also found that an 8-year-old boy was virus positive in anal swab for at least an additional 9 days.

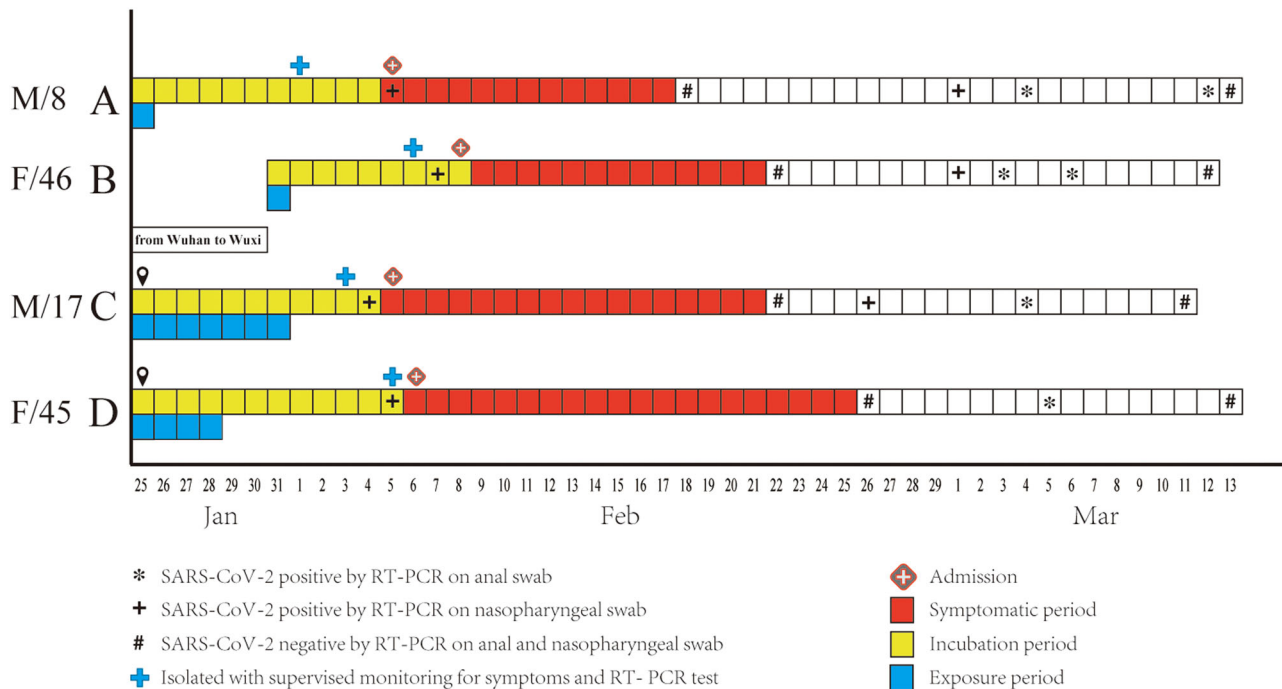
All of the four patients were diagnosed with COVID-19 through epidemiological investigation. Two of the four patients were male, and the age range of the patients was 8 to 46 years (Figure 1). The four patients all presented with fever, cough, or both as their initial symptoms, and computed tomography (CT) imaging revealed ground-glass opacification or mixed ground-glass opacification and lung consolidation. The spectrum of the COVID-19 in these four patients was from asymptomatic to mild to moderate. Combination medication treatment (recombinant interferon, ritonavir, and abidol) was provided to the four patients. After receiving this treatment, the clinical symptoms of these four patients resolved, and their CT imaging test results were normal. Moreover, these patients had two consecutive negative RT-PCR test results in nasopharyngeal and one negative test in anal swabs. The time from symptom onset to recovery ranged from 13 to 20 days.

Four patients diagnosed with COVID-19 who met the criteria for hospital discharge in China had positive RT-PCR results in anal swab after their recovery. There were studies that showed more

**TABLE 1** Ct values for the RT-PCR results of four patients who recovered from coronavirus disease 2019

Cases	Sex	Age	Discharge date	Result 1				Result 2				Result 3			
				Date	Sample types	ORF1ab	Nucleoprotein gene	Date	Sample types	ORF1ab	Nucleoprotein	Date	Sample types	ORF1ab	Nucleoprotein
Person A	Male	8	19 Feb	1 Mar	nasopharyngeal	40.34	37.96	4 Mar	anal	34.23	31.83	12 Mar	anal	34.39	31.79
Person B	Female	46	23 Feb	1 Mar	nasopharyngeal	34.82	32.34	3 Mar	anal	39.62	35.52	6 Mar	anal	37.52	36.67
Person C	Male	17	23 Feb	26 Feb	nasopharyngeal	37.41	35.36	4 Mar	anal	37.51	35.41	NA			
Person D	Female	45	27 Feb	5 Mar	anal	29.75	28.34	NA				NA			

Abbreviation: RT-PCR, reverse transcriptase polymerase chain reaction.



**FIGURE 1** Epidemiological linkage and timeline of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in Wuxi City, Jiangsu Province, China, from January to March 2020. RT-PCR, reverse transcriptase polymerase chain reaction

positives result in anal swab specimens than oral swab in a later stage of COVID-19 infection, suggesting shedding, and thereby transmitted through oral-fecal route.<sup>5,6</sup> These results implied that fecal samples may contaminate hands, food, and water, and then possible cause infection by invading the mouth, respiratory mucosa, and conjunctiva.<sup>3</sup>

In addition, we found a boy was virus positive in anal swab for at least an additional 9 days were consistent with the report from Zhoushan city.<sup>7</sup> And Zhang et al<sup>8</sup> detected SARS-CoV-2 in feces of three children during recovery period, notwithstanding their remained negative tests in throat/nasopharyngeal swab specimens. Therefore, it is necessary to be aware of the possibility of fecal-oral transmission of SARS-CoV-2 infection, especially for children cases.

In conclusion, the present method for the diagnosis and discharge criteria of viral test in oral/nasopharyngeal swabs is not perfect because live SARS-CoV-2 may exist in fecal while oropharyngeal/nasopharyngeal specimen negative. For the need for health protection, which should be considered for transmission through the fecal samples, these reporters might slow down the rapid spread of COVID-19 worldwide. However, our report was limited to a small number of patients, longitudinal large-scale studies are required to comprehensively understand the prognosis of the disease.

#### CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

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