

Prolonged SARS-CoV-2 shedding in saliva; implications for late-stage diagnosis and infectious duration

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Background: Saliva has been a COVID-19 diagnostic specimen of interest due to its simple collection, scalability, and yield. Yet COVID-19 testing and estimates of infectious period remains largely based on nasopharyngeal and nasal swabs. We sought to evaluate whether saliva captured prolonged shedding and potential infectiousness later in the disease course, compared to nasal swabs.

Methods: We conducted an observational cohort study of patients with moderate to severe COVID-19 at University Hospital in Newark, NJ. Paired saliva and nasal samples from 96 patients were analyzed, including longitudinal analysis of 79 paired observations from 28 patients. Using samples from a separate study, we performed saliva cultures from 29 patients with COVID-19 at least 7 days after symptom onset to evaluate persistent shedding of propagating virus.

Results: Saliva detected significantly more cases of SARS-CoV-2 beyond 5 days (n = 115, 86.1% saliva vs 48.7% nasal, p-value < 0.001), beyond 9 days (n = 63, 79.4% saliva vs 36.5% nasal, p-value < 0.001) and beyond 14 days of symptoms (n = 28, 71.4% saliva vs 32.1% nasal, p-value = 0.003). Additionally, saliva had lower Cts across all time periods. In the longitudinal analysis, a log-rank test indicates that the saliva remained positive longer than nasal swabs (p=0.0007) with a median survival time for saliva of 18 days and 13 days for nasal swabs. Viral culture of saliva beyond a week of symptoms identified cytopathic effects indicative of potential infectiousness associated with prolonged viral shedding.

Conclusions: Findings from this study suggest that SARS-CoV-2 RNA shedding persists longer and in higher abundance in saliva than in nasal swabs with potential of propagating virus particularly when Ct <30. Therefore, PCR testing of saliva may be useful in detecting potentially transmissible virus in late COVID-19.