

Letter to the Editor

The tell-tale oral fluid: salivary diagnostics take a turn

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Dear Editor,

Salivary diagnostics has taken a major leap in infectious disease diagnosis with the SARS-CoV-2 pandemic. The U.S. Food and Drug Administration (FDA) authorised the Rutgers University Clinical Genomics Laboratory and the Curative-Korva SARS-CoV-2 Assay (the Curative-Korva test) for diagnosis of SARS-CoV-2 in saliva samples [1,2]. Since then, the Covid-19 diagnosis has become easier and more accessible.

Saliva has been the major vector in the spread of COVID-19. SARS-CoV-2 is excreted in the oral cavity and spreads via aerosols. The droplets origin from nasopharyngeal or oropharyngeal, which is associated with saliva. While, larger droplets contribute to viral transmission to subjects nearby, the long-distance transmission is possible with smaller droplets infected with air-suspended viral particles [3].

The collection of saliva is a non-invasive, safe, quick process and eliminates the fear of inadequate sampling. In large-scale testing, sample collection methods that are technique sensitive, requiring trained professionals and increased protection measures (like personal protective equipment) are challenging and hard on available resources. Such a scenario demands the use of more efficient and convenient methods. Furthermore, the ease of self-administration facilitates at home sample collection eliminating the need to travel to a collection centre, reducing the risk of exposure to the individual as well as the healthcare personnel.

While the Food and Drug Administration (FDA) has approved the at home saliva collection kits, these samples still need laboratory processing that uses RT-PCR (Reverse Transcriptase Polymerase Chain Reaction) technology for SARS-Cov2 detection [1,2]. Going one step ahead, SkillCell

(subsidiary of Alcen Industry) and Sys2Diag/CNRS, French laboratory have come up with Rapid point of care SARS-Cov 2 salivary diagnostic kit, EasyCoV [4]. SARS-Cov-2 detection by EasyCoV is based on real time fluorescent and colorimetric reading of RT-LAMP (Reverse Transcription Loop mediated Isothermal Amplification). Rapid salivary molecular tests like EasyCoV (SkillCell, ©Alcen) eliminate the need for laboratory processing and provide the results within 1 hour [5]. This technology eliminates the uncertainties involved in storage and transportation.

ACE2 receptor of COVID 19 and role of oral medicine specialist

ACE2 is an important receptor for COVID-19. As illustrated in a study, SARS-CoV-2 infected salivary gland epithelial cells show high expression of ACE2 [6,7].

Xu *et al.* analyzed the expression of ACE2 in human organs. They found that the expression of ACE2 in minor salivary glands was higher than that in lungs, which suggests salivary glands could be potential target for COVID-19. In addition, SARS-CoV RNA can be detected in saliva before lung lesions appear. The positive rate of COVID-19 in patients' saliva can reach 91.7%, and saliva samples can also cultivate the live virus. This suggests that COVID-19 transmitted by asymptomatic infection may originate from infected saliva [8].

Hao *et al.* investigated the potential route of 2019-nCov infection on the mucosa of oral cavity. The results demonstrated that the ACE2 expressed on the mucosa of oral cavity.

Therefore, these findings have explained the basic mechanism that the oral cavity is a potentially high risk for 2019-nCoV infectious susceptibility. It provided a piece of evidence that oral medicine specialist play a pivotal role in

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the diagnosis of COVID 19 and also they may be the first ones to diagnose and get infected in aerosol generating procedure [9].

Embracing the technological advancements for use of salivary diagnostics in oral and systemic conditions

For decades, Saliva as a diagnostic fluid has been debated on with a number of research papers discussing its diagnostic value in various oral and systemic conditions. A myriad of biomarkers in saliva ranging from cellular, molecular, biochemical and microbial have been characterised for conditions ranging from autoimmune, cancer, infectious, autoimmune diseases (Sjogren's syndrome, cystic fibrosis) metabolic and genetic disorders [10,11]. Currently there are 16 salivary diagnostic tests approved by FDA for infectious conditions and drug metabolism status [7]. However, none of them entered the clinics as an adjunct diagnostic aid in India. Moreover, there are no currently available salivary diagnostic aids for head and neck cancer, diabetes and other metabolic disorders and autoimmune conditions.

The gap lies in the advent of sensitivity and specificity of salivary diagnostic tools. The establishment of defined guidelines and results following rigorous testing may allow salivary diagnostics to be used as chair-side tests for several oral and systemic diseases in the near future.

Conclusion

Considering the accuracy, efficacy, ease of use and cost effectiveness of salivary diagnostic tests, it has demonstrated its applications in medical and dental field. Moreover, salivary-based diagnostic techniques can potentially allow screening of an entire population for a specific disease in a timely fashion. In the future, salivary tests may pave the way for chair-side diagnosis of multiple oral and systemic diseases at the dental

office. However, much research needs to be done to incorporate saliva-based diagnostics to transfer it from the laboratory to the clinical practice.

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