EDITORIAL

Toothbrush, a Potential Source for SARS-CoV-2 RNA Detection

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The detectable presence of SARS-CoV-2 RNA in saliva samples has been well-documented.[1] Saliva is a biological fluid that can be easily sampled and can be used to assay the SARS-CoV-2 RNA in patients with active[2] as well as resolved infection. Despite the usefulness of saliva in SARS-CoV-2 detection, nasopharyngeal swabs remain the gold standard for diagnosis of COVID infection as they are easier to collect and pose less risk for contamination as in the case of saliva expectoration and collection. In this connection, we suggest the use of toothbrushes used by patients to detect and quantify SARS-CoV-2 RNA. It is well known that toothbrushes are contaminated by saliva and secretions from the respiratory tract. It would hence be worthwhile to explore if SARS-CoV-2 RNA can be detected from used toothbrushes.

The major limitation in recovering SARS-CoV-2 RNA from a toothbrush is due to the plethora of PCR inhibitors present in the toothpaste.[3] Thus, although brushing could aggregate the virus within the toothbrush the regular contact with toothpaste containing PCR inhibitors could potentially affect RNA yield. This limitation could be overcome by employing a SARS-CoV-2 RNA preservation technique advocated by Natarajan et al. for stool samples.[4] Similar to toothpaste, even human stool is known to contain inherent PCR inhibitors that could profoundly affect RNA yield. Thus, Natarajan et al. tested three techniques of preserving SARS-CoV-2 RNA in aliquoted human stool samples namely, Zymo DNA/RNA shield kit, OMNIgene-GUT kit, and the conventional technique of storage without the use of preservative. The authors also tested the efficacy of three standardized RNA extraction kits namely the Zymo Quick RNA Viral kit, QIAamp Viral RNA Mini Kit, and the MagMAX Viral/Pathogen Kit along with the above-mentioned preservation techniques to study the best combination of preservation and extraction. Both the ddPCR and RT-qPCR analytical techniques were employed in the study. The results revealed that the Zymo DNA/RNA shield kit along with QIAamp Viral RNA Mini Kit used with the ddPCR and RT-qPCR techniques yielded more significant RNA quantities than the other methods.

Based on the results of Natarajan et al., we propose the use of Zymo DNA/RNA shield kit along with QIAamp Viral RNA Mini Kit used with the ddPCR and RT-qPCR techniques for the preservation and extraction of SARS-CoV-2 RNA from contaminated toothbrushes. It is plausible that the technique similar to in stool samples could overcome the PCR inhibitors of the toothpaste and provide an adequate yield of SARS-CoV-2 RNA for detection and potentially even quantification. If proven, the tooth brush could serve a valuable tool for individual case-based diagnostics, and also aid as a source to study SARS-Cov-2 RNA in population-based studies. In addition, if significant detection of SARS-CoV-2 RNA in toothbrushes is tangible on a short- and long-term basis, then it would be of great application in the field of forensic medicine to identify if the deceased person has suffered COVID infection.

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