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[Nano Converg., Sep 16 2023, 10 \(1\) | https://doi.org/10.1186/s40580-023-00393-3](https://doi.org/10.1186/s40580-023-00393-3)**3D printed fluidic swab for COVID-19 testing with improved diagnostic yield and user comfort****Authors and Affiliations** ^Joochan Kim<sup>1</sup>, Jaehyung Jeon<sup>1</sup>, Hyowon Jang<sup>2</sup>, Youngkwang Moon<sup>1</sup>, Abdurhaman Teyib Abafogi<sup>1</sup>, Danny van Noort<sup>3</sup>, Jinkee Lee<sup>1,4</sup>, Taejoon Kang<sup>2,5\*</sup> and Sungsu Park<sup>1,4\*</sup><sup>1</sup>School of Mechanical Engineering, Sungkyunkwan University (SKKU), Seobu-ro 2066, Jangan-gu, Suwon 16419, Korea<sup>2</sup>Bionanotechnology Research Center, Korea Research Institute of Bioscience and Biotechnology (KRIBB), Gwahak-ro 291, Yuseong-gu, Daejeon 34141, Korea<sup>3</sup>Division of Biophysics and Bioengineering, IFM, Linköping University, Linköping 58183, Sweden<sup>4</sup>Department of Biophysics, Institute of Quantum Biophysics (IQB), Sungkyunkwan University (SKKU), Suwon 16419, Korea<sup>5</sup>School of Pharmacy, Sungkyunkwan University (SKKU), Suwon 16419, Korea

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**Abstract**

The current standard method of diagnosing coronavirus disease 2019 (COVID-19) involves uncomfortable and invasive nasopharyngeal (NP) sampling using cotton swabs (CS), which can be unsuitable for self-testing. Although mid-turbinate sampling is an alternative, it has a lower diagnostic yield than NP sampling. Nasal wash (NW) has a similar diagnostic yield to NP sampling, but is cumbersome to perform. In this study, we introduce a 3D printed fluidic swab (3DPFS) that enables easy NW sampling for COVID-19 testing with improved diagnostic yield. The 3DPFS comprises a swab head, microchannel, and socket that can be connected to a syringe containing 250  $\mu$ L of NW solution. The 3DPFS efficiently collects nasal fluid from the surface of the nasal cavity, resulting in higher sensitivity than CS for the detection of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This was confirmed by both reverse transcription-quantitative polymerase chain reaction (RT-qPCR) and lateral flow assays (LFA) in virus-spiked nasal samples and clinical samples. Additionally, users reported greater comfort when using the 3DPFS compared to CS. These findings suggest that the 3DPFS can improve the performance of COVID-19 testing by facilitating efficient and less painful nasal sample collection.

**논문정보**

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