



Sep 08, 2020

XPRIZE SHINE - Paper-based SARS-CoV-2 Saliva Test

Jon Arizti-Sanz^{1,2}, Catherine A. Freije¹, Chloe K. Boehm¹, Sameed M. Siddiqui^{1,3}, Allen M. Goodman¹, Tinna-Solveig F. Kosoko-Thoroddsen¹, A'Doriann Y. Bradley¹, Jeremy Johnson¹, Pardis C. Sabeti^{1,4,5,6,7}, Cameron Myhrvold^{1,8,7}

¹Broad Institute of Massachusetts Institute of Technology (MIT) and Harvard, Cambridge, MA 02142, USA;

²Harvard-MIT Program in Health Sciences and Technology, 77 Massachusetts Ave., Cambridge, MA 02139, USA.;

³Computational and Systems Biology PhD Program, MIT, Cambridge, MA 02139, USA.;

⁴Harvard T.H. Chan School of Public Health, 677 Huntington Avenue, Boston, MA 02115, USA.;

⁵Department of Organismic and Evolutionary Biology, Harvard University, 26 Oxford Street, Cambridge, MA 02138, USA.;

⁶Howard Hughes Medical Institute, Chevy Chase, MD 20815, USA.;

⁷Massachusetts Consortium on Pathogen Readiness, Boston, MA, USA.;

⁸Department of Organismic and Evolutionary Biology, Harvard University, 26 Oxford Street, Cambridge, MA 02138, USA

1 Works for me dx.doi.org/10.17504/protocols.io.bk2fkybn

C Catherine Freije

ABSTRACT

This protocol describes how to perform a SHINE paper-based assay to detect SARS-CoV-2 RNA from a self-collected saliva sample. This protocol is intended for in-home use. All enzymatic components are provided as a single-test freeze-dried pellet for shelf-stable storage, and all steps of the protocol are performed at ambient temperature. The protocol presented here is an improved version of the method presented in Arizti-Sanz J*, Freije CA*, *et al.* Integrated sample inactivation, amplification, and Cas13-based detection of SARS-CoV-2. *bioRxiv* (2020).

DOI

dx.doi.org/10.17504/protocols.io.bk2fkybn

PROTOCOL CITATION

Jon Arizti-Sanz, Catherine A. Freije, Chloe K. Boehm, Sameed M. Siddiqui, Allen M. Goodman, Tinna-Solveig F. Kosoko-Thoroddsen, A'Doriann Y. Bradley, Jeremy Johnson, Pardis C. Sabeti, Cameron Myhrvold 2020. XPRIZE SHINE - Paper-based SARS-CoV-2 Saliva Test. **protocols.io** <https://dx.doi.org/10.17504/protocols.io.bk2fkybn>

KEYWORDS

CRISPR, SARS-CoV-2, nucleic acid diagnostic

LICENSE

————— This is an open access protocol distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

IMAGE ATTRIBUTION

biorender.com

CREATED

Sep 08, 2020

LAST MODIFIED

Sep 08, 2020

PROTOCOL INTEGER ID

41767

MATERIALS

NAME	CATALOG #	VENDOR
Nalgene® Dropper Bottles with Control Dispensing Tip, 4mL, white	2750-9125	Thermo Fisher
Screw cap tube 5 mL sterile	1188R46	Thomas Scientific
FastAmp® Viral and Cell Solution for Covid-19 Testing Solution B	4633	
Reagent Mix A (Paper-based SARS-CoV-2 resuspension mix)		
Lyophilized Reagent Mix B (Paper-based SARS-CoV-2 detection mix)		
HybriDetect – Universal Lateral Flow Assay Kit	MGHD 1	
Inoculating Loops and Needles Sterile 10 uL	12000-810	VWR International

STEPS MATERIALS

NAME	CATALOG #	VENDOR
FastAmp® Viral and Cell Solution for Covid-19 Testing Solution B	4633	
Screw cap tube 5 mL sterile	1188R46	Thomas Scientific
Lyophilized Reagent Mix B (Paper-based SARS-CoV-2 detection mix)		
Nalgene® Dropper Bottles, 15mL, white	2751-9050	Thermo Fisher
Reagent Mix A (Paper-based SARS-CoV-2 resuspension mix)		
Inoculating Loops and Needles Sterile 10 uL	12000-810	VWR International
HybriDetect – Universal Lateral Flow Assay Kit	MGHD 1	

MATERIALS TEXT

The necessary volume of FastAmp Viral and Cell Solution is provided in the screw cap tube used for sample collection. All enzymatic components, reagents, and compatible buffers required for SARS-CoV-2 detection are included within Lyophilized Reagent Mix B and are reconstituted with Reagent Mix A (see protocol for details). A smartphone or smart device is necessary for automated interpretation of the SARS-CoV-2 detection results using the HandLens application. The required volume of Reagent Mix A is provided in the Nalgene Dropper Bottle.

SAFETY WARNINGS

Please take care with potentially infectious sample material that does not come into contact with the provided viral lysis solution contained within the saliva sample collection tube.

DISCLAIMER:

The protocol and its content is for informational and academic purposes only. It does not constitute legal, medical, clinical, or safety advice, or otherwise. Content added to protocols.io is not peer reviewed and may not have undergone a formal approval of any kind. Information presented in this protocol is not a substitute for independent professional judgment, advice, diagnosis, or treatment. Any action taken or not taken based on the protocol presented here is strictly at your own risk. You agree that none of the authors, contributors, administrators, nor anyone else associated with protocols.io can be held responsible for your use of the information contained in or linked to this protocol.

BEFORE STARTING

Download the HandLens application on the user-provided smart device (smartphone, tablet, etc.). Wash hands prior to starting the protocol.

Sample Collection and Viral Lysis

- 1 Expel approximately one drop of saliva into the sample collection tube and cap the tube.
Saliva collection tube contains necessary volume of FastAmp® Viral and Cell Solution.



**FastAmp® Viral and Cell Solution for
Covid-19 Testing Solution B**
Catalog #: 4633



Screw cap tube 5 mL sterile
by Thomas Scientific
Catalog #: 1188R46

- 2 Mix saliva sample and FastAmp® Viral and Cell Solution by shaking the closed sample collection tube for ⌚ 00:00:10
- 3 Wait ⌚ 00:05:00 incubating sample at 🌡 Room temperature before proceeding to Step 4.

SARS-CoV-2 Detection

- 4 Add the entire volume in the dropper bottle containing Reagent Mix A to the tube containing lyophilized Reagent Mix B. Cap the tube.



Nalgene™ Dropper Bottles, 15mL, white
by Thermo Fisher
Catalog #: 2751-9050



**Reagent Mix A (Paper-based SARS-
CoV-2 resuspension mix)**



**Lyophilized Reagent Mix B (Paper-
based SARS-CoV-2 detection mix)**

- 5 Mix Reagent Mix A and B by shaking for approximately ⌚ 00:00:10 .

- 6 Dip the inoculation loop into the sample collection tube (a small layer of liquid should be contained within the loop).



Inoculating Loops and Needles Sterile

10 uL

by VWR International

Catalog #: 12000-810

- 7 Transfer liquid in inoculation loop to the Reagent Mix A and B tube by dipping the loop into tube and stirring for **00:00:05** . Remove and discard the inoculation loop and cap the tube.

- 8 Mix the sample combined with Reagent Mix A and B by shaking for approximately **00:00:10** .

- 9 Wait **01:30:00** , incubating sample at **Room temperature** , before proceeding to Step 10.

Paper-based Readout and Automated Analysis

- 10 Open the Sample-Reagent Mix A and B tube and place the test strip into the liquid with the arrows on the test strip pointing upward and towards you.



HybriDetect – Universal Lateral Flow

Assay Kit

Catalog #: MGH1 1

- 11 Wait **00:05:00** with sample at **Room temperature** for visible horizontal bands to appear on the test strip.

- 12 With the user-provided smart device such as a smartphone, open the HandLens application and select paper-based as the test type.

- 13 Take a photo of the test strip, and select upload. The result of the test will appear on the smart device screen.