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# The Crick COVID-19 RT-PCR Testing Pipeline

The Crick COVID-19 Consortium<sup>1</sup>

<sup>1</sup>The Francis Crick Institute, Health Services Laboratory (HSL), University College London Hospital

1 Works for me dx.doi.org/10.17504/protocols.io.bfe2jjge

Crick COVID-19 Consortium



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## ABSTRACT

The Crick COVID-19 Consortium commenced on 19 March 2020 in response to the emerging COVID-19 pandemic in a collaboration between University College London Hospitals, Health Services Laboratory (HSL), the Institute of Cancer Research and the Francis Crick Institute.

Over 2 weeks, the consortium has set up a high throughput RT-PCR COVID-19 diagnostics assay in an academic environment. The work is conducted at the Francis Crick Institute as an extension of the accredited laboratories at HSL. The aim has been to minimise dependencies on reagents, in short supply globally, to provide resilience to the pipeline and provide a scale-able platform to screen hundreds to thousands of healthcare workers and patients per day.

The interactive Standard Operating Procedures (SOP) provide in this collection a step-by-step approach to set up a diagnostic pipeline in an academic institute in collaboration with partner laboratories and hospital trusts.

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The members of the Crick COVID-19 Consortium would like to thank Julia Roßmanith, Friedrich-Alexander Universität Erlangen-Nürnberg, for her assistance with the editing of this collection of protocols.

## EXTERNAL LINK

<https://www.crick.ac.uk/research/covid-19/covid19-consortium>

## THIS COLLECTION ACCOMPANIES THE FOLLOWING PUBLICATION

The Crick COVID-19 Consortium (2020) Scalable and Resilient SARS-CoV-2 testing in an Academic Centre. medRxiv. doi: <https://doi.org/10.1101/2020.04.19.20071373>

## ATTACHMENTS

[Article Scalable and Resilient SARS-CoV-2 testing in an Academic Centre.pdf](#)

## GUIDELINES



### COVID-19 testing approach

The COVID-19 testing approach was developed from the outset as a partnership, and all processes have been established in the Crick COVID-19 diagnostic testing pipeline through close coordination with the NHS trust diagnostic laboratory.

The Crick approach is based on five main work-streams, that were developed and tested independently, and are therefore largely standalone. The approach relies on highly trained research staff to support a semi-automated, but not highly integrated, pathway. The advantage is that the approach is agile and can make use of lab-space distributed across a research institution. Such a set-up is highly dependent on shift-work to maximise sample throughput, particularly with respect to sample reception, tracking and viral inactivation.

## The Crick COVID-19 RT-PCR Testing Pipeline workflow

### 1. Sample reception    **Registration of WINPATH recorded samples to internal LIMS**





Sample reception, unpacking and barcoding  
by Jerome Nicod,  
The Francis Crick Institute

PREVIEW

RUN

### 2. Viral inactivation    **Swab inactivation using 5 M Guanidinium thiocyanate**





Viral inactivation of clinical samples  
by Jerome Nicod,  
The Francis Crick Institute

PREVIEW

RUN

### 3. Sample plating    **Automated transfer from individual 2ml tubes to 96-well plate**





Automated transfer of inactivated virus samples from individual 2ml tubes to 96-well plate  
by Jerome Nicod,  
The Francis Crick Institute

PREVIEW

RUN

### 4. RNA Extraction    **Automated bead-based RNA extraction (kit free)**





Kit-free automated RNA extraction for SARS-CoV-2 testing  
by Jerome Nicod,  
The Francis Crick Institute

PREVIEW

RUN

### 5. RT-PCR    **SARS-CoV-2 detection using BGI kit (setup, analysis and reporting)**





SARS-CoV-2 detection using BGI RT-PCR kit  
by Jerome Nicod,  
The Francis Crick Institute

PREVIEW


RUN

**Buffers associated with the workflow:**



Preparation of Binding Buffer (BB)  
**by Jerome Nicod,**  
**The Francis Crick Institute**

PREVIEW
RUN





Preparation of TET Buffer  
**by Jerome Nicod,**  
**The Francis Crick Institute**

PREVIEW
RUN



Preparation of 5M Guanidine thiocyanate L6 Inactivation Buffer  
**by Jerome Nicod,**  
**The Francis Crick Institute**

PREVIEW
RUN



Preparation of 5M NaOH  
**by Jerome Nicod,**  
**The Francis Crick Institute**

PREVIEW
RUN

Preparation of 0.2M EDTA, pH 8.0  
**by Jerome Nicod,**  
**The Francis Crick Institute**



PREVIEW
RUN



Preparation of 0.1M Tris HCl, pH 6.4  
**by Jerome Nicod,**  
**The Francis Crick Institute**

PREVIEW
RUN



## FILES



Sample reception, unpacking and barcoding  
**by Jerome Nicod, The Francis Crick Institute**

















Viral inactivation of clinical samples  
**by Jerome Nicod, The Francis Crick Institute**

Automated transfer of inactivated virus samples from individual 2ml tubes to 96-well plate  
**by Jerome Nicod, The Francis Crick Institute**

Kit-free automated RNA extraction for SARS-CoV-2 testing

		Kit-free automated RNA extraction for SARS-CoV-2 testing by Jerome Nicod, The Francis Crick Institute
		SARS-CoV-2 detection using BGI RT-PCR kit by Jerome Nicod, The Francis Crick Institute
		Preparation of Binding Buffer (BB) by Jerome Nicod, The Francis Crick Institute
		Preparation of TET Buffer by Jerome Nicod, The Francis Crick Institute
		Preparation of 5M Guanidine thiocyanate L6 Inactivation Buffer by Jerome Nicod, The Francis Crick Institute
		Preparation of 5M NaOH by Jerome Nicod, The Francis Crick Institute
		Preparation of 0.2M EDTA, pH 8.0 by Jerome Nicod, The Francis Crick Institute
		Preparation of 0.1M Tris HCl, pH 6.4 by Jerome Nicod, The Francis Crick Institute