NORGEN BIOTEK CORP.

CORONAVIRUS COVID-19

2020 Action Plan

COVID-19 Complete Workflow

- Collection & Preservation
- Purification & Isolation
- PCR Based Detection

\+ **PCR Components**

WE ARE READY TO DO OUR PART.

ABOUT **NORGEN**

Norgen Biotek was founded in 1998 by Dr. Yousef Haj-Ahmad. The company is located in a 24,000 square foot state-of-the-art facility in Thorold, Ontario, Canada a few blocks from Brock University. Norgen is an ISO 9001, ISO 13485 and Illumina Propel certified fully-integrated Canadian biotechnology company focusing on developing products for sample collection, sample preparation and sample detection, as well as providing comprehensive research services to the scientific community. Norgen's ISO 9001 and ISO 13485 certifications indicate our commitment to manufacturing and selling high quality products, as well as our commitment to continually improving our company, our products and our quality management system. Our Illumina Propel certification emphasizes our proficiency with Illumina Next-Generation Sequencing (NGS) to support genetic and genomic research and provide high quality services to our customers.

Founder & President
Dr. Y. Haj-Ahmad

CORONA**VIRUS**

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Swab Collection and Total Nucleic Acid Preservation System (Cat. 68800)

- No need to immediately process samples
- Preserve total DNA, including viral DNA, at room temperature 2 years
- Preserve total RNA, including viral RNA, at room temperature for 2 months
- Inactivate microorganisms and viruses for safe and easy transport and handling
- Ship samples at room temperature without the need for costly cold chain transport
- Compatible with most DNA and RNA isolation methods
- Compatible with many sample types, including nose, mouth, throat and skin
- **Validated for COVID-19 detection**

Preserve total RNA including viral RNA with Norgen's convenient all-in-one collection system for up to 2 months*

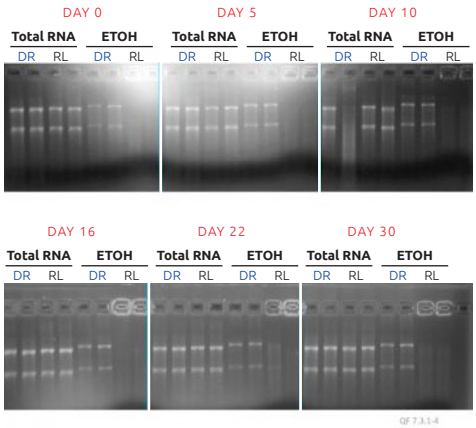

Figure 1. Isolation of high quality RNA from HeLa cells stored in Norgen's Total Nucleic Acid Preservative Tube at room temperature for up to 30 days. HeLa cells were stored in Norgen's Total Nucleic Acid Preservative Tube (DR) and RNAlater (RL) for 30 days, and the RNA was isolated from the preserved samples using both an ethanol precipitation method and Norgen's Total RNA Purification Kit (Cat. 17200). As it can be seen, the EtOH precipitation method failed to isolate RNA from the RNAlater preserved sample. High quality RNA was isolated from the samples preserved in Norgen's Total Nucleic Acid Preservation Tubes using both isolation methods, indicating excellent preservation of the RNA and compatibility with various isolation methods.

Featured Alternative

Saliva RNA Collection and Preservation Device
(Cat. RU53800)

Ordering Information

Swab Collection and Total Nucleic Acid Preservation System	
50 Units	Cat. 68800

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For more data and technical specifications please vist **www.norgenbiotek.com** or scan the **QR code**.

*Total DNA, including viral DNA will be preserved at room temperature for 2 years, Total RNA including viral RNA will be preserved for up to 2 months.

Total RNA Purification Kit
(Cat. 17200, 37500, 17250)

- Extract high quality & purity total RNA including miRNA
- No phenol step required
- Bind & elute all RNA irrespective of size or GC content, without bias
- Efficiently extract small RNA irrespective of GC content
- Very sensitive & linear down to a few cells without the need for carrier RNA
- Convenient & fast spin column format Isolate from a wide variety of specimens
- Purified RNA is suitable for a variety of downstream applications, including Small RNA Sequencing. Find out more information on Norgen's NGS services

For rapid purification of total RNA, including microRNA, without phenol

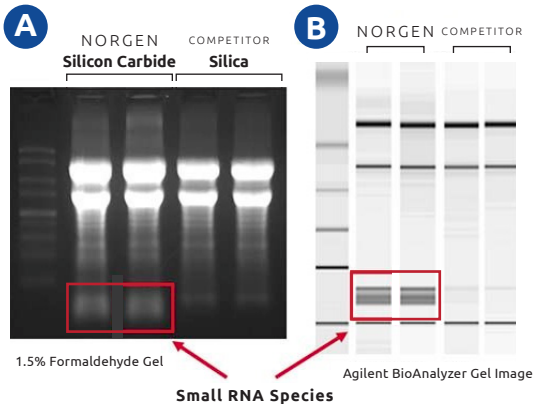

Figure 1. High Quality of Isolated RNA with Complete Size Range. Unlike most competitors' kits, Norgen's Total RNA Purification Kit allows for the isolation of all sizes of RNA, from the very large RNA down to the microRNA, without the use of phenol. Total RNA was isolated from 1 x 10^9 *E. coli* cells using Norgen's Total RNA Purification Kit and a competitor's kit. Five microliters and 1 µL of the 50 µL isolated RNA was analyzed on an agarose gel (Panel A) and the Agilent® 2100 BioAnalyzer RNA Nano 6000 chip (Panel B), respectively. Note the presence of small RNA species (red square) in the samples isolated via Norgen's kit and the absence of these RNA species in the competitor RNA preparation.

Ordering Information

Total RNA Purification Kit	
50 Preps	Cat. 17200
100 Preps	Cat. 37500
250 Preps	Cat. 17250

For more data and technical specifications please vist **www.norgenbiotek.com** or scan the **QR code**.

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2019-nCoV TaqMan RT-PCR Kit
(Cat. TM67100)

- Detection kit for SARS-CoV-2, which causes COVID-19 (2019-nCoV)
- **Ready to use format containing everything required for detection** (primer/probes, positive control, nuclease free water, One-Step RT-PCR Master Mix)

Detect SARS-CoV-2 specific RNA with real time RT-PCR based on TaqMan™ Technology

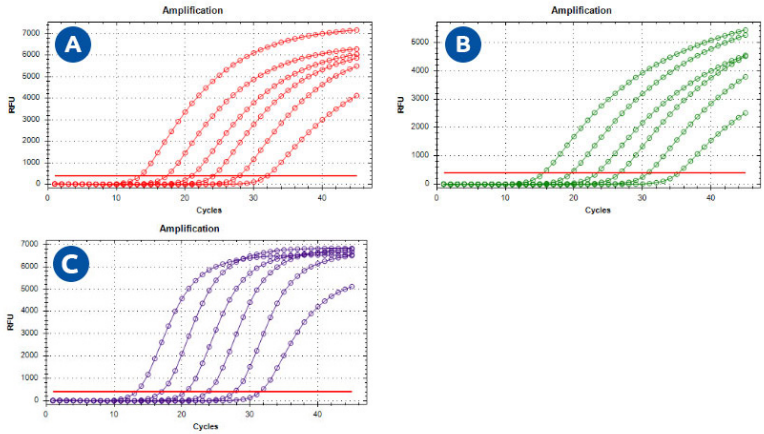

Figure 1. Analytical sensitivity for the detection of 2 SARS-CoV-2 nucleocapsid target genes and the RNase P internal Control target as recommended by the Centers for Disease Control and Prevention (CDC). Panel A represents the 2019-nCoV_N1 target, Panel B represents the 2019-nCoV_N2 target and Panel C represent the RNase P internal Control target. The analytical sensitivity of Norgen's 2019-nCoV TaqMan RT-PCR Kit was determined by analyzing a dilution series of quantified Norgen's 2019-nCoV RT-PCR Positive Control (Cat. PC67102) in triplicate (n=3) based on the use of TaqMan® technology. The linear range of Norgen's 2019-nCoV TaqMan RT-PCR Kit has been determined to detect as low as 2 copies/µL with a confidence ≥ 90%.

Ordering Information

2019-nCoV TaqMan RT-PCR Kit	
50 Rxns	Cat. TM67100

For more data and technical specifications please vist **www.norgenbiotek.com** or scan the **QR code**.

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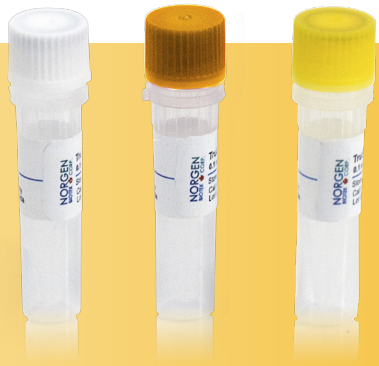
2019-nCoV Primer & Probe Mixes



- Primer & Probe sets for SARS-CoV-2, which causes COVID-19 (2019-nCoV)
- Contains all 3 CDC developed assays in individual tubes
- Each assay is targeting one of the 2 nucleocapsid target genes RNA (N1, N2) and an RNase P for internal control

Ordering Information	
50 Rxns	Cat. TM67101

Positive Control (Cat. PC67102) - Theoretical Copy Number			
	2019-nCoV_N1F	2019-nCoV_N2F	RNAse P-F
$2x10^8$	+	+	+
$2x10^7$	+	+	+
$2x10^6$	+	+	+
$2x10^5$	+	+	+
$2x10^4$	+	+	+
$2x10^3$	+	+	+
$2x10^2$	+	+	+
$2x10^1$	+	+	+
NTC	N/D	N/D	N/D

2019-nCoV RT-PCR Positive Control

- Positive control for SARS-CoV-2, which causes COVID-19 (2019-nCoV)
- Contains 2 nCoV nucleocapsid target gene RNA (N1, N2) and RNase P.
- Compatible with CDC primer/probe set

Ordering Information	
50 µL	Cat.PC67102

2X One-Step RT-PCR Master Mix

- Convenient ready-to-use solution
- High sensitivity and yield
- Robust amplification

Ordering Information	
100 Rxns	Cat. 28113
200 Rxns	Cat. 28114
500 Rxns	Cat. 28115

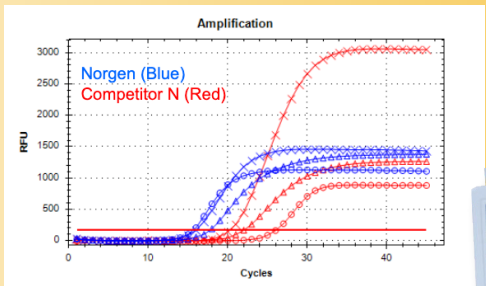


Figure 1. Performance of Norgen's 2X One-Step RT-PCR Master Mix (Cat. 28113) to detect SARS-CoV-2 using Norgen's 2019-nCoV Primer & Probe Mixes (Cat. TM67101) and Norgen's 2019-nCoV RT-PCR Positive Control (Cat. PC67102). The one-step RT-PCR reaction was prepared according to the CDC protocol and the sensitivity of detection of the three targets; 2019-nCoV_ N1 (Circle), 2019-nCoV_ N2 (Triangle) and RNase P (Cross), was compared with Competitor N's product (Red).

CORONAVIRUS COVID-19

In December 2019, an outbreak of respiratory illness started in Wuhan City, Hubei Province, China and has now spread throughout the world to many different countries. This respiratory disease was caused by a novel coronavirus and was initially termed "2019 novel coronavirus" or "2019-nCoV", however in February of 2020 the World Health Organization (WHO) announced that the official name of the disease is COVID-19. The official name of the coronavirus causing COVID-19 is SARS-CoV-2.

Coronaviruses are a large family of viruses known to infect both animals and humans. SARS-CoV-2 is a new strain of coronavirus infecting humans that had not been previously detected before the outbreak in China in December 2019. While the SARS-CoV-2 is new, many coronaviruses have been known to infect animals and humans for some time. Coronaviruses are known to commonly infect camels, cattle, cats, and bats. In humans, Coronavirus infections can cause various illnesses from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS).

Human infection is more severe when the coronavirus has originated in animals and spread to humans, as is the case with MERS and SARS. SARS-CoV-2 is a betacoronavirus, similar to MERS and SARS, both of which have their origins in bats. The animal source of SARS-CoV-2 has not yet been identified, however Chinese officials have linked many of the early cases to a large seafood and live animal market, suggesting that the initial transmission was the result of animal-to-person spread. However, many of the later detected cases did not report any exposure to animal markets, indicating that the virus is now spreading via human-to-human contact.

Symptoms of infection with SARS-CoV-2 can range from milder symptoms such as a runny nose, sore throat, cough, and fever to more severe symptoms including pneumonia or breathing difficulties. In some cases infection with SARS-CoV-2 has resulted in death. As with other respiratory illnesses, older people and individuals with pre-existing medical conditions (such as diabetes or heart disease) are more vulnerable to becoming severely ill with the virus.

The Chinese authorities posted the full genome of SARS-CoV-2 on the NIH sequencing database GenBank. The CDC reported that the first cases of COVID-19 in the US that were sequenced are similar to the sequence published by China, therefore adding further evidence to the fact that there was a single, recent emergence of this virus from an animal source.

Accurate diagnosis of COVID-19 is through the use of real-time RT PCR (rRT-PCR) assays for the *in vitro* qualitative detection of SARS-CoV-2 in respiratory specimens and sera. The CDC has published full guidelines on their website for the collection, storage and handling of specimens, nucleic acid extraction, quality control, the rRT-PCT detection assay (including the probes and primers), and interpreting test results.

For more information please visit:

www.cdc.gov/coronavirus
www.norgenbiotek.com/coronavirus

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