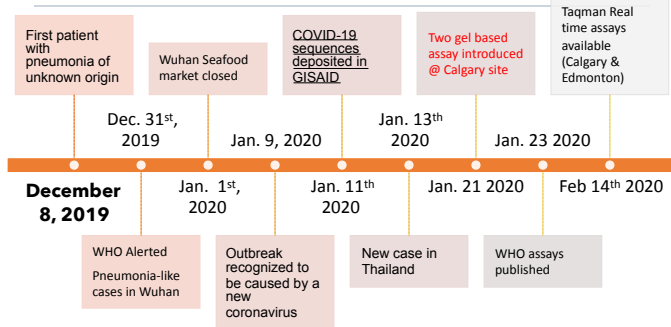


# Laboratory Testing for COVID-19

Kevin Fonseca, Clinical Virologist, Provincial Laboratory  
 Adjunct Associate Professor, MIID, Cummings School of Medicine  
[Kevin.Fonseca@albertahealthservices.ca](mailto:Kevin.Fonseca@albertahealthservices.ca)

- Timeline
- Assays
- Testing Algorithm
- Statistics



NIH U.S. National Library of Medicine National Center for Biotechnology Information

Search NCBI: MN908947.2

Search results for: MN908947.2

**Newly discovered betacoronavirus, BetaCoV 2019-2020**

The newly discovered coronavirus is similar to some of the betacoronaviruses detected in bats, but it is distinct from SARS-CoV and HERS-CoV.

The genome of the newly discovered CoV consists of a single, positive-stranded RNA that is approximately 30kb nucleotides long. The overall genome organization of the newly discovered CoV is similar to that of other coronaviruses. The newly sequenced RNA genome encodes the open reading frames (ORFs) common to all betacoronaviruses, including ORF1ab that encodes many structural proteins, the spike surface glycoprotein (S), the small envelope protein (E), the matrix protein (M), and the nucleocapsid protein (N), as well as several nonstructural proteins.

Yield name	Accession ID	Passage origin	Collection site	Host	Origin (by city)	Submitting lab
BetaCoV/Beijing/BJ-02/2020	EPI_ISL_424233	Original	2020-01-07	Human	China/Beijing Provincial Cent.	Department of Microbiol.
BetaCoV/Beijing/BJ-03/2020	EPI_ISL_424237	Original	2020-01-16	Human	China/Beijing Provincial Cent.	Department of Microbiol.
BetaCoV/Wuhan/WU-01/2019	EPI_ISL_421210	Original	2019-12-30	Human	Huazhong University Hospital	Wuhan Institute of Virology
BetaCoV/Wuhan/WU-02/2019	EPI_ISL_421219	Original	2019-12-30	Human	Huazhong University Hospital	Wuhan Institute of Virology
BetaCoV/Wuhan/WU-03/2019	EPI_ISL_421220	Original	2019-12-30	Human	Huazhong University Hospital	Wuhan Institute of Virology
BetaCoV/Wuhan/WU-04/2019	EPI_ISL_421214	Original	2019-12-30	Human	Huazhong University Hospital	Wuhan Institute of Virology
BetaCoV/Wuhan/WU-05/2019	EPI_ISL_421217	Original	2019-12-30	Human	Huazhong University Hospital	Wuhan Institute of Virology
BetaCoV/Wuhan/WU-06/2019	EPI_ISL_421221	Original	2019-12-30	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-07/2020	EPI_ISL_421222	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-08/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-09/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-10/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-11/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-12/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-13/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-14/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-15/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-16/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-17/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-18/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-19/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus
BetaCoV/Wuhan/WU-20/2020	EPI_ISL_421219	Original	2020-01-01	Human	National Institute for Virus	National Institute for Virus

Design primers for the specific detection of SARS CoV2 (COVID-19) to exclude other coronaviruses

Source Unknown

Peiris et al. Nature Medicine Supplement. December 2004

2019-nCoV specific primers (220bp)

2019-nCoV specific primers (220bp)

Pan-Coronavirus Polymerase primers (655bp)

Source Unknown

Peiris et al. Nature Medicine Supplement, December 2004

<p><b>Envelope protein (E gene)</b></p> <p>Sensitivity = 145 copies/ml of specimen</p> <p>WHO developed assay (Corman et al Eurosurv 2020)</p>	<p><b>RNA dependant RNA polymerase (RdRp)</b></p> <p>Sensitivity = 638 copies/ml of specimen</p> <p>ProvLab developed assay</p>
--	---

Source Unknown

Image Copyright Unknown

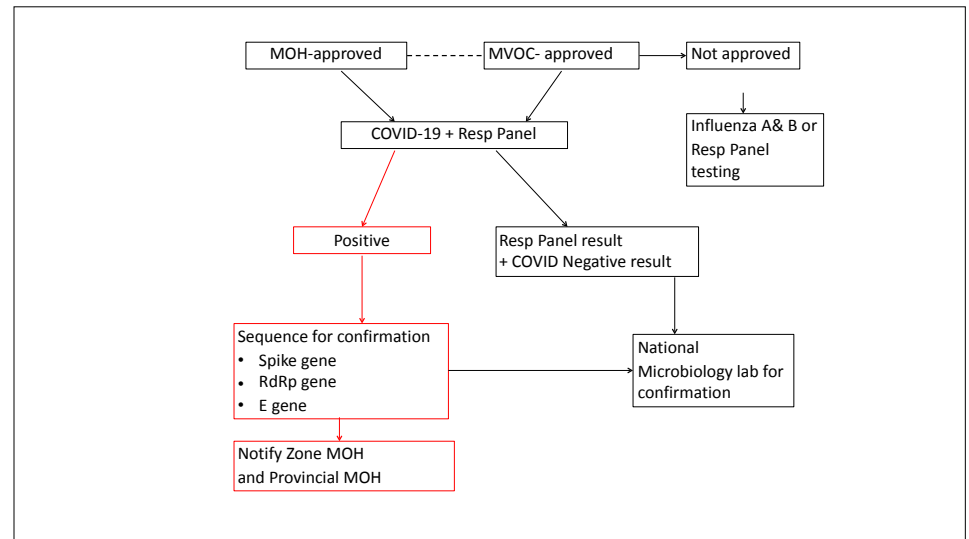
**Acceptable Specimen types:**

- Nasopharyngeal swab
- Auger suction
- Bronchoalveolar lavage
- Endotracheal secretions
- Nasopharyngeal aspirate
- Tracheal secretions
- (Nasal swab)
- (Throat swab)

Image Copyright Unknown

**Respiratory Panel**

- Influenza A - H1 & H3 subtypes
- Influenza B
- Respiratory Syncytial virus
- Human Metapneumovirus
- Parainfluenza viruses 1-4
- Entero/rhinovirus
- Adenovirus
- Human coronaviruses
  - HKU1
  - OC43
  - NL63
  - 229E
- Chlamydomphila pneumoniae
- Legionella pneumophila
- Mycoplasma pneumoniae



Published Date: 2020-02-09 23:45:17  
 Subject: PRO/AH/EDR- Novel coronavirus (39): China, global, false negative NAT tests, WHO  
 Archive Number: 20200209.6972103

NOVEL CORONAVIRUS (39): CHINA, GLOBAL, FALSE NEGATIVE NUCLEIC ACID TESTS, WHO

A ProMED-mail post  
<http://www.promedmail.org>  
 ProMED-mail is a program of the  
 International Society for Infectious Diseases  
<http://www.isid.org>

Key diagnostic test might be missing many coronavirus cases

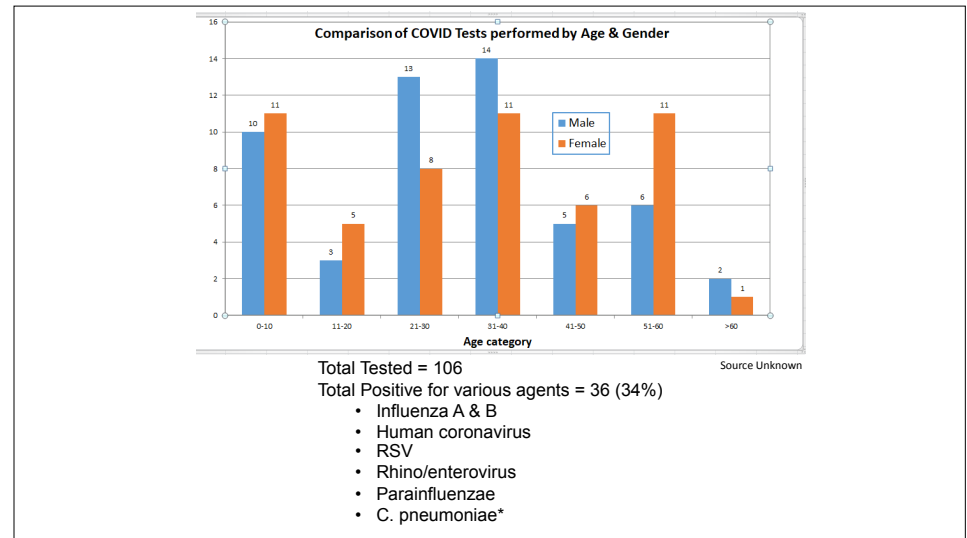
China's ability to control a rapidly spreading coronavirus epidemic is under further strain amid fears that a key test used to confirm new cases is failing to catch large numbers of people with the disease. Problems with so-called nucleic acid tests (NATs) widely used to identify the presence of the previously unknown pneumonia-causing virus make it likely that many infections are going uncounted even as the number of confirmed cases continues to spiral.

"Even patients who definitely have the disease only come back positive 30%-50% of the time," Wang said. "Testing throat swabs (from potentially infected people) also returns a lot of false negatives."

Source: <https://www.cnn.com/2020-02-08/key-diagnostic-test-might-be-missing-many-coronavirus-cases-101513176.html>

**Are coronavirus tests flawed?**  
 By James Gallagher  
 Health and science correspondent

There are deep concerns laboratory tests are incorrectly telling people they are free of the coronavirus.



**Acknowledgements:**

Research Team – developed and implemented assays  
Molecular Diagnostic Team – performing extraction of nucleic acid testing for respiratory viruses & COVID-19  
Virology Diagnostic Team & Non-Clinical Teams– support ancillary areas (data entry, resulting etc)