AACC

Better health through laboratory medicine.

PEARLS OF LABORATORY MEDICINE

Coronavirus Disease 2019 (COVID-2019)
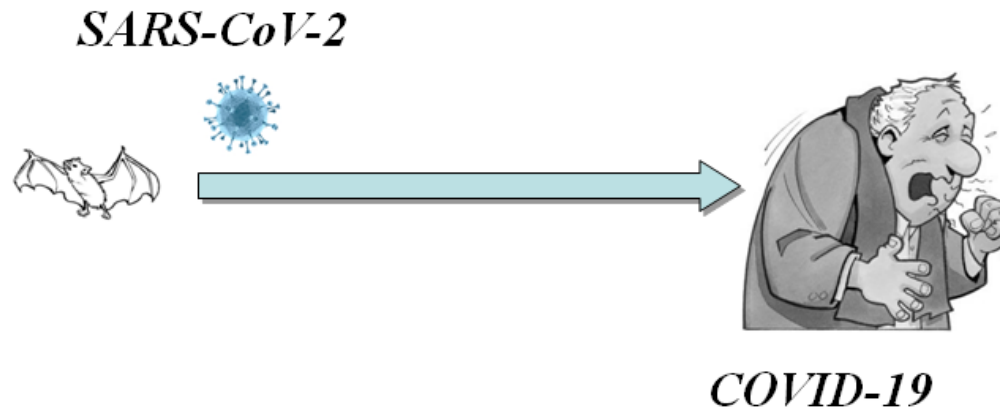
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CCTC
Clinical Chemistry Trainee Council

Coronavirus Disease 2019 (COVID 2019)

Mattiuzzi C, Lippi G. Which lessons shall we learn from the 2019 novel coronavirus outbreak? Ann Transl Med 2020;8(3):48.

Coronavirus Disease 2019 (COVID 2019)

Recent Coronaviruses outbreaks

Severe Acute Respiratory Syndrome (SARS)   **year 2002**

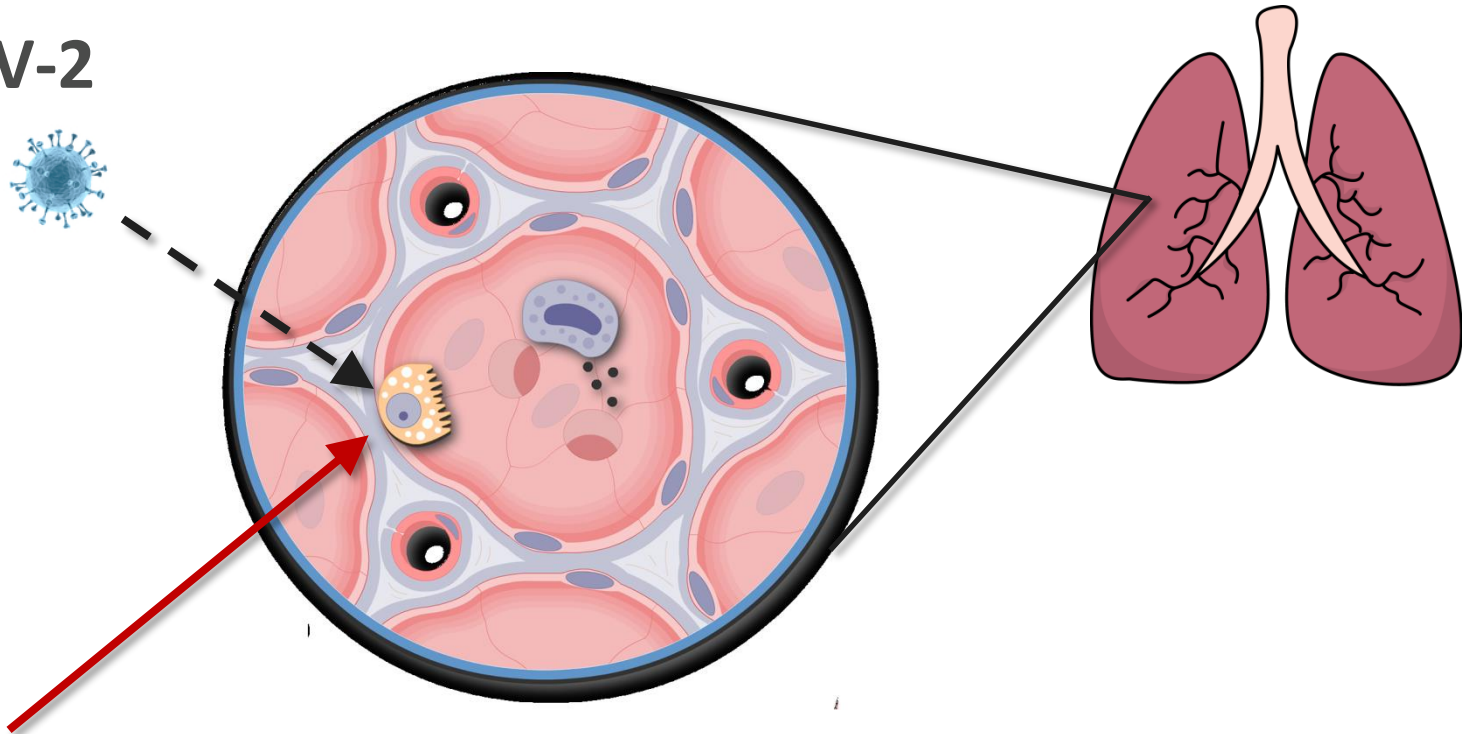**Middle East Respiratory Syndrome (MERS)**   **year 2012**

Coronavirus Disease (COVID-19)   **year 2019**

Mattiuzzi C, Lippi G. Which lessons shall we learn from the 2019 novel coronavirus outbreak? Ann Transl Med 2020;8(3):48.

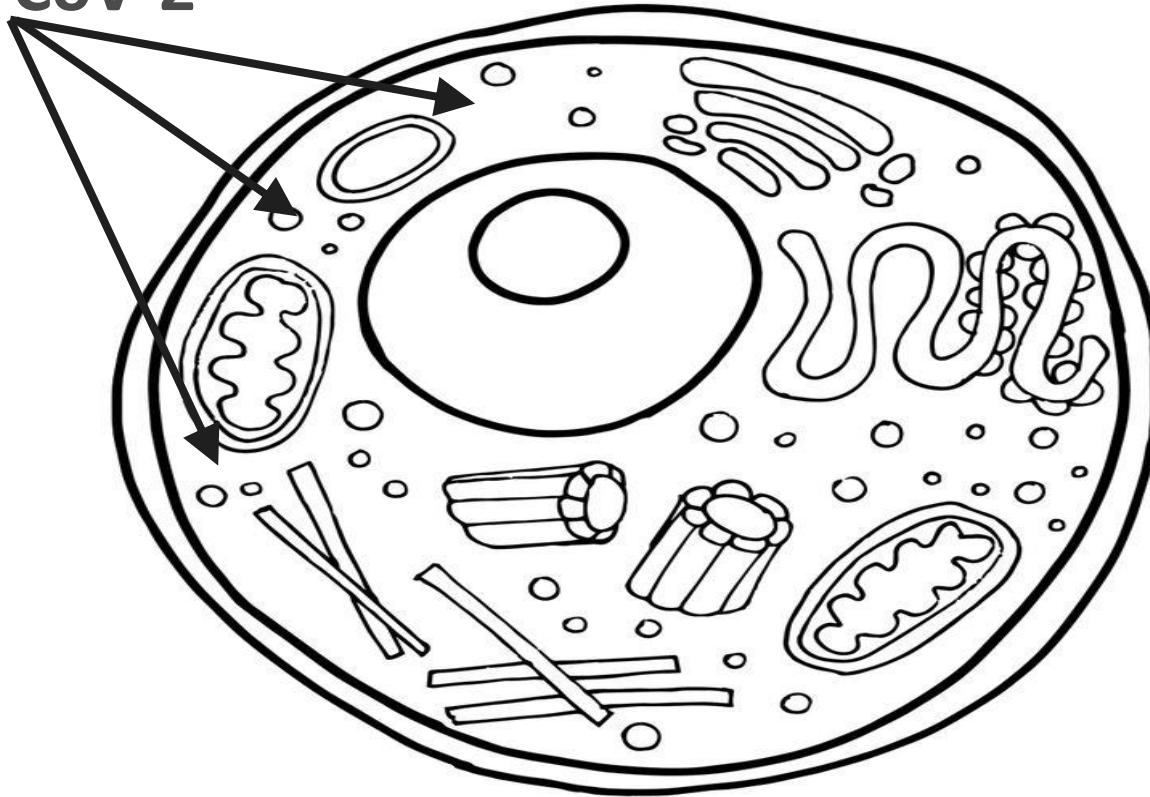# Coronavirus Disease 2019 (COVID 2019)

SARS-CoV-2

Alveolar epithelial type II cell

Zhang H, et al Angiotensin-converting enzyme 2 (ACE2) as a SARS-CoV-2 receptor: molecular mechanisms and potential therapeutic target. Intensive Care Med. 2020 Mar 3. doi: 10.1007/s00134-020-05985-9. [Epub ahead of print].

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Coronavirus Disease 2019 (COVID 2019)

SARS-CoV-2

Mattiuzzi C, Lippi G. Which lessons shall we learn from the 2019 novel coronavirus outbreak? Ann Transl Med 2020;8(3):48.

Coronavirus Disease 2019 (COVID 2019)

The leading features of this new viral syndrome encompass:

Human-to-human transmission:
• The risk is the highest during the symptomatic phase
• Transmission is also possible during the non-symptomatic phase, usually 4-6 days before the onset of the symptoms
• There are also anecdotal reports of possible transmission after remission of the symptoms

Incubation time:
• Generally between 2-14 days

Mattiuzzi C, Lippi G. Which lessons shall we learn from the 2019 novel coronavirus outbreak? Ann Transl Med 2020;8(3):48.

Coronavirus Disease 2019 (COVID 2019)

The leading clinical features of COVID-19 are:

- Fever
- Cough
- Shortness of breath
- Myalgia
- Fatigue
- Unusual episodes of headache

Mattiuzzi C, Lippi G. Which lessons shall we learn from the 2019 novel coronavirus outbreak? Ann Transl Med 2020;8(3):48.

Coronavirus Disease 2019 (COVID 2019)

The clinical picture of COVID-19 is typically:

- Mild   ~80% of patients
- Severe   ~10-15 of patients
- Critical   ~2-5% of patients

World Health Organization. Coronavirus disease 2019 (COVID-19) Situation Report – 44.
Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/

Coronavirus Disease 2019 (COVID 2019)

The risk of progression toward severe disease seems higher in:

- Elderly patients (i.e., > 60 years)

- Patients with severe co-morbidities (for example cancer, diabetes, cardiovascular disease, chronic respiratory diseases)

Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. JAMA. 2020 Feb 24. doi: 10.1001/jama.2020.2648. [Epub ahead of print]

Coronavirus Disease 2019 (COVID 2019)

The currently available mortality data are:

- Around 34% for MERS

- Around 10% for SARS

- Around 2-4% for COVID-19

Lippi G, Plebani M. The novel coronavirus (2019-nCoV) outbreak: think the unthinkable and be prepared to face the challenge. Diagnosis (Berl). 2020 Jan 28. doi: 10.1515/dx-2020-0015. [Epub ahead of print].

Coronavirus Disease 2019 (COVID 2019)

Death distribution for COVID-19 across different ages:

<10 years: <1%
10-19 years: 1%
20-29 years: 8%
30-79 years: 87%
≥80 years: 3%

Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. JAMA. 2020 Feb 24. doi: 10.1001/jama.2020.2648. [Epub ahead of print]

Coronavirus Disease 2019 (COVID 2019)

The etiological diagnosis of SARS-CoV-2 infection is currently based on:

- Collection of an upper respiratory specimen (i.e., nasopharyngeal AND oropharyngeal swabs)

- Analysis of the sample by (real-time) reverse transcription polymerase chain reaction (rRT-PCR)

Centers for Disease Control and Prevention. Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons Under Investigation (PUIs) for Coronavirus Disease 2019 (COVID-19). Available at: https://www.cdc.gov/coronavirus/2019-nCoV/lab/guidelines-clinical-specimens.html.

Coronavirus Disease 2019 (COVID 2019)

A validated diagnostic workflow for detecting SARS-CoV-2 encompasses the following real-time reverse-transcription polymerase chain reaction (rRT-PCR) assays:

- First line screening assay: E gene assay
- Confirmatory assay: RdRp gene assay
- Additional confirmatory assay: N gene assay

Corman VM, et al. Detection of 2019 novel coronavirus (2019-nCoV) by real-time RT-PCR. Euro Surveill. 2020 Jan;25(3). doi: 10.2807/1560-7917.ES.2020.25.3.2000045.

Coronavirus Disease 2019 (COVID 2019)

Frequent laboratory abnormalities in patients with COVID-19 include:

Lymphopenia (35-75%)

↑ C reactive protein (CRP 75-93%)

↑ Lactate dehydrogenase (LDH; 27-92%)

↑ Erythrocyte sedimentation rate (ESR; up to 85%)

↑ D-dimer (36-43%)

↓ Albumin (50-98%)

↓ Hemoglobin (41-50%).

Lippi G, Plebani M. Laboratory abnormalities in patients with COVID-2019 infection. Clin Chem Lab Med. 2020 Mar 3. doi: 10.1515/cclm-2020-0198. [Epub ahead of print].

Coronavirus Disease 2019 (COVID 2019)

Major predictors of COVID-19 severity are:

⬇ Lymphocyte count

⬇ Albumin

⬆ Neutrophil count

⬆ Lactate dehydrogenase (LDH)

⬆ Aminotransferases

⬆ Cardiac biomarkers (e.g., cardiac troponins)

⬆ D-dimer

⬆ Procalcitonin

⬆ C reactive protein (CRP)

Lippi G, Plebani M. Laboratory abnormalities in patients with COVID-2019 infection. Clin Chem Lab Med. 2020 Mar 3. doi: 10.1515/cclm-2020-0198. [Epub ahead of print].

Disclosures/Potential Conflicts of Interest

Upon Pearl submission, the presenter completed the Clinical Chemistry disclosure form. Disclosures and/or potential conflicts of interest:

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