## «Identification of SARS-CoV-2 in nasal swabs with MALDI-MS and machine learning methods» AP09259123

#### Relevance

Coronavirus infection, appeared in 2019, has become a challenge for humanity and for the health system in particular. The epidemic revealed many gaps in the organization of the diagnostic process, leading to the collapse of the laboratory service in the Republic of Kazakhstan during the periods of the highest incidence. To detect viral RNA in biomaterial, reverse transcription PCR (RT-PCR) is used. The detection of SARS-CoV-2 using RT-PCR tests is a highly accurate method, but the use of this diagnostic method is costly and time consuming.

Our research team is proposing to evaluate a method for detecting SARS-CoV-2 in nasal swabs using matrix laser desorption / ionization mass spectrometry (MALDI-MS) and machine learning analysis. This approach uses equipment and skills that are routinely used in clinical laboratories. The biomaterial does not require preliminary sample preparation and expensive reagents. Thus, the proposed method for the detection of SARS-CoV-2 in material obtained from a nasal swab will become a more affordable and less time-consuming test than RT-PCR.

**Aim:** To evaluate the rapid method for determining the SARS-CoV-2 virus in material obtained from a nasal smear using mass spectrometry and machine learning methods.

#### **Expected results**

Based on the results of the scientific study, it is planned to obtain an express method for detecting SARS-CoV-2 in biomaterial obtained from nasal swabs. The development of a new approach in the diagnosis of COVID-19 has a potential socio-economic effect, which consists in reducing the time of diagnostic search, timely adequate treatment of critical conditions, and reducing the length of hospitalization and, consequently, the cost of treatment. The implementation of the study will help to reduce mortality rates and increase life expectancy.

Obtaining data on new methods for early diagnosis of COVID-19 will make it possible to make changes to the diagnostic algorithm, which will become innovative not only within the Republic of Kazakhstan, but throughout the world.

## **Research group**

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## **Achieved results**

SOPs were prepared for conducting a questionnaire survey of study participants and sampling, permits from clinical bases for conducting studies were obtained, biomaterial and necessary clinical information are being collected. Protocol for MALDI-ToF of nasal swabs have been optimized. Molecular and genetic studies (RT-PCR) of nasal swabs in the control and study groups have begun.

## Information for potential users

The areas of application of the research results include: infectious diseases, clinical microbiology, laboratory diagnostics.

# Scientific publications within the framework of the project

Article was published and the presentation at the poster session was made: Poster abstract book 26–30 April 2021, P 282// Respiratory pathogens co-infection in patients with COVID-19 pneumonia in Kazakhstan. Alyona Lavrinenko, Svetlana Kolesnichenko, Anar Turmukhambetova, Irina Kadyrova Karaganda Medical University, Karaganda, Kazakhstan.