

Researchers propose a new, quick way to detect coronavirus

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This transmission electron microscope image shows SARS-CoV-2 -- also known as 2019-nCoV, the virus that causes COVID-19 -- isolated from a patient in the US. Virus particles are shown emerging from the surface of cells cultured in the

lab. The spikes on the outer edge of the virus particles give coronaviruses their name, crown-like. Credit: NIAID-RML

A scientific group led by Skoltech Professor Evgeny Nikolaev, corresponding member of the Russian Academy of Sciences, has developed a coronavirus testing technology based on mass spectrometry. The new method provides for quick detection of viral proteins in swab samples from the nasopharynx, sputum and mouthwashes. It can form the basis of a platform for rapid screening of the population for coronavirus infection. The technology description is published in the bioRxiv electronic scientific library.

Every day, tens of thousands of coronavirus tests are conducted around the world. Rapid and accurate population testing is one of the main ways to control the epidemiological situation. The standard method is based on [polymerase chain reaction](#) (PCR), which detects the presence of viral RNA in a sample by propagating its number in the [sample](#) to the detection threshold. Though it is generally available and widespread, this method is relatively slow and leads to a significant percentage of false-negative test results.

Mass [spectrometry](#) is the most informative modern technology for the analysis of molecular substances, including complex multicomponent mixtures. In [mass spectrometers](#), substances are ionized and their [mass](#) is measured using electric and magnetic fields. In medicine, mass spectrometry is used, in particular, in biochemical analysis to identify and determine the amount of proteins, lipids of metabolites and other chemical compounds in physiological fluids and body tissues. Skoltech researchers, working together with the colleagues from Kulakov Scientific Center for Obstetrics, Gynecology and Perinatology and Russian Academy of Sciences, have discovered how to detect and

identify proteins that are part of a viral particle and that are unique, found only in this type of virus. Mass spectrometry methods can simultaneously analyze hundreds of saliva and smear samples from the surface of the nasopharynx, as well as sputum, for the virus presence.

This method has absolute selectivity and [high sensitivity](#), and its use will reduce the number of false-negative results and determine the presence of coronavirus even at very low initial concentrations in the samples.

Researchers plan to build a platform for rapid screening of the population for coronavirus infection. "We use [mass spectrometry](#) and identify the individual peptides that are derived by break down proteins with enzymes. It's very fast. If you do not take into account logistics, then one analysis of about a hundred samples can be performed in about 10 minutes," says Evgeny Nikolaev, professor at the Center for Computational and Data Intensive Science (CDISE).

More information: EN Nikolaev et al. Mass Spectrometric detection of SARS-CoV-2 virus in scrapings of the epithelium of the nasopharynx of infected patients via Nucleocapsid N protein, (2020). [DOI: 10.1101/2020.05.24.113043](#)

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