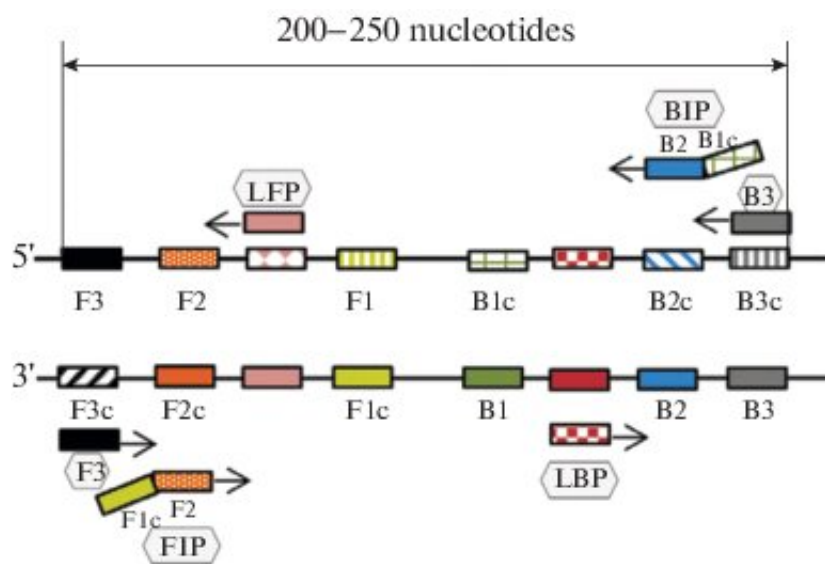


Universal COVID test based on isothermal amplification can detect all COVID-19 variants

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Scheme of LAMP primers: F3—forward outer primer; B3—backward outer primer; FIP—forward inner primer; BIP—backward inner primer; LFP—loop forward primer, LBP—loop backward primer. Credit: DOI: 10.1134/S0003683821080032

Russian researchers have developed a strategy to create a cheap and rapid COVID-19 test based on isothermal amplification. According to their publication in *Applied Biochemistry and Microbiology*, use of this strategy will make it possible to create universal test systems for any of the COVID-19 variants.

There are several options for systems that detect traces of SARS-CoV-2 in human blood or secretion samples. They usually detect either scraps of COVID-19's pathogen RNA using [polymerase chain reaction](#) (PCR) and its analogs, or antibodies to COVID-19.

Usually, quite a lot of time is required for such a test, from 30 minutes to several hours, which is why researchers are looking for new, faster methods to detect antibodies or COVID infection.

Julia Makarova, associate professor at the HSE Faculty of Biology and Biotechnology, is working with her colleagues on another alternative to PCR tests that is based on so-called loop-mediated isothermal amplification (LAMP). This testing approach allows for multiplication of certain DNA or RNA fragments from bio samples with the use of special markers and ferments of extremophilic bacteria that reside in hot springs.

The key advantage of LAMP over PCR is that all reactions can be made at the same temperature. This simplifies and speeds up the process. But these systems are much more complicated to develop and have a few drawbacks, which has previously limited their use in COVID-19 test systems.

The Russian researchers developed a strategy that will help overcome these drawbacks and give [healthcare professionals](#) an opportunity to use LAMP testing to detect traces of any COVID variants in samples of mucus and blood without preliminary processing in a laboratory.

According to Dr. Makarova, this will decrease the cost of COVID-19 tests considerably and speed up the process, since no specially trained professionals or expensive equipment will be needed.

"The virus mutates quite fast, and the test systems that were created a

year ago may be not as effective as they used to be. We analyze the mutations and are looking for the most stable parts of the virus genome. This will help create test systems that recognize all the existing variants and, importantly, the new variants that are appearing," said [Julia Makarova](#), associate professor at the HSE [Faculty of Biology and Biotechnology](#).

To solve this challenge, HSE biologists are looking for parts of the coronavirus genome that do not change much over time. They will serve as markers that bacteria ferments will use to convert the COVID RNA into DNA and multiply it further. Combined with the existing LAMP system components, they will help create a universal COVID-19 testing system, which will be able to quickly detect traces of any COVID variants, the researchers concluded.

More information: J. A. Makarova et al, Loop-Mediated Isothermal Amplification as a Promising Method for Mass COVID-19 Diagnostics, *Applied Biochemistry and Microbiology* (2021). [DOI: 10.1134/S0003683821080032](#)

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