

# Nencki Institute of Experimental Biology

## COVID-19 mass testing possible thanks to scientists from The Nencki Institute

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One test, and we test a dozen people. Pooled tests save time and money. Researchers from the Nencki Institute, in cooperation with the University of Warsaw, and COVID-19 diagnostic laboratories in SANEPID and the Medical University of Łódź, developed procedures and recommendations of pooled testing in Poland.

Pooled testing allows for an effective fight against the coronavirus pandemic, by arranging for screening tests to help identify infected persons, e.g. those who do

not show any symptoms.

- We are ready to implement pooled testing. Our findings are working, they have been checked on 701 samples obtained from patients positively diagnosed with SARS-CoV-2. The results are unambiguous: pooled testing is a response to the demand for mass testing, - says the head of the project, Professor Agnieszka Dobrzyń.

When they started their work, Polish scientists assumed that one test could be used to check even several dozen patients for the infection. Indeed, the research has shown that, with even a very low concentration of the virus in a sample, it is detectable as a collective test in a pool obtained from a combination of 30 people. However, detailed analyses revealed that if we take into account the time necessary to detect the infected person, along with the costs, the largest group worth examining with one test is 12 people. The size of this group varies depending on the percentage of infected people within the population.

- Therefore, we proposed three different ways of pooling. If it is less than 2%, a single test is enough for 12 samples. From 2% to 8%, then we use a grid test of 8 x 12 samples, and from 8% to 15%, then we use one test per 4 people, while over 15% of those infected in the population, group tests become unprofitable, individual tests are better - says Prof. Dobrzyń.

Pooled tests are ideal for screening tests, allowing to determine how widespread the virus is in a given population. - We should definitely include pooled testing in the basic diagnostics of COVID-19, certainly in such populations where we expect a low percentage of infected people, in individual companies, factories, universities, schools, and everywhere in which there is a large population of people who have to stay in one room - says Prof. Dobrzyń.

The ideal test group could be e.g. students of Medical Universities.

- They have to go back to practical classes, because you can't learn medicine with online lectures. Before we let students enter the clinics, they need to undergo tests to bring awareness of infected individuals, which can potentially cause a threat to others - says Prof. Dobrzyń.

As part of the SONAR Anti-CoronaVirus project, the scientists tested six PCR tests available in Poland to detect SARS-CoV-2. On this basis, they recommend two: MediPAN developed in Poznań and Korean DiaPlexQ. They have a very high sensitivity.

- The samples, which could not be unambiguously determined by pooled testing, contained less than two copies of the virus. They could have come from people at the very beginning of the infection or ending asymptomatic infection. However, my observations show that the most diluted samples were inaccurately collected material. This stage of the procedure can be easily improved - says Prof. Dobrzyń.

The team of researchers from the Nencki Institute will soon start pilot studies on selected populations of employees and students, which will confirm the effectiveness of the protocols they have developed. In the next stage, it will be possible to implement pooled testing throughout Poland.

Prof. Dobrzyń agrees with the opinion of the Director General of the World Health Organization (WHO) Tedros Adhanom Ghebreyesus, that the lack of mass testing is like fighting fire with hands tied. "We now extinguish the fire where it has already exploded. And with mass testing we could extinguish this fire more effectively, in the bud, before it spreads," concludes Professor Dobrzyń.

Key persons for the SONAR Anti-CoronaVirus project:

**Head of the project** - Prof. Agnieszka Dobrzyń, Director of the Nencki Institute, Head of the Cell Signaling and Metabolic Disorders Laboratory, Nencki Institute of Experimental Biology, Polish Academy of Sciences

**Coordinator for the assessment of test sensitivity and the development of a protocol for the implementation of group testing in practice** - Dr Aleksandra Pękowska, Assistant Professor, Head of Chromatin and Epigenomics Biology Laboratory, Centre of Scientific Excellence DIOSCURI, Nencki Institute of Experimental Biology, Polish Academy of Sciences

**Coordinator for optimization of the algorithm for group testing procedure** - Dr Szymon Toruńczyk, Assistant Professor at the Institute of Computer Science, Faculty of Mathematics, Computer Science and Mechanics, University of Warsaw.

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Photo credit: Kuba Rodziewicz