



*IDEA anti COVID-19 # 15*

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# Serological tests for Covid-19 antibodies: What could they be good for?<sup>3</sup>

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## Summary

- There are two kinds of tests for Covid-19. The first kind are PCR diagnostic tests, which reveal whether, at the moment of testing, the individual in question has the virus in their body or not. These tests are able to identify the presence of viral RNA in any sample of tissue or bodily fluid, or from a swab. The second kind of tests are antibody (serological) tests, which indicate whether the individual in question has previously been infected with the virus. Since antibodies only begin to be formed in the body a certain amount of time after an infection, serological tests are entirely unsuitable for those diagnostic purposes aimed to reveal the illness in its early stages. Serological antibody tests are, however, very important for finding out and confirming who has already gone through the infection. Serological tests measure IgM antibodies, formed in the early stages of the immune response, and IgG memory antibodies, formed in the later stages. This study looks in detail at the possible uses for serological tests.
- The main benefit of serological tests lies in the possibility of collecting information, which is currently still missing, but which is essential for informing our policy decisions in adopting optimal strategies to fight the Covid-19 epidemic. Serological testing could provide us with representative data, from which we can reliably detect what percentage of the population has

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<sup>3</sup> This study represents the author's opinion and not the official position of the Czech Academy of Sciences' Economics Institute nor of the Charles University Centre for Economic Research and Graduate Education (CERGE) or of the University of Bonn. The author is not an epidemiologist, doctor or microbiologist. The study may therefore contain errors as a result of her imperfect knowledge in these fields. Thanks are due to Štěpán Jurajda, Pavel Kocourek, Jana Lohrová and Jakub Steiner for their useful comments on the working version of this text, to Adam Jaroš, Hana Kaněrová and Josef Šilha for providing medical expertise, and to Daniel Münich for his help with editing the text. Any inaccuracies or errors are the author's responsibility. The study was produced with the support of the Czech Academy of Sciences as part of its AV21 Strategy programme, the Experientia Foundation, and Deutsche Forschungsgemeinschaft (DFG) grant CRC TR 224 (project B02).

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already been infected or re-infected, and how this percentage changes as the government introduces particular measures.

- A first use for serological testing are serological surveys carried out to estimate what percentage of the population has already come into contact with the virus. These surveys consist of testing a random sample of the population for antibodies. Blood donors or households that have already participated in existing socio-economic studies can serve as a suitable sample.
- Provided we know the combined error rate (false positive and false negative error) of the particular tests at use, serological surveys are useful, because they aim to reveal the extent of exposure to the virus within the overall population, rather than to diagnose individual cases. For this reason, however, it is important to use only those tests for whose the level of sensitivity (true positives) and specificity (true negatives) are known and have been verified on a large number of cases and control samples.
- A second use for serological tests is the possibility of issuing “immunity certificates” based on proven antibody protection. A suitable combination of serological and PCR tests can be used to identify individuals who have already been immune to the virus; these people have already been infected (they have a positive serological test) but have recovered (at the same time, they also have a negative PCR test). Such individuals can then be issued with “immunity certificates” that enable them to resume normal activities or that could be, for example, sent to the front line of the fight with the virus. However, caution needs to be taken so that the introduction of “immunity certificates” does not create perverse incentives for certain categories of people (such as those who expect the infection to affect them only mildly, or those who are in financial difficulties), who would then want to deliberately expose themselves to the virus in order to be able – after recovering – to return soon to work.
- At the moment, most serological tests for Covid-19 are still under development or they are undergoing evaluation. Nevertheless, many countries are preparing to carry out serological surveys, or they have already begun to do so (e.g. in the USA). The WHO is planning to launch a coordinated global programme of serological testing in the near future. It is important that intensive work on the complex algorithms of the suitable usage of these tests starts already now, so that we are ready to put these tests to use as soon as they become available.
- Serological tests are not suitable for over-the-counter sale, because they are not primarily intended for (self-)diagnosis. People might not be able to interpret the test result correctly: the tests are only effective a certain amount of time after infection; people might not correctly understand the test's sensitivity and specificity (the probability of a false positive or false negative result).