

MEDIA RELEASE

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Antibody study confirms low levels of infection in Sydney during the first COVID-19 wave

Australia's first population-level antibody study designed to shed light on how many people have contracted COVID-19 confirms that only a very small proportion – less than one percent – of Sydneysiders had been infected by the SARS-CoV-2 virus after the first epidemic wave.

Experts say the findings show the success of measures taken to date in NSW to control the virus's spread – but also the importance of people being vigilant and continuing to come forward for testing, given that the vast majority of people remain vulnerable to the infection.

Conducted from late April to early June this year, and capturing infections up to mid-May, [the study](#) involved analyses of more than 5,330 de-identified blood samples from three different groups of people. If the results are extrapolated to Sydney's five-million-strong population, it would suggest only one in 670 (or 7,450) of the city's residents had been infected during the first wave in Sydney.

While this is 3.5 times as high as the 2,118 COVID-19 cases detected and officially notified at the time, it represents a much lower level of community infection, and a lower ratio of undetected to detected infections, than seen in many international studies.

Antibodies are created when the body's immune system responds to infection, and can be detected for months afterwards. Antibody (also called 'serological') surveys can provide a more complete picture of the number of people infected with SARS-CoV-2, the virus that causes COVID-19, than reported case numbers. This is because many people who have COVID-19 experience only mild symptoms, or even none at all, and may not always come forward for testing.

The researchers tested the blood samples for SARS-CoV-2-specific antibodies after they had been collected as part of routine healthcare interactions not related to COVID-19. The percentages of samples testing positive for antibodies were all below 1% as follows:

- 0.15% of samples among people having a pathology test for any reason, except COVID-19
- 0.79% of samples among women tested as part of routine pregnancy checks
- 0.29% of samples among blood donors.

While no one group above is representative of the whole population, the general pathology collection was used to estimate the total number of infections following Sydney's first wave as it included all ages and contributed the most samples.

The study was co-led by the National Centre for Immunisation Research and Surveillance (NCIRS), the Kirby Institute at UNSW Sydney, and NSW Health Pathology's Institute of Clinical Pathology and Medical Research (ICPMR). It was conducted in collaboration with Australian Red Cross Lifeblood and public and private diagnostic laboratories across Sydney, with support from NSW Ministry of Health.

Lead author Associate Professor Heather Gidding, from the National Centre for Immunisation Research and Surveillance (NCIRS) and the University of Sydney, said the low prevalence of antibodies “confirms that there was limited community transmission in Sydney during the first epidemic wave”.

“This is undoubtedly due to the early and successful implementation of national and state-based public health measures,” Associate Professor Gidding said. “Successful measures included the rapid up-scaling of the capacity to test and contact trace, strict border controls, quarantining of international arrivals, and social distancing measures as well as a high degree of compliance with these measures by the public.”

NSW Health Pathology’s Director of Public Health Pathology, Professor Dominic Dwyer, said the data produced through NSW Health Pathology’s work “may also be used in future to help understand the extent to which infection creates immunity against future re-infection”.

“The work may help researchers assess the impact of a COVID-19 vaccine when one becomes available.” Professor Dwyer said.

Professor John Kaldor from the Kirby Institute at UNSW Sydney and a co-lead on the study said that despite the low number of positives, the survey provides crucial information about community spread of COVID-19.

“While it is not possible to obtain truly random samples from the community, the three populations surveyed in this study were complementary and provided very similar results. We used a well validated test that had a very low chance of false positives. It will also guide the approach to a national serosurvey” he said.

Professor Kristine Macartney, NCIRS Director, University of Sydney researcher and study co-lead, said: “Using these methods can also help us track how the much further the virus has spread silently since mid-May, when the blood samples used in this research were taken, given the extra cases of COVID-19 recorded since then.

“This new research gives us valuable new insights into the virus’s ability to spread through the Australian population – and confirms how much better Australia has fared compared to many other countries.”

NCIRS, the Kirby Institute and the ICPMR are also leading a multi-collaborator national SARS-CoV-2 serosurvey, with results expected in early 2021.

Declaration: [This study has been published online as a pre-print by the *Medical Journal of Australia* \(MJA\)](#). It has not undergone academic peer-review; changes may be made before final publication. This study was funded by the NSW Ministry of Health. The authors declare no competing interests.

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Questions:

What are the key public health implications or messages arising from this research?

Our study provides robust evidence that there was limited community transmission during the first epidemic wave of COVID-19 in Sydney. This is undoubtedly due to the early and successful implementation of national and state-based public health measures as well as a high degree of compliance with these measures by the public.

While our findings highlight the successful control of COVID-19 in Sydney they also demonstrate that almost all of the population had not been infected by mid-May 2020. This emphasises the need to maintain strong efforts to mitigate the spread of COVID-19 to limit subsequent epidemics as well as the need for vaccination programs.

What are serosurveys?

Serological surveys (serosurveys) like this one are being used around the world to estimate the prevalence of SARS-CoV-2-specific antibodies in different settings, and are important because they are able to detect cumulative number of SARS-CoV-2 infections in a population. Serological testing can detect prior infections regardless of whether the person has developed symptoms or whether they were tested at the time of their illness.

What have serosurveys in other countries shown?

Many countries are now using serosurveys, with various methods to obtain blood samples, to understand the true spread of infection in their populations.

For example, in the [United Kingdom blood donor serosurveys](#) show that antibodies to SARS-CoV-2 in London were present in 17.5% of blood donors by late April 2020. In [Ontario, Canada](#), seroprevalance was 1.1% by June 2020, and in [New York state in the USA](#), 14% of the population, sampled while attending grocery stores, had antibodies to SARS-CoV-2 by the end of April 2020, which was >10 times higher than the rate of reported cases using the nose/throat PCR test.

Additional international studies are listed here: <https://serotracker.com/Explore>

Who were blood samples taken from and why?

De-identified blood samples that were collected for other purposes were used for the study. This comprised samples from women undergoing routine antenatal testing (20-39 years old), people getting a blood test at selected diagnostic pathology services (all ages), and people donating blood plasma (20-69 year olds).

Women undergoing antenatal care represent a relatively healthy population that is stable over time and is likely to have continued to seek clinical care during the pandemic. Blood donors represent a screened healthy population over a broader age range including both sexes, but limited to adults. People having a blood test at a diagnostic pathology service include all ages, but could over-represent people with specific illnesses who may be more likely to have self-isolated to reduce the risk of infection.

What test was used and how were they analysed?

The collection of samples from across the greater Sydney area were tested using serology methods that were developed at NSW Health Pathology's Institute of Clinical Pathology and Medical Research (ICPMR) laboratory at Westmead. The tests have a very high sensitivity and specificity and underwent a thorough validation process.

To produce seroprevalance estimates, statistical analysis using Bayesian methods was undertaken. Through this, seroprevalance estimates were adjusted for estimated test sensitivity and specificity (any possible false positives or false negatives) and uncertainties in these estimates.

Was there any difference in prevalence between the populations sampled?

Even though the seroprevalance point estimates from each population were slightly different, the estimates were all within the same range, together indicating that <1% of Sydneysiders were infected with SARS-CoV-2 during the first epidemic wave.

What are the limitations of this research?

There are a number of limitations of this research.

While the populations we sampled were complementary to each other, they are not necessarily representative of the population as a whole and this must be considered when interpreting our results.

As only a small number of participants were antibody positive we couldn't detect differences between subgroups, or adjust for differences in the age distribution of the collections.

Also, our ratio of estimated infections to reported cases (3.5 to 1) needs to be interpreted with caution as this may have changed over time and is highly context-dependent. Since our serosurvey, nose/throat PCR test use has expanded substantially in NSW to include anyone with mild respiratory symptoms or close contacts of cases. This will have increased the detection of mild or even asymptomatic cases, potentially resulting in a lower ratio of infections to notified cases over time.

Background info

About NCIRS

NCIRS is the leading research organisation in Australia that provides objective expert advice on all aspects of vaccine preventable diseases, seroepidemiology, and other issues related to immunisation, to inform policy and planning for immunisation services in Australia.

Research and surveillance activities include the surveillance of infectious diseases, monitoring of vaccination coverage, vaccination program evaluations, vaccine safety monitoring and social research. NCIRS also provides technical support for the Australian Technical Advisory Group on Immunisation, including production of The Australian Immunisation Handbook.

NCIRS is undertaking multiple research projects to support the response to the COVID-19 pandemic in NSW nationally and internationally. <http://ncirs.org.au/covid-19/ncirs-covid-19-response>

About The Kirby Institute

The Kirby Institute is a leading global research institute dedicated to the prevention, treatment and of infectious diseases.

The primary work of The Kirby Institute relates to the coordination of national surveillance programs, population health and epidemiological research, clinical and behavioural research and clinical trials. Work in the laboratory is focused on finding ways to control infections, develop new therapies and ultimately towards the development of preventative vaccines. Outside of the laboratory, they provide critical leadership to decision makers in Australia and internationally on the most effective, efficient and sustainable strategies to address deadly epidemics.

Their world-class team comprises over 300 public health, clinical and laboratory scientists, research assistants, postgraduate students and professional staff. www.kirby.unsw.edu.au

About NSW Health Pathology

NSW Health Pathology (NSWHP) is creating better health and justice systems through the provision of highly specialised pathology and forensic services across the state. NSWHP's laboratory staff support clinical teams to make the best possible treatment decisions for patients, and the Forensic & Analytical Science Service provides independent, objective analysis to the NSW criminal and coronial justice systems.

At the commencement of the pandemic, NSW Health Pathology's ICPMR initiated the first diagnostic molecular test for COVID-19 and worked around the clock to grow the live virus. NSWHP quickly disseminated specialist diagnostic testing in its laboratories across NSW, which have continued to meet the increasing demand for testing across the state. The team at the ICPMR mapped the virus using whole genome sequencing and developed an accurate antibody blood test to assist the public health response. NSWHP continues to work hard to help protect the people of NSW during this pandemic and beyond.