

COVID-19 Resource Desk

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New Research

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COVID-19 related publications by Providence caregivers – see [Digital Commons](#)

Basic Science / Virology / Pre-clinical

1. **Mapping mutations to the SARS-CoV-2 RBD that escape binding by different classes of antibodies.** Greaney AJ et al. *Nat Commun.* 2021 Jul 7;12(1):4196. doi: 10.1038/s41467-021-24435-8. <https://www.nature.com/articles/s41467-021-24435-8>
Monoclonal antibodies targeting a variety of epitopes have been isolated from individuals previously infected with SARS-CoV-2, but the relative contributions of these different antibody classes to the polyclonal response remains unclear. Here we use a yeast-display system to map all mutations to the viral spike receptor-binding domain (RBD) that escape binding by representatives of three potentially neutralizing classes of anti-RBD antibodies with high-resolution structures. We compare the antibody-escape maps to similar maps for convalescent polyclonal plasmas, including plasmas from individuals from whom some of the antibodies were isolated. While the binding of polyclonal plasma antibodies are affected by mutations across multiple RBD epitopes, the plasma-escape maps most resemble those of a single class of antibodies that target an epitope on the RBD that includes site E484. Therefore, although the human immune system can produce antibodies that target diverse RBD epitopes, in practice the polyclonal response to infection is skewed towards a single class of antibodies targeting an epitope that is already undergoing rapid evolution.

Diagnostics & Screening

2. **Performance of the Innova SARS-CoV-2 antigen rapid lateral flow test in the Liverpool asymptomatic testing pilot: population-based cohort study.** García-Fiñana M, et al. *BMJ.* 2021 Jul 6;374:n1637. doi: 10.1136/bmj.n1637. <https://www.bmj.com/content/374/bmj.n1637>
The Innova LFT can be useful for identifying infections among adults who report no symptoms of covid-19, particularly those with high viral load who are more likely to infect others. The number of asymptomatic adults with lower Ct (indicating higher viral load) missed by LFT, although small, should be considered when using single LFT in high consequence settings. Clear and accurate communication with the public about how to interpret test results is important, given the chance of missing some cases, even at high viral loads. Further research is needed to understand how infectiousness is reflected in the viral antigen shedding detected by LFT versus the viral loads approximated by RT-qPCR.

Epidemiology & Public Health

3. **Association between Caseload Surge and COVID-19 Survival in 558 U.S. Hospitals, March to August 2020.** Kadri SS et al. *Ann Intern Med.* 2021 Jul 6. doi: 10.7326/M21-1213.

<https://www.acpjournals.org/doi/10.7326/M21-1213>

Despite improvements in COVID-19 survival between March and August 2020, surges in hospital COVID-19 caseload remained detrimental to survival and potentially eroded benefits gained from emerging treatments. Bolstering preventive measures and supporting surging hospitals will save many lives.

Prognosis

4. **Age and Acute Ischemic Stroke Outcome in North American Patients with COVID-19.** Dmytriw AA et al. *J Am Heart Assoc.* 2021 Jul 3:e021046. doi: 10.1161/JAHA.121.021046.

<https://www.ahajournals.org/doi/10.1161/JAHA.121.021046>

AIS in the context of COVID-19 affects young patients at much greater rates than pre-pandemic controls. Nevertheless, instances of poor functional outcome and mortality are closely tied to increasing age.

Survivorship & Rehabilitation

5. **Prevalence of Symptoms More Than Seven Months after Diagnosis of Symptomatic COVID-19 in an Outpatient Setting.** Nehme M, et al. *Ann Intern Med.* 2021 Jul 6. doi: 10.7326/M21-0878.

<https://www.acpjournals.org/doi/10.7326/M21-0878>

Residual symptoms after SARS-CoV-2 infection are common among otherwise young and healthy persons followed in an outpatient setting. These findings contribute to the recognition of long-term effects in a disease mostly counted by its death toll to date by promoting communication on postacute sequelae of SARS-CoV-2 and encouraging physicians to continue long-term monitoring of their patients.

6. **Assessment of Prolonged Physiological and Behavioral Changes Associated With COVID-19 Infection.** Radin JM, et al. *JAMA Netw Open.* 2021;4(7):e2115959.

doi:10.1001/jamanetworkopen.2021.15959

<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2781687>

Using longer duration wearable sensor data, we found a prolonged physiological impact of COVID-19 infection, lasting approximately 2 to 3 months, on average, but with substantial intraindividual variability, which may reflect various levels of autonomic nervous system dysfunction or potentially ongoing inflammation. Transient bradycardia has been noted in a case study⁶ approximately 9 to 15 days after symptom onset, which was also seen in our population. Our data suggest that early symptoms and larger initial RHR response to COVID-19 infection may be associated with the physiological length of recovery from this virus.

- 7. Outcomes among Patients Referred to Outpatient Rehabilitation Clinics After COVID-19 diagnosis — United States, January 2020–March 2021.** Rogers-Brown JS, et al. *MMWR Morb Mortal Wkly Rep* 2021;70. DOI: <http://dx.doi.org/10.15585/mmwr.mm7027a2>
Compared with control patients enrolled in a cancer rehabilitation program, adult post–COVID-19 patients referred for rehabilitation services reported poorer physical health and being less able to engage in physical activities and activities of daily living. Patients recovering from COVID-19 also had significantly higher health care use than control patients. Patients recovering from COVID-19 might require tailored physical and mental health rehabilitation services.

Therapeutics

- 8. Effect of Tenofovir Disoproxil Fumarate and Emtricitabine on nasopharyngeal SARS-CoV-2 viral load burden amongst outpatients with COVID-19: A pilot, randomized, open-label phase 2 trial.** Parienti JJ et al. *EClinicalMedicine*. 2021 Jun 27:100993. doi: 10.1016/j.eclinm.2021.100993. [https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370\(21\)00273-X/fulltext](https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(21)00273-X/fulltext)
In this pilot study of outpatients adult with recent non-severe COVID-19, tenofovir disoproxil fumarate plus emtricitabine appeared to accelerate the natural clearance of nasopharyngeal SARS-CoV-2 viral burden. These findings support the conduct of larger trials of tenofovir-based therapies for the prevention and early treatment of COVID-19.
- 9. Association between Administration of IL-6 Antagonists and Mortality Among Patients Hospitalized for COVID-19: A Meta-analysis.** WHO Rapid Evidence Appraisal for COVID-19 Therapies (REACT) Working Group. *JAMA*. 2021 Jul 6. doi: 10.1001/jama.2021.11330. <https://jamanetwork.com/journals/jama/fullarticle/2781880>
In this prospective meta-analysis of clinical trials of patients hospitalized for COVID-19, administration of IL-6 antagonists, compared with usual care or placebo, was associated with lower 28-day all-cause mortality.
**See also: [IL-6 Receptor Antagonist Therapy for Patients Hospitalized for COVID-19: Who, When, and How?](#)* Matthay MA, Luetkemeyer AF. *JAMA*. 2021 Jul 6. doi: 10.1001/jama.2021.11121.

Transmission / Infection Control

- 10. Safety and structural integrity of N95/PFF2 respirators decontamination.** Coelho WEGS, et al. *Am J Infect Control*. 2021 Jul 3:S0196-6553(21)00461-2. doi: 10.1016/j.ajic.2021.06.018. [https://www.ajicjournal.org/article/S0196-6553\(21\)00461-2/fulltext](https://www.ajicjournal.org/article/S0196-6553(21)00461-2/fulltext)
N95/PFF2 respirators were subjected to hydrogen peroxide decontamination and analyzed using scanning electron microscopy (SEM) and thermogravimetric analysis (TGA). Seven respirators of the same brand and lot were used, one being a control and the other six subjected to decontamination process. As for the sealing, a qualitative test was applied, in order to identify the changes in the structure that could damage the sealing of respirators. Results indicated that the fiber morphology in all layers was not affected by the six decontamination cycles. Also, the thermal stability in the different layers was very similar. Fit

testing showed that the respirators submitted to all cycles of decontamination were approved. Thus, it is possible to conclude that the hydrogen peroxide decontamination method is effective, since it does not alter the physical properties of the respirators.

11. **Efficacy of Portable Air Cleaners and Masking for Reducing Indoor Exposure to Simulated Exhaled SARS-CoV-2 Aerosols - United States, 2021.** Lindsley WG, et al. *MMWR Morb Mortal Wkly Rep.* 2021 Jul 9;70(27):972-976. doi: 10.15585/mmwr.mm7027e1. <https://www.cdc.gov/mmwr/volumes/70/wr/mm7027e1.htm>

To investigate the effectiveness of portable HEPA air cleaners and universal masking at reducing exposure to exhaled aerosol particles, the investigation team used respiratory simulators to mimic a person with COVID-19 and other, uninfected persons in a conference room. The addition of two HEPA air cleaners that met the Environmental Protection Agency (EPA)-recommended clean air delivery rate (CADR) (5) reduced overall exposure to simulated exhaled aerosol particles by up to 65% without universal masking. Without the HEPA air cleaners, universal masking reduced the combined mean aerosol concentration by 72%. The combination of the two HEPA air cleaners and universal masking reduced overall exposure by up to 90%. The HEPA air cleaners were most effective when they were close to the aerosol source. These findings suggest that portable HEPA air cleaners can reduce exposure to SARS-CoV-2 aerosols in indoor environments, with greater reductions in exposure occurring when used in combination with universal masking.

Vaccines / Immunology

12. **Reduced sensitivity of SARS-CoV-2 variant Delta to antibody neutralization.** Delphine Planas D, et al. *Nature.* 2021 Jul 8. doi: 10.1038/s41586-021-03777-9. <https://doi.org/10.1038/s41586-021-03777-9>

We examined its sensitivity to monoclonal antibodies (mAbs) and to antibodies present in sera from COVID-19 convalescent individuals or vaccine recipients, in comparison to other viral strains. Variant Delta was resistant to neutralization by some anti-NTD and anti-RBD mAbs including Bamlanivimab, which were impaired in binding to the Spike. Sera from convalescent patients collected up to 12 months post symptoms were 4 fold less potent against variant Delta, relative to variant Alpha (B.1.1.7). Sera from individuals having received one dose of Pfizer or AstraZeneca vaccines barely inhibited variant Delta. Administration of two doses generated a neutralizing response in 95% of individuals, with titers 3 to 5 fold lower against Delta than Alpha. Thus, variant Delta spread is associated with an escape to antibodies targeting non-RBD and RBD Spike epitopes.

13. **Efficacy and safety of an inactivated whole-virion SARS-CoV-2 vaccine (CoronaVac): interim results of a double-blind, randomised, placebo-controlled, phase 3 trial in Turkey.** Tanriover MD, et al. *Lancet* July 08, 2021 DOI:[https://doi.org/10.1016/S0140-6736\(21\)01429-X](https://doi.org/10.1016/S0140-6736(21)01429-X) [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)01429-X/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01429-X/fulltext) 10,218 volunteers were randomly allocated. During a median follow-up period of 43 days, nine cases of PCR-confirmed symptomatic COVID-19 were reported in the vaccine group and 32 cases were reported in the placebo group 14 days or more after the second dose, yielding a

vaccine efficacy of 83.5%. The frequencies of any adverse events were 18.9% in the vaccine group and 16.9% in the placebo group with no fatalities or grade 4 adverse events.

14. **Paucity and discordance of neutralising antibody responses to SARS-CoV-2 VOCs in vaccinated immunodeficient patients and health-care workers in the UK.** Nadesalingam A, et al. *Lancet Microbe*. 2021 Jun 28. doi: 10.1016/S2666-5247(21)00157-9.
[https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247\(21\)00157-9/fulltext](https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00157-9/fulltext)
We did a single-centre, cross-sectional study of immunodeficient outpatients and health-care workers employed at the same tertiary critical care National Health Service (NHS) Trust to understand the spectrum of immunity to the B.1 vaccine strain compared with three major VOCs after vaccination with one dose of either BNT162b2 or ChAdOx1 nCoV-19. NAb titres to B.1 were highest in vaccinated health-care workers with a history of previous SARS-CoV-2 infection, with no significant difference between the responses induced by BNT162b2 or ChAdOx1 nCoV-19 vaccines. Furthermore, with the exception of one immunodeficient patient with a history of SARS-CoV-2 infection, average NAb titres were five-fold lower in immunodeficient outpatients than in health-care workers. These data not only underscore the risk of clinically vulnerable patients to infection with SARS-CoV-2, but also the risk of onward transmission of VOCs by individual health-care workers with no or low NABs.
15. **Neutralising capacity against Delta (B.1.617.2) and other variants of concern following Comirnaty (BNT162b2, BioNTech/Pfizer) vaccination in health care workers, Israel.** Lustig Y, et al. *Euro Surveill*. 2021 Jul;26(26). doi: 10.2807/1560-7917.ES.2021.26.26.2100557.
<https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2021.26.26.2100557>
SARS-CoV-2 Delta (B.1.617.2) variant of concern (VOC) and other VOCs are spreading in Europe. Micro-neutralisation assays with sera obtained after Comirnaty (BNT162b2, BioNTech/Pfizer) vaccination in 36 healthcare workers (31 female) demonstrated significant fold change reduction in neutralising titres compared with the original virus: Gamma (P.1) 2.3, Beta (B.1.351) 10.4, Delta 2.1 and 2.6. The reduction of the Alpha (B.1.1.7) variant was not significant. Despite being lower, remaining neutralisation capacity conferred by Comirnaty against Delta and other VOCs is probably protective.
16. **Neutralisation of SARS-CoV-2 lineage P.1 by antibodies elicited through natural SARS-CoV-2 infection or vaccination with an inactivated SARS-CoV-2 vaccine: an immunological study.** Souza WM, et al. *Lancet*. July 08, 2021 DOI: [https://doi.org/10.1016/S2666-5247\(21\)00129-4](https://doi.org/10.1016/S2666-5247(21)00129-4)
[https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247\(21\)00129-4/fulltext](https://www.thelancet.com/journals/lanmic/article/PIIS2666-5247(21)00129-4/fulltext)
SARS-CoV-2 lineage P.1 (first found in Brazil) might escape neutralisation by antibodies generated in response to polyclonal stimulation against previously circulating variants of SARS-CoV-2. Continuous genomic surveillance of SARS-CoV-2 combined with antibody neutralisation assays could help to guide national immunisation programmes.
17. **Breakthrough SARS-CoV-2 Infections in Prison after Vaccination.** Brinkley-Rubinstein L, et al. *N Engl J Med*. 2021 Jul 7. doi: 10.1056/NEJMc2108479.
<https://www.nejm.org/doi/full/10.1056/NEJMc2108479>

We found that SARS-CoV-2 breakthrough infections were identified only rarely after vaccination in a carceral setting in Rhode Island. Thus, vaccination of staff members and incarcerated persons, along with a policy of expanded decarceration,⁵ appeared to be effective in preventing the transmission of SARS-CoV-2.

18. **Effectiveness of an Inactivated SARS-CoV-2 Vaccine in Chile.** Jara A et al. *N Engl J Med.* 2021 Jul 7. doi: 10.1056/NEJMoa2107715. <https://www.nejm.org/doi/full/10.1056/NEJMoa2107715>
Our results suggest that the inactivated SARS-CoV-2 vaccine effectively prevented Covid-19, including severe disease and death, a finding that is consistent with results of phase 2 trials of the vaccine.

19. **Infection and Vaccine-Induced Neutralizing-Antibody Responses to the SARS-CoV-2 B.1.617 Variants.** Edara VV et al. *N Engl J Med.* 2021 Jul 7. doi: 10.1056/NEJMc2107799. <https://www.nejm.org/doi/full/10.1056/NEJMc2107799>
Our results show that the B.1.617.1 variant was 6.8 times less susceptible, and the B.1.617.2 variant was 2.9 times less susceptible, to neutralization by serum from persons who had recovered from Covid-19 and from vaccinated persons than was the WA1/2020 variant. Despite this finding, a majority of the convalescent serum samples against B.1.617.1 and 96% against B.1.617.2 and all serum samples from vaccinated persons still had detectable neutralizing activity above the threshold of detection against both variants through 3 months after infection or after the second dose of vaccine. Thus, protective immunity conferred by the mRNA vaccines is most likely retained against the B.1.617.1 and B.1.617.2 variants.

20. **Antibody titers decline 3-month post-vaccination with BNT162b2.** Favresse J, et al. *Emerg Microbes Infect.* 2021 Jul 7:1-8. doi: 10.1080/22221751.2021.1953403. <https://pubmed.ncbi.nlm.nih.gov/34232116/>
In both seropositive and seronegative subjects, a significant antibody decline was observed at 3 months compared to the peak response. Nevertheless, the humoral response remained robust in all participants.

21. **Use of mRNA COVID-19 Vaccine after Reports of Myocarditis Among Vaccine Recipients: Update from the Advisory Committee on Immunization Practices - United States, June 2021.** Gargano JW et al. *MMWR Morb Mortal Wkly Rep.* 2021 Jul 9;70(27):977-982. doi: 10.15585/mmwr.mm7027e2. <https://www.cdc.gov/mmwr/volumes/70/wr/mm7027e2.htm>
After reports of myocarditis and pericarditis in mRNA vaccine recipients,[¶] which predominantly occurred in young males after the second dose, an ACIP meeting was rapidly convened to review reported cases of myocarditis and pericarditis and discuss the benefits and risks of mRNA COVID-19 vaccination in the United States. Myocarditis is an inflammation of the heart muscle; if it is accompanied by pericarditis, an inflammation of the thin tissue surrounding the heart (the pericardium), it is referred to as myopericarditis. Hereafter, myocarditis is used to refer to myocarditis, pericarditis, or myopericarditis. On June 23, 2021, after reviewing available evidence including that for risks of myocarditis, ACIP determined that the benefits of using mRNA COVID-19 vaccines under the FDA's EUA clearly outweigh the risks in all populations, including adolescents and young adults. The EUA has been modified to include information on

myocarditis after receipt of mRNA COVID-19 vaccines. The EUA fact sheets should be provided before vaccination; in addition, CDC has developed patient and provider education materials about the possibility of myocarditis and symptoms of concern, to ensure prompt recognition and management of myocarditis.

Women & Children

22. **Acceptability of Adolescent COVID-19 Vaccination among Adolescents and Parents of Adolescents — United States, April 15–23, 2021.** Scherer AM, et al. *MMWR Morb Mortal Wkly Rep.* ePub: 9 July 2021. DOI: <http://dx.doi.org/10.15585/mmwr.mm7028e1>
In April 2021, 52% of unvaccinated adolescents aged 13–17 years and 56% of parents of unvaccinated adolescents aged 12–17 years reported intent for adolescent COVID-19 vaccination. The most common factors that would increase vaccination intent were receiving more information about adolescent COVID-19 vaccine safety and efficacy. Efforts focusing on effectively communicating the benefits and safety of COVID-19 vaccination for adolescents to the public could help increase adolescent COVID-19 vaccine confidence and vaccination coverage.
23. **Evaluation of Messenger RNA from COVID-19 BTN162b2 and mRNA-1273 Vaccines in Human Milk.** Golan Y, et al. *JAMA Pediatr.* 2021 Jul 6. doi: 10.1001/jamapediatrics.2021.1929. <https://jamanetwork.com/journals/jamapediatrics/fullarticle/2781679>
Vaccine-associated mRNA was not detected in 13 milk samples collected 4 to 48 hours after vaccination from 7 breastfeeding individuals. These results provide important early evidence to strengthen current recommendations that vaccine-related mRNA is not transferred to the infant and that lactating individuals who receive the COVID-19 mRNA-based vaccine should not stop breastfeeding. In addition, any residual mRNA below the limits of detection in our assay would undergo degradation by the infant gastrointestinal system, further reducing infant exposure.

GUIDELINES & CONSENSUS STATEMENTS

[Guidance for Health Care Leaders During the Recovery Stage of the COVID-19 Pandemic: A Consensus Statement.](#) Geerts JM et al. *JAMA Netw Open.* 2021 Jul 1;4(7):e2120295. doi: 10.1001/jamanetworkopen.2021.20295.

[Choosing Wisely for COVID-19: ten evidence-based recommendations for patients and physicians.](#) Pramesh CS et al. *Nat Med.* 2021 Jul 5. doi: 10.1038/s41591-021-01439-x.

FDA / CDC / NIH / WHO Updates

[Joint CDC and FDA Statement on Vaccine Boosters](#), July 8, 2021 (see Press Release from Pfizer/BioNTech below)

NIH – Covid-19 Treatment Guidelines, [General Management and Therapeutic Management of Nonhospitalized Patients](#). Added July 8, 2021

WHO - [Therapeutics and COVID-19: living guideline](#)

Commentary / Press Releases

[Nurses Promoting Inclusive, Safe, Resilient, and Sustainable Cities and Communities: Taking Action on COVID-19, Systemic Racism, and Climate Change](#). Schenk, Elizabeth C, et al. [**Providence author**] *Am J Nurs*. 2021 Jul 1;121(7):66-69. doi: 10.1097/01.NAJ.0000758540.26343.2e.

[Pfizer and BioNTech Provide Update on Booster Program in Light of the Delta-Variant](#). July 8, 2021

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