Natural Immunity and Covid-19: Twenty-Nine Scientific Studies to Share with Employers, Health Officials, and Politicians

By Brownstone Institute October 10, 2021

From the beginning of the March 2020 lockdowns for the SARS-CoV-2 virus, the subject of natural immunity (also called post-infection immunity) has been neglected. Once the vaccination became widely available, what began with near silence at the beginning turned nearly into a complete blackout of the topic.

Even now, there is an absence of open discussion, presumably in the interests of promoting universal vaccination and required documentation of such vaccination as a condition of participating in public life and even the jobs marketplace. Still, the science exists. Many studies exist. Their authors deserve credit, recognition, and to have their voices heard.

These studies demonstrate what was and is already known: natural immunity for a SARS-type virus is robust, long-lasting, and broadly effective even in the case of mutations, generally more so than vaccines. In fact, a major contribution of 20th-century science has been to expand upon and further elucidate this principle that has been known since the ancient world. Every expert presumably knew this long before the current debates. The effort to pretend otherwise is a scientific scandal of the highest order, especially because the continued neglect of the topic is affecting the rights and freedoms of billions of people.

People who have contracted the virus and recovered deserve recognition. For that matter, people who prefer an exposure risk to the virus in order to gain robust immunity deserve the freedom to make that choice. The realization that natural immunity – which pertains now to perhaps half of the US population and billions around the world – is effective in providing protection should have a dramatic effect on vaccine mandates.

Individuals whose livelihoods and liberties are being deprecated and deleted need access to the scientific literature as it pertains to this virus. They should send a link to this page far and wide. The scientists have not been silent; they just haven't received the public attention they deserve. The preparation of this list was assisted by links provided by Paul Elias Alexander and Rational Ground's own cheat sheet on natural immunity, which also includes links to popular articles on the topic.

1. One-year sustained cellular and humoral immunities of COVID-19 convalescents, by Jie Zhang, Hao Lin, Beiwei Ye, Min Zhao, Jianbo Zhan, et al. Clinical Infectious Diseases, October 5, 2021. "SARS-CoV-2-specific IgG antibodies, and also NAb can persist among over 95% COVID-19 convalescents from 6 months to 12 months after disease onset. At least 19/71 (26%) of COVID-19 convalescents (double positive in ELISA and MCLIA) had detectable circulating IgM antibody against SARS-CoV-2 at 12m post-disease onset. Notably, the percentages of convalescents with positive SARS-CoV-2-specific T-cell responses (at least one of the SARS-CoV-2 antigen S1, S2, M and N protein) were 71/76

(93%) and 67/73 (92%) at 6m and 12m, respectively. Furthermore, both antibody and T-cell memory levels of the convalescents were positively associated with their disease severity."

2. Comparing SARS-CoV-2 natural immunity to vaccine-induced immunity: reinfections versus breakthrough infections, by Sivan Gazit, Roei Shlezinger, Galit Perez, Roni Lotan, Asaf Peretz, Amir Ben-Tov, Dani Cohen, Khitam Muhsen, Gabriel Chodick, Tal Patalon. MedRxiv, August 25, 2021. "Our analysis demonstrates that SARS-CoV-2-naïve vaccinees had a 13.06-fold increased risk for breakthrough infection with the Delta variant compared to those previously infected, when the first event (infection or vaccination) occurred during January and February of 2021. The increased risk was significant for a symptomatic disease as well…. This analysis demonstrated that natural immunity affords longer lasting and stronger protection against infection, symptomatic disease and hospitalization due to the Delta variant of SARS-CoV-2, compared to the BNT162b2 two-dose vaccine-induced immunity."

3. Shedding of Infectious SARS-CoV-2 Despite Vaccination, by Kasen K. Riemersma, Brittany E. Grogan, Amanda Kita-Yarbro, Gunnar E. Jeppson, David H. O'Connor, Thomas C. Friedrich, Katarina M. Grande, MedRxiv, August 24, 2021. "The SARS-CoV-2 Delta variant might cause high viral loads, is highly transmissible, and contains mutations that confer partial immune escape. Outbreak investigations suggest that vaccinated persons can spread Delta. We compared RT-PCR cycle threshold (Ct) data from 699 swab specimens collected in Wisconsin 29 June through 31 July 2021 and tested with a qualitative assay by a single contract laboratory. Specimens came from residents of 36 counties, most in southern and southeastern Wisconsin, and 81% of cases were not associated with an outbreak. During this time, estimated prevalence of Delta variants in Wisconsin increased from 69% to over 95%. Vaccination status was determined via self-reporting and state immunization records."

4. Necessity of COVID-19 vaccination in previously infected individuals, by Nabin K. Shrestha, Patrick C. Burke, Amy S. Nowacki, Paul Terpeluk, Steven M. Gordon, MedRxiv, June 5, 2021. "Individuals who have had SARS-CoV-2 infection are unlikely to benefit from COVID-19 vaccination, and vaccines can be safely prioritized to those who have not been infected before."

5. Large-scale study of antibody titer decay following BNT162b2 mRNA vaccine or SARS-CoV-2 infection, by Ariel Israel, Yotam Shenhar, Ilan Green, Eugene Merzon, Avivit Golan-Cohen, Alejandro A Schäffer, Eytan Ruppin, Shlomo Vinker, Eli Magen. MedRxiv, August 22, 2021. "This study demonstrates individuals who received the Pfizer-BioNTech mRNA vaccine have different kinetics of antibody levels compared to patients who had been infected with the SARS-CoV-2 virus, with higher initial levels but a much faster exponential decrease in the first group."

6. Discrete Immune Response Signature to SARS-CoV-2 mRNA Vaccination Versus Infection, by Ellie Ivanova, Joseph Devlin, et al. Cell, May 2021. "While both infection and vaccination induced robust innate and adaptive immune responses, our analysis revealed significant qualitative differences between the two types of immune challenges. In COVID-19 patients, immune responses were characterized by a highly augmented interferon response which was largely absent in vaccine recipients."

7. SARS-CoV-2 infection induces long-lived bone marrow plasma cells in humans, by Jackson S. Turner, Wooseob Kim, Elizaveta Kalaidina, Charles W. Goss, Adriana M. Rauseo, Aaron J. Schmitz,

Lena Hansen, Alem Haile, Michael K. Klebert, Iskra Pusic, Jane A. O'Halloran, Rachel M. Presti, Ali H. Ellebedy. Nature, May 24, 2021. "This study sought to determine whether infection with SARS-CoV-2 induces antigen-specific long-lived BMPCs in humans. We detected SARS-CoV-2 S-specific BMPCs in bone marrow aspirates from 15 out of 19 convalescent individuals, and in none from the 11 control participants…. Overall, our results are consistent with SARS-CoV-2 infection eliciting a canonical T-cell-dependent B cell response, in which an early transient burst of extrafollicular plasmablasts generates a wave of serum antibodies that decline relatively quickly. This is followed by more stably maintained levels of serum antibodies that are supported by long-lived BMPCs."

8. Longitudinal analysis shows durable and broad immune memory after SARS-CoV-2 infection with persisting antibody responses and memory B and T cells, by Kristen W. Cohen, Susanne L. Linderman, Zoe Moodie, Julie Czartoski, Lilin Lai, Grace Mantus, Carson Norwood, Lindsay E. Nyhoff, Venkata Viswanadh Edara, et al. MedRxiv, April 27, 2021. "Ending the COVID-19 pandemic will require long-lived immunity to SARS-CoV-2. We evaluated 254 COVID-19 patients longitudinally from early infection and for eight months thereafter and found a predominant broad-based immune memory response. SARS-CoV-2 spike binding and neutralizing antibodies exhibited a bi-phasic decay with an extended half-life of >200 days suggesting the generation of longer-lived plasma cells. In addition, there was a sustained IgG+ memory B cell response, which bodes well for a rapid antibody response upon virus re-exposure."

9. Incidence of Severe Acute Respiratory Syndrome Coronavirus-2 infection among previously infected or vaccinated employees, by N Kojima, A Roshani, M Brobeck, A Baca, JD Klausner. MedRxiv, July 8, 2021. "Previous SARS-CoV-2 infection and vaccination for SARS-CoV-2 were associated with decreased risk for infection or re-infection with SARS-CoV-2 in a routinely screened workforce. The was no difference in the infection incidence between vaccinated individuals and individuals with previous infection. Further research is needed to determine whether our results are consistent with the emergence of new SARS-CoV-2 variants."

10. Single cell profiling of T and B cell repertoires following SARS-CoV-2 mRNA vaccine, by Suhas Sureshchandra, Sloan A. Lewis, Brianna Doratt, Allen Jankeel, Izabela Ibraim, Ilhem Messaoudi. BioRxiv, July 15, 2021. "Interestingly, clonally expanded CD8 T cells were observed in every vaccinee, as observed following natural infection. TCR gene usage, however, was variable, reflecting the diversity of repertoires and MHC polymorphism in the human population. Natural infection induced expansion of larger CD8 T cell clones occupied distinct clusters, likely due to the recognition of a broader set of viral epitopes presented by the virus not seen in the mRNA vaccine. Our study highlights a coordinated adaptive immune response where early CD4 T cell responses facilitate the development of the B cell response and substantial expansion of effector CD8 T cells, together capable of contributing to future recall responses."

11. mRNA vaccine-induced T cells respond identically to SARS-CoV-2 variants of concern but differ in longevity and homing properties depending on prior infection status, Jason Neidleman, Xiaoyu Luo, Matthew McGregor, Guorui Xie, Victoria Murray, Warner C. Greene, Sulggi A. Lee, Nadia R. Roan. BioRxiv, July 29, 2021. "In infection-naïve individuals, the second dose boosted the quantity and altered the phenotypic properties of SARS-CoV-2-specific T cells, while in convalescents the second dose changed neither. Spike-specific T cells from convalescent vaccinees differed strikingly from those

of infection-naïve vaccinees, with phenotypic features suggesting superior long-term persistence and ability to home to the respiratory tract including the nasopharynx. These results provide reassurance that vaccine-elicited T cells respond robustly to emerging viral variants, confirm that convalescents may not need a second vaccine dose, and suggest that vaccinated convalescents may have more persistent nasopharynx-homing SARS-CoV-2-specific T cells compared to their infection-naïve counterparts."

12. Immunological memory to SARS-CoV-2 assessed for up to 8 months after infection, Jennifer M. Dan, Jose Mateus, Yu Kato, Kathryn M. Hastie, et al., Science, January 6, 2021. "Understanding immune memory to SARS-CoV-2 is critical for improving diagnostics and vaccines, and for assessing the likely future course of the COVID-19 pandemic. We analyzed multiple compartments of circulating immune memory to SARS-CoV-2 in 254 samples from 188 COVID-19 cases, including 43 samples at ≥ 6 months post-infection. IgG to the Spike protein was relatively stable over 6+ months. Spike-specific memory B cells were more abundant at 6 months than at 1 month post symptom onset. SARS-CoV-2-specific CD4+ T cells and CD8+ T cells declined with a half-life of 3-5 months. By studying antibody, memory B cell, CD4+ T cell, and CD8+ T cell memory to SARS-CoV-2 in an integrated manner, we observed that each component of SARS-CoV-2 immune memory exhibited distinct kinetics."

13. Persistence of neutralizing antibodies a year after SARS-CoV-2 infection, by Anu Haveri, Nina Ekström, Anna Solastie, Camilla Virta, Pamela Österlund, Elina Isosaari, Hanna Nohynek, Arto A. Palmu, Merit Melin. MedRxiv, July 16, 2021. "We assessed the persistence of serum antibodies following wild-type SARS-CoV-2 infection six and twelve months after diagnosis in 367 individuals of whom 13% had severe disease requiring hospitalization. We determined the SARS-CoV-2 spike (S-IgG) and nucleoprotein IgG concentrations and the proportion of subjects with neutralizing antibodies (NAb)."

14. Quantifying the risk of SARS-CoV-2 reinfection over time, by Eamon O Murchu, Paula Byrne, Paul G. Carty, et al. Rev Med Virol. 2021. "Reinfection was an uncommon event (absolute rate 0%–1.1%), with no study reporting an increase in the risk of reinfection over time. Only one study estimated the population-level risk of reinfection based on whole genome sequencing in a subset of patients; the estimated risk was low (0.1% [95% CI: 0.08–0.11%]) with no evidence of waning immunity for up to 7 months following primary infection. These data suggest that naturally acquired SARS-CoV-2 immunity does not wane for at least 10 months post-infection. However, the applicability of these studies to new variants or to vaccine-induced immunity remains uncertain."

15. SARS-CoV-2 antibody-positivity protects against reinfection for at least seven months with 95% efficacy, by Laith J. Abu-Raddad, Hiam Chemaitelly, Peter Coyle, Joel A. Malek. The Lancet, July 27, 2021. "Reinfection is rare in the young and international population of Qatar. Natural infection appears to elicit strong protection against reinfection with an efficacy ~95% for at least seven months."

16. Natural immunity against COVID-19 significantly reduces the risk of reinfection: findings from a cohort of sero-survey participants, by Bijaya Kumar Mishra, Debdutta Bhattacharya, Jaya Singh Kshatri, Sanghamitra Pati. MedRxiv, July 19, 2021. "These findings reinforce the strong plausibility

that development of antibody following natural infection not only protects against re-infection by the virus to a great extent, but also safeguards against progression to severe COVID-19 disease."

17. Protection of previous SARS-CoV-2 infection is similar to that of BNT162b2 vaccine protection: A three-month nationwide experience from Israel, by Yair Goldberg, Micha Mandel, Yonatan Woodbridge, Ronen Fluss, Ilya Novikov, Rami Yaari, Arnona Ziv, Laurence Freedman, Amit Huppert, et al.. MedRxiv, April 24, 2021. "Similarly, the overall estimated level of protection from prior SARS-CoV-2 infection for documented infection is 94·8% (CI:[94·4, 95·1]); hospitalization 94·1% (CI:[91·9, 95·7]); and severe illness 96·4% (CI:[92·5, 98·3]). Our results question the need to vaccinate previously-infected individuals."

18. Immune Memory in Mild COVID-19 Patients and Unexposed Donors Reveals Persistent T Cell Responses After SARS-CoV-2 Infection, by Asgar Ansari, Rakesh Arya, Shilpa Sachan, Someshwar Nath Jha, Anurag Kalia, Anupam Lall, Alessandro Sette, et al. Front Immunol. March 11, 2021. "Using HLA class II predicted peptide megapools, we identified SARS-CoV-2 cross-reactive CD4+ T cells in around 66% of the unexposed individuals. Moreover, we found detectable immune memory in mild COVID-19 patients several months after recovery in the crucial arms of protective adaptive immunity; CD4+ T cells and B cells, with a minimal contribution from CD8+ T cells. Interestingly, the persistent immune memory in COVID-19 patients is predominantly targeted towards the Spike glycoprotein of the SARS-CoV-2. This study provides the evidence of both high magnitude pre-existing and persistent immune memory in Indian population."

19. Live virus neutralisation testing in convalescent patients and subjects vaccinated against 19A, 20B, 20I/501Y.V1 and 20H/501Y.V2 isolates of SARS-CoV-2, by Claudia Gonzalez, Carla Saade, Antonin Bal, Martine Valette, et al, MedRxiv, May 11, 2021. " No significant difference was observed between the 20B and 19A isolates for HCWs with mild COVID-19 and critical patients. However, a significant decrease in neutralisation ability was found for 20I/501Y.V1 in comparison with 19A isolate for critical patients and HCWs 6-months post infection. Concerning 20H/501Y.V2, all populations had a significant reduction in neutralising antibody titres in comparison with the 19A isolate. Interestingly, a significant difference in neutralisation capacity was observed for vaccinated HCWs between the two variants whereas it was not significant for the convalescent groups."

20. Highly functional virus-specific cellular immune response in asymptomatic SARS-CoV-2 infection, by Nina Le Bert, Hannah E. Clapham, Anthony T. Tan, Wan Ni Chia, et al, Journal of Experimental Medicine, March 1, 2021. "Thus, asymptomatic SARS-CoV-2–infected individuals are not characterized by weak antiviral immunity; on the contrary, they mount a highly functional virus-specific cellular immune response."

21. SARS-CoV-2-specific T cell memory is sustained in COVID-19 convalescent patients for 10 months with successful development of stem cell-like memory T cells, Jae Hyung Jung, Min-Seok Rha, Moa Sa, Hee Kyoung Choi, Ji Hoon Jeon, et al, Nature Communications, June 30, 2021. "In particular, we observe sustained polyfunctionality and proliferation capacity of SARS-CoV-2-specific T cells. Among SARS-CoV-2-specific CD4+ and CD8+ T cells detected by activation-induced markers, the proportion of stem cell-like memory T (TSCM) cells is increased, peaking at approximately 120 DPSO. Development of TSCM cells is confirmed by SARS-CoV-2-specific MHC-I multimer staining.

Considering the self-renewal capacity and multipotency of TSCM cells, our data suggest that SARS-CoV-2-specific T cells are long-lasting after recovery from COVID-19, thus support the feasibility of effective vaccination programs as a measure for COVID-19 control."

22. Antibody Evolution after SARS-CoV-2 mRNA Vaccination, by Alice Cho, Frauke Muecksch, Dennis Schaefer-Babajew, Zijun Wang, et al, BioRxiv, et al, BioRxiv, July 29, 2021. "We conclude that memory antibodies selected over time by natural infection have greater potency and breadth than antibodies elicited by vaccination. These results suggest that boosting vaccinated individuals with currently available mRNA vaccines would produce a quantitative increase in plasma neutralizing activity but not the qualitative advantage against variants obtained by vaccinating convalescent individuals." Newer version reads: "These results suggest that boosting vaccinated individuals with currently available mRNA vaccines will increase plasma neutralizing activity but may not produce antibodies with breadth equivalent to those obtained by vaccinating convalescent individuals."

23. Differential effects of the second SARS-CoV-2 mRNA vaccine dose on T cell immunity in naïve and COVID-19 recovered individuals, by Carmen Camara, Daniel Lozano-Ojalvo, Eduardo Lopez-Granados. Et al., BioRxiv, March 27, 2021. "While a two-dose immunization regimen with the BNT162b2 vaccine has been demonstrated to provide a 95% efficacy in naïve individuals, the effects of the second vaccine dose in individuals who have previously recovered from natural SARS-CoV-2 infection has been questioned. Here we characterized SARS-CoV-2 spike-specific humoral and cellular immunity in naïve and previously infected individuals during full BNT162b2 vaccination. Our results demonstrate that the second dose increases both the humoral and cellular immunity in naïve individuals. On the contrary, the second BNT162b2 vaccine dose results in a reduction of cellular immunity in COVID-19 recovered individuals, which suggests that a second dose, according to the current standard regimen of vaccination, may be not necessary in individuals previously infected with SARS-CoV-2."

24. COVID-19 natural immunity: Scientific Brief. World Health Organization. May 10, 2021. "Available scientific data suggests that in most people immune responses remain robust and protective against reinfection for at least 6-8 months after infection (the longest follow up with strong scientific evidence is currently approximately 8 months). Some variant SARS-CoV-2 viruses with key changes in the spike protein have a reduced susceptibility to neutralization by antibodies in the blood. While neutralizing antibodies mainly target the spike protein, cellular immunity elicited by natural infection also target other viral proteins, which tend to be more conserved across variants than the spike protein."

25. SARS-CoV-2 re-infection risk in Austria, by Stefan Pilz, Ali Chakeri, John Pa Ioannidis, et al. Eur J Clin Invest. April 2021. "We recorded 40 tentative re-infections in 14 840 COVID-19 survivors of the first wave (0.27%) and 253 581 infections in 8 885 640 individuals of the remaining general population (2.85%) translating into an odds ratio (95% confidence interval) of 0.09 (0.07 to 0.13). We observed a relatively low re-infection rate of SARS-CoV-2 in Austria. Protection against SARS-CoV-2 after natural infection is comparable with the highest available estimates on vaccine efficacies. Further well-designed research on this issue is urgently needed for improving evidence-based decisions on public health measures and vaccination strategies."

26. Anti-spike antibody response to natural SARS-CoV-2 infection in the general population, by Jia Wei, Philippa C. Matthews, Nicole Stoesser, et al, MedRxiv, July 5, 2021. “We estimated antibody levels associated with protection against reinfection likely last 1.5-2 years on average, with levels associated with protection from severe infection present for several years. These estimates could inform planning for vaccination booster strategies.”

27. SARS-CoV-2 infection rates of antibody-positive compared with antibody-negative health-care workers in England: a large, multicentre, prospective cohort study (SIREN), by Victoria Jane Hall, FFPH, Sarah Foulkes, MSc, Andre Charlett, PhD, Ana Atti, MSc, et al. The Lancet, April 29, 2021. “A previous history of SARS-CoV-2 infection was associated with an 84% lower risk of infection, with median protective effect observed 7 months following primary infection. This time period is the minimum probable effect because seroconversions were not included. This study shows that previous infection with SARS-CoV-2 induces effective immunity to future infections in most individuals.”

28. SARS-CoV-2 Natural Antibody Response Persists for at Least 12 Months in a Nationwide Study From the Faroe Islands, by Maria Skaalum Petersen, Cecilie Bo Hansen, Marnar Fríheim Kristiansen, et al, Open Forum Infectious Diseases, Volume 8, Issue 8, August 2021. “Although the protective role of antibodies is currently unknown, our results show that SARS-CoV-2 antibodies persisted at least 12 months after symptom onset and maybe even longer, indicating that COVID-19-convalescent individuals may be protected from reinfection. Our results represent SARS-CoV-2 antibody immunity in nationwide cohorts in a setting with few undetected cases, and we believe that our results add to the understanding of natural immunity and the expected durability of SARS-CoV-2 vaccine immune responses. Moreover, they can help with public health policy and ongoing strategies for vaccine delivery.

29. Associations of Vaccination and of Prior Infection With Positive PCR Test Results for SARS-CoV-2 in Airline Passengers Arriving in Qatar, by Roberto Bertollini, MD, MPH[1]; Hiam Chemaitelly, MSc[2]; Hadi M. Yassine. JAMA Research Letter, June 9, 2021. “Of 9180 individuals with no record of vaccination but with a record of prior infection at least 90 days before the PCR test (group 3), 7694 could be matched to individuals with no record of vaccination or prior infection (group 2), among whom PCR positivity was 1.01% (95% CI, 0.80%-1.26%) and 3.81% (95% CI, 3.39%-4.26%), respectively. The relative risk for PCR positivity was 0.22 (95% CI, 0.17-0.28) for vaccinated individuals and 0.26 (95% CI, 0.21-0.34) for individuals with prior infection compared with no record of vaccination or prior infection.”

Articles in the popular media

Why COVID-19 Vaccines Should Not Be Required for All Americans, by Marty Makary, US News, August 21, 2021

Having SARS-CoV-2 once confers much greater immunity than a vaccine—but vaccination remains vital, by Meredith Wadson, Science, August 26, 2021

Natural infection vs vaccination: Which gives more protection? By David Rosenberg, Israeli National News, July 13, 2021.

Flu survivors still immune after 90 years, by Ed Yong, National Geographic, August 17, 2008.

Rescind Vaccine Mandates: Open Letter to Medical Societies, Hospitals, Clinics, and Other Healthcare Facilities, Association of American Physicians and Surgeons, August 31, 2021.

University Vaccine Mandates Violate Medical Ethics, By Aaron Kheriaty and Gerard V. Bradley, Wall Street Journal, June 14, 2021.

Immunity to the Coronavirus May Last Years, New Data Hint, by Apoorva Mandavilli, New York Times, November 17, 2020.

COVID-19 induces lasting antibody protection, Tamari Bhandara, Washington University School of Medicine, May 24, 2021.

The World Health Organization Oversold the Vaccine and Deprecated Natural Immunity, by Jeffrey Tucker, Brownstone Institute, August 29, 2021.

Why Does the CDC Recognize Natural Immunity for Chicken Pox but Not Covid? By Paul Elias Alexander, Brownstone Institute, September 17, 2021.

Rand Paul and Xavier Becerra Square Off on Natural Immunity, with Devastating Results, by Brownstone Institute, October 2, 2021.

Lockdowns, Mandates, and Natural Immunity: Kulldorff vs. Offit, by Brownstone Institute, October 6, 2021.

Hospitals Should Hire, Not Fire, Nurses with Natural Immunity, by Martin Kulldorff, October 1, 2021.

The Strange Neglect of Natural Immunity, by Jayanta Bhattacharya, Brownstone Institute, July 28, 2021.

Author

Brownstone Institute

The Brownstone Institute for Social and Economic Research is a nonprofit organization conceived of in May 2021 in support of a society that minimizes the role of violence in public life.