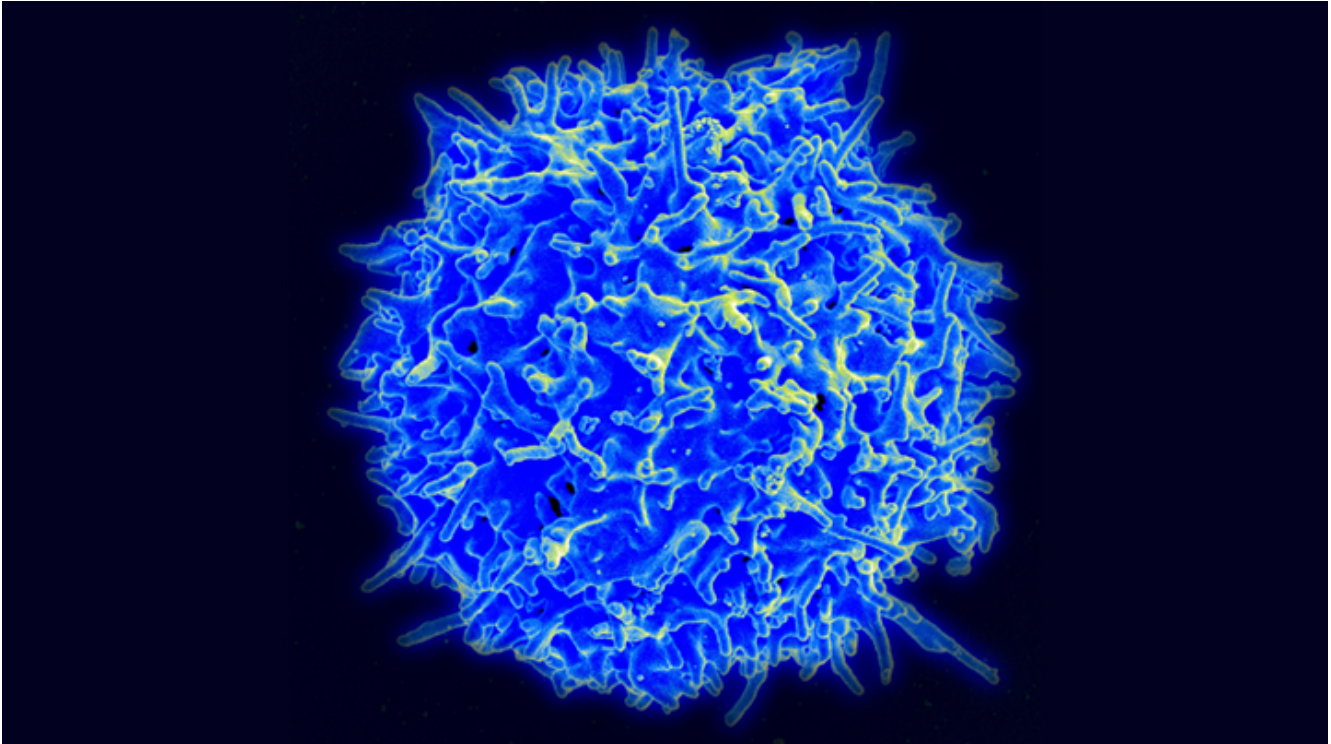


Evaluation of Natural Immunity

Collection of Studies Evaluating Natural Immunity After Covid Infection & Analysis of Post-Vaccine Breakthrough Infections.



Caption: Scanning electron micrograph of a human T lymphocyte (T cell) from a healthy donor's immune system.
Credit: National Institute of Allergy and Infectious Diseases/NIH

Science - AAAS

https://www.science.org/news/2021/08/grim-warning-israel-vaccination-blunts-does-not-defeat-delta?fbclid=IwAR3f0Q18rGa5NIEx-uvxSsR7vNAYPFCwEIGnQKrpj_U954rq6G_WGfPqGMs&

<https://www.news-medical.net/news/20210705/Scientists-identify-natural-SARS-CoV-2-super-immunity-against-23-variants.aspx>

<https://science.sciencemag.org/content/373/6556/eabh1766>

“Our study demonstrates that convalescent subjects previously infected with ancestral variant SARS-CoV-2 produce antibodies that cross-neutralize emerging VOCs with high potency.”

Harvard Medical School

<https://pubmed.ncbi.nlm.nih.gov/33909660/>

“our modeling suggests that SARS-CoV-2 mutants with one or two mildly deleterious mutations are expected to exist in high numbers due to neutral genetic variation, and consequently resistance to vaccines or other prophylactics that rely on one or two antibodies for protection can develop quickly -and repeatedly- under positive selection.”

Nature Research

<https://www.nature.com/articles/s41586-021-03647-4>

“Overall, our data provide strong evidence that SARS-CoV-2 infection in humans robustly establishes the two arms of humoral immune memory: long-lived BMPCs and memory B cells.”

<https://www.nature.com/articles/s41586-021-03696-9>

“The data suggest that immunity in convalescent individuals will be very long lasting.”

[https://www.nature.com/articles/s41590-021-00923-3?](https://www.nature.com/articles/s41590-021-00923-3?fbclid=IwAR3XTp7tT0UV1Ck0AByddNaLqa6NuCjlrJn39K3Q0Uzbf7ifviDQfa89-cA)

[fbclid=IwAR3XTp7tT0UV1Ck0AByddNaLqa6NuCjlrJn39K3Q0Uzbf7ifviDQfa89-cA](https://www.nature.com/articles/s41590-021-00923-3?fbclid=IwAR3XTp7tT0UV1Ck0AByddNaLqa6NuCjlrJn39K3Q0Uzbf7ifviDQfa89-cA)

“data suggests that the majority of naturally infected individuals develop robust and long-lasting T cell immunity”

NIH Directors Blog

<https://directorsblog.nih.gov/2020/07/28/immune-t-cells-may-offer-lasting-protection-against-covid-19/>

“Immunity induced by previous natural infection often protects over the long-term.”

Research & Innovation Center, Maccabi Healthcare Services, Tel Aviv, Israel

New study out of Israel (July 2021) <https://www.israelnationalnews.com/News/News.aspx/309762>
Article link below:

<https://www.medrxiv.org/content/10.1101/2021.08.24.21262415v1>

“This study demonstrated that natural immunity confers longer lasting and stronger protection against infection, symptomatic disease and hospitalization caused by the Delta variant of SARS-CoV-2, compared to the BNT162b2 two-dose vaccine-induced immunity.”

Kidney International

[https://www.kidney-international.org/article/S0085-2538\(21\)00680-3/fulltext](https://www.kidney-international.org/article/S0085-2538(21)00680-3/fulltext)

“Our data demonstrate a significantly higher number of humoral responders to Variants Of Concern (VOCs) and titers of neutralizing antibodies to both SARS-CoV-2 and VOCs in convalescent compared with vaccinated Diabetic Patients (DPs). Accordingly, cellular immune response also demonstrated significantly higher levels and functionality of T cells directed to the Spike (S)-protein of SARS-CoV-2 and VOCs in convalescent compared with vaccinated DPs”

NIH - National Institutes of Health

<https://www.nih.gov/news-events/news-releases/t-cells-recognize-recent-sars-cov-2-variants>

“In their study of recovered COVID-19 patients, the researchers determined that SARS-CoV-2-specific CD8+ T-cell responses remained largely intact and could recognize virtually ALL mutations in the variants studied.”

Wall Street Journal - S.F. Dept of Health, NIH, CDC

https://www.wsj.com/articles/some-vaccines-last-a-lifetime-heres-why-covid-19-shots-dont-11631266201?mod=e2fb&fbclid=IwAR1-PXstoGhpsykuAEWmC4imjbZuv5urKCnb_X5_m2GpbqaNqNPv-CcMf1s_aem_AX6JE2AsGxl0fPsVjyCfHPHpC8b64Wk2MuOR9qp9nrtLPwfayn22E3KMGFA_Cd0FkCCSdAzNpSAK0fbgfoudNiBDWGVmzIPUii-Rfm7qKNdtY0bUBofvrkWDFyQMCg-zEM

Centers for Infectious Disease and Policy, University of Minnesota

<https://www.cidrap.umn.edu/news-perspective/2021/04/previous-covid-19-may-cut-risk-reinfection-84>

“The findings of the authors suggest that infection and the development of an antibody response provides protection similar to or even better than currently used SARS-CoV-2 vaccines.”

Cell

<https://www.sciencedirect.com/science/article/pii/S0092867420310084>

“Our collective dataset shows that SARS-CoV-2 elicits broadly directed and functionally replete memory T cell responses, suggesting that natural exposure or infection may prevent recurrent episodes of severe COVID-19.”

[https://www.cell.com/immunity/fulltext/S1074-7613\(21\)00168-0?fbclid=IwAR3CrFicVpc3-06_a2nJPkuPuSW_wz7G7iK_nZ_fSKXrd6YKICvyWhm14KU](https://www.cell.com/immunity/fulltext/S1074-7613(21)00168-0?fbclid=IwAR3CrFicVpc3-06_a2nJPkuPuSW_wz7G7iK_nZ_fSKXrd6YKICvyWhm14KU)

“Our findings demonstrate the basis of selective Tcell cross-reactivity for an immunodominant SARSCoV2 epitope and its homologs from seasonal coronaviruses, suggesting long-lasting protective immunity.”

<https://www.cell.com/action/showPdf?pii=S1931-3128%2821%2900238-9&fbclid=IwAR34yfRI41JITXzW8UgSFH7XLVgaaL8WKSHmL15abwl3guCEVhKlh9oUTkA>

“All in all, it looks like 'Natural immunity' is likely broader than that provided by any recombinant/mRNA vaccine only including the Spike protein. The situation is similar for humoral immunity, but cellular immunity recognises epitopes throughout the genome, and is far more difficult for the virus to escape.”

Cleveland Clinic

<https://www.medrxiv.org/content/10.1101/2021.06.01.21258176v2>

“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.”

Grossman School of Medicine, New York

<https://www.medrxiv.org/content/10.1101/2021.04.20.21255677v1>

In the next study, it was found that “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.”

Israel Institute of Technology, Israel

<https://www.medrxiv.org/content/10.1101/2021.04.20.21255670v1.full.pdf>

A recent Israeli study showed that “overall estimated level of protection from prior SARS-CoV-2 infection is 94.8% ; hospitalization 94.1% ; and severe illness 96.4%. Our results question the need to vaccinate previously-infected individuals.”

Vaccine and Infectious Disease Division, Fred Hutchinson Cancer Research Center, Seattle

<https://pubmed.ncbi.nlm.nih.gov/33948610/>

“natural immunity is durable”

University of Birmingham - Institute of Immunology and Immunotherapy

<http://www.theguardian.com/society/2021/apr/14/single-pfizer-or-astrazeneca-dose-produces-strong-antibody-response-study-shows>

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3825573

Looking at T cell production after vaccination, it was found that “after the AstraZeneca vaccine 31% of people develop T-cells against the spike protein. After the Pfizer vaccine, 12% of people developed T cells” against the spike protein. Which means when AB’s fade, protection may be poor, and will likely need continued boosters.

“Circulating antibodies are not predictive of robust T cell immunity”

Post Covid Vaccine - Breakthrough Infections

Mayo Clinic

<https://www.medrxiv.org/content/10.1101/2021.08.06.21261707v1>

“Comparison of two highly-effective mRNA vaccines for COVID-19 during periods of Alpha and Delta variant prevalence“

Journal of the American Medical Association

https://jamanetwork.com/journals/jama/fullarticle/2783797?guestAccessKey=6ead80fe-bf08-4d53-8c5c-607249932480&utm_source=silverchair&utm_medium=email&utm_campaign=article_alert-jama&utm_content=olf&utm_term=083021

Comparison of SARS-CoV-2 Antibody Response Following Vaccination With BNT162b2 and mRNA-1273

Journal of the American Medical Association

[https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(21\)00460-6/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(21)00460-6/fulltext)

Risk Factors and Disease profile of post-vaccination Sars-Cov-2 infection