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Necessity of COVID-19 vaccination in previously infected individuals

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doi: <https://doi.org/10.1101/2021.06.01.21258176>

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ABSTRACT

Background The purpose of this study was to evaluate the necessity of COVID-19 vaccination in persons previously infected with SARS-CoV-2.

Methods Employees of the Cleveland Clinic Health System working in Ohio on Dec 16, 2020, the day COVID-19 vaccination was started, were included. Any subject who tested positive for SARS-CoV-2 at least 42 days earlier was considered previously infected. One was considered vaccinated 14 days after receipt of the second dose of a SARS-CoV-2 mRNA vaccine. The cumulative incidence of SARS-CoV-2 infection over the next five months, among previously infected subjects who received the vaccine, was compared with those of previously infected subjects who remained unvaccinated, previously uninfected subjects who received the vaccine, and previously uninfected subjects who

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Results Among the 52238 included employees, 1359 (53%) of 2579 previously infected subjects remained unvaccinated, compared with 22777 (41%) of 49659 not previously infected. The cumulative incidence of SARS-CoV-2 infection remained almost zero among previously infected unvaccinated subjects, previously infected subjects who were vaccinated, and previously uninfected subjects who were vaccinated, compared with a steady increase in cumulative incidence among previously uninfected subjects who remained unvaccinated. Not one of the 1359 previously infected subjects who remained unvaccinated had a SARS-CoV-2 infection over the duration of the study. In a Cox proportional hazards regression model, after adjusting for the phase of the epidemic, vaccination was associated with a significantly lower risk of SARS-CoV-2 infection among those not previously infected (HR 0.031, 95% CI 0.015 to 0.061) but not among those previously infected (HR 0.313, 95% CI 0 to Infinity).

Conclusions 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.

Summary Cumulative incidence of COVID-19 was examined among 52238 employees in an American healthcare system. COVID-19 did not occur in anyone over the five months of the study among 2579 individuals previously infected with COVID-19, including 1359 who did not take the vaccine.

Competing Interest Statement

The authors have declared no competing interest.

Funding Statement

There was no funding for this study.

Author Declarations

I confirm all relevant ethical guidelines have been followed, and any necessary IRB and/or ethics committee approvals have been obtained.

Yes

The details of the IRB/oversight body that provided approval or exemption for the research described are given below:

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information by the research team, with the understanding that sharing or releasing identifiable data to anyone other than the study team was not permitted without additional IRB approval.

All necessary patient/participant consent has been obtained and the appropriate institutional forms have been archived.

Yes

I understand that all clinical trials and any other prospective interventional studies must be registered with an ICMJE-approved registry, such as ClinicalTrials.gov. I confirm that any such study reported in the manuscript has been registered and the trial registration ID is provided (note: if posting a prospective study registered retrospectively, please provide a statement in the trial ID field explaining why the study was not registered in advance).

Yes

I have followed all appropriate research reporting guidelines and uploaded the relevant EQUATOR Network research reporting checklist(s) and other pertinent material as supplementary files, if applicable.

Yes

Paper in collection COVID-19 SARS-CoV-2 preprints from medRxiv and bioRxiv

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OR SIGN UP WITH DISQUS Name **withamk** • 4 days ago

No funding? It has to be funded by something, donations of labor and materials, or by Cleveland itself.

^ | v • Reply • Share ›

ateamrdr • 18 days ago

This is very interesting. What about the issue of transmission? If you do come into contact with the virus after having been previously infected, you might recover faster, but are you more likely to transmit if you have natural immunity vs vaccine immunity?

1 ^ | v 4 • Reply • Share ›

Adam Mercy • 25 days ago

It is reassuring to some, but borderline insanity to others that we have to prove we have an immune system. We knew early in 2020, that prior T cell immunity was present in probably 50%+ of the population, from prior coronaviruses from as far back as 15y (or longer).

Covid likely is a patient-specific immune hypersensitivity. Some say MCAS, it may turn out to be. If that is the case, vaccines or not, those patients need drugs -- which implies drug therapies are the only way out.

And yet, the conclusion to this piece is about prioritizing vaccines. Scientists take a look at data from nation states like Mexico. Not small trials, massive interventions at scale. Or India. You are making a blunder which will meme"d about till the end of time. See our twitter on how to save your reputations.

6 ^ | v • Reply • Share ›

susan fischer → Adam Mercy • 19 days ago

We had covid THIRTEEN months ago and still tested positive for antibodies.

4 ^ | v • Reply • Share ›

The Truth → Adam Mercy • 22 days ago

It's a five month study!! What about a year from now?? In able to continue immunity do they need to become reinfected??

2 ^ | v 1 • Reply • Share ›

hexa_gone → The Truth • 3 days ago

S Korea had a study that shows 10months on and convalescent t-cell immunity still

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Israel's data shows reinfection at less than 0.01% for convalescent and
For fully vaccinated, infection rate is 0.06%

^ | v • Reply • Share ›

Pete → The Truth • 4 days ago

Does the vaccine continue to provide immunity or do you need a booster shot?

^ | v • Reply • Share ›

Jewbacca • a month ago

FWIW, this was Israeli policy when we rolled out vaccines -- no vaccination for those previously infected and recovered --- as it was deemed both not needed and those that recovered from COVID were at somewhat higher risk of complications from the shot, such that the risk of side effects outweighed the risk of severe illness.

Glad you guys can catch up.

8 ^ | v 1 • Reply • Share ›

killshot → Jewbacca • 8 days ago

Agree...but some of us informed practitioners were saying this long ago. Do you have a reference re the "those that recovered from COVID were at somewhat higher risk of complications from the shot."?

^ | v • Reply • Share ›

Jewbacca → killshot • 7 days ago

There's a ton of studies one web search away. Here's the most commonly cited:

<https://www.medrxiv.org/con...>

^ | v • Reply • Share ›

Matt Jolley • a month ago

The study reports no reinfections. This recent UK PHE data shows 15,983 "possible reinfections". <https://www.gov.uk/governme...>

2 ^ | v • Reply • Share ›

808maui → Matt Jolley • 21 days ago

That study showed only 53 confirmed reinfections. Of course its a much bigger study which is why it it would not show zero. That would be amazing with those numbers but the study itself showed a very, very low rate. Thank you for the link.

^ | v • Reply • Share ›

James O'Neill → 808maui • 15 days ago

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Drew • a month ago

Anyone know an estimate as to when the article will be peer-reviewed? Thanks in advance!

3 ^ | v • Reply • Share ›

thomas • a month ago

I am not in the health field (that may be obvious from the questions I have) but I am very interested in this study because my parents (in their 70's) both had and recovered from covid. They have not received a vax yet.

1. Why wouldn't having the infection give immunity? Is there something about this specific virus, or this type of virus in general, that it wouldn't be expected to give immunity?
2. If infection doesn't give immunity, how will the vaccines work? I realize some vaccines are mRNA or viral vector, but at least the two Chinese ones, the Indian one, and a new one the French are working on are all based on using a dead/weakened virus. Shouldn't recovering from an actual infection work just as good as the simulated infection of a vaccine?
3. Is 1,359 subjects really considered small? How big were the sample sizes for the initial vaccine studies? What would be an acceptable size? My background is more in the social sciences, and we often see samples in the hundreds.
4. Is it really correct to assume that people who had COVID would be more careful afterwards? I know with my parents, they were almost consumed with fear about catching the disease, but once they did and recovered, much of that went away. I wasn't around to see their behavior, but just based on conversations, I find it hard to believe they were more careful.

When my parents saw the doctor after recovering, he told them they could not get the vaccine for at least 3 months and that they didn't need to get it until after 6 months. So this study seems in line with what the medical establishment was already saying (they had COVID back in March).

2 ^ | v • Reply • Share ›

Nancy Henning Weres → thomas • 13 days ago

Yes! I'm a pediatrician who has kept children with coronaviruses out of the hospital, using the NIH protocol that seems to have been mysteriously dumped in 2020. BUT sometimes immunity to coronaviruses makes certain people get sick when they are exposed again.

^ | v • Reply • Share ›

Ran Talbott → thomas • a month ago

It's confusing and uncertain.

All of the studies show that antibody levels decline somewhat over time, so there's some concern that immunity **might** eventually wear off, as it does with some diseases. But the

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(again). What they do is "educate" your immune system so it **immediately** springs into action, instead of waiting to recognize that "Hey! This thing is hurting me!". Notice that nearly all the cases reported in the vaccine trials are asymptomatic, only a small number are "mild", and **none** have been severe or fatal.

To allay your concerns, the fact that your parents were only recently infected means that there are **tens of millions** of people who are **way** ahead of them on whatever curve there might be. So, if it does turn out that resistance declines too much, they'll get lots of warning.

2 ^ | v · Reply · Share ›

thomas → Ran Talbott · a month ago

Thanks!

^ | v · Reply · Share ›

Rosey1980 → thomas · a month ago

I'll answer your first question. Where did you get the idea that people who have recovered from Covid don't have immunity? Studies have shown that yes, recovered individuals do have immunity to Covid.

<https://www.sciencedirect.c...>

The point of this study is to show that vaccines should be given to those who have not been infected with Covid since the people who have recovered have developed an immunity to it.

^ | v · Reply · Share ›

thomas → Rosey1980 · a month ago

I got the idea from people in the comments. They are suggesting that the recommendations from this study are wrong, and people who have had COVID need to get the vax. That would imply that people aren't getting immunity naturally, or that natural immunity is inferior. That's all my first question was about.

^ | v · Reply · Share ›

Happyhexer → thomas · 18 days ago

<https://www.news-medical.ne...>

^ | v · Reply · Share ›

Bill Wilson · a month ago

The sample size could be larger but it is the best "science" we have so far.

^ | v · Reply · Share ›

Bob Leon · a month ago

Below is an excerpt from the full text stating that the purpose of the study was to prove that it was

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previously infected persons who did not receive the vaccine.

The purpose of this study was to attempt to do just that,"

3 ^ | v • Reply • Share ›

Christy Blanchford • a month ago

We don't develop long lasting immunity to the other 4 common covid viruses so why would we have long term immunity to covid 19? This was only 42 days out, we get reinfected with the covid common cold after 1-2 years. Manus, Brazil showed us that despite 80% covid infection rate that should have conferred herd immunity , 6 months later they were digging mass graves again. This paper is doing a disservice....

1 ^ | v 3 • Reply • Share ›

ak → Christy Blanchford • 11 days ago

"We don't develop long lasting immunity to the other 4 common covid viruses" how can I verify that statement?

^ | v • Reply • Share ›

Rosey1980 → Christy Blanchford • a month ago

Covid 19 is in the same group of Coronaviruses as SARS and MERS which are not classified as the common cold. People who have recovered from SARS still show a strong immune response to SARS 17 years later. Other studies have come out showing that people who recovered from Covid have immunity(T cells) for at least 10 months but it could very well be longer.

6 ^ | v • Reply • Share ›

Dr Chad • 2 months ago

This would coincide with virtually all other RNA respiratory viruses studied. I am surprised that the initial instinct seems to be resistant to recognizing that natural immunity would be inferior to induced immunity when we have no precedent to suggest that would be the case.

9 ^ | v 1 • Reply • Share ›

thomas → Dr Chad • a month ago

natural immunity would be inferior to induced immunity

Is this a typo, did you mean to say "induced immunity would be inferior to natural immunity"?

1 ^ | v • Reply • Share ›

Igor M. → Dr Chad • a month ago

I think you're being too generous: I very much suspect, the initial instinct wasn't "to be resistant" but to profiteer; for one, it was obvious from the previous sera studies that SARS-CoV-2 recovered had to sell immunity (I can't recall off the top of my head, but I think it was t

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pamragland → Dr Chad • a month ago

Just to clarify you think that the study is showing that natural immunity is worse than that from the shots?

^ | v • Reply • Share ›

Billy Budapest → Dr Chad • a month ago

If, as you say, there is no precedent to suggest "natural immunity would be inferior to induced immunity", then why are you surprised "the initial instinct seems to be resistant to recognizing" it?

^ | v • Reply • Share ›

Billy Budapest → Dr Chad • a month ago

Your comment is incoherent, you may want to edit it.

1 ^ | v • Reply • Share ›

Emily Russell • 2 months ago

It's important to note that a null statistical finding does not indicate that there is no evidence of association. With only 1,359 individuals who were previously infected and unvaccinated, I question that this study has enough statistical power to support the bold claims in the discussion. I would like to see a power analysis as part of the final published work.

5 ^ | v 3 • Reply • Share ›

pamragland → Emily Russell • a month ago

Yet there were only that many in the entire study for ages 12 to 15.

^ | v • Reply • Share ›

Tracii Kunkel → Emily Russell • a month ago

Exactly. These were also all hospital employees. Many of them were likely infected back when the hospitals were being overrun with COVID and we were unable to keep up with protective gear. You can't compare the situation in Fall 2020-summer 2021 with Spring 2020 and say it was an even playing field. To not acknowledge these drawbacks won't fly when it hits peer review.

1 ^ | v • Reply • Share ›

Billy Budapest → Emily Russell • a month ago

What "bold" claim do they make? The outcomes are exactly what one would expect based on decades of experience with other vaccines.

2 ^ | v • Reply • Share ›

Tracii Kunkel → Billy Budapest • a month ago

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Billy Budapest → Tracii Kunkel • a month ago

First, you did not answer my question. Second, I don't know why you get a flu shot every year, maybe you could tell me. If you're asking me if you need to get it every year, my answer is the published science says "no".

1 ^ | v • Reply • Share ›

in_this_moment_free → Tracii Kunkel • a month ago • edited

I don't know of any studies on the following yet when it comes to colds and flu there are some people I've met who get many colds and flus per season and some who get next to none.

That said, the understanding I have is covid-19 is not like a flu. It is unique. A "novel" version.

Yet at the same time younger people with stronger immunity tend to get milder cases of corona.

Moving forward seems the science types are gonna have some work to do sorting this stuff out.

^ | v • Reply • Share ›

Paul Cwik • 2 months ago

Peer Review in this case does not mean that peers reconduct the experiments. It simply means that others (with suitable credentials) have read and accepted the paper as having correctly followed the scientific methods. In other words, they are simply looking for errors in the paper, not re-doing and confirming the results.

7 ^ | v 1 • Reply • Share ›

Tracii Kunkel → Paul Cwik • a month ago

Peer review in ANY case does not mean that peers reconduct the experiment - that called replication, not peer review. Peer review does examine scientific methods and looks for errors, one of those being not accounting for confounding variables and misinterpreting results. There were multiple confounding variables that were not addressed in this paper that will need to be addressed before it is accepted into any decent journal.

1 ^ | v • Reply • Share ›

Johannes → Tracii Kunkel • a month ago

"multiple confounding variables"- such as what ?
and would this problem of confounding variables also apply to vaccine trials ?

Thanks

^ | v • Reply • Share ›

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thomas → Squid Tractor • a month ago

I don't think that's how any of these types of studies ever work. I looked at some of the vaccine trials - they were just monitoring infection rates of vaxxed versus not vaxxed over time. No one was specifically being exposed to the virus.

1 ^ | v • Reply • Share ›

nothing → Squid Tractor • a month ago

Being exposed to olive virus does not ensure infection.

The point was that the unvaccinated, naturally immune people did not have MORE infections than the vaccinated, naturally immune people. Neither group was quarantined or intentionally exposed...

^ | v • Reply • Share ›

Tracii Kunkel • 2 months ago

The key here - NOT PEER REVIEWED. It's been demonstrated that people who have been invfected have often changed their health-risk behaviors after recovery. How could the researchers have not assessed this factor? It's possible that the low rate of re-infection by those without the vaccine was heavily influenced by them taking precauutions much more seriously.

5 ^ | v 11 • Reply • Share ›

Rory Considine → Tracii Kunkel • a month ago

Tracii, just wondering, but do you use the same logic when reacting to current claims re. the success stats for the effectiveness of vaccines? I ask this because the vaccinated also alter their behaviours and are strongly advised to do so. They are told to wear masks, wash their hands, keep their distance etc., the same as the unvaccinated. So, would this safety behaviour not also affect the claimed very high success percentage rates for vaccines?

^ | v 1 • Reply • Share ›

Quixander → Rory Considine • a month ago

I don't think that has been demonstrated at all for people who have received the vaccine. My unscientific personal observation of others (including myself) has been a relaxing of safety behaviors, not an increase; furthermore, the official guidance for vaccinated individuals has been a relaxation of many infection control measures such as masking and distancing. So I don't think these are comparable at all.

1 ^ | v • Reply • Share ›


thomas → Tracii Kunkel • a month ago

As I mentioned in my longer post (please read it once they post it, I'm very interested in this for my parents and have a lot of questions), my parents got and recovered from COVID.

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Quixander  thomas • a month ago

Good point, and doubly so if they had faith in what President Trump was telling the public for months, that having had COVID-19 guaranteed immunity. Also there are a lot of people who think they had COVID-19 way back in late 2019/early 2020, but never confirmed it with testing and probably had some other respiratory illness.

1 ^ | v • Reply • Share >

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