Remarks to the Select Subcommittee on the Covid Pandemic
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Chairman Wenstrup, ranking member Ruiz and committee members, thank you for inviting me to speak today. I am a research scientist with 24 years of experience working in the laboratory, primarily focusing on host pathogen interaction and infectious diseases. Currently I am a staff scientist in the research technologies branch at NIAID where I perform collaborative research with investigators throughout the institute on projects that focus on infectious diseases, rare and auto-immune diseases, and immunology. *I am here in my personal capacity and not speaking on behalf of the NIH, NIAID, HHS, or the federal government.*

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The US Covid pandemic response has been plagued by a failure to adjust to emerging data and to account for unintended consequences. One glaring example of this is the handling of school closures, with the CDC guidelines continuously at odds with evidence from other countries, and with evidence from districts that opened in the US in the fall of 2020. This disregard for data led to prolonged closures and resulted in the catastrophic decline of academic achievement and widening of the equity gap.

However, this was not the only area where our health agencies failed to acknowledge evidence. In addition to school closures, they also failed to recognize the protection against Covid afforded by natural immunity. Natural immunity refers to the immunological response that an individual develops after recovering from an infection. This type of immunity is generated by our adaptive immune system, which produces memory B cells and T cells that remain in the body and can quickly respond to the same, and even a related, pathogen if it is encountered again. For centuries, natural immunity has been recognized as a vital defense mechanism against reinfection, long before the precise cellular mechanisms were understood.

The reasons why our public health establishment chose to disregard natural immunity remain unclear, but the consequences of this oversight are all too apparent. Lost jobs, staffing shortages, children kept out of school, and wasted vaccines were just some of the negative outcomes. Despite mounting data to the contrary throughout the early days of the pandemic, the messaging in the US was that there was no evidence of lasting protection from infection and that everyone, including those with natural immunity, should get vaccinated as soon as possible.

What data did we have and when did we have them?

In July of 2020, a paper published in Nature showed a robust T cell response in patients that had recovered from SARS-CoV2. The paper also demonstrated that patients that had recovered from SARS had long-lasting memory T cells that were still reactive to the virus 17 years after the 2003 epidemic, a good indicator that SARS-CoV2 immunity would be similarly durable. Later in October 2020, an article in Cell reaffirmed these

findings, showing robust T cell responses in recovered individuals with the authors stating “that natural exposure or infection may prevent recurrent episodes of severe Covid-19”. Finally, another paper in November 2020 showed that even a mild infection can generate memory immune cells.

Building on these earlier studies, several papers published in the first half of 2021 continued to provide evidence that severe, mild, and even asymptomatic infection could mount a strong response. Additionally, multiple longitudinal studies demonstrated that these immune memory cells persisted over time. One group estimated that the lifespan of memory T cells in SARS-CoV2 recovered patients was similar to the lifespan of T cells generated by the yellow fever vaccine which is only given once in a lifetime.

In May 2021, research showed that individuals who have recovered from SARS-CoV2 also had long-lived B cells present in their bone marrow. These B cells were comparable in nature to those present in patients that had recovered from 1918 flu which were still able to produce neutralizing antibodies to influenza even 90 years after the initial infection. This suggested that individuals who had recovered from COVID-19 would also have similar long-lasting immunity to the virus. By July 2021, it was shown that recovered patients could even produce antibodies to variants of concern.

How did this immunological response correlate to real world outcomes?

In September 2020, a study from Qatar estimated a 0.01% reinfection rate within a few months from the first infection with none of those reinfected having a severe illness. In February 2021, a US study of 3 million people showed a 0.3% reinfection rate compared to 3% positivity in those without prior infection during the same time period. In April 2021, the SIREN study of health care workers in England showed that prior infection was associated with an 84% lower risk of reinfection. Both this study and a Qatari study published in May 2021 showed that protection was durable for at least 7 months, likely longer. Another Qatari study published in November 2021 in NEJM stated that reinfections had 90% lower odds of resulting in severe disease.

How did natural immunity compare to immunity elicited by vaccines?

In April 2021, a study analyzing the entire Israeli adult population showed that the protection offered by the vaccine after 3 months was equivalent to that of natural immunity, and suggested that vaccines should be prioritized for the immune-naive. Likewise, a July 2021 study conducted in the US had similar findings. In August 2021, another important Israeli study conducted during the delta wave showed that vaccinated individuals had a 27 fold increase in the risk of a symptomatic infection compared to those with natural immunity and were also at significantly higher risk for hospitalization. A systematic review published in October 2021 showed, again, that vaccine-conferred immunity and natural immunity offered equivalent protection. The CDC also published a report in Jan 2022 that persons who had survived a previous infection had lower case rates than persons vaccinated alone. Several additional

studies around this time also showed that natural immunity waned much slower than vaccine-conferred immunity.

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Early data clearly demonstrated the robustness of natural immunity, showing it was similar or even superior to vaccine-conferred immunity. Other countries acknowledged this by allowing exemptions from mandates and passports, while the US continued to disregard it.

In the short term, this provided justification for vaccine mandates which made no exceptions for those with prior infection, an approach that resulted in staffing shortages, particularly in the health care sector, where we could least afford to lose workers. It also caused needless loss of life as vaccines were given to essential workers with natural immunity instead of being prioritized for vulnerable and elderly populations. Additionally, the daily quarantine of thousands of students could have been significantly reduced if districts had, at least, made exceptions for students with natural immunity. Disregarding the wealth of evidence of natural immunity led to missed opportunities to implement policies that could have been more effective and efficient in controlling the pandemic and limiting collateral damage.

Unfortunately, now, vaccination rates for *other* vaccines have declined, ironically increasing society's vulnerability to infectious outbreaks. While some of this may be due to missed medical appointments and school closures, there has also been a significant loss of trust in public health due misleading messaging and inflexible policies during the pandemic. Our health agencies must learn from this unfortunate error of failing to be candid with the American public and for the pervasive implementation of policies that were not adequately supported by data.