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Commentary

Vaccine against SARS-CoV-2 in previously infected health care workers

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A growing amount of data have demonstrated, after either severe, mild or asymptomatic infection by SARS-CoV-2, a decline of neutralizing antibody titers (NAbT) over time, although the persistence of NAb as long as 10-13 months was reported [1–2]. The significance and the level of NAbT as correlate of protection from reinfection is still to be defined; nevertheless memory B-cell population and T-cell mediated immunity appear to be maintained [3].

Turner et al. [4] provided clinical evidence, from people who have had COVID-19, that long-lived, memory plasma cells that produce antibodies are generated in the bone marrow. These type of cells, that can be maintained for many years, provide long-term antibody production that would offer stable protection at a level of 10–20% of that during the acute phase, with a shift from antibody production by short-lived plasma cells to antibody production by memory plasma cells.

Vaccination with a single mRNA dose after infection boosts NAbT, bringing them to levels not reached after a complete cycle of vaccination in healthy individuals [1, 5]. Further, NAbT reach a plateau after repeated mRNA vaccine boosting, as recently reported in individuals after ten months from infection [6]; nevertheless the decay kinetic over time after different boosting due to various vaccine types or different schedules is currently not well defined.

In this issue of EBioMedicine, Havervall et al [7] provides important and timely data about the booster effect, in a well characterized population, of a single ChAdOx1 dose more or less than 11 months (45 and 37 subjects respectively) after natural infection. At least one week post dose a strong NAb response was observed, similar or higher than that after two weeks from two BNT162b2 doses in healthy individuals. Despite a decline of RBD-specific IgG Ab, the neutralizing capacity remained relatively stable over the first two months, and ever similar or higher in the ChAdOx1 group with respect to BNT162b2 ones. Interestingly a similar trend was observed when Alpha, Beta, Gamma and Delta variants were studied. These data about the durability over two months of NAbTs in previously infected and vaccinated individuals contribute to the discussion on the recommendation of two dose regimens regardless of preexisting immunity. Further, data on ChAdOx1 confirming evidences of a broad response that was already reported in the context of emerging Variant of Concern (VoC) are very useful, because many items need to be addressed to clarify this complex picture. These results were obtained in non-hospitalized individuals, allowing to discuss about an immunity primed by a mild or asymptomatic disease, that is probably a very common figure into the general population.

Recently lower spike-antibody titers after two doses of ChAdOx1 in comparison with BNT162b2 among previously infected or seronegative individuals were reported; these titers, among previously infected, were 2.5 fold lower in the ChAdOx1 group and waned by about five-fold and two-fold in ChAdOx1 and BNT162b2 groups respectively over 70 days after the second dose in naïve subjects [8]. Preliminary data on heterologous regimens, comparing ChAd/ChAd versus ChAd/BNT schedule in healthy health care workers (HCWs) against Alpha, Beta and Gamma variants, suggest stronger antibody and T-cell response after heterologous combination [9], that may be correlate with longer immunity and greater protection against viral variants. About this, on the need to evaluate in a composite way the immune response, among HCWs studied 39 weeks post infection with the Wuhan Hu-1 strain, Reynolds et al [10] showed, three weeks after one BNT162b2 dose, enhanced T-cell immunity, antibody secreting memory B cell response to spike and neutralizing antibodies effective against B.1.1.7 and B.1.351 variants, confirming the strong prime-boosting effect of prior infection on a single BNT162b2 dose vaccination. By comparison, HCWs receiving one vaccine dose without prior infection demonstrated reduced immunity against variants. Human leukocyte antigen (HLA) polymorphisms were correlated with different T-cell response to B.1.1.7 and B.1.351 spike mutations. Anyway, make the pool of memory B-cells to be larger than before, leading to a faster, stronger response to subsequent exposures remains a challenge to tackle even asymptomatic infections.

Durability of immunity after natural infection and following different vaccination schedule, as well as sustained vaccine efficacy and vaccine escape, need to be monitored for a long time to come, in a rapidly evolving scenario, to evaluate the appropriateness and exact timing of further doses, even with differently designed vaccines, that appear to be necessary.

The identification of the categories at risk, such as frail or those most exposed, to make prioritization choices will require a strategy shared and ethically acceptable, in a global context of great inequality in access to drug therapy and prevention.

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Declaration of Competing Interest

The author declares no conflicts of interest.

References

[1] Vicenti I, Gatti F, Scaggiante R, et al. Single-dose BNT162b2 mRNA COVID-19 vaccine significantly boosts neutralizing antibody response in health care workers recovering from asymptomatic or mild natural SARS-CoV-2 infection. Int J Infect Dis 2021;108:176–8.

[2] Wisnivesky JP, Stone K, Bagiella E, et al. Long-term Persistence of Neutralizing Antibodies to SARS-CoV-2 Following Infection. J Gen Intern Med 2021 Aug 3:1–3 Online ahead of print. doi: 10.1007/s11606-021-07057-0.

[3] Gaebler C, Wang Z, Lorenzi JCC, et al. Evolution of antibody immunity to SARS-CoV-2. Nature 2021; 591:639–44.

[4] Turner JS, Kim W, Kalaidina E, et al. SARS-CoV-2 infection induces long-lived bone marrow plasma cells in humans. Nature 2021. doi: 10.1038/s41586-021-03647-4.

[5] Saadat S, Rikhtegaran Tehrani Z, Logue J, et al. Binding and neutralization antibody titers after a single vaccine dose in health care workers previously infected with SARS-CoV-2. JAMA 2021;325:1467–9. doi: 10.1001/jama.2021.3341.

[6] Vicenti I., Gatti F., Scaggiante R. et al The second dose of the BNT162b2 mRNA vaccine does not boost SARSCoV2 neutralizing antibody response in previously infected subjects Infection https://doi.org/10.1007/s15010-021-01680-z

[7] Haverall S., Marking U., Greilert-Norin N. et al. Antibody Responses After a Single 1 Dose of ChAdOx1 nCoV-19 Vaccine in Healthcare Workers Previously Infected with SARS-CoV-2. EBioMedicine. https://doi.org/10.1016/j.ebiom.2021.103523

[8] Shrotry M, Navaratnam AMD, Nguyen V, et al. Spike-antibody waning after second dose of BNT162b2 or ChAdOx1. Lancet 2021 online on July 15. doi: 10.1016/S0140-6736(21)01642-1.

[9] Barros-Martins J, Hammerschmidt SI, Cossmann A, et al. Immune responses against SARS-CoV-2 variants after heterologous and homologous ChAdOx1 nCoV-19/BNT162b2 vaccination. Nat Med 2021 2021 online July 14. doi: 10.1038/s41591-021-01449-9.

[10] Reynolds CJ, Pade C, Gibbons JM. et al Prior SARS-CoV-2 infection rescues B and T cell responses to variants after first vaccine dose. Science 2021. doi: 10.1126/science.abh1282.