Comparing SARS-CoV-2 Neutralizing Antibodies in the Convalescent unvaccinated subjects, Convalescent Vaccinated and the Naïve Vaccinated

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Background
The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged in mid-December 2019 and spread rapidly. It is widely believed that pre-pandemic normalcy will return following successful implementation of safe and effective vaccine strategies. The purpose of this study was to compare longitudinal dynamics of NAbs following the original booster vaccine in convalescent and naïve vaccinated individuals and examine kinetics in a third comparison group consisting of unvaccinated convalescent plasma donors.

Specific Aims
The purpose of this study was to compare longitudinal dynamics of NAbs following the original booster vaccine in convalescent and naïve vaccinated individuals and examine kinetics in a third comparison group consisting of unvaccinated convalescent plasma donors.

Design and Methods
We assessed NAbs before and after a booster vaccine in 68 adults who had completed the initial vaccine series for SARS-COV-2. To describe change in NAbs among unvaccinated subjects, we assessed the natural decline in NAbs following a positive test for SARS-COV-2 among 136 unvaccinated convalescent plasma donors (convalescent unvaccinated) from an earlier study.

Results
Prior to the booster, convalescent vaccinated subjects had higher NAbs compared to naïve vaccinated subjects but the difference was not statistically significant p=0.08. Two months following the booster, NAbs in the naïve vaccinated group were almost four times higher than NAbs in the 55 unvaccinated subjects, while the convalescent vaccinated group had levels 2.5 times higher p<0.01.

NAbs in the convalescent unvaccinated group was significantly lower than the vaccinated and boosted groups (p<0.01). Repeated measures showed that the average predicted NAb declined from 5.4 at 10 days to 1.7 AU/ml at 90 days. A single infection with Sars-CoV-2 does not provide the levels of neutralizing antibodies as does the combination of either convalescent vaccinated or the naïve vaccinated groups.

Discussion
The diagnostic value of serology testing for SARS-CoV-2 is limited, NAbs have shown to be useful in estimating immunity to natural disease and vaccinations within populations. Presence of neutralizing antibodies post-infection is an essential component of antiviral immunity. In our study NAbs were available for 55 unvaccinated convalescent plasma donors 45 to 75 days after their positive test, allowing comparison with convalescent and naïve vaccinated subjects. Neutralizing antibodies were above the threshold for immunity for nearly all (93%) of the convalescent unvaccinated subjects with data on or before 30 days of a positive test, compared to 56% among subjects with data 90 days or later. This finding is consistent with studies showing that NAbs resulting from natural infection peak around 30 days following symptom onset and decline over a period of 80 to 90 days (25-28). This was confirmed in our study showing a decline in predicted NAbs from 5.4 AU/ml at 10 days following the positive test to 1.7 AU/ml at 90 days.

Conclusion
NAbs in the convalescent unvaccinated group was significantly lower than the vaccinated and boosted groups (p<0.01). Repeated measures showed that the average predicted NAb declined from 5.4 at 10 days to 1.7 at 90 days. A single infection with Sars-CoV-2 does not provide the levels of neutralizing antibodies as does the combination of either convalescent vaccinated or the naïve vaccinated groups.

References