Serological Response After COVID-19 Vaccination Based on Gender, Race, and Age

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Introduction

- There is currently limited data on serum antibody presence and the magnitude of response based on gender, race, and age in those who have been vaccinated against COVID-19. Post-vaccination serum titer response testing yields valuable information regarding vaccination-induced antibody protection from COVID-19 over time.
- The goal of this study is to determine the serum antibody response and magnitude to SARS-CoV-2 from individuals who have been vaccinated against COVID-19 based on gender, race, and age.

Methods

- We obtained 33 patients’ and health care workers’ blood samples (36% male (M), 54% female (F), 82% White (W), 9% Black (B), 6% Asian (A), 3% Native Hawaiian/Other Pacific Islander (NH), average age 47) after vaccination with either the Pfizer (82%), Moderna (14%), or J&J (4%) COVID-19 vaccine.
- All subjects were then tested for IgG seropositivity against the SARS-COV-2 surface spike protein receptor binding domain (RBD) as well as the internal nucleoprotein (NP) via ELISA.
- Serological response magnitude was then measured with end-point dilution (EPD) titers against both RBD and NP.
- Vaccine is expected to increase RBD titers but not NP titers.

Results

- Fs and Ms were 100% seropositive against RBD after vaccination. Against NP, Ms were 78% seropositive and Fs were 54% seropositive, likely reflecting pre-vaccination COVID-19 infection (Fig 1).
- Average post-vaccination EPD titers against RBD were M 1:8,914 and F 1:26,432, and M 1:585 and F 1:316 against NP (Fig 1).
- Ws, Bs, As, and NHs were 100% seropositive against RBD after vaccination. Against NP, Ws were 56% seropositive, and Bs, As, and NHs were 100% seropositive (Fig 2).
- Average post vaccination EPD titers against RBD were W 1:2,375, B 1:10,240, A 1: 2720, and NH 1:10,240, and W 1:385, B 1:720, A 1:400 and NH 1:160 against NP (Fig 2).
- Those ≤55 and >55 were 95% and 100% seropositive against RBD after vaccination, and 59% and 80% seropositive against NP. RPD and NP titers for ≤55 and >55 were 1:11,006 and 1:25483, and 1:299 and 1:474 (Fig 3).

Conclusions

- Our data shows high rates of seropositivity against RBD in Ms and Fs after vaccination in those who were positive for NP (likely post natural infection) and negative for NP.
- As predicted, the magnitude of serological response against RBD was higher as compared to NP across both gender, race, and age.
- Ms were more seropositive against both RBD and NP when compared to Fs.
- Fs had the greatest magnitude of serological response against RBD, while titer magnitude against NP was similar across gender.
- Bs and NHs had the greatest magnitude of serological response against RBD, while Bs had the greatest titer response against NP.
- >55 had the greatest magnitude of serological response against RBD.
- In the future, pre and post-vaccination titer serology will be correlated to understand how previous exposure to COVID-19 affects vaccination serology.