New Zealand Government

MINISTRY OF HEALTH
MANATŪ HAUORA

COVID-19

Understanding New Zealanders' immune response to the Pfizer-BioNTech COVID-19 vaccine

Ka Mātau, Ka Ora Study Findings – From Knowledge Comes Wellbeing

Introduction

With support from the Ministry of Health and Ministry of Business, Innovation and Employment, Vaccine Alliance Aotearoa New Zealand – Ohu Kaupare Huaketo is conducting a clinical study to evaluate the immune response to the Pfizer COVID-19 vaccine in New Zealand's unique population. The study is evaluating differences in immune response by ethnicity, age and presence of co-morbidities associated with increased risk of COVID-19. It is also evaluating the ability of vaccine immune responses to neutralise viral variants. This study is the largest evaluation of COVID-19 vaccine immune responses in Māori and Pacific peoples. Data on responses at one month after the second dose were recently published online.

Key findings

- **Antibody responses overall were robust and consistent with international data; over 99% of vaccinated people responded to the vaccine.**
- **Responses were similar across ethnic, gender and BMI groups.**
- **Responses declined with increasing age, particularly in adults ≥75 years of age.**
- **People with type 2 diabetes had lower responses.**
- **Adults ≥75 years of age and people with type 2 diabetes are at risk for early waning.**
- **Neutralising responses to Omicron variant were very low compared to ancestral strain and Delta variant.**

Study design

The prospective cohort study assessed immunogenicity in Pfizer COVID-19 vaccine recipients in New Zealand without previous COVID-19. Approximately 300 New Zealanders were enrolled in Rotorua and Christchurch from June to September 2021, with sample enrichment for Māori, Pacific peoples, older adults ≥ 65 years of age, and those with co-morbidities. The study did not include immunocompromised people. Serum samples were analysed at baseline and 28 days after second dose for presence of quantitative anti-S IgG by chemiluminescent microparticle immunoassay and for neutralizing capacity against Wuhan, Beta, Delta, and Omicron BA.1 strains using a surrogate viral neutralisation assay. The ongoing study will include evaluation of response to booster doses and cellular immune responses.

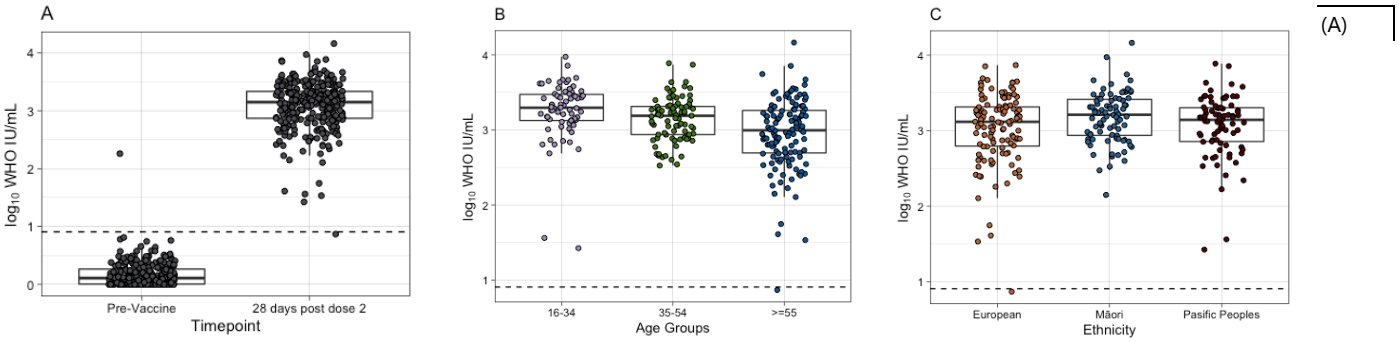
Results

285 adults with median age of 52 years were included. 55% were female, 30% were Māori, 28% were Pacific peoples, and 26% were ≥65 years of age. Obesity, cardiac and pulmonary disease and diabetes were more common than in the general population. All participants received 2 doses of Pfizer COVID-19 vaccine through the national immunization programme. At 28 days after second vaccination, 99.6% seroconverted to the vaccine, and anti-S IgG and neutralising antibody levels were high across gender and ethnic groups (Figures 1 and 2). IgG and neutralising responses declined with age. Lower responses were associated with age ≥75 and diabetes, but not BMI. The ability to neutralise the Omicron BA.1 variant in vitro was severely diminished but maintained against other variants of concern (Figure 3).

Relevance for New Zealand Vaccine Strategy

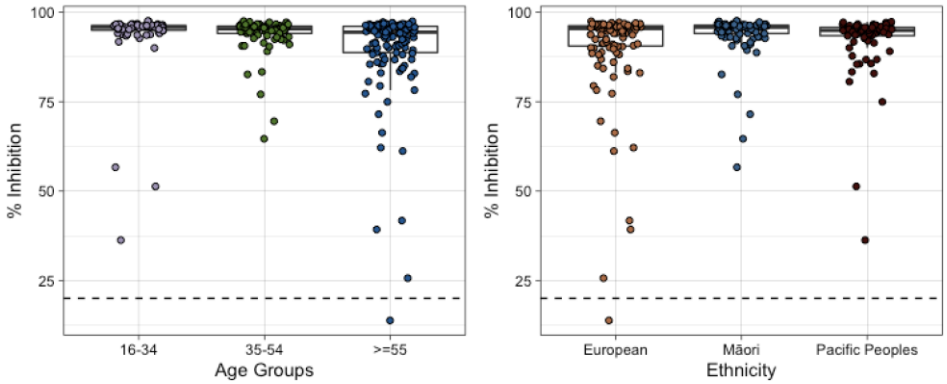
- Confidence in Pfizer-BioNTech vaccine – for those already vaccinated and those still undecided.
- New Zealand-unique population consistent with international data.
- Need for boosters – for protection against Omicron, additional doses for older adults and people with type 2 diabetes.

Figure 1. Unadjusted SARS-CoV-2 anti-S IgG responses by age and ethnicity



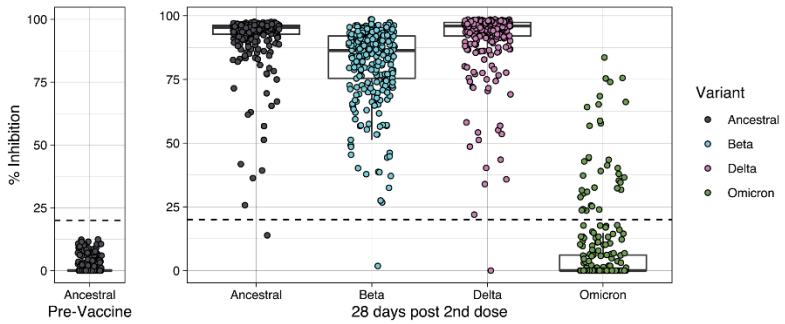
Unadjusted $\log_{10}$ transformed WHO IU SARS-CoV-2 anti-S IgG responses for participants pre-first vaccination and 28 days post-second vaccination, N = 285. (B) Data shown by age groupings, N=285. (C) Data shown by major ethnicity categories from New Zealand Census, N = 285. Solid horizontal line represents median and box represents interquartile range. The dotted line represents the $\log_{10}$ transformed value of the cut-off for a positive result (7.1 WHO IU/mL).

Figure 2. Unadjusted SARS-CoV-2 neutralising antibody responses to ancestral strain at 28 days post-vaccination by age and ethnicity



Unadjusted percent inhibition against ancestral SARS-CoV-2 strain in participants post-second vaccination separated by age groups (left pane) and separated by ethnicity categories (right pane), N = 285. Solid horizontal line represents median and box represents interquartile range.

Figure 3. Unadjusted SARS-CoV-2 neutralising antibody responses to ancestral at baseline, and to ancestral and variants at 28 days post-vaccination



Unadjusted percent inhibition against ancestral SARS-CoV-2 strain in participants pre-first vaccination (left pane) and inhibition against ancestral, Beta, Delta, and Omicron BA.1 variants from participants 28 days post-second vaccination (right pane), N = 285. Solid horizontal line represents median and box represents interquartile range. Cut-

The full report is available at **https://www.medrxiv.org/content/10.1101/2022.04.05.22273480v1**

Please contact covid-19vaccine.postevent@health.govt.nz for more information about the study