LOWER VACCINE-ACQUIRED IMMUNITY IN THE ELDERLY POPULATION FOLLOWING TWO-DOSE BNT162B2 VACCINATION IS ALLEVIATED BY A THIRD VACCINE DOSE

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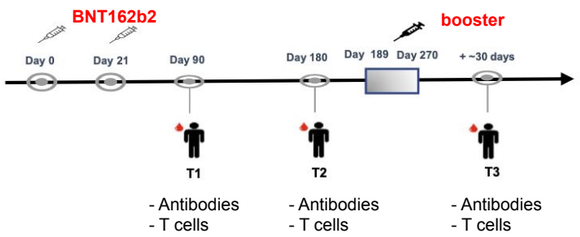
INTRODUCTION

The elderly population are at higher risk of developing severe Coronavirus disease 2019 (COVID-19) disease. It is thus important to target this population first in the development of a vaccination regimen. While studies have shown similar efficacy of a two-dose regimen in both young and elderly populations, understanding of the maintenance of adaptive immune responses in the elderly remains limited.

Here, we aim to analyse antibody and T cell responses in individuals who received the third mRNA vaccine dose. Comparison of the young and elderly populations may shed some light on the establishment and persistence of the vaccine-induced responses.

METHODOLOGY

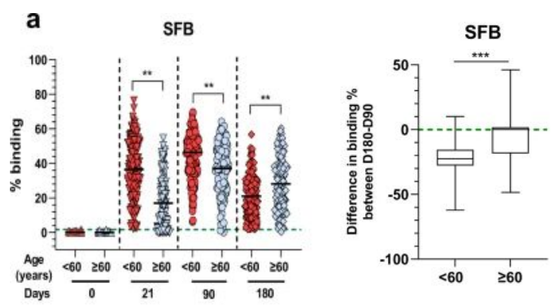


Abs: S-flow, neutralisation

T cells: Flow cytometry

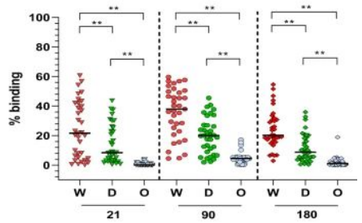
RESULTS

Antibody responses of individuals above and below 60 years old



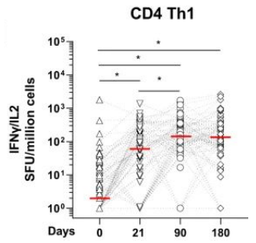
Initially, those aged <60 had a **greater initial antibody response** than those aged >60. But with time, antibody responses of those aged <60 began to drop lower than their counterparts at day 180, suggesting a faster weaning in antibody levels in the young and a delayed but more sustained response in the elderly.

T cells & antibody recognition of virus strains



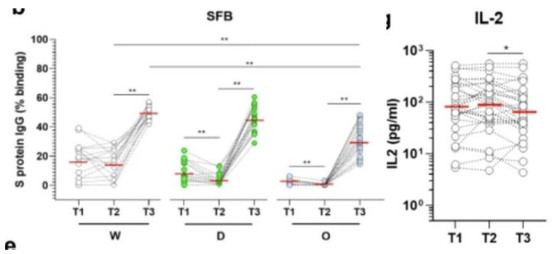
Antibody responses of vaccinees were **highest** for Wuhan Ancestral virus, then Delta and finally Omicron Variants. Thus, chances of infection by the **Omicron variant** despite vaccination is the **greatest**.

T cells & antibody recognition of virus strains



Contrary to antibodies, T cell responses remained **very stable even at day 180**. This observation is maintained for IL-2, CD8 and IFN-γ.

Immune responses of individual above 60 years old following 3rd vaccination



In individuals aged >60 years, the **3rd dose strongly boosted the antibody responses** against the total Spike protein of the Wuhan Ancestral, Delta and Omicron variants (left).

T cell responses were also measured. **IL-2 T cell response**, while decreased, **still remained high** after the 3rd dose, while **IFN-γ response remain unchanged** (right).

CONCLUSION

The young have an adequate response after one dose, while the elderly require 2 doses for adequate protection.

A 3rd booster vaccination in elderly low responders significantly improves antibody responses and maintains T cell responses against the Wuhan, Delta and Omicron variants.

The longevity of the immune response after the 3rd vaccination remains unknown.

Our current vaccines provide sustained protection against severe COVID-19 disease, but booster shots are required for further protection against reinfection down the line.

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