0841

mRNA Vaccines Induce a Higher Antibodies Response in Children With Previous COVID-19

Costanza Di Chiara[1,2§], Anna Cantarutti[3§], Francesco Bonfante[4], Maria Raffaella Petrara[1], Chiara Cosma[1], Matteo Pagliari[4], Nicola Cotugno[5], Alessandra Meneghel[1], Elisa Benetti[1], Luca Bosa[1], Paolo Palma[5], Anita De Rossi[1], Carlo Giaquinto[1,2], Daniele Donà[1,2§], Andrea Padoan[1§], for the VERDI study team

[§]contributed as co-first and co-last authors

[1] University of Padova, Padova, Italy; [2] Penta – Child Health Research, Padova, Italy; [3] University of Milano-Bicocca, Milan, Italy; [4] Istituto Zooprofilattico Sperimentale delle Venezie, Padova, Italy; [5] Bambino Gesù Children's Hospital, IRCCS, Rome, Italy. Department of Systems Medicine, University of Rome "Tor Vergata", Rome, Italy.

BACKGROUND

mRNA vaccines trigger an higher magnitude and durability of humoral response to SARS-CoV-2 in adults after a previous infection compared to infection-naïve people. However, data are lacking in the pediatric population.

This study aimed to evaluate the early and long-term immune response after the BNT162b2 monovalent vaccine in children aged 5-11 years with or without a previous SARS-CoV-2 infection.

METHODS

Multi-centre, prospective, observational study evaluating the immune response to SARS-CoV-2 in children aged 5-11 years attended the Pediatric Departments at the University of Padua and Bambino Gesù Children's Hospital in Rome (Italy);

Volunteers underwent three immunological follow-up (pre-vaccination and 1 month (mo), and 6 mo after the second dose); a blood sample was collected during each visit for the characterization of the immune profile;

Neutralizing antibodies (Nabs) and anti-S-RBD IgG titers were analyzed through Plaque Reduction Neutralization Test (PRNT) and chemiluminescent immune-enzymatic assay (CLIA), respectively. B and T cell phenotypes were analyzed by flow cytometry;

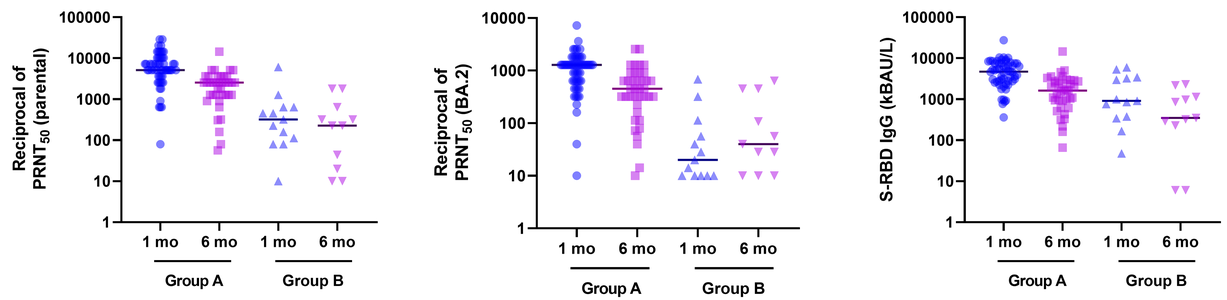
Geometric mean titers (GMTs) and 95% CI and median and IQR of variables were evaluated according to pre-existing confirmed COVID-19.

RESULTS

Eighty-two children (mean age 8.6±3.5 years) were studied between Dec-2021 to Dec-2022; 60 with a molecular-documented previous COVID-19 (**Group A**) and 22 without previous infection defined as the absence of antigen-specific antibodies before the vaccination (**Group B**).
Overall, 44 were healthy children (HC), 20 were immune compromised (IC), and 18 had a previous diagnosis of MIS-C (MIS-C).

mRNA vaccine elicits a **higher humoral response in children with a previous COVID-19** with an overall median S-RBD IgG, Parental, and Omicron NAbs in Group A 5, 18, and 28-fold higher than Group B (p<0.0001) (Fig.1)

Fig.1



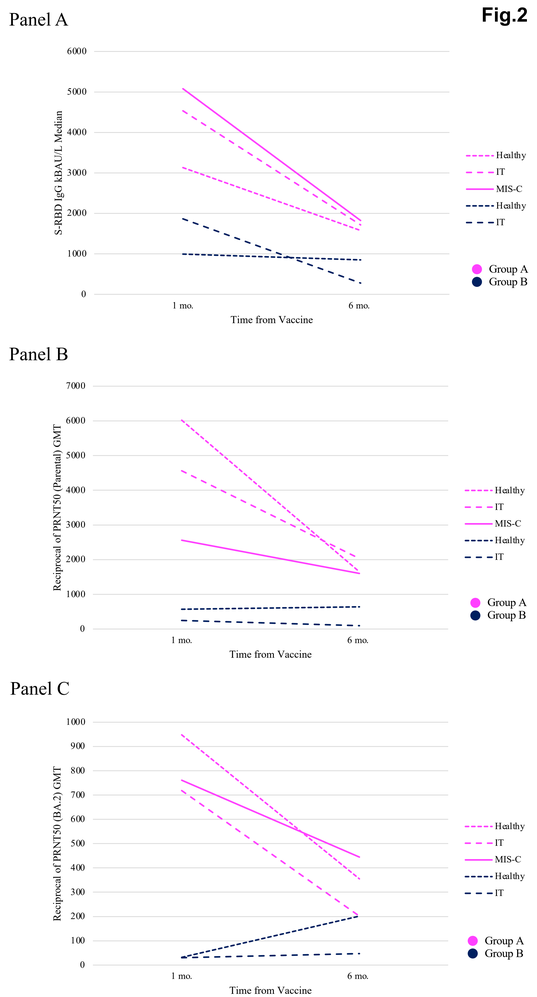
Similarly, T-regs and B-regs were higher in Group A than B at 1 (p<0.01) and 6 months (p<0.02).

Among HC, IC, and MIS-C in Group A, comparable antibodies titers at 1 mo (S-RBD p=0.37, Parental NAbs p=0.38, Omicron NAbs p=0.83) and antibodies decay of 50-70% between 1 and 6 mo were observed. Similarly, an analogous decrement of antibodies was recorded among HC and IC in Group B (S-RBD p=0.60, Parental NAbs p=0.71, Omicron NAbs p=0.42) (Fig.2).

CONCLUSIONS

We observed that mRNA vaccination triggers a higher humoral response in children with a previous history of COVID-19, regardless of the immune deficiency or previous MIS-C, providing insight into boosting preexisting immunity with mRNA vaccines.
Moreover, antibodies declined from 1 to 6 mo after vaccination in both groups.

Fig.2



ADDITIONAL KEY INFORMATION

Author contact details: costanza.dichiara@phd.unipd.it

Acknowledgements: This work is partially supported by VERDI (grant agreement No 101045989).