Initial Spike-Specific Th1-like Responses to mRNA Vaccination against SARS-CoV-2 Correlate with the Durability of Serological Neutralizing Antibody Titers

Philip Samaan[1], Patrick Budylowski[3,5], Serena Chau[5], Adrian Pasculescu[6], Freda Qi[6], Melanie Delgado-Brand[6], Tulunay Tursun[6], Geneviève Mailhot[6], Roya Monica Dayam[6], Anjali Patel[7], Keelia Quinn de Launay[7], Jamie Boyd[7], Alyson Takaoka[7], Karen Colwill[6], Allison McGeer[1,6], Sharon Straus[7], Anne-Claude Gingras[4,6], Mario Ostrowski[1,2,5,8]

[1]Department of Laboratory Medicine and Pathobiology, [2]Department of Immunology, [3]Institute of Medical Science, [4]Department of Molecular Genetics, and [5]Department of Medicine, University of Toronto, Toronto, ON, Canada. [6]Lunenfeld-Tanenbaum Research Institute, Sinai Health, Toronto, ON, Canada. [7]Unity Health, St. Michael's Hospital, Toronto, ON, Canada. [8]Keenan Research Centre for Biomedical Science, St. Michael's Hospital, Toronto, ON, Canada.

Introduction

Immunological correlates of protection against infection, symptomatic disease, and death are still unclear. Investigating these correlates can greatly aid in the identification of surrogate markers that can be used to predict SARS-CoV-2 vaccine efficacy and durability on an individual basis. Serological titers of neutralizing antibodies are purported to be the best immune correlates of protection to date.

Objective

Our objective is to understand how spike-specific IFN-γ and IL-2 T-cell responses to vaccination contribute to protection against infection through their impacts on serological neutralizing antibody titers overtime.

Methods

Peripheral blood mononuclear cell (PBMC) and serum samples (n = 139) were acquired from high-risk long-term care home (LTCH) staff at baseline, 2-6 weeks, and 6 months post-second dose of BNT162b2 or mRNA-1273. Dual-colour ELISpot assays were used to assess ancestral SARS-CoV-2 spike-specific IFN-γ and IL-2 T-cell responses at each timepoint. ELISA assays were additionally conducted to measure anti-spike and anti-RBD IgG and IgA antibody levels in LTCH staff sera. The ability of LTCH staff sera to neutralize ancestral SARS-CoV-2 *in vitro* was lastly assessed using live SARS-CoV-2 neutralization assays.
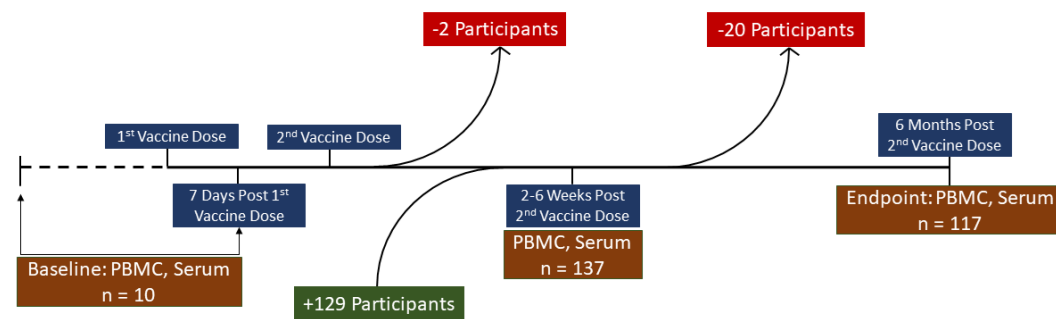

Figure 1: An overview of the LTCH staff cohort throughout the study.

Results

Figure 2. Correlations between spike-specific IL-2 T-cell responses at 2-6 weeks and (a) anti-spike IgG, (b) anti-RBD IgG, and (c) anti-RBD IgA antibody titers at 6 months post-second dose.
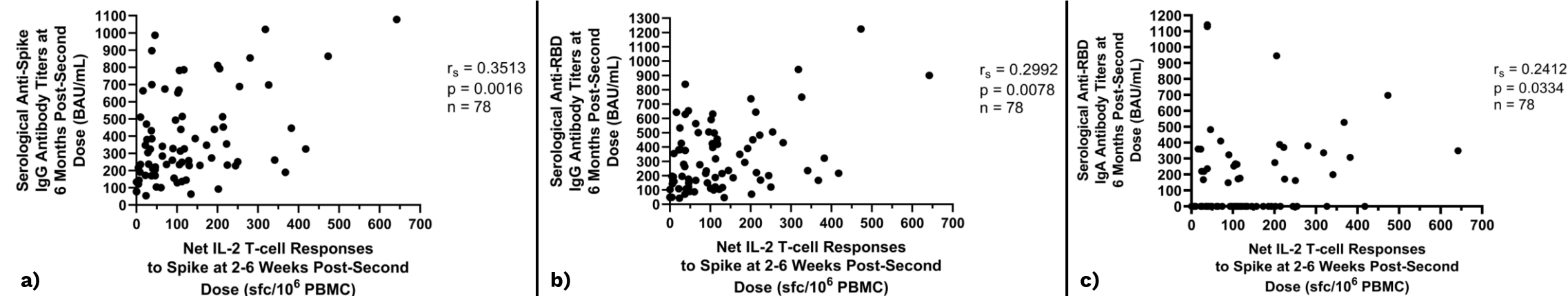
Figure 3. Correlations between spike-specific (a) IFN-γ, (b) IL-2, and (c) dual IFN-γ/IL-2 T-cell responses at 2-6 weeks and serological neutralizing capacity at 6 months post-second dose.
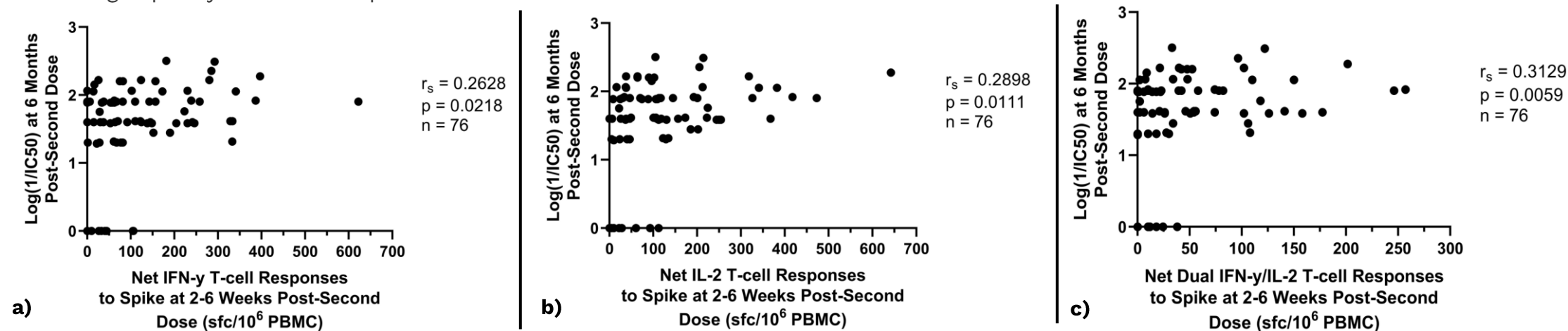
Conclusions

The stronger induction of SARS-CoV-2 spike-specific Th1-like IFN-γ/IL-2 responses by mRNA vaccination correlates with the durability of serological neutralizing antibody titers at 6 months post-second dose

➤ Sheds light on the potential role of spike-specific T-cells in sustaining vaccine-induced antibody responses

References

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