Longitudinal SARS-COV-2 anti-spike antibody response in pregnant people with natural infection and variable vaccine uptake

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BACKGROUND

Natural SARS-CoV-2 infection results in anti-nucleocapsid (N) and anti-spike (S) antibody (Ab) development. Anti-S Ab response (conferred by infection and/or vaccination) is more closely associated with protection.

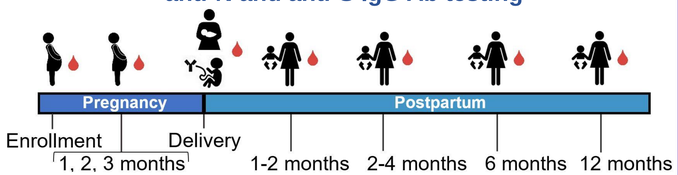
We evaluated longitudinal anti-N and anti-S Ab responses in pregnant people with prior SAR-CoV-2 infection with variable vaccine uptake.

METHODS

Prospective cohort study of pregnant people with history of SARS-CoV-2 infection from January 2021 – September 2022 in the metropolitan Seattle area.

- Participants eligible if anti-N IgG+ by Abbott Architect chemiluminescent immunoassay (CMIA) from a pregnancy seroprevalence study, *or* RT-PCR+ or antigen+ from medical record
- Samples from timepoints below were tested for both anti-N and anti-S IgG Ab on Abbott Architect CMIA*
- Kaplan-Meier methods were used to measure anti-N and anti-S IgG Ab response duration

Figure 1. Timing of samples collected for SARS-CoV-2 anti-N and anti-S IgG Ab testing



RESULTS

Table 1. Baseline characteristics of participants

	n (%) or Median (IQR) N=102
Age (years)	32 (30-35)
Enrolled in pregnancy/delivery	99 (97)
Gestational age (weeks)	32 (18-40)
Enrolled postpartum	3 (3)
Postpartum time (weeks)	10 (2-13)
Prior RT-PCR+ or antigen result	92 (90)
Vaccine status**	
No vaccine	62 (61)
Partial	2 (2)
Full	24 (24)
Boosted	14 (14)

Among 102 participants on enrollment:

78 (76%) were anti-N IgG+, 96 (94%) were anti-S IgG+

- 75 (74%) had concordant anti-N/S IgG+ results

*Anti-N IgG+ Abbott index ≥1.4, Anti-S IgG+ ≥50 AU/mL

**Partial: one dose of mRNA vaccine, full: two doses of mRNA vaccine or one dose of viral vector vaccine, boosted: three doses of mRNA vaccine (or at least one dose plus a viral vector vaccine) or two doses of viral vector vaccine.

Among pregnant people with prior SARS-CoV-2 infection, ***duration of anti-S IgG+ response was longer than anti-N IgG+***, irrespective of vaccine status. Vaccination during pregnancy was associated with ***higher anti-S IgG at baseline and delivery*** compared to those unvaccinated.

Figure 2. Longitudinal anti-N and anti-S IgG Ab responses among pregnant people with prior SARS-CoV-2 infection

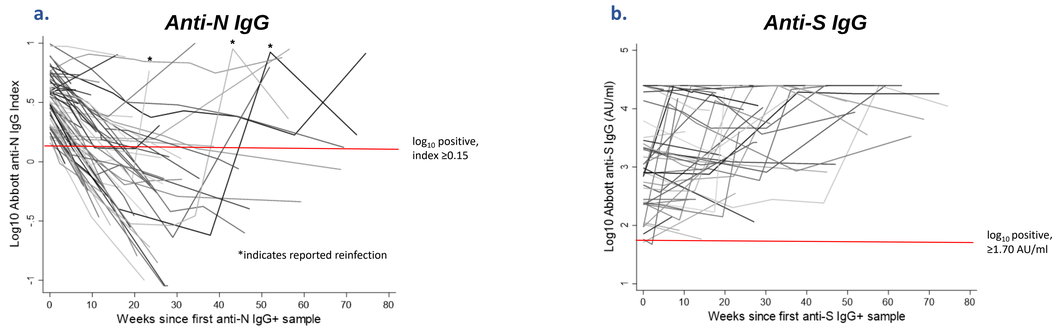
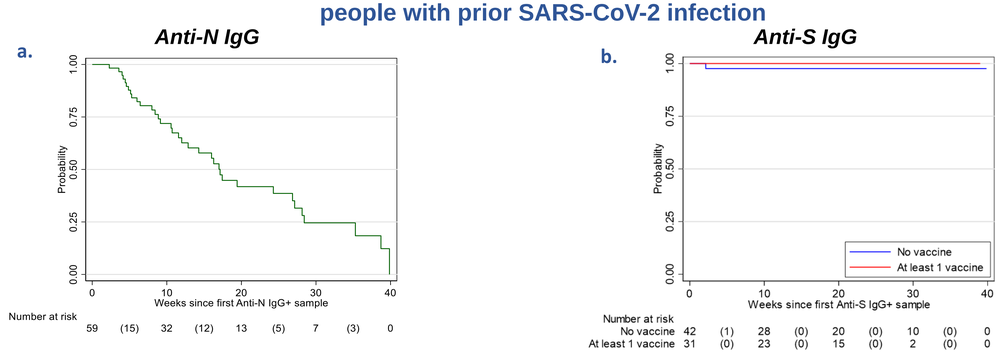


Figure 3. Time from first anti-N IgG+ or anti-S IgG+ to below positive threshold among pregnant people with prior SARS-CoV-2 infection



Among 59 participants with anti-N IgG+ on enrollment with ≥2 available samples:

- Median time to anti-N IgG negative results was 28 weeks (IQR 14-50) after first RT-PCR+ or antigen+ results and 17 weeks (IQR 9-28) after baseline anti-N IgG+ sample.

Among 73 participants with anti-S IgG+ on enrollment with ≥2 available samples:

- Only 1 (unvaccinated) participant had a negative anti-S IgG Ab result by 22 weeks after first RT-PCR+ result and 2 weeks after baseline anti-S IgG+ sample.

Table 2. SAR-CoV-2 Ab results at enrollment and delivery

	n (%) or Median (IQR) N=49	
	Enrollment	Delivery
Vaccine status**		
No vaccine	26 (53)	21 (43)
Partial	0 (0)	1 (2)
Full	14 (29)	15 (31)
Boosted	9 (18)	12 (24)
Anti-N IgG+	37 (76)	23 (47)
Anti-S IgG+	46 (94)	48 (98)
Anti-S IgG+ (AU/ml)	25,000 (553-25,000)	25,000 (1,185-25,000)
No vaccine^	744 (232-6211)	1,109 (435-4,368)
Partial	N/A	17,187 (N/A)
Full	25,000 (25,000-25,000)	25,000 (12,189-25,000)
Boosted	25,000 (25,000-25,000)	25,000 (25,000-25,000)

^p<0.05 for median anti-S IgG (AU/ml) for participants with no vaccine vs. ≥1 vaccine (median 744 vs. 25,000 AU/ml at enrollment, median 1,109 vs. 25,000 AU/ml at delivery) by Wilcoxon rank sum

Among 49 participants with enrollment and delivery samples:

- 23 (47%) were anti-N IgG+, 48 (98%) were anti-S IgG+ by delivery median of 9 weeks (IQR 2-20) from enrollment

Median anti-S IgG was higher among participants who received ≥1 vaccine vs. no vaccine at enrollment and delivery.

CONCLUSIONS

- Among pregnant people with prior SARS-CoV-2 infection, duration of anti-S IgG+ Ab response was longer than anti-N IgG+ Ab, irrespective of vaccine status.
- Vaccination during pregnancy was associated with higher anti-S IgG levels at baseline and delivery compared to those unvaccinated.
- While anti-S IgG+ Ab were detectable for ≥6 months, longer term follow-up is needed to assess durability of hybrid immunity (vaccine + infection) vs. infection alone and potentially has implications for infant protection.

Collaborators

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