Humoral Immune Response Following COVID-19 Vaccination in Patients with Chronic Lymphocytic Leukemia (CLL) and Indolent Non-Hodgkin's Lymphoma (NHL): Results From A Large, Single-Center Observational Study

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Context

- CLL and indolent NHL are hematologic malignancies that typically result in immune dysfunction.[1]
- Infection represents a major cause for morbidity and mortality in these patients.[2]
- Patients with CLL and NHL are at higher risk of hospitalization and death from COVID-19.[3]
- Vaccination against SARS-CoV-2 provides protection against the complications of viral infection in the general population, however published data has shown inferior antibody (Ab) response in patients with CLL, questioning the full effectiveness of vaccination in these groups.[4]
- Data from larger cohorts and data following booster doses are lacking.

Study Design

- Our primary objective was to determine antibody (Ab) response rate (RR) to the COVID-19 vaccination in patients with CLL, Waldenstrom's macroglobulinemia (WM), and other indolent NHLs.
- Retrospective observational study of patients seen between January and October 2021. Updated data was collected until May 27, 2022.
- 398 patients were screened for eligibility. Inclusion criteria were: Confirmed diagnosis of CLL or indolent NHL; Completion of a full vaccination series with either J&J, Moderna, or Pfizer; and Ab testing within 6 months of the initial vaccination series.
- SARS-COV2 Ab titers were obtained after completion of a full vaccination series and, if applicable, after a third vaccine dose (booster). Ab response was considered positive if either total Ab titer or IgG spike protein Ab was positive. Comparisons were performed using chi-square tests.

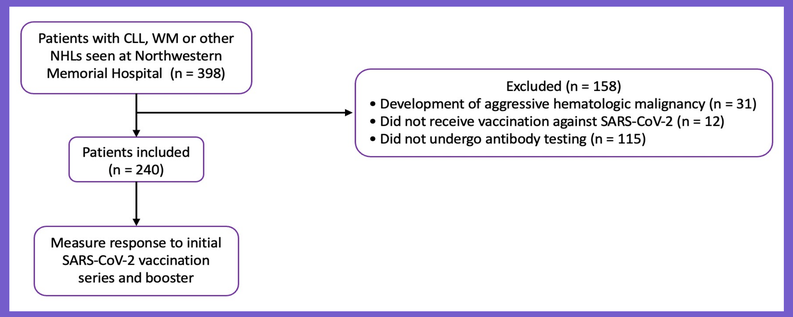


Table 1. Antibody Response Rate (Initial Series)

Malignancy	All Patients	Moderna	Pfizer	P-value*
CLL (n = 181)	50% (91/181)	61% (44/72)	44% (47/106)	0.028
• No Treatment (n = 79)	*68% (54/79)*	*71% (25/35)*	*66% (29/44)*	*0.60*
• Any Treatment (n = 102)	*36% (37/102)***	*51% (19/37)*	*29% (18/62)*	*0.026*
• *Anti-CD20 Ab (n = 101)*	*40% (40/101)*	*53% (19/36)*	*33% (21/64)*	*0.19*
• *BTK Inhibitor (n = 76)*	*33% (25/76)*	*54% (14/26)*	*23% (11/48)*	*0.0072*
• *BCL-2 Inhibitor (n = 30)*	*37% (11/30)*	*46% (6/13)*	*29% (5/17)*	*0.35*
WM (n = 21)	67% (14/21)	88% (7/8)	54% (7/13)	0.11
Other NHLs (n = 38)	71% (27/38)	80% (8/10)	70% (19/27)	0.56

**Comparing antibody positivity in respective subgroups among patient who received either the Moderna or Pfizer vaccination. P-value calculated using chi-square testing and a value of < 0.05 is considered statistically significant.*

*** Some patients excluded from subsequent p-value calculation due to receiving doses from different vaccine brands*

Figure 1. Antibody Response Rate (Booster)



Rate of Ab positivity in all patients (n = 124) who received booster vaccination and had subsequent antibody testing (A), with sub-groups of treatment-naïve patients (B) or patients with current or prior cancer-directed therapy (C).

Results

- 240 patients were included in the final analysis. 64% (153/240) of patients were male and 84% (202/240) were Caucasian.
- Ab response to the initial vaccination series was 50% (91/181) in CLL and 69% (41/59) in other indolent NHLs.
- For CLL patients, there was a higher Ab RR in patients receiving the Moderna compared to the Pfizer vaccine (61% vs 44%, p=0.028).
- Current or prior cancer therapy correlated with a lower Ab RR (36% vs 68%, p<0.0001).
- Use of anti-CD20 agents in the year prior to vaccination resulted in a lower Ab RR (12% vs 53%, p<0.0001). This difference persisted after the booster vaccinations (11% vs. 55%; p = 0.017).
- Figure 1 depicts pre- and post-booster seroconversion rates based on vaccination type only in those with three vaccine doses across all malignancies (n = 124).
- Of the 71 patients with negative Ab response who subsequently received a third vaccine dose, 38% (27/71) developed a measurable Ab response.

Conclusions

- Ab RR to COVID-19 vaccination is suboptimal in patients with CLL and indolent NHL, and continued infection precautions should be employed.
- The Moderna vaccine may provide superior humoral immunity to COVID-19 in patients with CLL.
- A third vaccine dose increases Ab RR in this patient population.

References

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