COVID-19 VACCINE EFFECTIVENESS IN ONCOLOGY PATIENTS

Rachel La Costa, PA-C, DMSc

UC San Diego Health

POINT LOMA NAZARENE UNIVERSITY

Association of Physician Assistants in Oncology

DISCLOSURES: NONE

Association of Physician Assistants in Oncology

EDUCATIONAL OBJECTIVES

At the conclusion of this sessions, participants should be able to:

- Analyze the serological response to COVID-19 vaccination in patients with cancer.
- Identify oncology patient populations with poor seroconversion following COVID-19 vaccination.
- Identify additional risk-mitigating strategies for protection from COVID-19 infection in patients with cancer.

Association of Physician Assistants in Oncology

COVID-19 VACCINES

mRNA Vaccines

PHASE 3

APPROVED IN U.S., ELSEWHERE | EMERGENCY USE IN MANY COUNTRIES

Pfizer BIONTECH

VACCINE NAME: Comirnaty (also known as tozinameran or BNT162b2)
EFFICACY: 91%
DOSE: 2 doses, 3 weeks apart
TYPE: Muscle injection

PHASE 3

APPROVED IN U.S., ELSEWHERE | EMERGENCY USE IN MANY COUNTRIES

moderna NIH National Institutes of Health *Turning Discovery Into Health*

VACCINE NAME: mRNA-1273 or Spikevax
EFFICACY: Preventing Covid-19 illness: 93.2%. Preventing severe disease: 98.2%.
DOSE: 2 doses, 4 weeks apart
TYPE: Muscle injection

Adenoviral Vector Vaccine

PHASE 3

APPROVED IN CANADA | EMERGENCY USE IN U.S., OTHER COUNTRIES

Johnson & Johnson Beth Israel Lahey Health Beth Israel Deaconess Medical Center janssen

VACCINE NAME: Ad26.COV2.S
EFFICACY: 72% in United States, 68% in Brazil and 64% in South Africa
DOSE: 1 dose
TYPE: Muscle injection

Viral Protein Vaccine

PHASE 3

APPROVED IN CANADA | EMERGENCY USE IN U.S., OTHER COUNTRIES

NOVAVAX
Creating Tomorrow's Vaccines Today

VACCINE NAME: NVX-CoV2373 (also known as Covovax or Nuvaxovid)
EFFICACY: 90.4%
DOSE: 2 doses, 3 weeks apart
TYPE: Muscle injection

The New York Times

CDC DEFINITION OF IMMUNOCOMPROMISED PATIENTS

Who Is Moderately or Severely Immunocompromised?

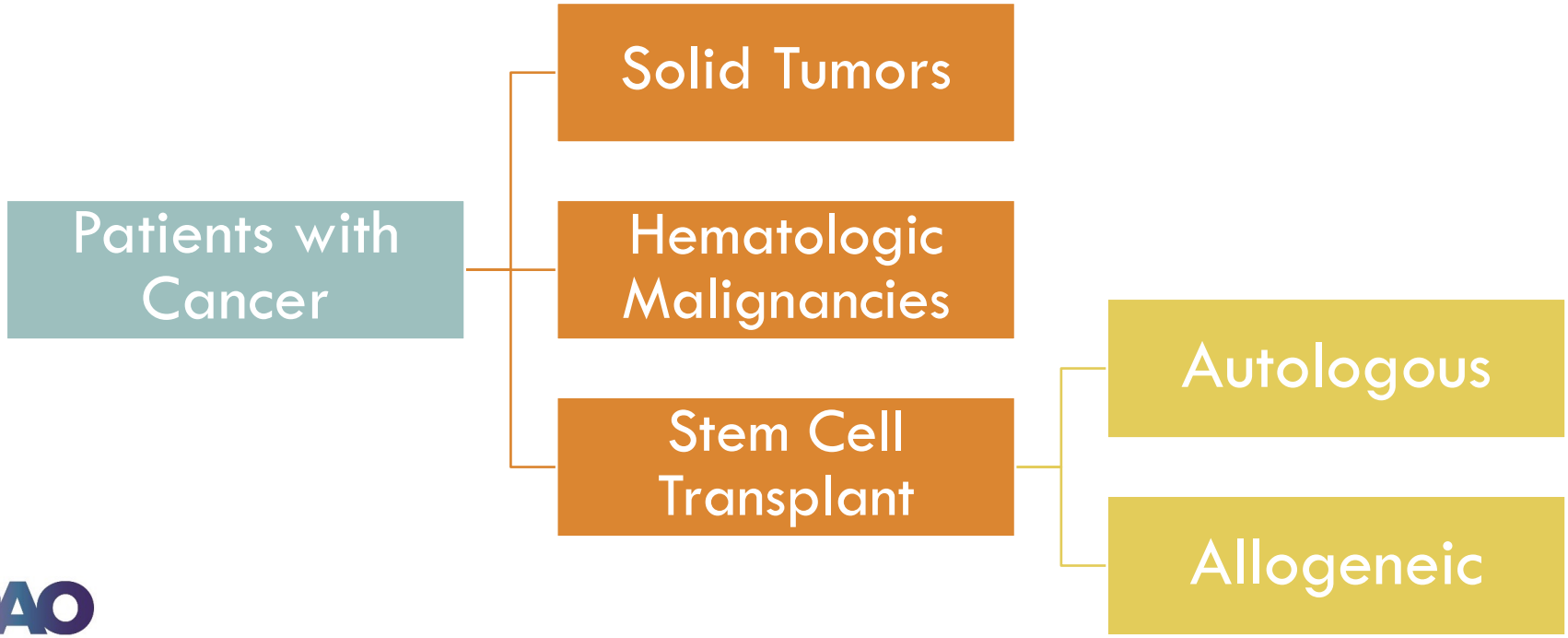
People are considered to be moderately or severely immunocompromised (have a weakened immune system) due to several types of conditions and treatments. Examples include:

* Been receiving active cancer treatment for tumors or cancers of the blood
- Received an organ transplant and are taking medicine to suppress the immune system
* Received chimeric antigen receptor (CAR)-T-cell therapy (a treatment to help your immune system attach to and kill cancer cells) or received a stem cell transplant (within the last 2 years)
- Moderate or severe primary immunodeficiency (such as DiGeorge syndrome, Wiskott-Aldrich syndrome)
- Advanced or untreated HIV infection
- Active treatment with high-dose corticosteroids or other drugs that may suppress their immune response

Association of Physician Assistants in Oncology

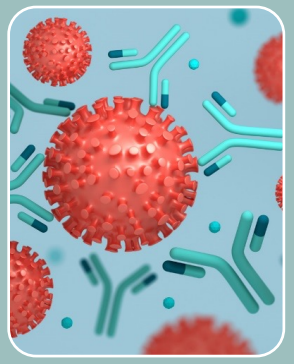
CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

RESPONSE TO COVID-19 VACCINATION



Association of Physician Assistants in Oncology

Seroconversion Rates



Antibody Titers

Association of Physician Assistants in Oncology

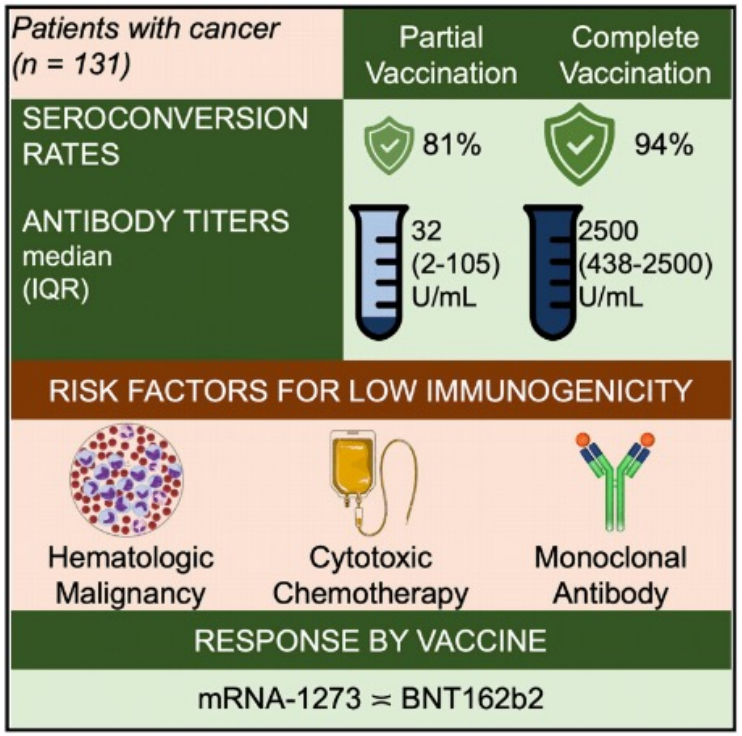
Cancer Cell

CellPress

Article

Immunogenicity of SARS-CoV-2 messenger RNA vaccines in patients with cancer

Alfredo Addeo,[1,5,*] Pankil K. Shah,[2,5] Natacha Bordry,[1] Robert D. Hudson,[2] Brenna Albracht,[2] Mariagrazia Di Marco,[1] Virginia Kaklamani,[2] Pierre-Yves Dietrich,[1] Barbara S. Taylor,[3] Pierre-Francois Simand,[1] Darpan Patel,[2] Jing Wang,[2] Intidhar Labidi-Galy,[1,4] Sara Fertani,[1] Robin J. Leach,[2] Jose Sandoval,[1] Ruben Mesa,[2] Kate Lathrop,[2,6] Nicolas Mach,[1,6] and Dimpy P. Shah[2,6,7,*]



Association of Physician Assistants in Oncology

Addeo et al., 2021, *Cancer Cell*

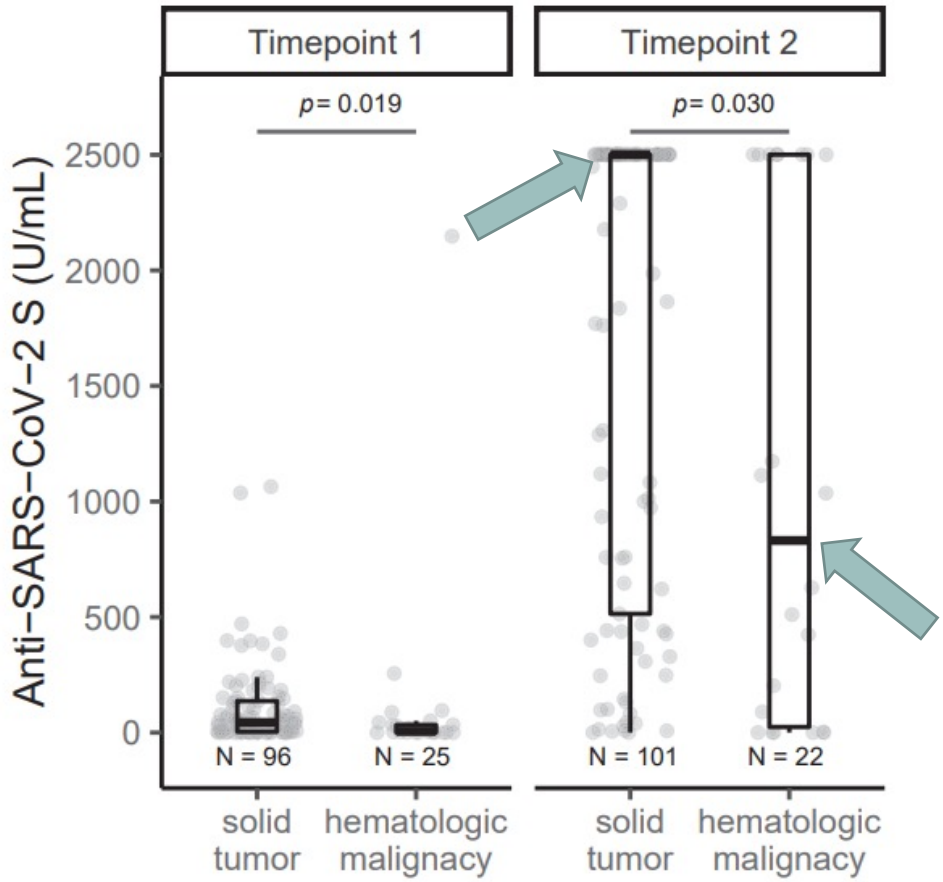


Figure 2. Differences in anti-SARS-CoV-2 S (anti-S) IgG titers following partial and complete vaccination, stratified by type of cancer

Association of Physician Assistants in Oncology

Addeo et al., 2021, *Cancer Cell*

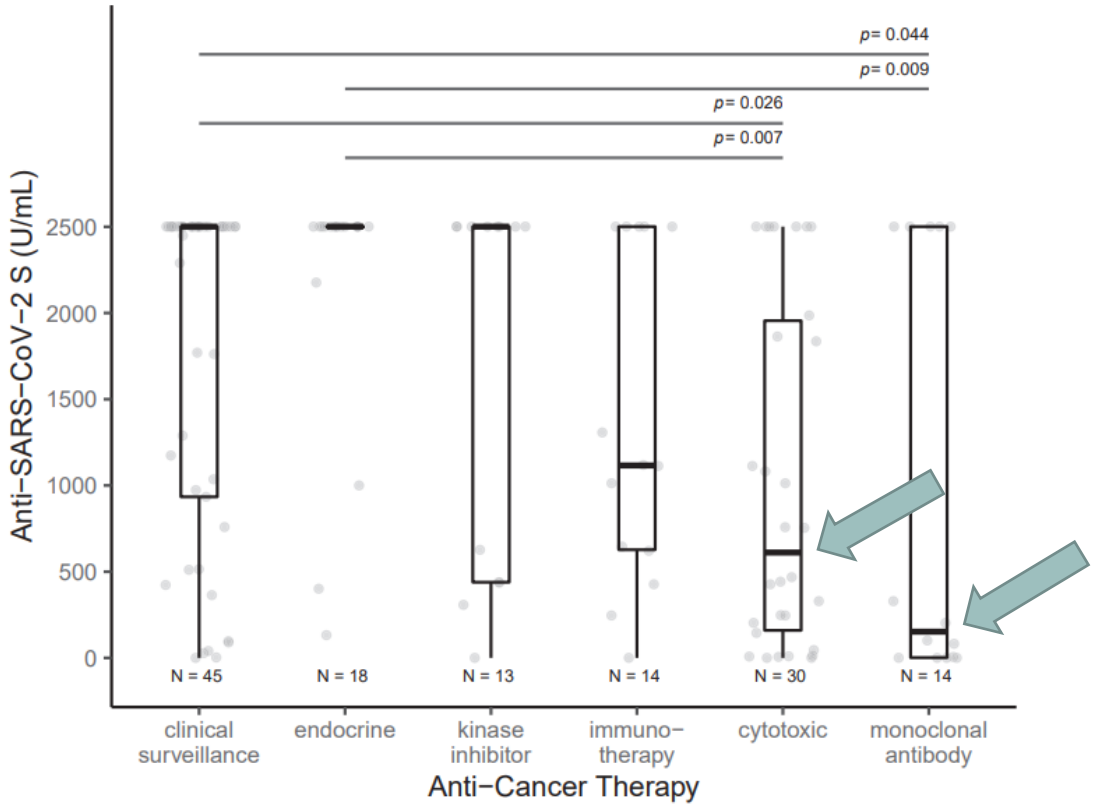


Figure 3. Differences in anti-SARS-CoV-2 S (anti-S) IgG titers following complete vaccination, stratified by anti-cancer treatment modality

Association of Physician Assistants in Oncology

Addeo et al., 2021, *Cancer Cell*

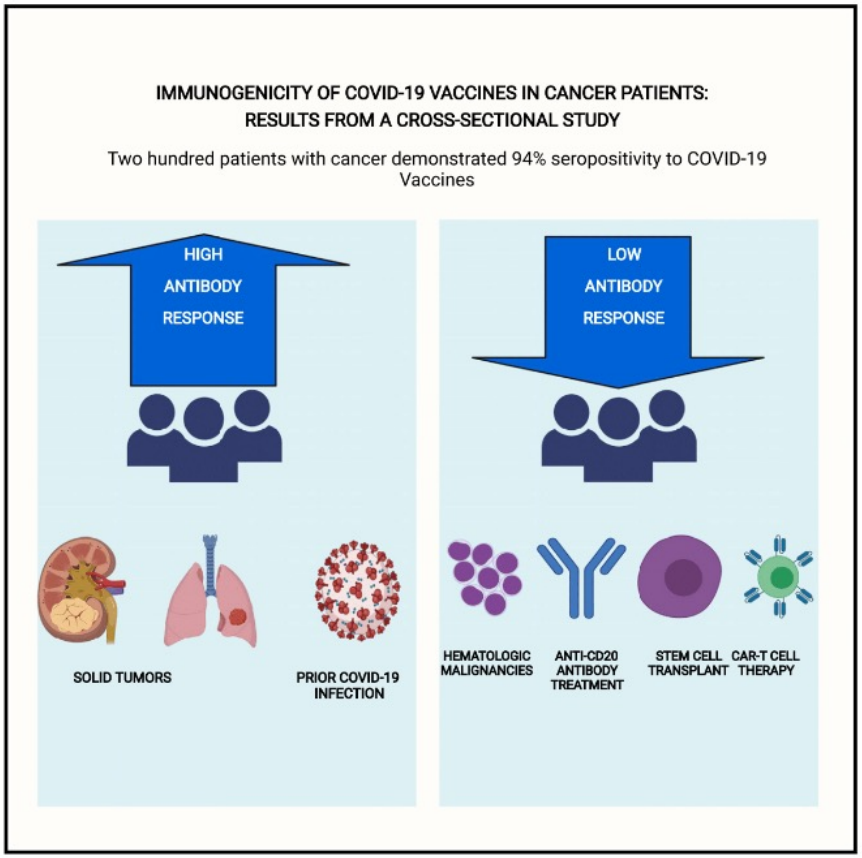
Cancer Cell

CellPress

Article

Seroconversion rates following COVID-19 vaccination among patients with cancer

Astha Thakkar,[1] Jesus D. Gonzalez-Lugo,[1] Niyati Goradia,[1] Radhika Gali,[1] Lauren C. Shapiro,[1] Kith Pradhan,[1] Shafia Rahman,[1] So Yeon Kim,[1] Brian Ko,[1] R. Alejandro Sica,[1] Noah Kornblum,[1] Lizamarie Bachier-Rodriguez,[1] Margaret McCort,[2] Sanjay Goel,[1] Roman Perez-Soler,[1] Stuart Packer,[1] Joseph Sparano,[1] Benjamin Gartrell,[1] Della Makower,[1] Yitz D. Goldstein,[3] Lucia Wolgast,[3] Amit Verma,[1,*] and Balazs Halmos[1,4,*]



Association of Physician Assistants in Oncology

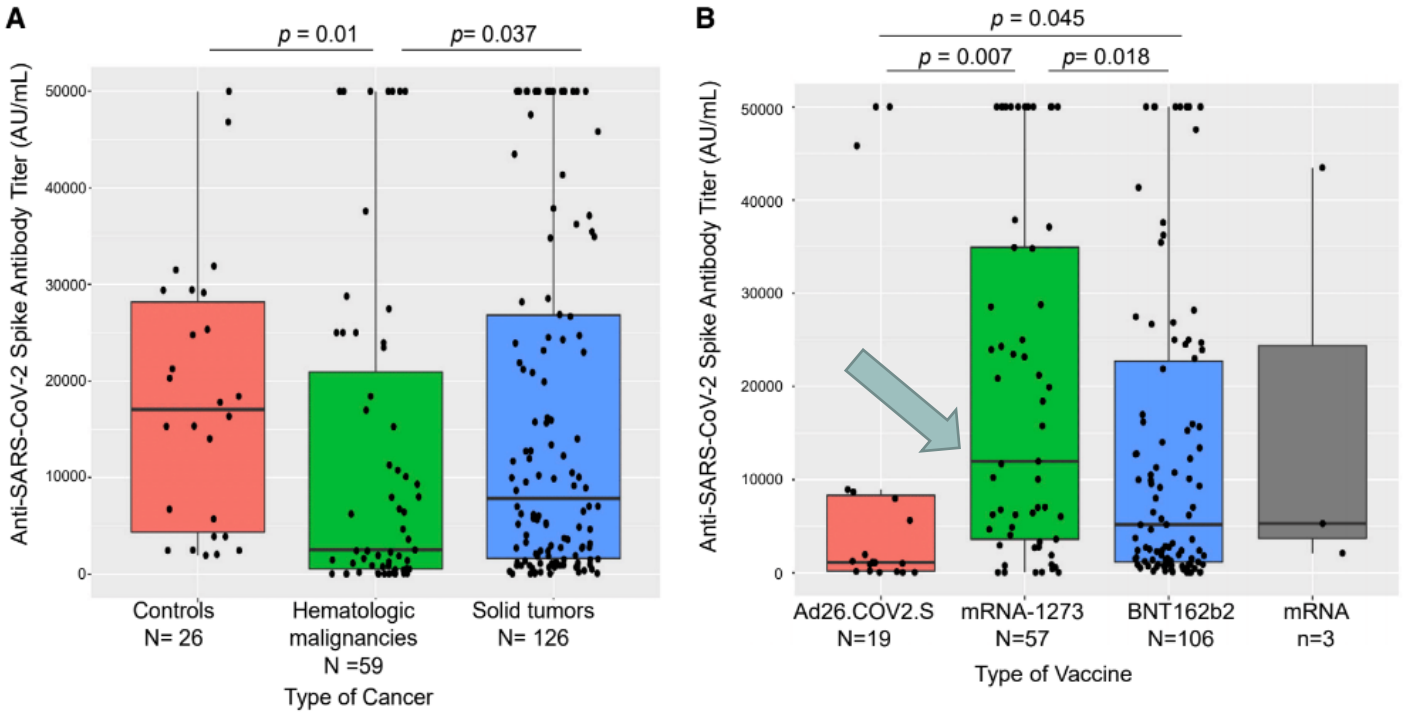


Figure 2. Association of anti-SARS-CoV-2 spike IgG with vaccine types and cancer types

(A) Patients with hematologic malignancies had lowest titers when compared with those with solid tumors and non-cancer patient controls. No difference was seen between patients with solid tumors and controls.

(B) Anti-spike protein IgG antibody titers (AU/mL) were significantly higher in patients who received mRNA vaccines than in those who received adenoviral vaccine.

Box plots here and in subsequent figures show median (horizontal bar), the 75th and 25th quartiles, and error bars depicting the largest and smallest values (up to 1.5 times the interquartile range). Differences assessed by Kruskal-Wallis test.

Thakkar et al., 2021, *Cancer Cell*

THE LANCET
Haematology

Immunogenicity of the BNT162b2 COVID-19 mRNA vaccine and early clinical outcomes in patients with haematological malignancies in Lithuania: a national prospective cohort study

Kazimieras Maneikis, Karolis Šablauskas*, Ugnė Ringelevičiūtė, Vilmantė Vaitekėnaitė, Rita Čekauskienė, Lina Kryžauskaitė, Daniel Naumovas, Valdas Banys, Valdas Pečeliūnas, Tumas Beinortas†, Laimonas Griškevičius†*

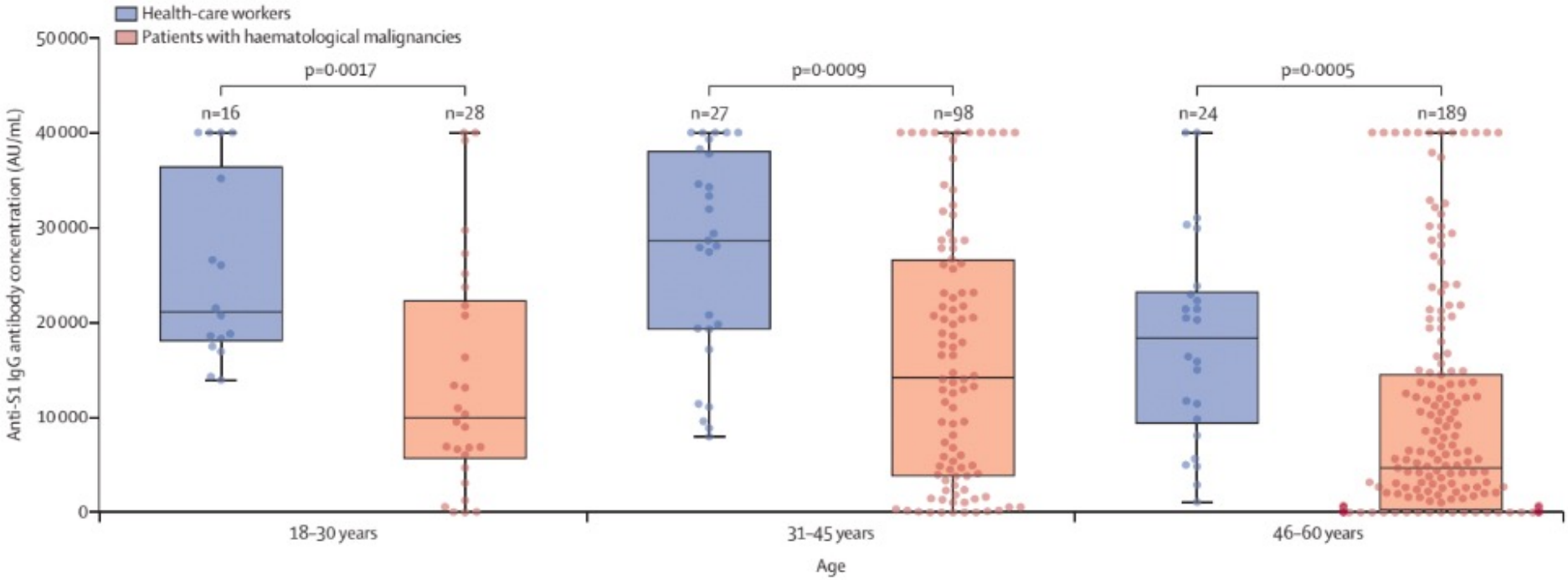


Figure 2: **Serological response to two doses of BNT162b2 mRNA vaccine**

The boxes show IQR, centre line shows the median, and whiskers show maximum and minimum values; the dots show individual participants. (A) Serological response to two doses of BNT162b2 in healthy individuals and in individuals with haematological malignancies grouped by age. (B) Serological response to two doses of BNT162b2 in treated patients compared with untreated patients with haematological malignancies; p values are for the comparison between the median anti-S1 IgG antibody concentration of each treatment group and the untreated group; the treatment regimens of each group are shown in the table. BTKIs=Bruton tyrosine kinase inhibitors. HSCT=haematopoietic stem-cell transplantation. IMiDs=immunomodulatory imide drugs. TKIs=tyrosine kinase inhibitors.

Association of Physician Assistants in Oncology

Maneikis et al., 2021, *Lancet Haematology*

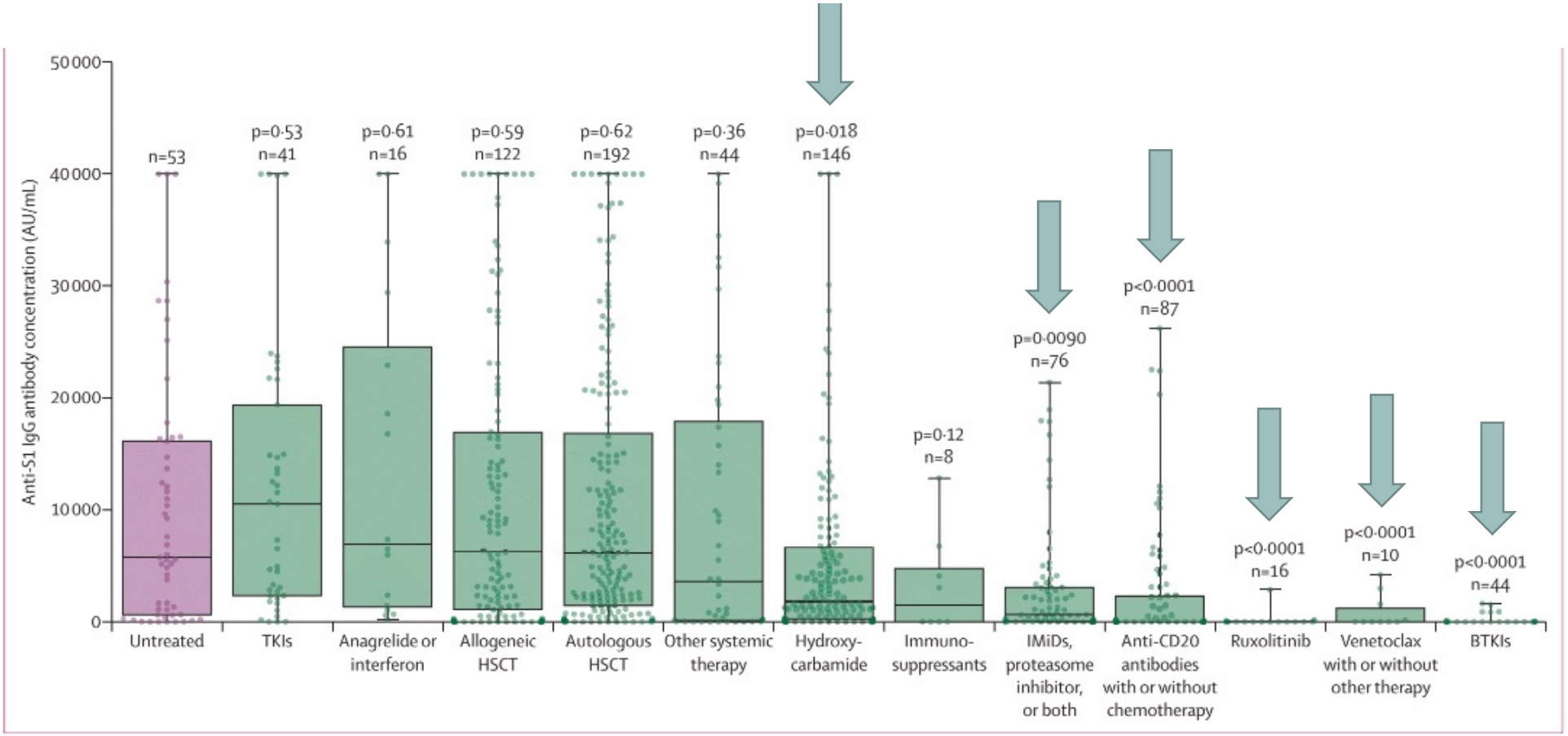


Figure 2: **Serological response to two doses of BNT162b2 mRNA vaccine**

The boxes show IQR, centre line shows the median, and whiskers show maximum and minimum values; the dots show individual participants. (A) Serological response to two doses of BNT162b2 in healthy individuals and in individuals with haematological malignancies grouped by age. (B) Serological response to two doses of BNT162b2 in treated patients compared with untreated patients with haematological malignancies; p values are for the comparison between the median anti-S1 IgG antibody concentration of each treatment group and the untreated group; the treatment regimens of each group are shown in the table. BTKIs=Bruton tyrosine kinase inhibitors. HSCT=haematopoietic stem-cell transplantation. IMiDs=immunomodulatory imide drugs. TKIs=tyrosine kinase inhibitors.

Maneikis et al., 2021, *Lancet Haematology*

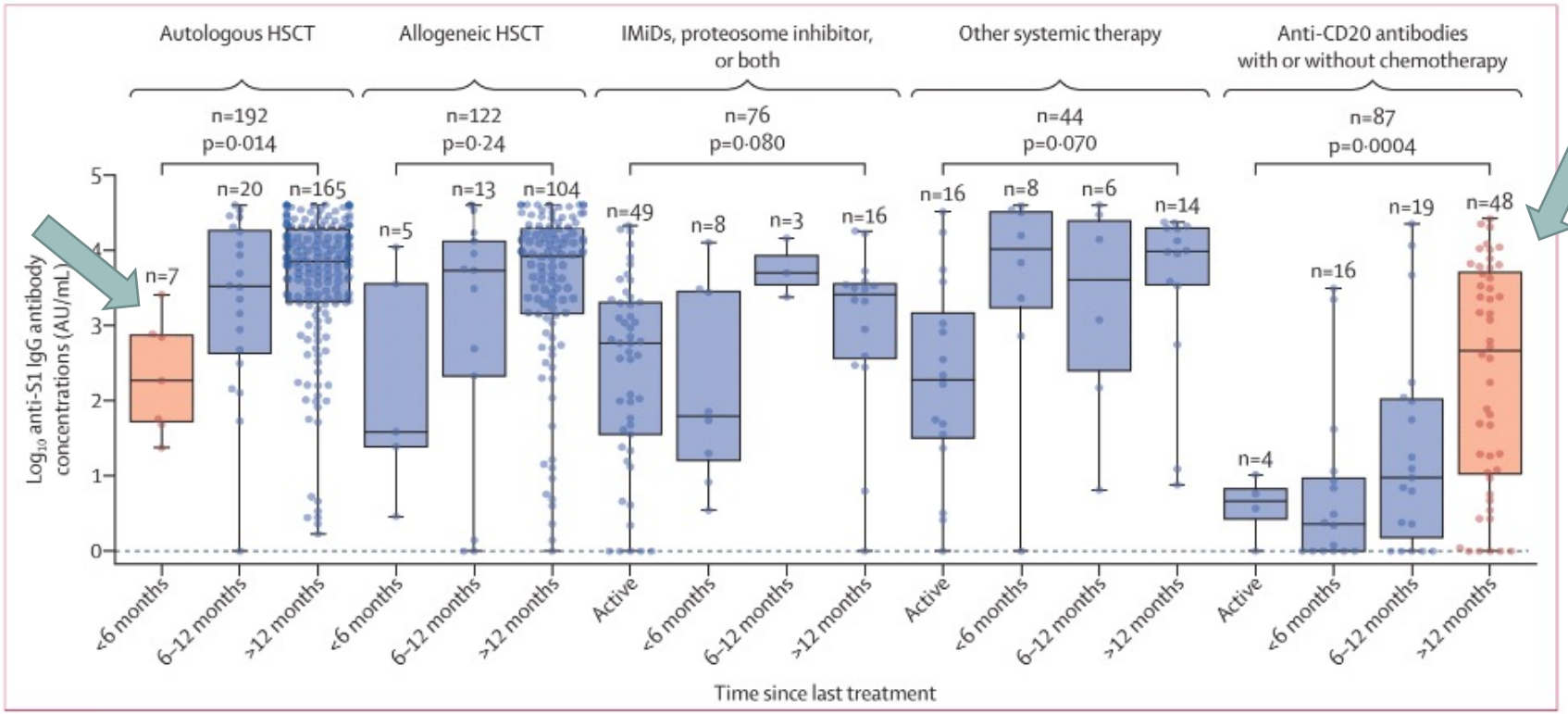


Figure 3: **Serological response after the second dose of vaccine stratified by time since treatment**

The boxes show IQR, centre line shows the median, and whiskers show maximum and minimum values; the dots show individual participants; and p values are for the comparisons of anti-S1 IgG antibody median values within each treatment group. The subgroup differing significantly from others within the treatment group is shown in orange. The treatment regimens of each group are shown in the table. HSCT=haematopoietic stem-cell transplantation. IMiDs=immunomodulatory imide drugs.

Association of Physician Assistants in Oncology

Maneikis et al., 2021, *Lancet Haematology*

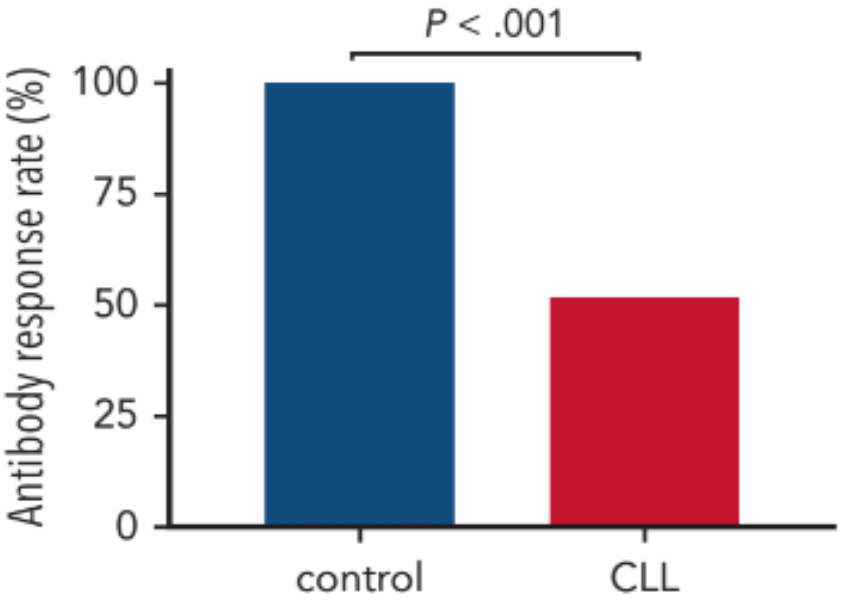
blood®

CLINICAL TRIALS AND OBSERVATIONS

CME Article

Efficacy of the BNT162b2 mRNA COVID-19 vaccine in patients with chronic lymphocytic leukemia

Yair Herishanu,[1,2,*] Irit Avivi,[1,2,*] Anat Aharon,[1,2] Gabi Shefer,[3] Shai Levi,[2] Yotam Bronstein,[1,2] Miguel Morales,[3] Tomer Ziv,[1] Yamit Shorer Arbel,[1] Lydia Scarfò,[4,5] Erel Joffe,[6] Chava Perry,[1,2] and Paolo Ghia[4,5]



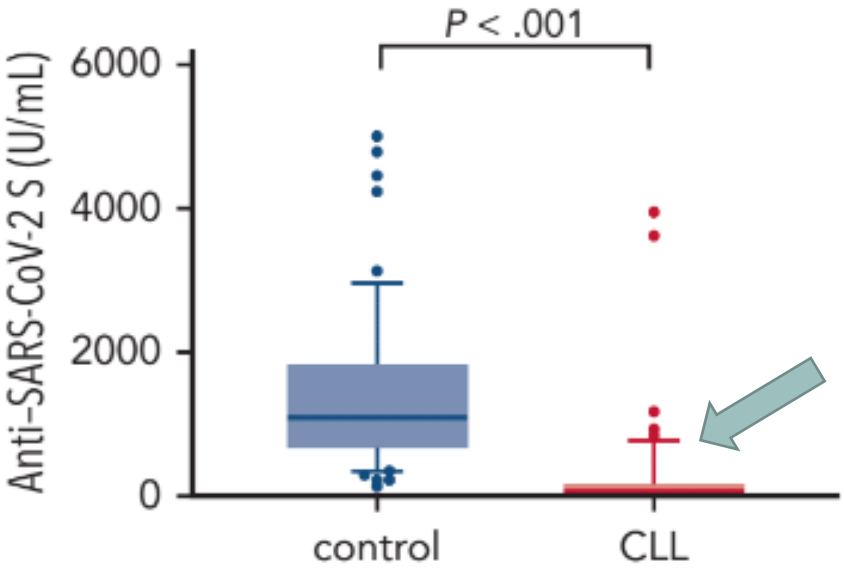


Figure 1. Anti–SARS-CoV-2 antibody response in patients with CLL and healthy control subjects. (A-B) Distribution of individual responses in patients with CLL (n = 52) and sex- and age-matched control subjects (n = 52). Each column represents the level of antibodies in individual patients (red bars indicate treatment naive, green bar indicates on-therapy, blue bars indicate off-therapy in remission, and purple bars indicate off-therapy in relapse) in panel A and in individual healthy control subjects (red bars) in panel B. (C) Response rate in patients with CLL (n = 52) and sex- and age-matched control subjects (n = 52). (D) Anti–SARS-CoV-2 antibody levels in patients with CLL (n = 52) and sex- and age-matched control subjects (n = 52).

Association of Physician Assistants in Oncology

Herishanu et al., 2021, *Blood*

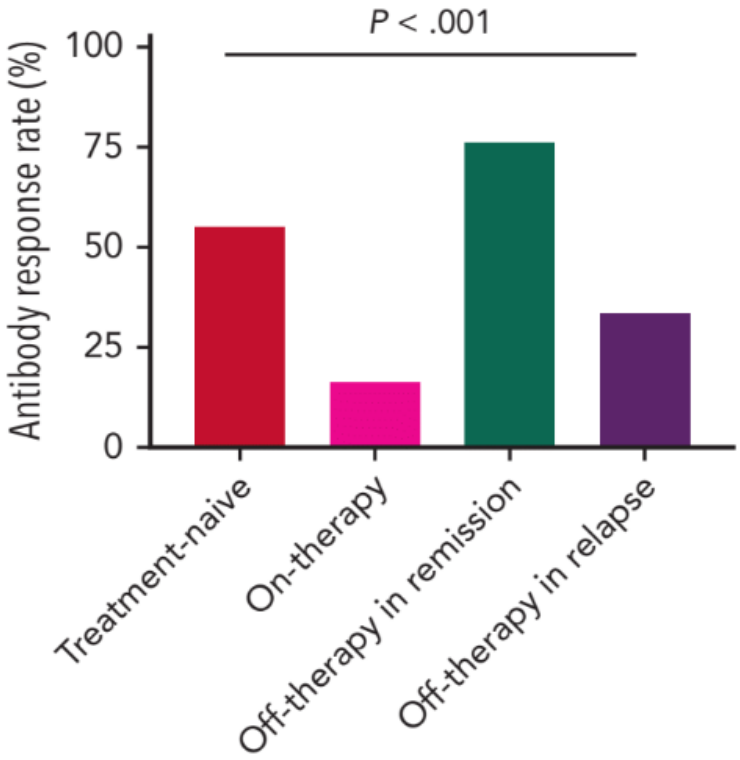


Figure 2. Anti–SARS-CoV-2 antibody responses in patients with CLL according to disease status and treatment. (A-B) Response rate and anti–SARS-CoV-2 antibody levels in patients with CLL according to disease status: Treatment naive (n = 58), on-therapy (n = 75), off-therapy in remission (n = 24), and off-therapy in relapse (n = 10). (C) Response rate in patients with CLL treated with BTKi (n = 50) and venetoclax (Ven) ± anti-CD20 antibody (n = 22). NS, not significant.

Association of Physician Assistants in Oncology

Herishanu et al., 2021, *Blood*

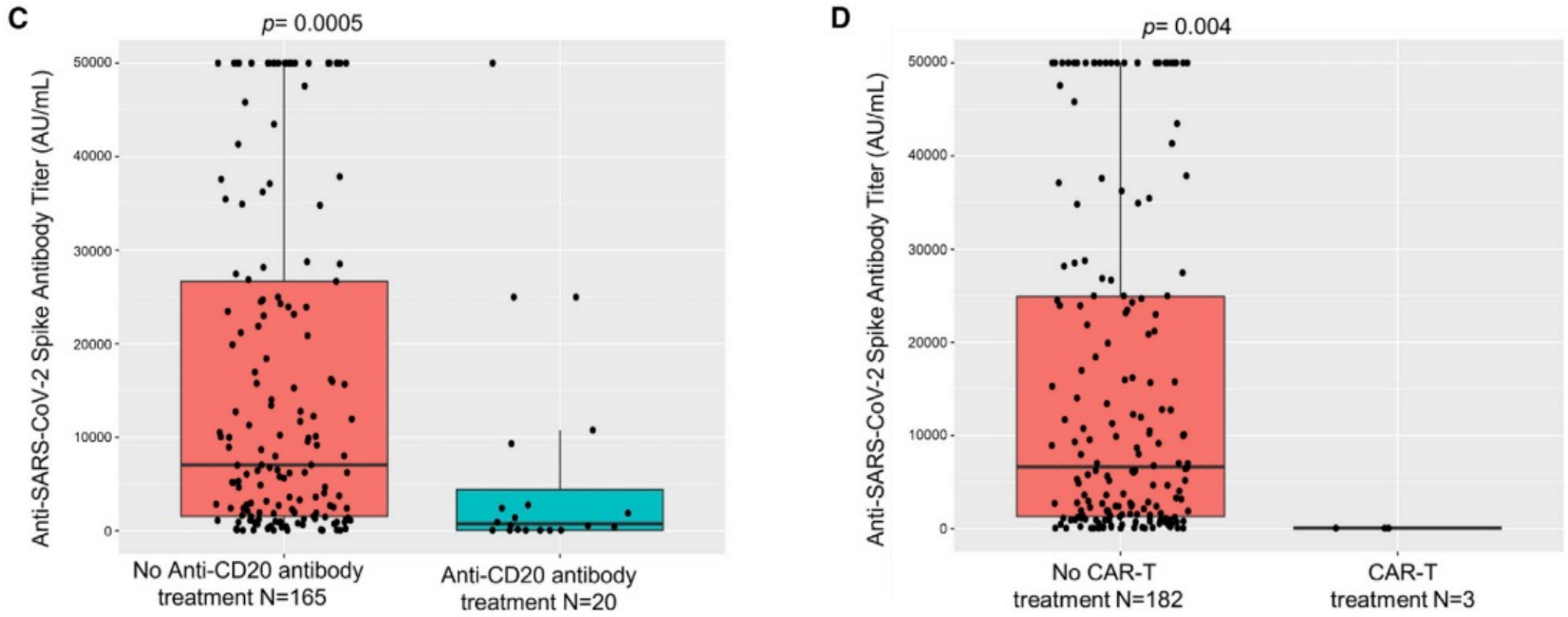


Figure 4. Association of anti-SARS-CoV-2 spike IgG with immunosuppressive therapies

(A and B) Anti-spike protein IgG antibody titers (AU/mL) after full vaccination did not significantly differ in patients having received stem cell transplantation (SCT) (A) or anti-CD38 antibody therapy (B) when compared with respective counterparts.

(C and D) Patients receiving anti-CD20 antibody treatments (C) or CAR-T cell therapy (D) had a significantly lower titer after vaccination when compared with respective counterparts.

Box plots are shown with differences assessed by Kruskal-Wallis test.

Thakkar et al., 2021, *Cancer Cell*

RECOMMENDATIONS

Association of Physician Assistants in Oncology

COVID-19 VACCINES FOR PEOPLE WHO ARE MODERATELY OR SEVERELY IMMUNOCOMPROMISED

Pfizer or Moderna mRNA Vaccines

1st Dose
PRIMARY SERIES

2nd Dose
PRIMARY SERIES
3 weeks after 1st dose (Pfizer)
4 weeks after 1st dose (Moderna)

3rd Dose
PRIMARY SERIES
At least 4 weeks after 2nd dose

4th Dose
BOOSTER
At least 3 months after 3rd dose [1]

5th Dose
BOOSTER
At least 4 months after 4th dose [1]

Association of Physician Assistants in Oncology

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

COVID-19 VACCINES FOR PEOPLE WHO ARE MODERATELY OR SEVERELY IMMUNOCOMPROMISED

Johnson & Johnson/Janssen Vaccine

1st Dose
PRIMARY SERIES

2nd Dose
ADDITIONAL DOSE
At least 4 weeks after 1st dose and should be Pfizer-BioNTech or Moderna

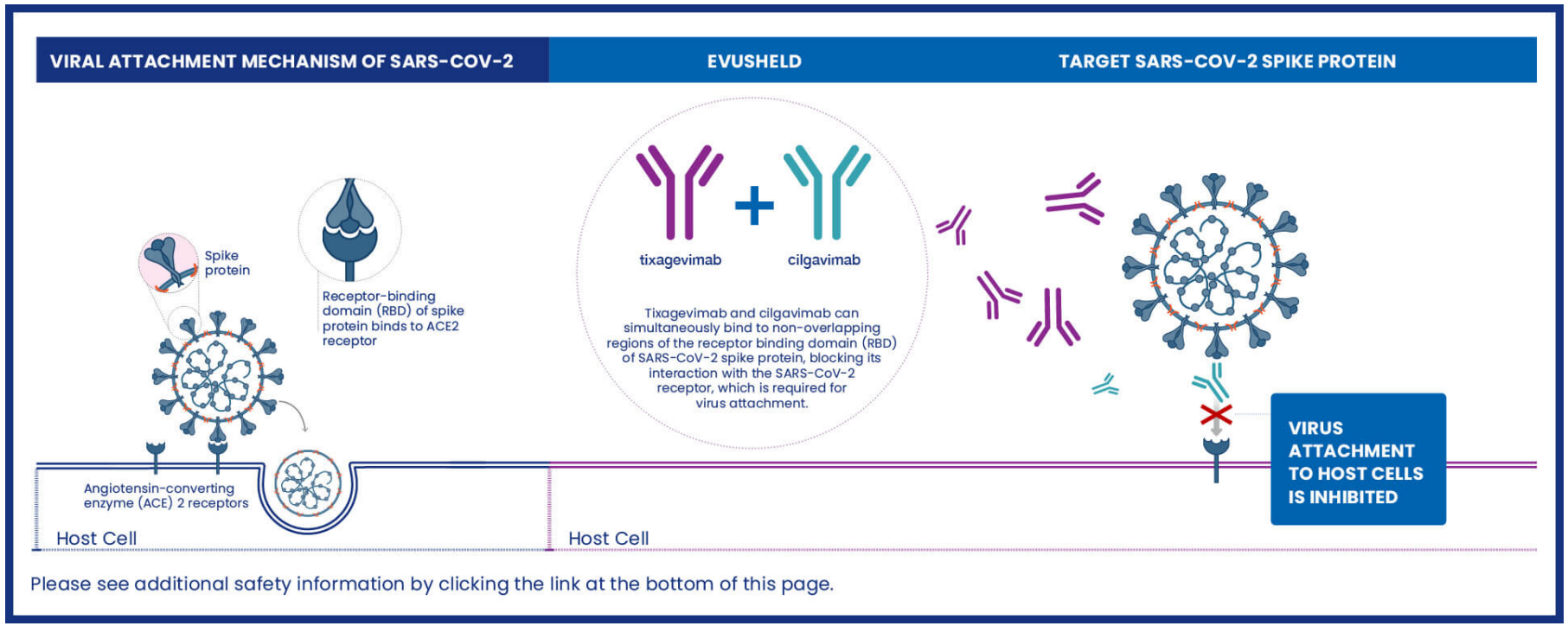
3rd Dose
BOOSTER
At least 2 months after 2nd dose [1]

4th Dose
BOOSTER
At least 4 months after 3rd dose [1]

Association of Physician Assistants in Oncology

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

EVUSHELD (TIXAGEVIMAB CO-PACKAGED WITH CILGAVIMAB)



Please see additional safety information by clicking the link at the bottom of this page.

AstraZeneca

ADDITIONAL RECOMMENDATIONS

- Consider awaiting neutrophil and platelet recovery prior to vaccination
- Consider delaying anti-CD20 or BTK inhibitor therapy
- Ensure that vaccination is not a contraindication to enrollment on a clinical trial
- "Cocoon" strategy
- Non-pharmacological interventions
- *Patient education*

Association of Physician Assistants in Oncology

REFERENCES

1. The New York Times. Coronavirus Vaccine Tracker. https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html. Updated July 28, 2022. Accessed July 28, 2022.
2. Addeo A, Shah PK, Bordry N, et al. Immunogenicity of SARS-CoV-2 messenger RNA vaccines in patients with cancer. *Cancer Cell*. 2021;39(8):1091-1098.e2. doi:10.1016/j.ccell.2021.06.009
3. Thakkar A, Gonzalez-Lugo JD, Goradia N, et al. Seroconversion rates following COVID-19 vaccination among patients with cancer. *Cancer Cell*. 2021;39(8):1081-1090.e2. doi:10.1016/j.ccell.2021.06.002
4. Maneikis K, Šablauskas K, Ringelevičiūtė U, et al. Immunogenicity of the BNT162b2 COVID-19 mRNA vaccine and early clinical outcomes in patients with haematological malignancies in Lithuania: a national prospective cohort study. *Lancet Haematol*. 2021;8(8):e583-e592. doi:10.1016/S2352-3026(21)00169-1
5. Herishanu Y, Avivi I, Aharon A, et al. Efficacy of the BNT162b2 mRNA COVID-19 vaccine in patients with chronic lymphocytic leukemia. *Blood*. 2021;137(23):3165-3173. doi:10.1182/blood.2021011568

Association of Physician Assistants in Oncology

QUESTIONS?

Please feel free to reach out!

Email: rachelmlacosta@gmail.com

Association of Physician Assistants in Oncology