10TH EDITION HIV PERSISTENCE DURING THERAPY™ Reservoirs & Eradication Strategies Workshop
DECEMBER 13-16, 2022
www.hiv-persistence.com
FLORIDA MIAMI USA

Investigating Short-term Effects of COVID-19 mRNA Vaccination on Plasma Viremia and Intact HIV Reservoir Size in Individuals Receiving Antiretroviral Therapy (ART)

Maggie Duncan

Simon Fraser University

Brumme Lab

December 15th, 2022

SFU SIMON FRASER UNIVERSITY

BRITISH COLUMBIA CENTRE *for* EXCELLENCE *in* HIV/AIDS

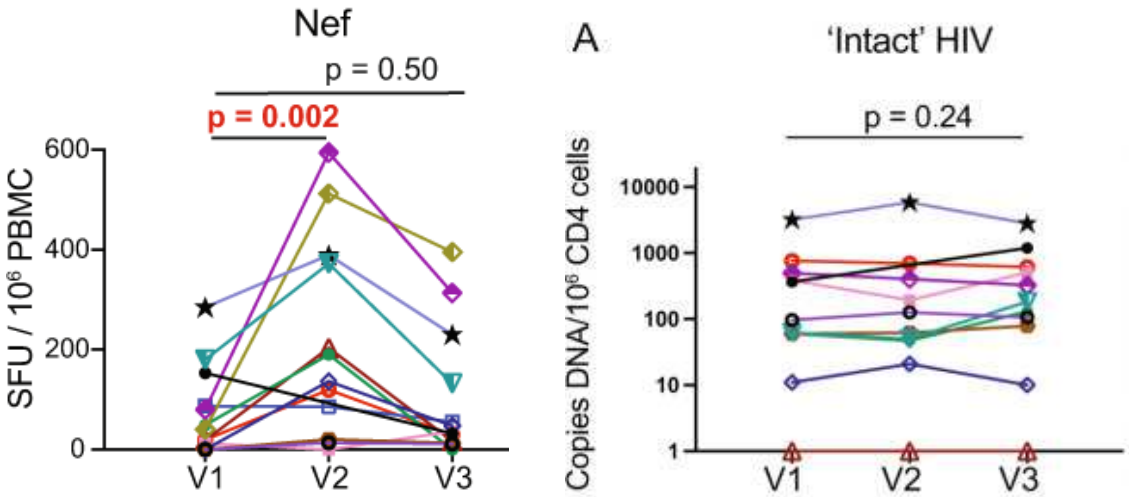
REACH For the Cure
Research Enterprise to Advance a Cure for HIV

No conflicts of interest to declare

Background

- Transient HIV viremia in ART-suppressed PLWH reported anecdotally following COVID-19 mRNA vaccination (Bozzi et al., 2021)

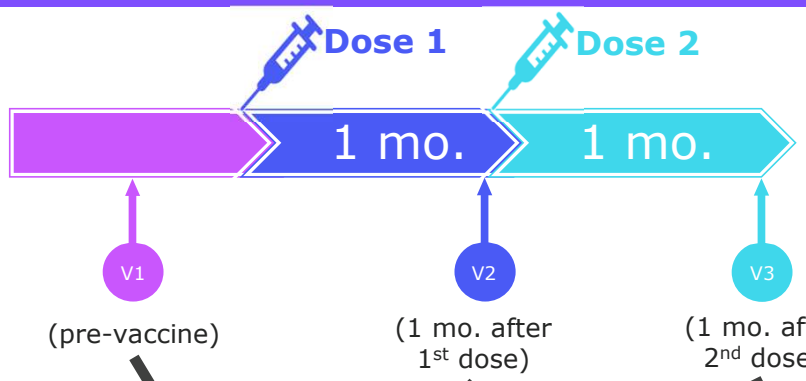
- Nef-specific CD8+ T cells increased and acquired granzyme B effector functions following COVID-19 mRNA vaccination (Stevenson et al., 2022)
  - No significant change in HIV reservoir size



From Stevenson et al., 2022. *Nat. Comm*

We investigated the effects of COVID-19 mRNA vaccination on HIV plasma viremia and reservoir size in 62 ART-treated individuals

Study Design



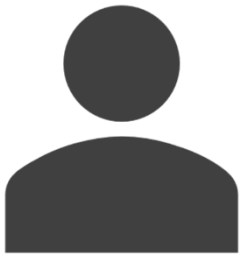
N=62

pVL testing from plasma

CD4+ T cells isolated from PBMCs, DNA extraction from PBMCs

Reservoir quantification with IDPA

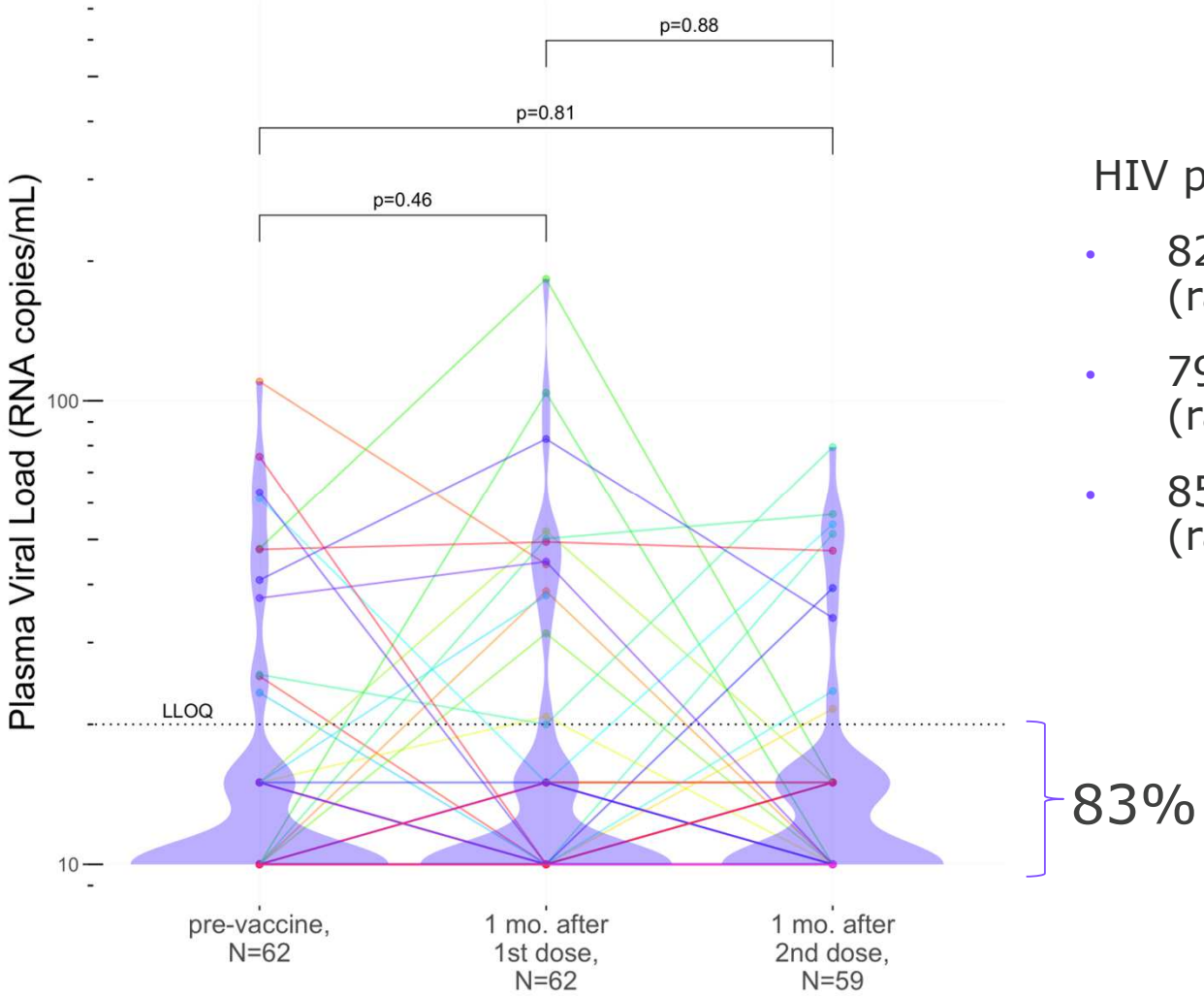
Study Design



N=62

Cohort Characteristics	N = 62
Sociodemographic	
Age in years, median (IQR)	43 (35, 56)
Sex assigned at birth, n(%)	
Male	55 (89%)
Female	7 (11%)
HIV-Related	
Nadir CD4+ T-cell count (cells/mm^3), median (IQR)	305 (160, 498)
Baseline CD4+ T-cell count (cells/mm^3), median (IQR)	725 (475, 915)
Baseline CD4+/CD8+ T-cell ratio, median (IQR)	0.88 (0.63, 1.25)
Years on ART, median (IQR)	6 (3, 14)
Baseline pVL (copies HIV RNA/mL), median (IQR)	<20 (<20,<20)
ART regimen type, n(%)	
INSTI	46 (74%)
NNRTI	6 (9.7%)
PI	5 (8.1%)
Intensive/Other	5 (8.1%)
COVID-19-Related	
COVID-19 vaccine regimen, n(%)	
Pfizer/BioNTech+Pfizer/BioNTech	43 (69%)
Moderna+Moderna	16 (26%)
Pfizer/BioNTech+Moderna	3 (4.8%)
COVID-19 Exposure, n(%)	
COVID-19 naive	57 (92%)
COVID-19 pre-vaccine	4 (6.5%)
COVID-19 between 1st and 2nd vaccine doses	1 (1.6%)

Results: HIV Plasma Viral Load



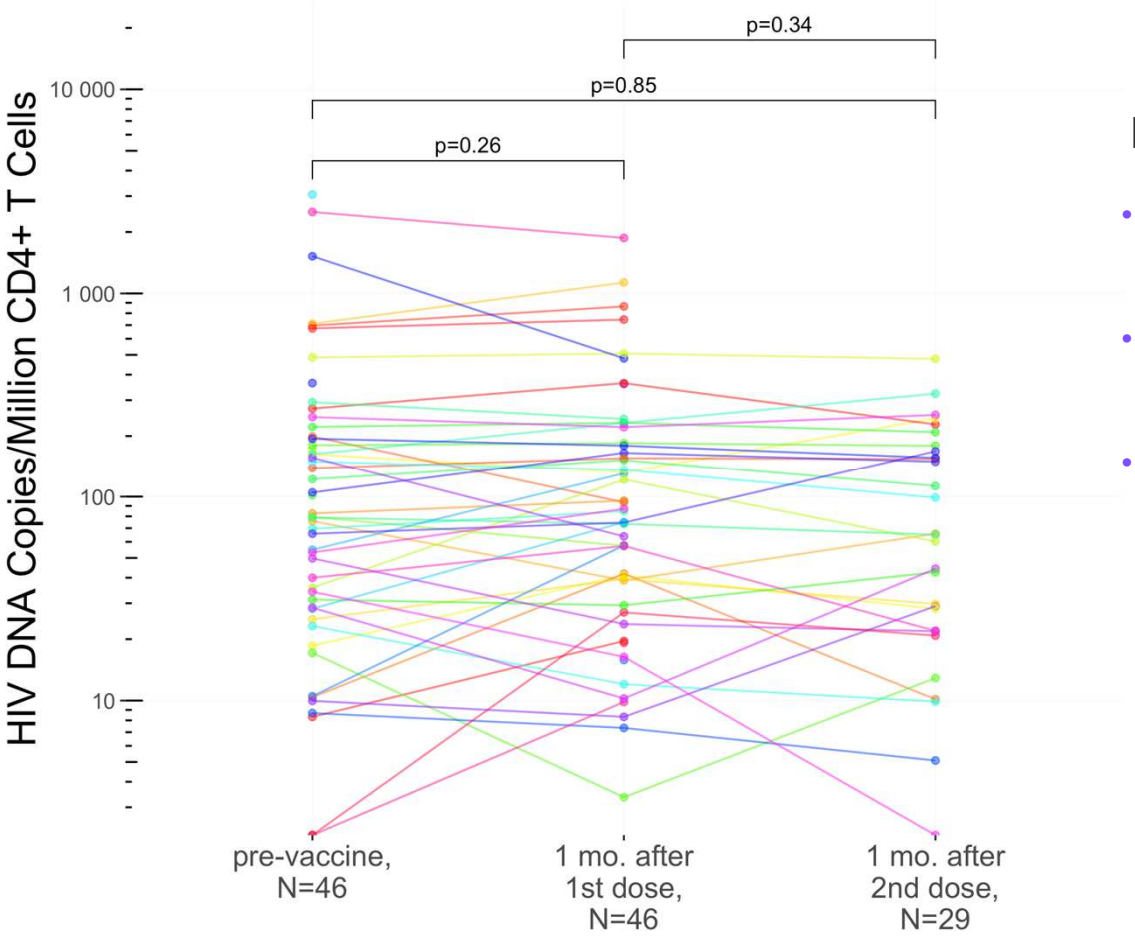
83%

HIV pVL was <20 copies/mL in:

- 82% of participants pre-vaccination (range <20-110 copies/mL)
- 79% one month post-first-dose (range <20-183 copies/mL)
- 85% one month post-second-dose (range <20-79.4 copies/mL)

No significant changes in HIV plasma viral load were observed after vaccination (all p>0.4)

Results: HIV Reservoir Size (Intact Proviruses)

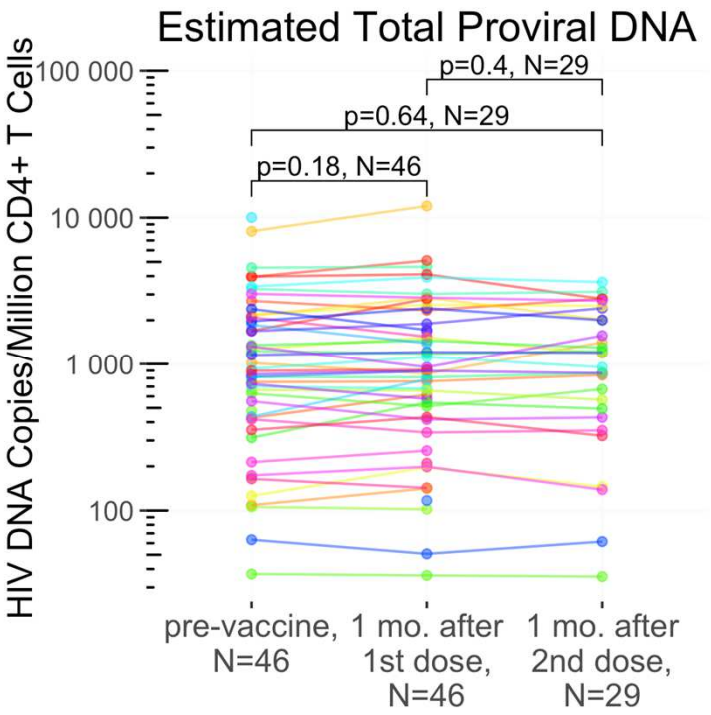


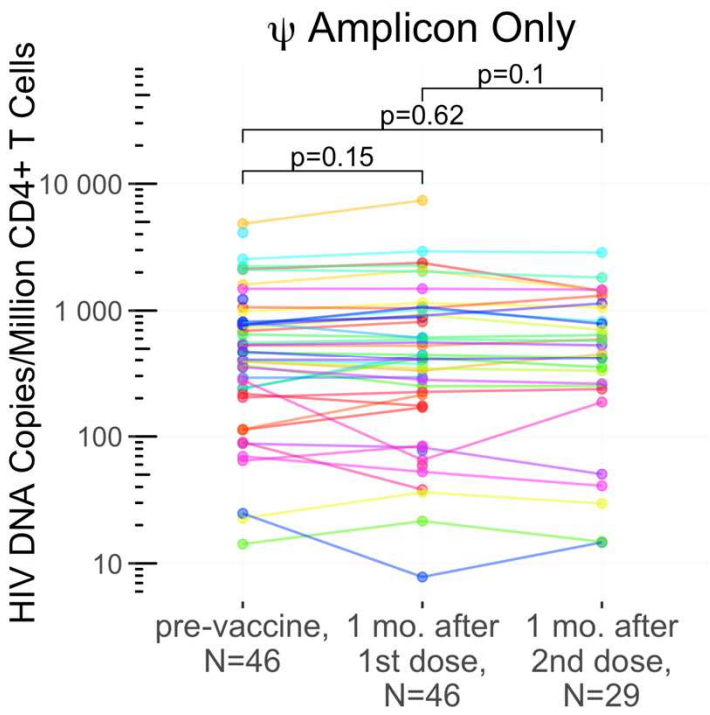
Median intact reservoir size was:

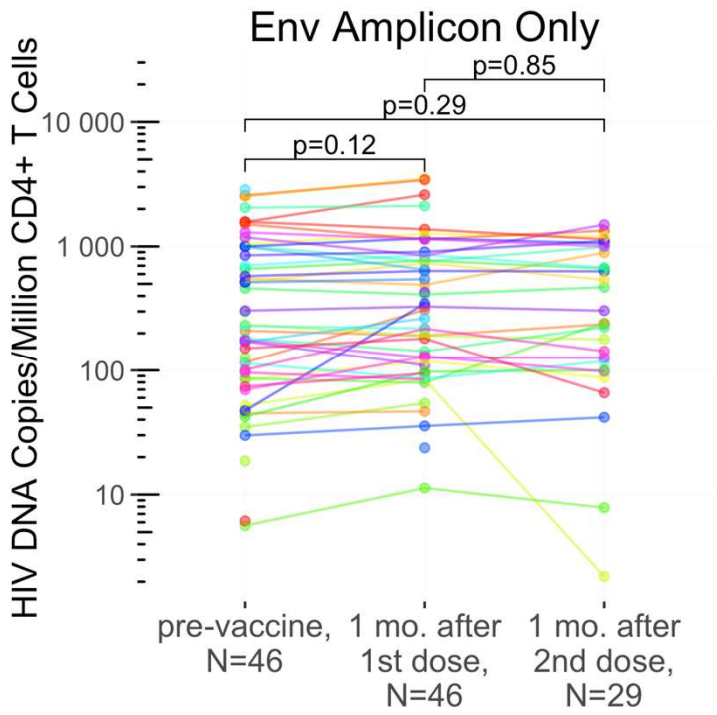
- 80 (IQR:28-197) HIV copies/million CD4+ T-cells pre-vaccine
- 85 (IQR:29-184) HIV copies/million CD4+ T-cells after the first dose
- 65 (IQR:22-168) HIV copies/million CD4+ T-cells after the second dose

No significant changes in intact reservoir size were observed after vaccination (all p>0.2)

Results: Total and Defective Proviral DNA





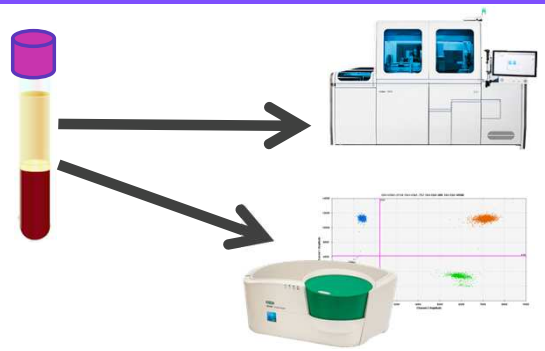


- No significant changes in estimated total, ψ+ only and env+ only HIV DNA loads were observed after vaccination (all p≥ 0.1)

Results: Exploratory Analysis

Result Type	Stratification Variable	Stratification Variable Value	Comparison Visit A	Comparison Visit B	Number of Pairs	p Values	q Values	Significant?
IntactHIVCopiesPerMillionCD4			2	1	46	0.26	0.9	No
IntactHIVCopiesPerMillionCD4			3	1	29	0.85	1	No
IntactHIVCopiesPerMillionCD4			3	2	29	0.34	0.9	No
EnvCopiesPerMillionCD4			2	1	46	0.24	0.9	No
EnvCopiesPerMillionCD4			3	1	29	0.35	0.9	No
EnvCopiesPerMillionCD4			3	2	29	0.95	1	No
GagCopiesPerMillionCD4			2	1	46	0.15	0.9	No
GagCopiesPerMillionCD4			3	1	29	0.62	1	No
GagCopiesPerMillionCD4			3	2	29	0.1	0.9	No
EstTotalReservoirSize			2	1	46	0.18	0.9	No
EstTotalReservoirSize			3	1	29	0.64	1	No
EstTotalReservoirSize			3	2	29	0.4	0.91	No
IntactHIVCopiesPerMillionCD4	Sex_at_birth	Female	2	1	5	0.81	1	No
IntactHIVCopiesPerMillionCD4	Sex_at_birth	Female	3	1	4	0.25	0.9	No
IntactHIVCopiesPerMillionCD4	Sex_at_birth	Female	3	2	4	0.88	1	No
EnvCopiesPerMillionCD4	Sex_at_birth	Female	2	1	5	0.06	0.9	No
EnvCopiesPerMillionCD4	Sex_at_birth	Female	3	1	4	0.38	0.9	No
EnvCopiesPerMillionCD4	Sex_at_birth	Female	3	2	4	0.88	1	No
GagCopiesPerMillionCD4	Sex_at_birth	Female	2	1	5	0.12	0.9	No
GagCopiesPerMillionCD4	Sex_at_birth	Female	3	1	4	0.12	0.9	No
GagCopiesPerMillionCD4	Sex_at_birth	Female	3	2	4	0.88	1	No
EstTotalReservoirSize	Sex_at_birth	Female	2	1	5	0.06	0.9	No
EstTotalReservoirSize	Sex_at_birth	Female	3	1	4	0.25	0.9	No
EstTotalReservoirSize	Sex_at_birth	Female	3	2	4	0.62	1	No
IntactHIVCopiesPerMillionCD4	Sex_at_birth	Male	2	1	41	0.23	0.9	No
IntactHIVCopiesPerMillionCD4	Sex_at_birth	Male	3	1	25	0.69	1	No
IntactHIVCopiesPerMillionCD4	Sex_at_birth	Male	3	2	25	0.22	0.9	No
EnvCopiesPerMillionCD4	Sex_at_birth	Male	2	1	41	0.5	1	No
EnvCopiesPerMillionCD4	Sex_at_birth	Male	3	1	25	0.54	1	No
EnvCopiesPerMillionCD4	Sex_at_birth	Male	3	2	25	0.96	1	No
GagCopiesPerMillionCD4	Sex_at_birth	Male	2	1	41	0.37	0.9	No
GagCopiesPerMillionCD4	Sex_at_birth	Male	3	1	25	0.13	0.9	No
GagCopiesPerMillionCD4	Sex_at_birth	Male	3	2	25	0.07	0.9	No
EstTotalReservoirSize	Sex_at_birth	Male	2	1	41	0.41	0.91	No
EstTotalReservoirSize	Sex_at_birth	Male	3	1	25	0.87	1	No
EstTotalReservoirSize	Sex_at_birth	Male	3	2	25	0.54	1	No

↓ for 76 more rows…



Stratification by:

- Sex assigned at birth
- COVID-19 vaccine regimen
- ART Regimen

No significant differences in pVL or HIV DNA measures following vaccination

- **Key question:** Does mRNA vaccination for COVID-19 induce increased plasma viral loads or impact HIV reservoir size in PLWH taking ART?
- **Key findings:** While COVID-19 mRNA vaccines may stimulate HIV-specific immune responses in ART-treated individuals, our results suggest that they do not reproducibly induce measurable changes in intact reservoir size nor lasting plasma HIV viremia

Acknowledgements

SFU SIMON FRASER UNIVERSITY

Zabrina Brumme
Harrison Omondi
Natalie Kinloch
Yurou Sang
Mark Brockman

BRITISH COLUMBIA CENTRE *for* EXCELLENCE *in* HIV/AIDS

Hope Lapointe
Sarah Speckmaier
Nadia Moran-Garcia
Marianne Harris
Hanwei Sudderuddin
Kieran Atkinson

ST. PAUL'S HOSPITAL
PROVIDENCE HEALTH CARE

Christopher Lowe
Marc Romney
Tanya Lawson

REACH For the Cure
Research Enterprise to Advance a Cure for HIV

CIHR IRSC Canadian Institutes of Health Research / Instituts de recherche en santé du Canada

We thank the clinics that helped advertise our study

Above all, we thank the study participants, without whom research would not be possible

Learn more at Poster #1.37