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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

NEETA THAKUR, et al.,

Plaintiffs,

vs.

DONALD J. TRUMP, et al.,

Defendants.

Case No. 3:25-cv-04737-RL

DECLARATION OF MATTHEW SPINELLI IN SUPPORT OF PLAINTIFFS' COMBINED MOTION FOR SUMMARY JUDGMENT AND CLASS CERTIFICATION

Judge: The Honorable Rita F. Lin

Hearing Date: October 20, 2026
Hearing Time: 10:00 AM
Courtroom: 4 – 17th Floor

DECLARATION OF MATTHEW SPINELLI

I, Matthew Spinelli, declare as follows:

1. I have personal knowledge of the facts contained in this declaration and, if called as a witness, could and would testify competently to those facts.

2. I am a clinical researcher, implementation scientist, and infectious disease physician with a focus on HIV and pre-exposure prophylaxis ("PrEP"). I am currently an Associate Professor of Medicine at University of California, San Francisco ("UCSF"). A true and correct copy of my CV is attached as **Exhibit A**.

3. I completed my undergraduate studies at Columbia College and then attended medical school at Mount Sinai School of Medicine. I moved to the San Francisco Bay Area in 2013 for my Residency in Internal Medicine at UCSF and remained for a Fellowship in Infectious Diseases. I became an assistant professor at UCSF in 2020 and associate professor in 2025.

4. My research focuses on using techniques from epidemiology, clinical research, and implementation science to better understand ideal strategies for implementing HIV and sexually transmitted infection prevention and treatment.

5. I previously participated in clinical research that led to the development of a novel point-of-care urine test that assists physicians in evaluating patients' adherence to their PrEP regimen. I developed a motivational interview-based adherence intervention using the novel point-of-care test to provide adherence feedback, with the goal of improving PrEP adherence among younger men who have sex with men ("MSM") or sexual minority men, and antiretroviral therapy adherence among MSM or sexual minority men living with HIV.

6. My interest in this work began after PrEP was approved shortly before I began my residency. I was excited to prescribe this transformative HIV prevention strategy to my patients. PrEP has a very low number needed to prevent an HIV infection-which indicates a highly effective prevention medication, meaning fewer patients need to be treated to see a beneficial outcome—and is nearly 100% effective in preventing HIV when taken with adequate adherence. Unfortunately, PrEP was not being used sufficiently to make an impact on the HIV epidemic, which motivated my career in implementation science research. A similar strategy over the last 4

years has been developed to prevent sexually transmitted infections including syphilis and chlamydia by taking two tablets of an antibiotic, doxycycline, after sex. Following it being shown to be effective, we have seen declines in both syphilis and chlamydia for the first time in many years in San Francisco where it has been implemented at scale. I have published 92 peer-reviewed publications which focus on these topics.

Grant Application and Award

7. In January 2024, I applied for a National Institutes of Health ("NIH") grant with a proposal titled *Randomized Directly Observed Therapy Study to Interpret Clinical Trials of Doxy-PEP*. This grant sought to establish adherence measurement approaches for Doxy-PEP, relevant to understanding its limited efficacy among women compared to men in clinical trials, as well as work to measure its impact on antimicrobial resistance. A true and correct copy of compilation of excerpts of my grant application, addressing the specific aims of the research, research strategies, and scientific references, is attached as **Exhibit B.**

8. On August 14, 2024, I was awarded NIH grant R01AI186641. The project term was specified as August 14, 2024 to June 30, 2029. The total grant sum to be awarded was $4,026,066 for five years. A true and correct copy of the grant award is attached as **Exhibit C**.

Grant Termination on March 18, 2025

9. Because of our project's progress and ongoing promise, our team was devastated to receive notice that the NIH had terminated our grant by letter dated March 18, 2025 (hereafter the "Termination Letter"). A true and correct copy of the Termination Letter is attached as **Exhibit D**.

10. The Termination Letter stated, as the basis for termination:

> This award no longer effectuates agency priorities. Research programs based on gender identity are often unscientific, have little identifiable return on investment, and do nothing to enhance the health of many Americans. Many such studies ignore, rather than seriously examine, biological realities. It is the policy of NIH not to prioritize these research programs.

11. The Termination Letter did not explain how my research into how patients can be supported in adhering to their prescribed treatment was unscientific or failed to advance health.

12. While the grant application discussed medical and scientific research relating to

transgender people as a population that is disproportionately impacted by HIV, (*see* **Exhibit B**) my research was focused on the study of the pharmacokinetics and pharmacodynamics of doxycycline in men and women, using urine, plasma, and hair drug-level measurement, relevant to efforts to counter the worsening syphilis epidemic and address national priorities to address antimicrobial resistance.

Appeal of Grant Termination

13. UCSF submitted an appeal on my behalf on March 21, 2025.

14. As of the date of this declaration, I have not received a response to the appeal.

Grant Reinstatement

15. On July 9, 2025, I received notice that the grant was reinstated. A true and correct copy of this reinstatement notice is attached as **Exhibit E**.

16. Following reinstatement, I was able to access funding to continue my work. I was able to enroll additional participants, sign contracts with vendors, hire staff, and continue follow-up of previously enrolled and newly enrolled participants.

Harm from NIH Grant Termination

17. When the grant was initially terminated in March 2025, many of the research participants in this study had expressed sadness about not being able to finish the study and contributing to the work to fight the syphilis and gonorrhea epidemics. I received approximately 3-5 requests weekly to join the study through the study's posting on clinicaltrials.gov. The stress I experienced from losing my grant funding had affected me both emotionally and physically. The consequences of these cuts—impacting my study participants, and the populations our research serves—were a constant burden. Neither my research staff nor I received hard funding from the University, hence our jobs were imminently at risk.

18. Further, when the grant was abruptly terminated with instructions that we may not use the grant after the cancellation date, we had 6 participants actively receiving our study medication and were left with no resources to monitor their safety or allow them to complete their enrollment in the trial. While we were trying to recover these costs from the NIH, we had to use discretionary funding from my division's budget to cover these essential costs to protect the safety

of our research participants.

19. At the time of termination, the trial was about 13% enrolled, with participants receiving study product. Monitoring during and after dosing is critical to protecting the safety of participants. Doxycycline may cause liver injury and allergic reactions days to weeks after administration of the drug. Abrupt termination of the study would put these participants at risk of harm. Indeed, the Data Safety and Monitoring Board in the study, the independent entity charged with providing oversight for participant safety in the study, had expressed urgent concern about the stop-work order and the termination for the grant supporting the study based on the belief that it is unethical to stop follow-up for participants who have received study product.

20. If the grant is re-terminated before the project is complete in June 2029, then these harms—to the study participants, the populations the research serves, and to my own career goals and well-being—will repeat themselves.

Role of Class Representative

21. I am ready to assume the responsibilities of serving as a class representative. I understand that I must stay informed regarding developments in the lawsuit, communicate regularly with my attorneys, and act in the best interests of the class. I have no conflicts that would prevent me from assuming this responsibility.

22. I have been in communication with other UC researchers, who would be members of the class, who have suffered the same general type of harm as I describe above, from the abrupt termination of their previously approved research grants. This harm is widespread, and I believe it will only increase in scope and impact if classwide relief is not granted.

I declare under penalty of perjury under the laws of the State of California and the United States that the foregoing is true and correct.

Executed on this July 10th day of July, 2026, at Castiglione della Pescaia, Italy.

DocuSigned by:

FE68F257CBED461...

Matthew Spinelli

Exhibit A

Prepared: May 31, 2026

University of California, San Francisco

CURRICULUM VITAE

Name: Matthew A Spinelli, MD, MAS

Position: Associate Professor in Residence, Step 1
Medicine
School of Medicine
Division of HIV, Infectious Diseases, and Global Medicine
PrEP Medical Lead, Ward 86 Clinic, San Francisco General Hospital
Lecturer, Department of Epidemiology
Executive Committee Member, UCSF Implementation Science Center

Address: 2540 23rd Street, Fourth Floor
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Voice: 415-849-9145
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Email: matthew.spinelli@ucsf.edu
Web: https://profiles.ucsf.edu/matthew.spinelli

EDUCATION

2004 - 2008	Columbia University	B.A.	Italian Literature
2009 - 2013	Mount Sinai School of Medicine	M.D.	Medicine
2013 - 2016	University of California, San Francisco, Department of Medicine	Residency	Internal Medicine
2016 - 2018	University of California, San Francisco, Division of Infectious Diseases	Clinical Fellowship	Infectious Diseases
2017 - 2019	University of California, San Francisco Department of Epidemiology	Master's in Advanced Studies	Clinical Research and Implementation Science
2018 - 2020	University of California, San Francisco, Division of HIV, ID, and Global Medicine/San Francisco General Hospital	HIV Clinical/Research Fellowship	HIV and Infectious Diseases

LICENSES, CERTIFICATION

2018	American Board of Internal Medicine/Infectious Diseases Certified
2016	Buprenorphine Provider Waiver

2016	American Board of Internal Medicine Board Certified
2015	California Medical License# A134550

PRINCIPAL POSITIONS HELD

07/2013 - 07/2016	University of California, San Francisco	Internal Medicine Resident	Medicine
07/2016 – 12/2019	University of California, San Francisco	Clinical and Research Fellow	Infectious Diseases
01/2020 – 07/2025	University of California, San Francisco	Assistant Professor	HIV, ID, and Global Medicine
07/2025 - present	University of California, San Francisco	Associate Professor	HIV, ID, and Global Medicine

HONORS AND AWARDS

2023	Meritorious Service Award in HIV Clinical Medicine	National HIV Congress of India
2022	Rising Star HIV Adherence Researcher Award	International Association of Providers of AIDS Care
2020	New Investigator Award	Conference on Retroviruses and Opportunistic Infections
2019	Lange/ANRS New Investigator Top Abstract in Prevention Science	International AIDS Society
2019	Early Career Clinical Investigator Award	UCSF Center for AIDS Research
2019	Strategic Support Award	UCSF AIDS Research Institute
2019	New Investigator Award	Conference on Retroviruses and Opportunistic Infections
2018	Strategic Support Award	UCSF AIDS Research Institute
2018	New Investigator Award	HIV Research for Prevention
2018	IDweek Trainee Award	Infectious Diseases Society of America
2018	New Investigator Award	Conference on Retroviruses and Opportunistic Infections
2017	Clinical Fellow Award nominee	Zuckerberg San Francisco General Clinical Department of Medicine
2016	Certificate in Health Disparities	Zuckerberg San Francisco General Clinical

2016	30 Under 30 Award	University of California Global Food Initiative
2013	Alpha Omega Alpha Honor Medical Society	Mount Sinai School of Medicine
2012	Distinction in Medical Education	Mount Sinai School of Medicine
2011	Emerging Leaders Award	Physicians for Human Rights
2008	Henry Evans Traveling Fellowship	Columbia University
2008	Phi Beta Kappa Honor Society	Columbia University

KEYWORDS/AREAS OF INTEREST

Antiretroviral adherence interventions; Implementation Science; Sexually transmitted infection prevention; Point-of-care drug-level testing; Immune responses, and outcomes related to COVID-19 infection and vaccination among people living with HIV

CLINICAL ACTIVITIES

CLINICAL ACTIVITIES SUMMARY

My primary outpatient clinic practice has been the Ward 86 clinic since July 2017, where I provide HIV and PrEP primary care one half-day a week to underserved populations accessing care within the San Francisco Department of Public Health Primary Care system. Starting in July 2018, I served as the ID hospitalist attending (Jacob's Attending) 2 weeks and 6 weekends a year at UCSF Parnassus until my faculty appointment in 2020. From 2018-2020, I also worked as an HIV consultant at the East Bay AIDS Center in Oakland CA six weekends/year, and also provided pre- and post-exposure prophylaxis consultation at the CDC National Clinical Consultation Center based at San Francisco General Hospital for approximately two weeks/year. Since 2019, I have served as an attending infectious disease consultant at San Francisco General Hospital for 28-42 days a year. In this role, I provide clinical consultation for hospitalized patients with Infectious Diseases conditions, and I supervise infectious diseases fellows and residents. From 2020-2021, I served as an Internal Medicine Teaching Attending at San Francisco General Hospital. As discussed under the service section, I also volunteered on the COVID-19 service at San Francisco General Hospital in the first two years of the pandemic and volunteered as a consultant for SFGH Employee Health Services. As of 2023, I serve as the Medical Lead for Pre-exposure Prophylaxis at Ward 86, where I lead programs to implement injectable PrEP and oral PrEP within the San Francisco Department of Public Health Primary Care Clinics, including supervising the e-consult program and two PrEP navigators.

CLINICAL SERVICES

2016 - 2017	Infectious Diseases Clinical Fellow: I served as the full-time consult fellow at UCSF, Zuckerberg San Francisco General, and the SF VA under supervision from an Infectious Diseases attending	Full-time

2016 - 2017	SF Veterans Administration Infectious Disease Clinic Provider: I was an ID , HIV and PrEP consultant and primary care doctor.	One half-day weekly
2017 - 2018	Senior Infectious Diseases Clinical Fellow: I was the consult fellow on the Transplant Infectious Diseases service and the UCSF weekend ID consult team	8 weeks a year
2018 - 2019	UCSF Jacob's Attending: I served as the ID hospitalist and supervised ID fellows.	Two weeks and 6 weekends a year
2017 - present	Primary Care/HIV Attending at Ward 86: I am the primary care doctor for people living with HIV and PrEP users.	One half-day weekly
2020 - 2021	Internal Medicine Residency Teaching Attending, San Francisco General Hospital	Two weeks a year
2019 - present	Infectious Diseases and HIV Consult Attending	Four weeks a year
2023 - present	Medical Lead for PrEP, Ward 86 Clinic	~4 hours/week of administrative and supervisory work

PROFESSIONAL ACTIVITIES

MEMBERSHIPS

2025 - present	AIDS Clinical Trials Group Implementation Science Steering Committee
2025 - present	AIDS Clinical Trials Group Antiretroviral Therapy Strategies Transformative Science Group Investigator
2020 - present	UCSF/SFDPH Implementation Science Center Executive Committee Member
2018 - present	International AIDS Society Member
2016 - present	Infectious Diseases Society of America Member
2016 - present	HIV Medicine Association Member

SERVICE TO PROFESSIONAL ORGANIZATIONS

2012 - 2014	Society for General Internal Medicine	Student-Run Free Clinics Interest Group Leader
2023 - 2024	International AIDS Society HIV Research for Prevention 2024 Peru	Implementation Science Track Member/Organizer

SERVICE TO PROFESSIONAL PUBLICATIONS

2017 - present	AIDS and Behavior, consulting editor (3-6 publications/year; 21 total)

2018 - present	Open Forum Infectious Diseases, Editorial Advisory Board since 2020 (3 publications/year; 14 total)
2018 - present	Clinical Infectious Diseases, ad hoc reviewer (7 total)
2018 - present	Adolescent Medicine, ad hoc reviewer (1 total)
2018 - present	Journal of Acquired Immunodeficiency Syndromes, ad hoc reviewer (14 total)
2018 - present	Lancet HIV, ad hoc reviewer (9 total)
2019 - present	AIDS Research and Human Retroviruses, ad hoc reviewer (1 total)
2019 - present	Journal of the International AIDS Society, ad hoc reviewer (3 total)
2020 - present	PLOS One, ad hoc reviewer (2 total)
2020 - present	Lancet Infectious Diseases, ad hoc reviewer (1 total)
2021 - present	Journal of Antimicrobial Chemotherapy, ad hoc reviewer (1 total)
2024 - present	Sexually Transmitted Diseases, ad hoc reviewer (1 total)

INVITED PRESENTATIONS - INTERNATIONAL

2018	"Examining PrEP Interruptions in a Safety-net Primary Care Network: Missed Opportunities to Re-engage PrEP Users Accessing non-PrEP Services," HIV Research for Prevention 2018, Madrid	Oral Research Presentation
2023	"Intersecting Pandemics: COVID-19 among People With HIV", National HIV Congress, India	Presenter
2023	"The Evidence Supporting U=U: Implications for Clinical Practice", National HIV Congress, India	Presenter
2023	"The Year in Review: Challenging HIV/ID Cases with Images from 2023", National HIV Congress, India	Presenter
2024	"Using Object Adherence Metrics to Triage Resistance Testing and Support Adherence Interventions," The United States President's Emergency Plan for AIDS Relief (PEPFAR) Monthly Meeting	Presenter
2024	“Adapting PrEP for Specific Populations,” HIV Research for Prevention, 2024, Lima, Peru	Symposium Organizer/Moderator

INVITED PRESENTATIONS - NATIONAL

2017	CDC Project PrIDE for PrEP, 2017; Lab monitoring on PrEP for primary care	Presenter
2018	CDC Project PrIDE, 2018; PrEP persistence in primary care	Presenter

2019	International Association of Providers of AIDS Adherence Conference, "Is there something wrong with your methods: antiretroviral adherence?"	Presenter
2020	Conference on Retroviruses and Opportunistic Infections; "Near-Perfect Accuracy Of A Real-Time Urine Tenofovir Test Compared To Lab-Based ELISA"	Presenter
2021	Infectious Diseases Society of America IDWeek 2021, PrEP Symposium,	Moderator
2021	Infectious Diseases Society of America IDWeek 2021, "Lower SARS-CoV-2 IgG and Pseudovirus Neutralization Titers Post-mRNA Vaccination among People Living with HIV"	Late Breaker Presenter
2022	Conference on Retroviruses and Opportunistic Infections; "Impact of SARS-CoV-2 Viral Load on Disease Severity and Response to Treatments"	Symposium Presenter
2022	Infectious Diseases Society of America, ID Week, 2022 “Not Going to Miss our Shot: PrEP for the ID Provider,”	Presenter
2025	AIDS Clinical Trials Group Annual Meeting, “Cost-effective Approaches to Triage Testing for Integrase Inhibitor Resistance”	Presenter

INVITED PRESENTATIONS - REGIONAL AND OTHER INVITED PRESENTATIONS

2016	UCSF Division of Infectious Diseases (grand rounds); Disseminated coccidioidomycosis in the setting of HIV	Presenter
2017	UCSF Division of Infectious Diseases (grand rounds); Landouzy’s typhobacillosis in the setting of HIV	Presenter
2017	Getting to Zero San Francisco; “The Evidence for U=U”	Presenter
2018	Arizona AIDS Education and Training Center Annual Conference; The Evidence and clinical implications of U=U.	Presenter
2018	UCSF HIV Grand Rounds; Old diseases, new tricks: syphilitic osteitis and inguinal LGV	Presenter
2018	UCSF Center for AIDS Research,(invited speaker); PrEP implementation in primary care	Presenter
2018	UCSF Medical Management of HIV and Hepatitis, “Image Cases in HIV”	Presenter
2019	UCSF Medical Management of HIV and Hepatitis, “Image Cases in HIV”	Presenter
2019	UCSF HIV Grand Rounds; “The impact of homelessness at HIV diagnosis on mortality.”	Presenter

2020	UCSF Medical Management of HIV and Hepatitis, “Image Cases in HIV”	Presenter
2021	UCSF Medical Management of HIV and Hepatitis, “Image Cases in HIV”	Presenter
2021	UCSF HIV Grand Rounds; "International AIDS Society 2021 Report Back"	Presenter
2021	UCSF Center for AIDS Research Presenter; "Lower SARS-CoV-2 IgG and Surrogate Virus Neutralization Titers Post-mRNA Vaccination among People Living with HIV"	Presenter
2022	UCSF Medical Management of HIV and Hepatitis, “Image Cases in HIV”	Presenter
2023	UCSF Medical Management of HIV and Hepatitis, “Image Cases in HIV”	Presenter
2024	UCSF Medical Management of HIV and Hepatitis, “Image Cases in HIV”	Presenter
2025	UCSF Center for AIDS Research Annual Meeting Presenter; “Biobehavioral Approaches to Develop HIV Prevention and Treatment Adherence Interventions”	Presenter

CONTINUING EDUCATION AND PROFESSIONAL DEVELOPMENT ACTIVITIES

2014	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2015	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2016	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2017	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2018	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2019	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2020	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2021	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2022	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present

2023	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2024	UCSF Medical Management of HIV and Hepatitis C, 3 Day CME Course, Attendee from 2014-present
2016	UCSF HIV Grand Rounds Participant, Weekly from September to May
2017	UCSF HIV Grand Rounds Participant, Weekly from September to May
2020	UCSF HIV Grand Rounds Participant, Weekly from September to May
2021	UCSF HIV Grand Rounds Participant, Weekly from September to May
2022	UCSF HIV Grand Rounds Participant, Weekly from September to May
2023	UCSF HIV Grand Rounds Participant, Weekly from September to May
2024	UCSF HIV Grand Rounds Participant, Weekly from September to May
2021	UCSF HIV Grand Rounds Co-Director (2021-2023)
2022	UCSF HIV Grand Rounds Co-Director (2021-2023)
2023	UCSF HIV Grand Rounds Co-Director (2021-2023)
2020	UCSF Implementation Science Short Course, Director of 2 Day CME courses, Director from 2020-present
2021	UCSF Implementation Science Short Course, Director of 2 Day CME courses, Director from 2020-present
2022	UCSF Implementation Science Short Course, Director of 2 Day CME courses, Director from 2020-present
2023	UCSF Implementation Science Short Course, Director of 2 Day CME courses, Director from 2020-present

GOVERNMENT AND OTHER PROFESSIONAL SERVICE

2012 - 2013	East Harlem Health Outreach Partnership Free Clinic	Clinic Chair

UNIVERSITY AND PUBLIC SERVICE

SERVICE ACTIVITIES SUMMARY

As of 2023, I have served as an implementation science track organizer for the International AIDS Society HIV Research for Prevention Conference 2024 in Lima, Peru. From 2022 to the present, I have served as an executive committee member for the UCSF Department of Epidemiology/Medicine/San Francisco Department of Public Health Implementation Science center. There I help to set center funding and strategic priorities, including selecting UCSF faculty members to receive grant funding and welcoming new faculty members to join our center. From 2020-2021, after the beginning of the COVID-19 pandemic, I volunteered to staff the San Francisco General COVID-19 Service, for 6 weeks total, and provided consultations to the Employee Health Service for 6 months via weekly meetings to assist in the development of screening and return to work protocols. Since 2017, I have served on the Getting to Zero San Francisco Retention in Care or the PrEP Advisory Group, a multi-sector initiative to achieve the

UNAIDS 2030 goals in San Francisco. As a part of this initiative, we have piloted a program to provide cell phone chargers and medication lockers at HIV service sites. From 2014-2020 I served as a preceptor for UCSF medical students in providing urgent medical care to adults experiencing homelessness at Multi Service Center South, operated by the St. Vincent de Paul Society. I also was selected as a Global Food Initiative Fellow for two years in a row from 2014 through 2016 by the UC Office of the President. For this role, I conducted campus engagement activities focused on food insecurity, and planned system-wide events with other campuses such as the California Higher Education Sustainability Conference. While at Mount Sinai, I was a member, and from 2012-13, the clinic chair, of a student-run free clinic located in East Harlem, New York City, the East Harlem Health Outreach Partnership. As Clinic Chair, I supervised a capital fund-raising campaign that raised approximately $100,000, and planned the inaugural alumni benefit celebration which generated an additional $90,000. I directed strategic planning and expansion for the clinic with faculty mentor, Dr. Yasmin Meah.

UNIVERSITY SERVICE
UC SYSTEM AND MULTI-CAMPUS SERVICE

2014 - 2016	UC Office of the President Global Food Initiative	Fellow

SCHOOL OF MEDICINE

2014 - 2020	UCSF Medical School Homeless Clinic	Preceptor
2020 - 2021	UCSF/San Francisco General Department of Medicine	Volunteer on COVID-19 Service
2022 - present	UCSF/SFPDH Partnerships for Research in Implementation Science (PRISE) Center	Executive Committee

COMMUNITY AND PUBLIC SERVICE

2020 - 2021	San Francisco General Employee Health Service	COVID-19/Infectious Diseases Consultation
2017 - present	Getting to Zero San Francisco	Retention in Care Advisory Group Member
2009 - 2013	East Harlem Health Outreach Partnership Clinic	Clinical volunteer

CONTRIBUTIONS TO DIVERSITY

CONTRIBUTIONS TO DIVERSITY

In terms of research contributions, my COVID-19 related research supported by R01 funding has demonstrated differences in COVID-19 disease incidence and outcomes among Latino and Black/African-American populations. My PrEP-focused research program involves interventions dedicated to improved outcomes among all PrEP users. My K23 project, which uses and urine point-of-care adherence test for PrEP to provide targeted motivational interviewing for those struggling with adherence challenges, recruited at least 50% Latino and Black/African-American participants and developed tailored, language-concordant materials for Latino PrEP users. My UG3 Award, "Developing a U.S. National Cohort to Improve Virologic

Suppression among Stimulant-using Men Living with HIV," includes a commitment to recruit at least 40% Black/African-American people living with HIV, given that this population accounts for 40% of new HIV diagnoses.

In terms of mentoring activities, I currently mentor for a year-long project a UCSF medical student, Hannah Schmidt, who identifies as underrepresented in medicine (UIM) as a Filipino-American. Her project focuses on the impact of HIV-criminalization on HIV care engagement and virologic suppression. I also continue to mentor a medical student, Nebyou Mergia, who is a UIM and an African-American. He has completed a summer explore project and continues to do research with me on the impact of alcohol use disorder on HIV care outcomes. I previously mentored Dr. Alicia Morehead-Gee, is a UIM/ Black woman. She completed research on differences in PrEP outcomes among Black men using PrEP which led to a UCLA clinical scholars fellowship. She currently serves as the Medical Director of AltaMed Health in Los Angeles where she develops primary care services.

For educational activities, I have completed additional training in for course directors. I currently lead an initiative to incorporate principles relevant to low and middle income settins within “IMS 246:Translating Evidence into Practice: Individual-level Implementation Strategy Design.” This has included ensuring that every unit includes reading materials from low and middle-income settings. Within the Implementation Science Short Course (2-day CME course), I have added a lecture on this topic.

TEACHING AND MENTORING

TEACHING SUMMARY

My formal teaching includes serving as course director of the UCSF Department of Epidemiology/Implementation Science Division Course, Designing Individual-Level Interventions (IMS246), and the Implementation Science Short Course Director since 2020, both along with Dr. Emilia DeMarchis. In the upcoming year, I will serve as the sole course director for both courses. IMS 246/Designing Individual-Level Interventions includes approximately 60 students each year over 9-10 modules. The course teaches the theoretical background of the major intervention design approaches, including implementation and intervention mapping, the Behavior Change Wheel, and tools based within the Center for Implementation Research (CFIR) model. Students leave the course with a draft specific aims page for a future implementation science grant. The Implementation Science Short Course is a full-day two-day intensive CME course, which provides an overview of implementation science theories, models, and frameworks, intervention planning, program evaluation, study design, mixed methods, and an introduction to grant writing. This course is open to approximately 50 students each year, typically associate and assistant professors and fellows who are transitioning to faculty positions, and all students who participate receive CME credit.

Prior to this, I served as a teaching assistant for Epidemiologic Approaches to Implementation Science in the UCSF TICR/Implementation Science program, where I guided students through implementation science projects targeted at quality improvement both at UCSF and internationally. I have also participated in the Foundations Course of the Bridge Curriculum during which I met with medical students along with one of my patients who is living with HIV, and discussed aspects of caring for and living with HIV. As an associate professor, I proctored junior ID and HIV fellows in HIV clinical medicine one hour weekly after each HIV clinic. In terms of informal teaching, from 2021 to 2023 I served as the co-director of UCSF/ZSFG HIV Grand Rounds that is weekly and CME-accredited.

Prepared: May 31, 2026

FORMAL TEACHING

	Academic Yr	Course No. & Title	Teaching Contribution	School	Class Size
	2020 - present	IMS/EPI 246: Translating Evidence into Practice: Individual-level Intervention Design	Course Director	Medicine	60-80
	2020 - present	UCSF Implementation Science Short Course	Course Director	Medicine	60
	2018 - 2019	Epi 239: Epidemiologic Approaches to Implementation Science	Teaching Assistant	Medicine	20
	2017 - 2018	IDS 121D: Foundations 1 Course	Visiting Seminar Leader	Medicine	20

INFORMAL TEACHING

2021 - 2023 UCSF HIV Grand Rounds Co-Director (weekly with 50 in-person and 150 virtual attendees)

2019 - present Infectious Diseases/HIV Attending, San Francisco General Hospital: Supervised medical students, residents, and fellows approximately 50% of time while on full-time service (4 weeks a year)

2020 - 2021 Internal Medicine Teaching Attending, San Francisco General Hospital: Supervised medical students, residents, and fellows approximately 50% of time while on full-time service (2 weeks a year)

MENTORING SUMMARY

Since 2022, I have served as a research mentor for Tyler Martinson, MD, a UCSF preventative medicine resident. We have completed 5 publications together, 3 with him as first author, including a recent high impact publication in AIDS focused on doxy-PEP implementation. Since 2023, I serve as a research mentor to Renata Buccheri, MD, on her Implementation Science Master's, including on one first-author publication in Open Forum Infectious Disease and as a co-author on a second publication focused on Implementation Science relevant to Chagas Disease Diagnosis and Treatment Starting last summer, I serve as mentor for two UCSF medical students, Nebyou Mergia for a UCSF Summer Explore, and Hannah Schmidt, for a year-long research project. I have served as a research mentor for Dr. Kelly Johnson from 2020-2023, and have served as the senior author on three publications related to the development of a point of care urine test for tenofovir alafenamide, an HIV antiretroviral, which we published in JAIDS, Clinical Infectious Diseases, and Open Forum Infectious Diseases. She has received a faculty appointment at UCSF and leads PrEP and STI research at the California Department of Public Health. Since 2020, I have provided career advising and will serve as a scientific advisor on Dr. Ayesha Appa's K23 and DP2 submissions related to the development of adherence interventions for PrEP for people who use drugs. From these

awards, I have served as a co-author on a publication developing a novel methamphetamine drug-level measurement technique in hair. Since 2020, I have served as a career mentor for Dr. Matthew Hickey, and a research mentor in implementation science. I have served as a co-author on 3 publications with him and he completed the course which I direct, Individual-Level Implementation Strategy Design in the Implementation Science Division. I served as a career mentor and research mentor for Dr. Sarah Puryear, who submitted and received a K23 while I was mentoring her on development of HIV adherence interventions for people who use alcohol and are living with HIV. She is now a Director of Clinical Development at Gilead Sciences where she performs clinical trials on novel PrEP agents. Lastly, I have mentored Benjamin Jones, a current UCSF medical student in HIV and COVID-19 research, he plans to pursue ID and Addiction Medicine Fellowship after completing his residency. We completed a review article together on COVID-19 outcomes among people living with HIV which was published in Current HIV/AIDS Reports.

Prior to my faculty appointment, I served as a primary research mentor for a UCSF internal medicine resident, Dr. Alicia Morehead-Gee on a project examining PrEP uptake and continuation. She served as a co-author on 4 publications for our group, and went on to enroll in the National Clinical Scholars Research Fellowship at the UCLA site, and is now the PrEP Medical Director for AltaMed Health Services in Los Angeles. I also mentored Patrick Kinley, a public health specialist at the San Francisco Department of Public Health on factors impacting PrEP service delivery in primary care. He completed one second author publication under my mentorship and has now enrolled in the Rutgers/Princeton joint MD/PhD program.

PREDOCTORAL STUDENTS SUPERVISED OR MENTORED

Dates	Name	Program or School	Mentor Type	Role	Current Position
2018 - 2020	Patrick Kinley	San Francisco Department of Public Health	Research/Scholarly Mentor	Research Mentor	Medical Student
2021 - 2023	Benjamin Jones	UCSF School of Medicine	Research/Scholarly Mentor	Research Mentor	Medical Student
2024 - present	Nebyou Mergia	UCSF School of Medicine	Research/Scholarly Mentor	Research Mentor for Summer Explore	Medical Student
2024 - present	Hannah Schmidt	UCSF School of Medicine	Research/Scholarly Mentor	Research Mentor for Full-time Year Long Project	Medical Student

POSTDOCTORAL FELLOWS AND RESIDENTS MENTORED

Dates	Name	Fellow	Mentor Role	Faculty Role	Current Position

Prepared: May 31, 2026

Dates	Name	Fellow	Mentor Role	Faculty Role	Current Position
2017 - 2018	Alicia Morehead-Gee	Internal Med. Resident	Research/Scholarly Mentor	Research mentor for a publication on racial disparities in PrEP use.	PrEP Medical Director, AltaMed Health, Los Angeles
2023 - present	Tyler Martinson	Internal Medicine (Kaiser)/Preventive Medicine (UCSF)	Research/Scholarly Mentor, Career Mentor	Research mentor on two publications, including one in which mentee was first author as the senior author	Medical Resident
2024- present	Renata Buccheri	Vitalant Institute Staff Scientist	Research/Scholarly Mentor, Career Mentor	Research mentor on two publications, including one in which mentee was first author	Vitalant Institute Staff Scientist

FACULTY MENTORING

Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2020 - present	Ayesha Appa	Infectious Diseases Fellow and Assistant Professor	Research/Scholarly Mentor, Career Mentor	Scientific Advisor on K23 and co-investigator on DP2 submission, served as co-author on 1 publication	Assistant Professor, Division of HIV, ID, and Global Medicine, UCSF
2020 - present	Matthew Hickey	Infectious Disease Fellow and Assistant Professor	Research/Scholarly Mentor, Career Mentor	Advised on career development and served as an advisor on implementation science, completed 3 publications with mentee as co-author	Assistant Professor, Division of HIV, ID, and Global Medicine, UCSF
2020 - 2023	Kelly Johnson	Infectious Disease fellow and Assistant Professor	Research/Scholarly Mentor, Career Mentor	Research Mentor, completed 3 publications with mentee as first-author and mentor as senior author	Assistant Professor, Division of Infectious Diseases, UCSF

Dates	Name	Position while Mentored	Mentor Type	Mentoring Role	Current Position
2019 - 2023	Sarah Puryear	Infectious Diseases Fellow and Assistant Professor	Research/Scholarly Mentor, Career Mentor	Advised on her K submission and have served as a career mentor	Director, Clinical Development at Gilead Sciences

RESEARCH AND CREATIVE ACTIVITIES

RESEARCH AND CREATIVE ACTIVITIES SUMMARY

Last year, I was awarded an R01 as sole PI. This project, “Randomized Directly Observed Therapy Study to Interpret Clinical Trials of Doxy-PEP,” involves implementing a randomized controlled trial with directly observed therapy to determine adherence benchmarks for doxycycline in various biomatrices (hair, urine, and plasma). We will then use these cut-offs to examine results from the recently completed dPEP and DoxyPEP studies, helping to interpret the threshold for efficacy among the study populations of these two large studies. The preliminary hair drug-level analysis from dPEP was a part of the New England Journal of Medicine paper reporting on the initial trial results. Also this year, I received a Gilead Strategic Support Award which will examine changes in PrEP use and HIV incidence following the implementation of pharmacy-delivered PrEP within the state of California, using a large insurance claims database. As of 2023, I received a UG3/UH3 award which involves recruiting and developing an online cohort of people living with HIV followed remotely. The goals of this study are to specifically examine the impact of stimulant use on HIV outcomes and inflammation, and will serve as a platform for intervention clinical trials to improve virologic suppression among people living with HIV who use stimulants. After meeting recruitment thresholds (we enrolled 1000 participants in 12 months), this award is eligible for an additional 3 years of funding through the UH3 phase which is in the process of being awarded. At the NIAID limited interaction targeted epidemiology (LITE) grants meeting in July 2024, we presented our progress to date and learned we have enrolled the most participants of any of the HIV treatment focused grants. My PrEP-focused research program involves using a point-of-care test for urine tenofovir to study and target adherence counseling for young U.S. men who on PrEP, which forms the basis of my K23 award from NIMH. Aim 1 of my grant involves studying factors associated with PrEP adherence among young men measured via the novel test, in which we found that the urine tested predicted future PrEP discontinuation, and was published in AIDS this year. Aims 2 and 3 involve developing a counseling intervention targeted by this test, and testing the intervention in a pilot RCT among 60 young menrecruited remotely across the United States. This RCT was completed and showed a 1-2 dose/week increase in PrEP adherence comparing intervention participants to controls, for which a publication is being drafted. As part of my K23, I also have completed analyses to interrogate the performance characteristics of the urine assay used in the clinical trial. We have shown the the novel assay is sensitive, specific, precise and highly correlated with gold standard laboratory-based metrics, and that low adherence by the immunoassay is associated with future HIV seroconversion among people with HIV. I have published these findings in AIDS and JAIDS.

RESEARCH AWARDS - CURRENT

1. R01AI186641	PI	45 % effort	Spinelli (PI)

NIAID/NIH		08/14/2024	7/31/2029
Randomized Directly Observed Therapy Study to Interpret Clinical Trials of Doxy-PEP		$ 433,527 direct/yr 1	$ 2433527 total

By study end, we will have determined dosing cut-offs for doxy in hair, plasma, and urine, and will use these cut-offs to examine the relationship between adherence patterns and STI reduction in the dPEP study, and adherence predictors and metrics within the DoxyPEP trial. These benchmarks and pharmacodynamic analyses will establish adherence metrics for current and future rollout studies of doxy-PEP

I serve as the sole PI for this project.

2. UG3/UH3DA058304	Corresponding PI	10% % effort	Spinelli (PI)
NIDA/NIH		05/15/2023	04/30/2028
Developing a U.S. National Cohort to Improve Virologic Suppression among Stimulant-using Men Living with HIV		$ 1,054,387 direct/yr 1	$ 2,024,874 total

A growing epidemic of stimulant use among sexual minority men (SMM), including those living with HIV, could interfere with achievement of the U.S. Ending the HIV Epidemic goals, with improved HIV virologic suppression among SMM who use stimulants needed. This project will first examine multi-level determinants of HIV virologic suppression including stimulant use in a digitally recruited cohort of SMM. We will then perform a randomized controlled trial of reSTART, a multi-component HIV antiretroviral therapy adherence intervention that integrates a point-of-care urine test for HIV adherence self-monitoring and an evidence-based positive affect intervention for SMM living with HIV who use stimulants, to examine reSTART's impact on virologic suppression, adherence, stimulant use, positive affect/emotions of participants, and cost.

I serve as the corresponding PI of this grant, supervising all study activities and staff.

3. K23MH122286	PI	75 % effort	Spinelli (PI)
National Institute of Mental Health		01/24/2020	12/31/2024
PrEP Point-of-Care Brief-Intervention for Adherence among Young Men Who Have Sex with Men (PrEP2-BAY Study)		$ 220,000 direct/yr 1	$ 1,100,000 total

Under the guidance of a dedicated mentoring team, Dr. Spinelli will use a mixed methods approach to test the central hypothesis that an intervention leveraging a POC urine bioassay to detect PrEP adherence can both target and enhance adherence counseling for PrEP.

I am the principal investigator for this grant.

4. CA-0219674	PI	10 % effort	Spinelli (PI)
Gilead Sciences Investigator-Initiated Award		12/31/2024	06/01/2026
Examining the Impact of California Senate Bill 159 on PrEP uptake and HIV incidence:An Interrupted Time Series Analysis		$ 286,981 direct/yr 1	$ 286,981 total

Although CASB159 allowed pharmacies to implement PrEP prescribing programs, most have not. As a result of the U.S. Preventive Services Task Force (USPSTF) Grade A recommendation for pre-exposure prophylaxis (PrEP), private health plans in California generally are required to cover both PrEP drugs and related medical services without cost-sharing beginning no later than the 2021 plan year. This represents an intervention that may open access and remove barriers to PrEP (no time-consuming prior authorizations), and may expand avenues to receive PrEP (allows pharmacist prescribing). If CASB159 has improved uptake, it could prevent infections and reduce the incidence of HIV in implemented areas. If CASB159 has not been implemented in high-burden areas, we need to understand how we can better deploy Pharmacist-prescribed PrEP to enhance PrEP's impact on efforts to End the HIV Epidemic (EHE). Quantifying the extent of CASB159 implementation will facilitate value discussions with advocates, governments, and payers for open access to support EHE. Stakeholders can also model the cost-benefit of the expansion of PrEP and legislative interventions and have discussions on how to support intervention implementation.

I serve as the corresponding PI of this grant, supervising all study activities and staff.

5. R01DA059291	Co-I	7.5 % effort	Gandhi (PI)
NIH/NIDA		07/01/2023	05/31/2028
Unraveling the intersection of substance use, inflammation, and HIV via hair levels		$ 550,062 direct/yr 1	$ 2750310 total

Via a collaboration between the UCSF Hair Analytical Laboratory (HAL) and the UCLA mSTUDY cohort investigating substance use in people with and without HIV, this grant aims to developing and validating the methods for a multi-analyte panel of substances in hair in the UCSF HAL (Aim 1); analyze the relationship between hair levels and self- reported adherence measures, urine toxicology screens, and clinical outcomes (Aim 2); and assess the relationship between hair levels of substances and biomarkers of inflammation (Aim 3).

I serve as a co-investigator on this study, adding expertise in the analysis of clinical outcomes using drug level measurement.

6. 2R01AI143340	Co-I	7.5 % effort	Gandhi (PI)
NIH/NIAID		04/01/2024	3/31/2029
Randomized Trial to Optimize Virologic Suppression Rates Using a Point of Care Urine Monitoring Assay, ROVING-PUMA		$ 466,476 direct/yr 1	$ 2,332,380 total

This renewal R01 application proposes a large randomized trial comparing use of the point-of-care urine tenofovir assay our group developed with tailored counseling versus standard-of-care enhanced adherence counseling (EAC) among participants with documented virologic failure on tenofovire-lavmivudine-dolutegravir (TLD) at clinics in South Africa in terms of achieving virologic suppression (Aim 1), feasibility and acceptability (Aim 2) and cost effectiveness. The aspiration of this grant is to move the low-cost urine assay into clinical care and inform WHO ART guidelines

I serve as co-investigator on this project, lending expertise in assessment of implementation outcomes for the proposal.

RESEARCH AWARDS - PAST

1. n/a	PI	na % effort	Spinelli (PI)

Prepared: May 31, 2026

	UCSF AIDS Research Institute	07/01/2019	06/30/2020
	Evaluating Facilitators and Barriers to Adherence among Young Men who have Sex with Men Using a Novel Point-of-Care Urine Test for Tenofovir	$ 20,0000 direct/yr 1	$ 20,000 total
	This grant has the goal of identifying behavioral facilitators and barriers impacting PrEP adherence for young men who have sex with men using computer assisted self-interview and urine tenofovir drug-level measurement.		
	I am the principal investigator for this grant.		
2.	n/a PI	na % effort	Spinelli (PI)
	UCSF AIDS Research Institute	07/01/2018	06/30/2019
	Development of a Point of Care Immunoassay for Detecting Tenofovir in Urine: a Real-Time PrEP Adherence Metric	$ 20,000 direct/yr 1	$ 20,000 total
	This grant performed validation work to implement a point-of-care urine test for tenofovir, finding it sensitive, specific, and accurate when compared to laboratory-based assay.		
	I am the principal investigator for this grant.		
3.	R01AI158013 M-PI	10% % effort	Spinelli/Gandhi (PI)
	National institute of Allergy and Infectious Diseases	08/01/2020	07/31/2024
	Evaluation of the Interplay between HIV and COVID-19 in a large urban safety-net HIV clinic	$ 800,000 direct/yr 1	$ 3,200,000 total
	The COVID-19 pandemic has been moving quickly and is now in areas with higher rates of HIV infection, such as the United States. However, very little is known about how HIV and the virus that causes COVID-19 (SARS- CoV-2) interact, including whether HIV increases the risk of COVID-19; whether people with HIV develop long- lasting immunity against SARS-CoV-2 after infection; and how the disruption to care systems engendered by the COVID-19 epidemic, will impact the ability of patients to take their antiretroviral therapy and maintain virologic suppression. This study in a large urban HIV clinic will look at whether people living with HIV are more susceptible to COVID-19 and have worse clinical outcomes; will investigate immunity against COVID-19 in people with and without HIV after COVID-19 infection; and will look at whether the disruption to health care systems, social support, and the economy will influence HIV clinical and sociobehavioral outcomes (like depression, anxiety, food insecurity, housing issues, substance use) among people with HIV.		
	I serve as the co-PI for this grant, and lead Aims 1 and 3 of the proposal.		
4.	P30AI027763 co-Investigator	2.5 % effort	Gandhi (PI)
	NIAID/NIH	09/01/2022	08/30/2023
	Developing a Regional Approach to Equitable Implementation of Long-Acting PrEP	$ 316,521 direct/yr 1	$ 316,521 total
	The goal of this Ending the HIV Epidemic (EHE) Supplement Award is to develop a regional approach to scale-up of long-acting injectable PrEP across 3 San Francisco Bay Area counties highly impacted by HIV and to develop an Implementation Toolkit that can be adapted across EHE jurisdictions.		
	I serve as the implementation science specialist on this Supplement Award.		

Prepared: May 31, 2026

PEER REVIEWED PUBLICATIONS

1. 2007 Chen P, Hübner W, Spinelli MA, Chen BK. Predominant mode of human immunodeficiency virus transfer between T cells is mediated by sustained Env-dependent neutralization-resistant virological synapses. J Virol. 2007 Nov; 81(22):12582-95. PMID: 17728240. PMCID: PMC2169007

2. 2007 Papadopulos F, Spinelli M, Valente S, Foroni L, Orrico C, Alviano F, Pasquinelli G. Common tasks in microscopic and ultrastructural image analysis using ImageJ. Ultrastruct Pathol. 2007 Nov-Dec; 31(6):401-7. PMID: 18098058

3. 2017 Spinelli MA, Ponath C, Tieu L, Hurstak EE, Guzman D, Kushel M. Factors associated with substance use in older homeless adults: Results from the HOPE HOME study. Subst Abus. 2017 Jan-Mar; 38(1):88-94. PMID: 27897965. PMCID: PMC5472372

4. 2017 Spinelli MA, Frongillo EA, Sheira LA, Palar K, Tien PC, Wilson T, Merenstein D, Cohen M, Adedimeji A, Wentz E, Adimora AA, Metsch LR, Turan JM, Kushel MB, Weiser SD. Food Insecurity is Associated with Poor HIV Outcomes Among Women in the United States. AIDS Behav. 2017 Dec; 21(12):3473-3477. PMID: 29119474. PMCID: PMC5824627

5. 2018 Spinelli MA, Scott HM, Vittinghoff E, Liu AY, Morehead-Gee A, Gonzalez R, Buchbinder SP. Provider Adherence to Pre-exposure Prophylaxis Monitoring Guidelines in a Large Primary Care Network. Open Forum Infect Dis. 2018 Jun; 5(6):ofy099. PMID: 29977959. PMCID: PMC6016415

6. 2018 Matthew A Spinelli, Hyman Scott, Eric Vittinghoff, Albert Y Liu, Kenneth Coleman, Monica Gandhi, Susan P Buchbinder. 2272. High Interest in Doxycycline for Sexually Transmitted Infection Post-Exposure Prophylaxis (Doxy-PEP) in a Multi-city Survey of Men Having Sex With Men (MSM) Using a Social-Networking App. Open Forum Infectious Diseases. 2018 Nov 26; 5(suppl_1):s672-s673.

7. 2018 Matthew A Spinelli, Hyman Scott, Eric Vittinghoff, Albert Y Liu, Kenneth Coleman, Monica Gandhi, Susan P Buchbinder. 2272. High Interest in Doxycycline for Sexually Transmitted Infection Post-Exposure Prophylaxis (Doxy-PEP) in a Multi-city Survey of Men Having Sex With Men (MSM) Using a Social-Networking App. Open Forum Infectious Diseases. 2018 Nov 26; 5(suppl_1):s672-s673.

8. 2018 Matthew A Spinelli, Hyman Scott, Eric Vittinghoff, Albert Y Liu, Kenneth Coleman, Monica Gandhi, Susan P Buchbinder. 2272. High Interest in Doxycycline for Sexually Transmitted Infection Post-Exposure Prophylaxis (Doxy-PEP) in a Multi-city Survey of Men Having Sex With Men (MSM) Using a Social-Networking App. Open Forum Infectious Diseases. 2018 Nov 26; 5(suppl_1):s672-s673.

9. 2018 Gandhi M, Bacchetti P, Rodrigues WC, Spinelli M, Koss CA, Drain PK, Baeten JM, Mugo NR, Ngure K, Benet LZ, Okochi H, Wang G, Vincent M. Development and Validation of an Immunoassay for Tenofovir in Urine as a Real-Time Metric of Antiretroviral Adherence. EClinicalMedicine. 2018 Aug-Sep; 2-3:22-28. PMID: 30906930. PMCID: PMC6428441

10. 2018 Spinelli MA, Scott HM, Vittinghoff E, Liu AY, Morehead-Gee A, Gonzalez R, Gandhi M, Buchbinder SP. Brief Report: A Panel Management and Patient Navigation Intervention Is Associated With Earlier PrEP Initiation in a Safety-Net Primary Care Health System. J Acquir Immune Defic Syndr. 2018 11 01; 79(3):347-351. PMID: 30085955. PMCID: PMC6185763

11. 2019 Spinelli MA, Scott HM, Vittinghoff E, Liu AY, Gonzalez R, Morehead-Gee A, Gandhi M, Buchbinder SP. Missed Visits Associated With Future Preexposure Prophylaxis (PrEP) Discontinuation Among PrEP Users in a Municipal Primary Care Health Network. Open Forum Infect Dis. 2019 Apr; 6(4):ofz101. PMID: 30949540. PMCID: PMC6441570

12. 2019 Spinelli MA, Glidden DV, Rodrigues WC, Wang G, Vincent M, Okochi H, Kuncze K, Mehrotra M, Defechereux P, Buchbinder SP, Grant RM, Gandhi M. Low tenofovir level in urine by a novel immunoassay is associated with seroconversion in a preexposure prophylaxis demonstration project. AIDS. 2019 04 01; 33(5):867-872. PMID: 30649051. PMCID: PMC6375797

13. 2019 Spinelli MA, Scott HM, Vittinghoff E, Liu AY, Coleman K, Buchbinder SP. High Interest in Doxycycline for Sexually Transmitted Infection Postexposure Prophylaxis in a Multicity Survey of Men Who Have Sex With Men Using a Social Networking Application. Sex Transm Dis. 2019 04; 46(4):e32-e34. PMID: 30870327. PMCID: PMC6425754

14. 2019 Gandhi M, Spinelli MA, Mayer KH. Addressing the Sexually Transmitted Infection and HIV Syndemic. JAMA. 2019 04 09; 321(14):1356-1358. PMID: 30964514. PMCID: PMC6615736

15. 2019 Gandhi M, Bacchetti P, Spinelli MA, Okochi H, Baeten JM, Siriprakaisil O, Klinbuayaem V, Rodrigues WC, Wang G, Vincent M, Cressey TR, Drain PK. Brief Report: Validation of a Urine Tenofovir Immunoassay for Adherence Monitoring to PrEP and ART and Establishing the Cutoff for a Point-of-Care Test. J Acquir Immune Defic Syndr. 2019 05 01; 81(1):72-77. PMID: 30664078. PMCID: PMC6456396

16. 2019 Spinelli MA, Glidden DV, Anderson PL, Gandhi M, Cohen S, Vittinghoff E, Coleman ME, Scott H, Bacon O, Elion R, Kolber MA, Buchbinder SP, Liu AY. Brief Report: Short-Term Adherence Marker to PrEP Predicts Future Nonretention in a Large PrEP Demo Project: Implications for Point-of-Care Adherence Testing. J Acquir Immune Defic Syndr. 2019 06 01; 81(2):158-162. PMID: 31095005. PMCID: PMC6530484

17. 2019 Paul Drain, Kenneth Ngure, Nelly Mugo, Matthew Spinelli, Purba Chatterjee, Peter Bacchetti, David Glidden, Jared Baeten, Monica Gandhi. Testing a Real-Time Tenofovir Urine Adherence Assay for Monitoring and Providing Feedback to PrEP in Kenya (the PUMA study): A Pilot Randomized Clinical Trial (Preprint). JMIR Research Protocols. 2019 Jun 13.

18. 2019 Spinelli MA, Glidden DV, Anderson PL, Gandhi M, McMahan VM, Defechereux P, Schechter M, Veloso VG, Chariyalertsak S, Guanira JV, Bekker LG, Buchbinder SP, Grant RM. Impact of Estimated Pre-Exposure Prophylaxis (PrEP) Adherence Patterns on Bone Mineral Density in a Large PrEP Demonstration Project. AIDS Res Hum Retroviruses. 2019 Sep; 35(9):788-793. PMID: 31119944. PMCID: PMC6735322

19. 2019 Spinelli MA, Hessol NA, Schwarcz S, Hsu L, Parisi MK, Pipkin S, Scheer S, Havlir D, Buchbinder SP. Homelessness at diagnosis is associated with death among people with HIV in a population-based study of a US city. AIDS. 2019 09 01; 33(11):1789-1794. PMID: 31259765. PMCID: PMC6663574

20. 2019 Spinelli MA, Buchbinder SP. PrEP Persistence is a Critical Issue in PrEP Implementation. Clin Infect Dis. 2019 Sep 12. PMID: 31509603

21. 2019 Scott HM, Spinelli M, Vittinghoff E, Morehead-Gee A, Hirozawa A, James C, Hammer H, Liu A, Gandhi M, Buchbinder S. Racial/ethnic and HIV risk category disparities in preexposure prophylaxis discontinuation among patients in publicly funded primary care clinics. AIDS. 2019 Nov 15; 33(14):2189-2195. PMID: 31436610. PMCID: PMC6832847

22. 2020 Gandhi M, Wang G, King R, Rodrigues WC, Vincent M, Glidden DV, Cressey TR, Bacchetti P, Spinelli MA, Okochi H, Siriprakaisil O, Klinbuayaem V, Mugo NR, Ngure K, Drain PK, Baeten JM. Development and validation of the first point-of-care assay to objectively monitor adherence to HIV treatment and prevention in real-time in routine settings. AIDS. 2020 Feb 01; 34(2):255-260. PMID: 31634188. PMCID: PMC7021226

23. 2020 Spinelli MA, Laborde N, Kinley P, Whitacre R, Scott HM, Walker N, Liu AY, Gandhi M, Buchbinder SP. Missed opportunities to prevent HIV infections among pre-exposure prophylaxis users: a population-based mixed methods study, San Francisco, United States. J Int AIDS Soc. 2020 04; 23(4):e25472. PMID: 32294338. PMCID: PMC7159249

24. 2020 Laborde ND, Kinley PM, Spinelli M, Vittinghoff E, Whitacre R, Scott HM, Buchbinder SP. Understanding PrEP Persistence: Provider and Patient Perspectives. AIDS Behav. 2020 Feb 11. PMID: 32048078

25. 2020 Drain P, Ngure K, Mugo N, Spinelli M, Chatterjee P, Bacchetti P, Glidden D, Baeten J, Gandhi M. Testing a Real-Time Tenofovir Urine Adherence Assay for Monitoring and Providing Feedback to Preexposure Prophylaxis in Kenya (PUMA): Protocol for a Pilot Randomized Controlled Trial. JMIR Res Protoc. 2020 Apr 02; 9(4):e15029. PMID: 32238341. PMCID: PMC7163413

26. 2020 Spinelli MA, Rodrigues WC, Wang G, Vincent M, Glidden DV, Okochi H, Stalter R, Defechereux P, Deutsch M, Grant RM, Ngure K, Mugo NR, Baeten JM, Gandhi M. HIGH ACCURACY OF A REAL-TIME URINE ANTIBODY-BASED TENOFOVIR POINT-OF-CARE TEST COMPARED TO LABORATORY-BASED ELISA IN DIVERSE POPULATIONS. J Acquir Immune Defic Syndr. 2020 Mar 10. PMID: 32167963

27. 2020 Stalter RM, Baeten JM, Donnell D, Spinelli MA, Glidden DV, Rodrigues WC, Wang G, Vincent M, Mugo N, Mujugira A, Marzinke M, Hendrix C, Gandhi M. Urine Tenofovir Levels Measured by a Novel Immunoassay Predict HIV Protection. Clin Infect Dis. 2020 Jun 22. PMID: 32569370

28. 2020 Spinelli MA, Laborde N, Kinley P, Whitacre R, Scott HM, Walker N, Liu AY, Gandhi M, Buchbinder SP. The importance of PrEP persistence in preventing HIV infections on PrEP. J Int AIDS Soc. 2020 08; 23(8):e25578. PMID: 32844591. PMCID: PMC7448189

29. 2020 Spinelli MA, Haberer JE, Chai PR, Castillo-Mancilla J, Anderson PL, Gandhi M. Approaches to Objectively Measure Antiretroviral Medication Adherence and Drive Adherence Interventions. Curr HIV/AIDS Rep. 2020 08; 17(4):301-314. PMID: 32424549. PMCID: PMC7363551

30. 2020 Spinelli MA, Hickey MD, Glidden DV, Nguyen JQ, Oskarsson JJ, Havlir D, Gandhi M. Viral suppression rates in a safety-net HIV clinic in San Francisco destabilized during COVID-19. AIDS. 2020 12 01; 34(15):2328-2331. PMID: 32910069. PMCID: PMC7674255

31. 2020 Hickey MD, Sergi F, Zhang K, Spinelli MA, Black D, Sola C, Blaz V, Nguyen JQ, Oskarsson J, Gandhi M, Havlir DV. Pragmatic randomized trial of a pre-visit intervention to improve the quality of telemedicine visits for vulnerable patients living with HIV. J Telemed Telecare. 2020 Dec 20; 1357633X20976036. PMID: 33342328. PMCID: PMC8214632

32. 2021 Brown LB, Spinelli MA, Gandhi M. The interplay between HIV and COVID-19: summary of the data and responses to date. Curr Opin HIV AIDS. 2021 01; 16(1):63-73. PMID: 33186229. PMCID: PMC7735216

33. 2021 Matthew A. Spinelli, Lillian B. Brown, David V. Glidden, Kyle Hunter, Patrick Martin-Tuite, James Zheng, Curtis Sera, Diane Havlir, Susan P. Buchbinder, Monica Gandhi. SARS-CoV-2 incidence, testing rates, and severe COVID-19 outcomes among people with and without HIV. AIDS. 2021 Sep 20; Publish Ahead of Print.

34. 2021 Matthew A Spinelli, Michael J Peluso, Kara Lynch, Cassandra Yun, David V Glidden, Timothy J Henrich, Steve Deeks, Monica Gandhi. LB8. Lower SARS-CoV-2 IgG and Pseudovirus Neutralization Titers Post-mRNA Vaccination among People Living with HIV. Open Forum Infectious Diseases. 2021 Dec 4; 8(Suppl 1):s805-s805.

35. 2021 Spinelli MA, Brown LB, Glidden DV, Hunter K, Martin-Tuite P, Zheng J, Sera C, Havlir D, Buchbinder SP, Gandhi M. SARS-CoV-2 incidence, testing rates, and severe COVID-19 outcomes among people with and without HIV. AIDS. 2021 12 01; 35(15):2545-2547. PMID: 34870933. PMCID: PMC8673488

36. 2021 Stalter RM, Baeten JM, Donnell D, Spinelli MA, Glidden DV, Rodrigues WC, Wang G, Vincent M, Mugo N, Mujugira A, Marzinke M, Hendrix C, Gandhi M, Partners PrEP Study Team . Urine Tenofovir Levels Measured Using a Novel Immunoassay Predict Human Immunodeficiency Virus Protection. Clin Infect Dis. 2021 02 01; 72(3):486-489. PMID: 33527128. PMCID: PMC7850546

37. 2021 Matthew A Spinelli, Michael J Peluso, Kara Lynch, Cassandra Yun, David V Glidden, Timothy J Henrich, Steve Deeks, Monica Gandhi. LB8. Lower SARS-CoV-2 IgG and Pseudovirus Neutralization Titers Post-mRNA Vaccination among People Living with HIV. Open Forum Infectious Diseases. 2021 Dec 4; 8(Suppl 1):s805-s805.

38. 2021 Schwarcz S, Hessol NA, Spinelli MA, Hsu LC, Wlodarczyk D, Tulsky J, Newman MD, Buchbinder SP. Sensitivity and Specificity of the National Death Index for Multiple Causes of Death in People With HIV. Public Health Rep. 2021 Sep-Oct; 136(5):595-602. PMID: 33541227. PMCID: PMC8361560

39. 2021 Spinelli MA, Glidden DV, Gennatas ED, Bielecki M, Beyrer C, Rutherford G, Chambers H, Goosby E, Gandhi M. Importance of non-pharmaceutical interventions in lowering the viral inoculum to reduce susceptibility to infection by SARS-CoV-2 and potentially disease severity. Lancet Infect Dis. 2021 09; 21(9):e296-e301. PMID: 33631099. PMCID: PMC7906703

40. 2021 Peluso MJ, Deitchman AN, Torres L, Iyer NS, Nixon CC, Munter SE, Donatelli J, Thanh C, Takahashi S, Hakim J, Turcios K, Janson O, Hoh R, Tai V, Hernandez Y, Fehrman E, Spinelli MA, Gandhi M, Trinh L, Wrin T, Petropoulos CJ, Aweeka FT, Rodriguez-Barraquer I, Kelly JD, Martin JN, Deeks SG, Greenhouse B, Rutishauser RL, Henrich TJ. Long-Term SARS-CoV-2-Specific Immune and Inflammatory Responses Across a Clinically Diverse Cohort of Individuals Recovering from COVID-19. medRxiv. 2021 Mar 01. PMID: 33688685. PMCID: PMC7941662

41. 2021 Peluso MJ, Takahashi S, Hakim J, Kelly JD, Torres L, Iyer NS, Turcios K, Janson O, Munter SE, Thanh C, Nixon CC, Hoh R, Tai V, Fehrman EA, Hernandez Y, Spinelli MA, Gandhi M, Palafox MA, Vallari A, Rodgers MA, Prostko J, Hackett J, Trinh L, Wrin T, Petroplolous CJ, Chiu CY, Norris PJ, DiGermanio C, Stone M, Busch MP, Elledge SK, Zhou XX, Wells JA, Shu A, Kurtz TW, Pak JE, Wu W, Burbelo PD, Cohen JI, Rutishauser RL, Martin JN, Deeks SG, Henrich TJ, Rodriguez-Barraquer I, Greenhouse B. SARS-CoV-2 antibody magnitude and detectability are driven by disease severity, timing, and assay. medRxiv. 2021 Mar 05. PMID: 33688675. PMCID: PMC7941652

42. 2021 Peluso MJ, Kelly JD, Lu S, Goldberg SA, Davidson MC, Mathur S, Durstenfeld MS, Spinelli MA, Hoh R, Tai V, Fehrman EA, Torres L, Hernandez Y, Williams MC, Arreguin MI, Bautista JA, Ngo LH, Deswal M, Munter SE, Martinez EO, Anglin KA, Romero MD, Tavs J, Rugart PR, Chen JY, Sans HM, Murray VW, Ellis PK, Donohue KC, Massachi JA, Weiss JO, Mehdi I, Pineda-Ramirez J, Tang AF, Wenger M, Assenzio M, Yuan Y, Krone M, Rutishauser RL, Rodriguez-Barraquer I, Greenhouse B, Sauceda JA, Gandhi M, Hsue PY, Henrich TJ, Deeks SG, Martin JN. Rapid implementation of a cohort for the study of post-acute sequelae of SARS-CoV-2 infection/COVID-19. medRxiv. 2021 Mar 12. PMID: 33758895. PMCID: PMC7987054

43. 2021 Spinelli MA, Hessol NA, Schwarcz SK, Scheer S, Gandhi M, Chin Hsu L. Disparities in Integrase Inhibitor Usage in the Modern HIV Treatment Era: A Population-Based Study in a US City. Open Forum Infect Dis. 2021 Jul; 8(7):ofab139. PMID: 34250184. PMCID: PMC8266565

44. 2021 Santiago-Rodriguez EI, Maiorana A, Peluso MJ, Hoh R, Tai V, Fehrman EA, Hernandez Y, Torres L, Spinelli MA, Gandhi M, Kelly JD, Martin JN, Henrich TJ, Deeks SG, Sauceda JA. Characterizing the COVID-19 illness experience to inform the study of post-acute sequelae and recovery: a qualitative study. medRxiv. 2021 Mar 24. PMID: 33758881. PMCID: PMC7987040

45. 2021 Okochi H, Louie A, Phung N, Zhang K, Tallerico RM, Kuncze K, Spinelli MA, Koss CA, Benet LZ, Gandhi M. Tenofovir and emtricitabine concentrations in hair are comparable between individuals on tenofovir disoproxil fumarate versus tenofovir alafenamide-based ART. Drug Test Anal. 2021 Jul; 13(7):1354-1370. PMID: 33742745

46. 2021 Spinelli MA, Rutherford G, Gandhi M. Lowering SARS-CoV-2 viral load might affect transmission but not disease severity in secondary cases - Authors' reply. Lancet Infect Dis. 2021 07; 21(7):915-916. PMID: 33864804. PMCID: PMC8046414

47. 2021 Johnson KA, Niu X, Glidden DV, Castillo-Mancilla JR, Yager J, MaWhinney S, Morrow M, Okochi H, Cressey TR, Drain PK, Gandhi M, Anderson PL, Spinelli MA. Lower Urine Tenofovir Concentrations Among Individuals Taking Tenofovir Alafenamide Versus Tenofovir Disoproxil Fumarate: Implications for Point-of-Care Testing. Open Forum Infect Dis. 2021 Jul; 8(7):ofab200. PMID: 34285929. PMCID: PMC8286091

48. 2021 Spinelli MA, Lynch KL, Yun C, Glidden DV, Peluso MJ, Henrich TJ, Gandhi M, Brown LB. SARS-CoV-2 seroprevalence, and IgG concentration and pseudovirus neutralising antibody titres after infection, compared by HIV status: a matched case-control observational study. Lancet HIV. 2021 06; 8(6):e334-e341. PMID: 33933189. PMCID: PMC8084354

49. 2021 Spinelli MA, Lowery B, Shuford JA, Spindler J, Kearney MF, McFarlane JR, McDonald C, Okochi H, Phung N, Kuncze K, Jee K, Johannessen D, Anderson PL, Smith DK, Defechereux P, Grant RM, Gandhi M. Use of Drug-level Testing and Single-genome Sequencing to Unravel a Case of Human Immunodeficiency Virus Seroconversion on Pre-exposure Prophylaxis. Clin Infect Dis. 2021 06 01; 72(11):2025-2028. PMID: 32686825. PMCID: PMC8315126

50. 2021 Spinelli MA. SARS-CoV-2 vaccination in people with HIV. Lancet HIV. 2021 08; 8(8):e455-e456. PMID: 34153265. PMCID: PMC8213375

51. 2021 DeJong C, Spinelli MA, Okochi H, Gandhi M. Tenofovir-based PrEP for COVID-19: an untapped opportunity? AIDS. 2021 07 15; 35(9):1509-1511. PMID: 33710026. PMCID: PMC8243808

52. 2021 Peluso MJ, Takahashi S, Hakim J, Kelly JD, Torres L, Iyer NS, Turcios K, Janson O, Munter SE, Thanh C, Donatelli J, Nixon CC, Hoh R, Tai V, Fehrman EA, Hernandez Y, Spinelli MA, Gandhi M, Palafox MA, Vallari A, Rodgers MA, Prostko J, Hackett J, Trinh L, Wrin T, Petropoulos CJ, Chiu CY, Norris PJ, DiGermanio C, Stone M, Busch MP, Elledge SK, Zhou XX, Wells JA, Shu A, Kurtz TW, Pak JE, Wu W, Burbelo PD, Cohen JI, Rutishauser RL, Martin JN, Deeks SG, Henrich TJ, Rodriguez-Barraquer I, Greenhouse B. SARS-CoV-2 antibody magnitude and detectability are driven by disease severity, timing, and assay. Sci Adv. 2021 Jul; 7(31). PMID: 34330709. PMCID: PMC8324059

53. 2021 Spinelli MA, Glidden DV, Gennatas ED, Rutherford GW, Gandhi M. Effectiveness of Adding a Mask Recommendation to Other Public Health Measures. Ann Intern Med. 2021 08; 174(8):1193. PMID: 34399080

54. 2021 Peluso MJ, Deitchman AN, Torres L, Iyer NS, Munter SE, Nixon CC, Donatelli J, Thanh C, Takahashi S, Hakim J, Turcios K, Janson O, Hoh R, Tai V, Hernandez Y, Fehrman EA, Spinelli MA, Gandhi M, Trinh L, Wrin T, Petropoulos CJ, Aweeka FT, Rodriguez-Barraquer I, Kelly JD, Martin JN, Deeks SG, Greenhouse B, Rutishauser RL, Henrich TJ. Long-term SARS-CoV-2-specific immune and inflammatory responses in individuals recovering from COVID-19 with and without post-acute symptoms. Cell Rep. 2021 08 10; 36(6):109518. PMID: 34358460. PMCID: PMC8342976

55. 2021 Johnson KA, Okochi H, Glidden DV, Gandhi M, Spinelli M. Brief Report: No Difference in Urine Tenofovir Levels in Patients Living With HIV on Unboosted Versus Dose-Adjusted Boosted Tenofovir Alafenamide. J Acquir Immune Defic Syndr. 2021 Sep 01; 88(1):57-60. PMID: 33990489. PMCID: PMC8373700

56. 2022 Santiago-Rodriguez EI, Maiorana A, Peluso MJ, Hoh R, Tai V, Fehrman EA, Hernandez Y, Torres L, Spinelli MA, Gandhi M, Kelly JD, Martin JN, Henrich TJ, Deeks SG, Sauceda JA. Characterizing the COVID-19 Illness Experience to Inform the Study of Post-acute Sequelae and Recovery. Int J Behav Med. 2022 Oct; 29(5):610-623. PMID: 34918211. PMCID: PMC8675303

57. 2022 Peluso MJ, Kelly JD, Lu S, Goldberg SA, Davidson MC, Mathur S, Durstenfeld MS, Spinelli MA, Hoh R, Tai V, Fehrman EA, Torres L, Hernandez Y, Williams MC, Arreguin MI, Ngo LH, Deswal M, Munter SE, Martinez EO, Anglin KA, Romero MD, Tavs J, Rugart PR, Chen JY, Sans HM, Murray VW, Ellis PK, Donohue KC, Massachi JA, Weiss JO, Mehdi I, Pineda-Ramirez J, Tang AF, Wenger MA, Assenzio MT, Yuan Y, Krone MR, Rutishauser RL, Rodriguez-Barraquer I, Greenhouse B, Sauceda JA, Gandhi M, Scheffler AW, Hsue PY, Henrich TJ, Deeks SG, Martin JN. Persistence, Magnitude, and Patterns of Postacute Symptoms and Quality of Life Following Onset of SARS-CoV-2 Infection: Cohort Description and Approaches for Measurement. Open Forum Infect Dis. 2022 Feb; 9(2):ofab640. PMID: 35106317. PMCID: PMC8755302

58. 2022 Jennings L, Kellermann T, Spinelli M, Nkantsu Z, Cogill D, van Schalkwyk M, Decloedt E, van Zyl G, Orrell C, Gandhi M. Drug Resistance, Rather than Low Tenofovir Levels in Blood or Urine, Is Associated with Tenofovir, Emtricitabine, and Efavirenz Failure in Resource-Limited Settings. AIDS Res Hum Retroviruses. 2022 06; 38(6):455-462. PMID: 34779228. PMCID: PMC9225825

59. 2022 Spinelli MA, Grinsztejn B, Landovitz RJ. Promises and challenges: cabotegravir for preexposure prophylaxis. Curr Opin HIV AIDS. 2022 07 01; 17(4):186-191. PMID: 35762372. PMCID: PMC9240402

60. 2022 Conroy AA, McKenna S, Ruark A, Neilands TB, Spinelli M, Gandhi M. Relationship Dynamics are Associated with Self-Reported Adherence but not an Objective Adherence Measure in Malawi. AIDS Behav. 2022 Nov; 26(11):3551-3562. PMID: 35507094. PMCID: PMC9631807

61. 2022 Peluso MJ, Spinelli MA, Deveau TM, Forman CA, Munter SE, Mathur S, Tang AF, Lu S, Goldberg SA, Arreguin MI, Hoh R, Tai V, Chen JY, Martinez EO, Yee BC, Chenna A, Winslow JW, Petropoulos CJ, Sette A, Weiskopf D, Kumar N, Lynch KL, Hunt PW, Durstenfeld MS, Hsue PY, Kelly JD, Martin JN, Glidden DV, Gandhi M, Deeks SG, Rutishauser RL, Henrich TJ. Postacute sequelae and adaptive immune responses in people with HIV recovering from SARS-COV-2 infection. AIDS. 2022 10 01; 36(12):F7-F16. PMID: 35866847. PMCID: PMC9444925

62. 2022 Peluso MJ, Deveau TM, Munter SE, Ryder D, Buck A, Beck-Engeser G, Chan F, Lu S, Goldberg SA, Hoh R, Tai V, Torres L, Iyer NS, Deswal M, Ngo LH, Buitrago M, Rodriguez A, Chen JY, Yee BC, Chenna A, Winslow JW, Petropoulos CJ, Deitchman AN, Hellmuth J, Spinelli MA, Durstenfeld MS, Hsue PY, Kelly JD, Martin JN, Deeks SG, Hunt PW, Henrich TJ. Impact of Pre-Existing Chronic Viral Infection and Reactivation on the Development of Long COVID. medRxiv. 2022 Jul 22. PMID: 35898346. PMCID: PMC9327632

63. 2022 Spinelli MA, Jones BLH, Gandhi M. COVID-19 Outcomes and Risk Factors Among People Living with HIV. Curr HIV/AIDS Rep. 2022 10; 19(5):425-432. PMID: 35930187. PMCID: PMC9362624

64. 2022 van Zyl G, Jennings L, Kellermann T, Nkantsu Z, Cogill D, van Schalkwyk M, Spinelli M, Decloedt E, Orrell C, Gandhi M. Urine tenofovir-monitoring predicts HIV viremia in patients treated with high genetic-barrier regimens. AIDS. 2022 11 15; 36(14):2057-2062. PMID: 36305182. PMCID: PMC9623472

65. 2022 Spinelli MA, Le Tourneau N, Glidden DV, Hsu L, Hickey MD, Imbert E, Arreguin M, Jain JP, Oskarsson JJ, Buchbinder SP, Johnson MO, Havlir D, Christopoulos KA, Gandhi M. Impact of Multicomponent Support Strategies on Human Immunodeficiency Virus Virologic Suppression Rates During Coronavirus Disease 2019: An Interrupted Time Series Analysis. Clin Infect Dis. 2022 08 24; 75(1):e947-e954. PMID: 35245934. PMCID: PMC9129130

66. 2022 Spinelli MA, Peluso MJ, Lynch KL, Yun C, Glidden DV, Henrich TJ, Deeks SG, Gandhi M. Differences in Post-mRNA Vaccination Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Immunoglobulin G (IgG) Concentrations and Surrogate Virus Neutralization Test Response by Human Immunodeficiency Virus (HIV) Status and Type of Vaccine: A Matched Case-Control Observational Study. Clin Infect Dis. 2022 Aug 24; 75(1):e916-e919. PMID: 34864962. PMCID: PMC8689738

67. 2023 Peluso MJ, Deveau TM, Munter SE, Ryder D, Buck A, Beck-Engeser G, Chan F, Lu S, Goldberg SA, Hoh R, Tai V, Torres L, Iyer NS, Deswal M, Ngo LH, Buitrago M, Rodriguez A, Chen JY, Yee BC, Chenna A, Winslow JW, Petropoulos CJ, Deitchman AN, Hellmuth J, Spinelli MA, Durstenfeld MS, Hsue PY, Kelly JD, Martin JN, Deeks SG, Hunt PW, Henrich TJ. Chronic viral coinfections differentially affect the likelihood of developing long COVID. J Clin Invest. 2023 02 01; 133(3). PMID: 36454631. PMCID: PMC9888380

68. 2023 Durstenfeld MS, Peluso MJ, Spinelli MA, Li D, Hoh R, Chenna A, Yee B, Winslow J, Petropoulos C, Gandhi M, Henrich TJ, Aras MA, Long CS, Deeks SG, Hsue PY. Association of SARS-CoV-2 Infection and Cardiopulmonary Long COVID With Exercise Capacity and Chronotropic Incompetence Among People With HIV. J Am Heart Assoc. 2023 10 17; 12(20):e030896. PMID: 37830367. PMCID: PMC10757521

69. 2023 McCluskey SM, Govender K, Adamson J, Gandhi M, Spinelli MA, Moosa MY, Muyindike W, Moodley P, Pillay M, Masette G, Sunpath H, Pillay S, Chen G, Hedt-Gauthier B, Marconi VC, Siedner MJ. Point-of-care urine tenofovir testing to predict HIV drug resistance among individuals with virologic failure. AIDS. 2023 06 01; 37(7):1109-1113. PMID: 36928169. PMCID: PMC10164085

70. 2023 Landovitz RJ, Hanscom BS, Clement ME, Tran HV, Kallas EG, Magnus M, Sued O, Sanchez J, Scott H, Eron JJ, Del Rio C, Fields SD, Marzinke MA, Eshleman SH, Donnell D, Spinelli MA, Kofron RM, Berman R, Piwowar-Manning EM, Richardson PA, Sullivan PA, Lucas JP, Anderson PL, Hendrix CW, Adeyeye A, Rooney JF, Rinehart AR, Cohen MS, McCauley M, Grinsztejn B, HPTN 083 Study Team. Efficacy and safety of long-acting cabotegravir compared with daily oral tenofovir disoproxil fumarate plus emtricitabine to prevent HIV infection in cisgender men and transgender women who have sex with men 1 year after study unblinding: a secondary analysis of the phase 2b and 3 HPTN 083 randomised controlled trial. Lancet HIV. 2023 12; 10(12):e767-e778. PMID: 37952550

71. 2023 Johnson KA, Okochi H, Arreguin M, Watabe J, Glidden DV, Chattopadhyay A, Imbert E, Hickey MD, Gandhi M, Spinelli M. Urine Tenofovir Levels Strongly Correlate With Virologic Suppression in Patients With Human Immunodeficiency Virus on Tenofovir Alafenamide-Based Antiretroviral Therapy. Clin Infect Dis. 2023 03 04; 76(5):930-933. PMID: 36253952. PMCID: PMC10226738

72. 2023 Herbertson EC, Lahiri CD, Olugbake OA, Soremekun RO, Spinelli MA, Gandhi M. Adherence determination using urine-tenofovir point-of-care testing and pharmacy refill records: A cross-sectional study. Medicine (Baltimore). 2023 Nov 24; 102(47):e36321. PMID: 38013290. PMCID: PMC10681504

73. 2023 Spinelli M, Gandhi M, Riva A. The intertwined epidemics of HIV and COVID-19 - emerging data and responses. Curr Opin HIV AIDS. 2023 05 01; 18(3):117-118. PMID: 37144612

74. 2023 Stewart J, Oware K, Donnell D, Violette LR, Odoyo J, Soge OO, Scoville CW, Omollo V, Mogaka FO, Sesay FA, McClelland RS, Spinelli M, Gandhi M, Bukusi EA, Baeten JM, dPEP Kenya Study Team. Doxycycline Prophylaxis to Prevent Sexually Transmitted Infections in Women. N Engl J Med. 2023 Dec 21; 389(25):2331-2340. PMID: 38118022. PMCID: PMC10805625

75. 2023 Durstenfeld MS, Peluso MJ, Spinelli MA, Li D, Hoh R, Gandhi M, Henrich TJ, Aras MA, Long CS, Deeks SG, Hsue PY. Association of SARS-CoV-2 Infection and Cardiopulmonary Long COVID with Exercise Capacity and Chronotropic Incompetence among People with HIV. medRxiv. 2023 May 02. PMID: 37205522. PMCID: PMC10187359

76. 2023 Peluso MJ, Swank ZN, Goldberg SA, Lu S, Dalhuisen T, Borberg E, Senussi Y, Luna MA, Song CC, Clark A, Zamora A, Lew M, Viswanathan B, Huang B, Anglin K, Hoh R, Hsue PY, Durstenfeld MS, Spinelli MA, Glidden DV, Henrich TJ, Daniel Kelly J, Deeks SG, Walt DR, Martin JN. Plasma-based antigen persistence in the post-acute phase of SARS-CoV-2 infection. medRxiv. 2023 Dec 29. PMID: 37961239. PMCID: PMC10635183

77. 2023 Mars SG, Spinelli MA, Ondocsin J, Koester KA, Rodriguez ES, Jain J, Arreguin M, Johnson MO, Gandhi M. Pandemic expertise: qualitative findings on the experiences of living with HIV during the COVID-19 pandemic. AIDS Care. 2023 Aug 24; 1-8. PMID: 37621106

78. 2023 Mustanski B, Ryan DT, Spinelli MA, Gandhi M, Newcomb ME. Urine point-Of-care tenofovir test demonstrates strong predictive clinical and research utility. AIDS. 2023 Sep 06. PMID: 37696260

79. 2024 Spinelli M, Gandhi M. Point-of-care urine tenofovir monitoring of adherence to drive interventions for HIV treatment and prevention. Expert Rev Mol Diagn. 2024 Mar; 24(3):169-175. PMID: 38353417

80. 2024 Shah P, Spinelli M, Irungu E, Kabuti R, Ngurukiri P, Babu H, Kungu M, Champions TMFS, Nyabuto C, Mahero A, Devries K, Kyegombe N, Medley GF, Gafos M, Seeley J, Weiss HA, Kaul R, Gandhi M, Beattie TS, Kimani J. Factors Associated with Usage of Oral-PrEP among Female Sex Workers in Nairobi, Kenya, Assessed by Self-Report and a Point-of-Care Urine Tenofovir Immunoassay. AIDS Behav. 2024 Nov; 28(11):3836-3849. PMID: 39136824. PMCID: PMC11471708

81. 2024 Martinson T, Nwogu-Attah J, Spinelli M, Gandhi M. Low-cost urine tenofovir assay to triage dolutegravir resistance testing. Lancet HIV. 2024 May; 11(5):e282-e283. PMID: 38461845

82. 2024 Jain JP, Heise MJ, Lisha NE, Moreira CH, Glidden DV, Burkholder GA, Crane HM, Jacobson JM, Cachay ER, Mayer KH, Napravnik S, Moore RD, Dawson-Rose C, Johnson MO, Christopoulos KA, Gandhi M, Spinelli MA. Impact of the Coronavirus Disease 2019 Pandemic on Substance Use Disorder Risk Among People Living With Human Immunodeficiency Virus (HIV) Enrolled in HIV Care in the United States: An Interrupted Time Series Analysis. Open Forum Infect Dis. 2024 Sep; 11(9):ofae491. PMID: 39252870. PMCID: PMC11382144

83. 2024 Peluso MJ, Swank ZN, Goldberg SA, Lu S, Dalhuisen T, Borberg E, Senussi Y, Luna MA, Chang Song C, Clark A, Zamora A, Lew M, Viswanathan B, Huang B, Anglin K, Hoh R, Hsue PY, Durstenfeld MS, Spinelli MA, Glidden DV, Henrich TJ, Kelly JD, Deeks SG, Walt DR, Martin JN. Plasma-based antigen persistence in the post-acute phase of COVID-19. Lancet Infect Dis. 2024 Jun; 24(6):e345-e347. PMID: 38604216

84. 2024 Spinelli MA, Bisom-Rapp E, Heise MJ, Camp C, Appa A, Liu AY, Sassaman K, Shiels M, Mayorga-Munoz F, Chimezie A, Nguyen J, Oskarsson J, Gandhi M. High Retention and Adherence with Rapid Long-Acting Injectable PrEP Implementation in an Urban Safety-Net Clinic Population. Clin Infect Dis. 2024 Nov 01. PMID: 39484783. PMCID: PMC12135906

85. 2024 Spinelli MA, Christopoulos KA, Moreira CV, Jain JP, Lisha N, Glidden DV, Burkholder GA, Crane HM, Shapiro AE, Jacobson JM, Cachay ER, Mayer KH, Napravnik S, Moore RD, Gandhi M, Johnson MO. Viral Suppression Trajectories Destabilized After Coronavirus Disease 2019 Among US People With Human Immunodeficiency Virus: An Interrupted Time Series Analysis. Clin Infect Dis. 2024 Apr 10; 78(4):991-994. PMID: 37963086. PMCID: PMC11006098

86. 2024 Spinelli MA, Ngure K, Gandhi M. Preexposure Prophylaxis (PrEP) for HIV. JAMA. 2024 Nov 12; 332(18):1574-1575. PMID: 39401050. PMCID: PMC11772257

87. 2024 Martinson T, Montoya R, Moreira C, Kuncze K, Sassaman K, Heise MJ, Glidden DV, Amico KR, Arnold EA, Buchbinder SP, Ewart LD, Carrico A, Wang G, Okochi H, Scott HM, Gandhi M, Spinelli MA. Point-of-care urine tenofovir test predicts future HIV pre-exposure prophylaxis discontinuation among young users. AIDS. 2024 Jun 21. PMID: 38905507. PMCID: PMC11293961

88. 2024 Hickey MD, Grochowski J, Mayorga-Munoz F, Oskarsson J, Imbert E, Spinelli M, Szumowski JD, Appa A, Koester K, Dauria EF, McNulty M, Colasanti J, Havlir DV, Gandhi M, Christopoulos KA. Identifying Implementation Determinants and Strategies for Long-Acting Injectable Cabotegravir-Rilpivirine in People With HIV Who Are Virally Unsuppressed. J Acquir Immune Defic Syndr. 2024 07 01; 96(3):280-289. PMID: 38534179. PMCID: PMC11192618

89. 2024 Gandhi M, Glidden DV, Chakravarty D, Wang G, Biwott C, Mogere P, Maina G, Njeru I, Kiptinness C, Okello P, Spinelli MA, Chatterjee P, Velloza J, Ogello V, Medina-Marino A, Okochi H, Mugo NR, Ngure K. Impact of a point-of-care urine tenofovir assay on adherence to HIV pre-exposure prophylaxis among women in Kenya: a randomised pilot trial. Lancet HIV. 2024 Jul 05. PMID: 38976993

90. 2024 Spinelli MA, Johnson MO, Lisha NE, Jain JP, Moreira CV, Glidden DV, Burkholder GA, Crane HM, Jacobson JM, Cachay ER, Mayer KH, Napravnik S, Moore RD, Gandhi M, Christopoulos KA. Prevalence and Correlates of SARS-CoV-2 Vaccine Uptake and Hesitancy Among People With HIV Across the United States. J Acquir Immune Defic Syndr. 2024 Sep 01; 97(1):13-18. PMID: 39116328. PMCID: PMC11315354

91. 2025 Bikinesi L, Spinelli MA, Nyoni N, Mouton D, Mengistu A, Kamangu J, Konstantinus I, Kalimugogo P, Mutandi G, Negussie F, Wang G, Welty S, McFarland W, Beard RS, Haberer J, McCluskey S, Gandhi M, Hong SY. The impact of adherence counseling incorporating a point of care urine tenofovir assay on virologic suppression among individuals failing tenofovir-lamivudine-dolutegravir: A pre-post intervention study. Int J Infect Dis. 2025 Feb; 151:107328. PMID: 39647577. PMCID: PMC11748914

92. 2025 Spinelli MA, Christopoulos KA. Reply. J Acquir Immune Defic Syndr. 2025 Feb 01; 98(2):e12. PMID: 39791985

93. 2025 Appa A, Spinelli MA, Javanbakht M, Heise MJ, Okochi H, Bazazi AR, Coffin P, Gorbach PM, Gandhi M. Unintentional Fentanyl Use Detected in Hair of People With HIV Risk Using Methamphetamine. JAMA. 2025 Feb 26. PMID: 40009421. PMCID: PMC11866066

94. 2025 Schmidt HR, Heise MJ, Sassaman K, D'Angelo A, Martinson T, Mahuvakar S, Duncan DT, Horvath KJ, Hirshfield S, Williams R, Johnson M, Grov C, Carrico A, Gandhi M, Spinelli MA. High viral suppression amid demographic disparities: a U.S. national cohort of people with HIV on a popular dating app. AIDS. 2025 Mar 06. PMID: 40053492. PMCID: PMC12122227

95. 2025 Martinson T, Heise MJ, Sassaman K, Schmidt HR, D'Angelo AB, Mahuvakar S, Duncan DT, Horvath KJ, Hirshfield S, Williams R, Johnson MO, Grov C, Carrico A, Gandhi M, Spinelli MA. Interest and disparities in awareness and uptake of doxyPEP among U.S. MSM living with HIV. AIDS. 2025 Mar 27. PMID: 40162974. PMCID: PMC12202166

96. 2025 Spinelli MA, Heise MJ, Gistand N, Cox C, Grochowski J, Oskarsson J, Glidden DV, Gandhi M. HIV Viral Suppression With Use of Long-Acting Antiretroviral Therapy in People With and Without Initial Viremia. JAMA. 2025 Apr 22; 333(16):1451-1453. PMID: 40048173. PMCID: PMC11886863

97. 2025 Spinelli MA, Heise MJ, Roman J, Bena J, Barry MP, Buchbinder SP, Scott HM. Sustained Effectiveness of Doxycycline Post-Exposure-Prophylaxis in a Large Sexual Health Clinic over 96 Weeks: An Interrupted Time Series Analysis. Clin Infect Dis. 2025 May 06. PMID: 40327542

98. 2025 Renata Buccheri, Matthew A Spinelli, Megan J Heise, David V Glidden, Kevin Sassaman, Tyler Martinson, Hannah R Schmidt, Alexa B D'Angelo, Dustin T Duncan, Keith J Horvath, Sabina Hirshfield, Renessa S Williams, Mallory O Johnson, Christian Grov, Adam Carrico, Monica Gandhi. Feasibility of Point-of-Care Urine Self-Testing to Measure Tenofovir Adherence and Predict Viral Suppression. Open Forum Infectious Diseases. 2025 May 17; ofaf300.

99. 2025 Carlos Henrique Valente Moreira, Laura Azevedo, Ariela Mota Ferreira, Ana Carolina Gonçalves Oliveira, Andréia Brito de Souza, Desirée Sant'Ana Haikal, Cláudia Di Lorenzo Oliveira, Clareci Silva Cardoso, Matthew Spinelli, Ana Luiza Bierrenbach, Nayara Dornela Quintino, Nayara Ragi Baldoni, Renata Fiuza Damasceno, Malu Ribeiro Drumond, Thallyta Maria Vieira, Dardiane Santos Cruz, Sâmara Fernandes Leite, Ana Clara de Jesus Santos, Léa Campos de Oliveira Silva, Renata Buccheri, Antônio Luiz Pinho Ribeiro, Ester Cerdeira Sabino. Bridging the gap in Chagas disease management: a mixed-methods study using an implementation science approach within the Brazilian primary health care system—'Implementa-Chagas/SaMi-Trop project'. The Lancet Regional Health - Americas. 2025 Jul 1; 47:101136.

100. 2025 Ghanooni, D., Heise, M. J., Sassaman, K., Glidden, D. V., Martinson, T., Mahuvakar, S., Duncan, D. T., Horvath, K. J., Hirshfield, S., Williams, R., Johnson, M. O., Grov, C., Gandhi, M., Carrico, A. W., & Spinelli, M. (2025). Suboptimal ART adherence, undetectable urine tenofovir, and higher CRP values. AIDS. Accepted 06/29/2025. *In Press.*

101. 2025 Sithole N, Govender I, Spinelli M, Smit T, Cibane S, Zwane M, Phakathi N, Krows M, Nkosi B, Seeley J, Barnabas RV, Siedner MJ, Moshabela M, Celum C, Grant A, Gandhi M, Shapiro AE. The unintended outcome: a retrospective cross-sectional study using a urine lateral flow assay to detect ART use reveals non-disclosure of taking ART in South Africa's public health system. J Int AIDS Soc. 2025 Jun;28(6):e26515. doi: 10.1002/jia2.26515. PMID: 40551583; PMCID: PMC12185906.

BOOKS AND CHAPTERS

1. 2014 Spinelli M and Dunlop M. Travel Medicine. Chapter in UCSF Outpatient Medicine Handbook 2014.

2. 2014 Spinelli M and Satterfield J. Motivational Interviewing for Behavioral Change. Chapter in UCSF Outpatient Medicine Handbook 2014.

3. 2018 Spinelli M and Gandhi M. Undetectable Equals Untransmittable. UCSF HIV InSite Clinical Edge. Jan 2018. http://hivinsite.ucsf.edu/InSite?page=md-expert-spinelli.

4. 2021 Current Medical Diagnosis and Treatment 2022, HIV Infection & AIDS Chapter Co-Editor

5. 2022 Current Medical Diagnosis and Treatment 2023, HIV Infection & AIDS Chapter Co-Editor

6. 2023 Current Medical Diagnosis and Treatment 2024, HIV Infection & AIDS Chapter Co-Editor

7. 2024 Current Medical Diagnosis and Treatment 2025, HIV Infection & AIDS Chapter Co-Editor

SIGNIFICANT PUBLICATIONS

1. 2025 Spinelli MA, Heise MJ, Gistand N, Cox C, Grochowski J, Oskarsson J, Glidden DV, Gandhi M. HIV Viral Suppression With Use of Long-Acting Antiretroviral Therapy in People With and Without Initial Viremia. JAMA. 2025 Apr 22;333(16):1451-1453. doi: 10.1001/jama.2025.0109. PMID: 40048173; PMCID: PMC11886863. This project compared 48-week viral load outcomes after starting long-acting antiretroviral therapy among people in the US with HIV with or without viremia from January 2021 through September 2024 at the Ward 86 Clinic.

2. 2023 Landovitz RJ, Hanscom BS, Clement ME, Tran HV, Kallas EG, Magnus M, Sued O, Sanchez J, Scott H, Eron JJ, Del Rio C, Fields SD, Marzinke MA, Eshleman SH, Donnell D, Spinelli MA, Kofron RM, Berman R, Piwowar-Manning EM, Richardson PA, Sullivan PA, Lucas JP, Anderson PL, Hendrix CW, Adeyeye A, Rooney JF, Rinehart AR, Cohen MS, McCauley M, Grinsztejn B, HPTN 083 Study Team. Efficacy and safety of long-acting cabotegravir compared with daily oral tenofovir disoproxil fumarate plus emtricitabine to prevent HIV infection in cisgender men and transgender women who have sex with men 1 year after study unblinding: a secondary analysis of the phase 2b and 3 HPTN 083 randomised controlled trial. Lancet HIV. 2023 12; 10(12):e767-e778. PMID: 37952550

   I served as the lead safety physician during the end of the randomized phase and during the open label extension of the HPTN 083 Study which demonstrated the efficacy of injectable cabotegravir as the first long-acting PrEP agent. This analysis showed similar efficacy in the open label extension to the randomized clinical trial, and explored the potential for breakthrough HIV seroconversion occurring while using cabotegravir PrEP to lead to the long-acting early viral inhibition (LEVI) syndrome. LEVI syndrome can lead to delayed HIV testing positivity using standard antigen/antibody-based testing as opposed to more sensitive HIV viral load testing. This work has had important implications for PrEP guideline development and use of this highly efficacious PrEP agent.

3. 2023 Stewart J, Oware K, Donnell D, Violette LR, Odoyo J, Soge OO, Scoville CW, Omollo V, Mogaka FO, Sesay FA, McClelland RS, Spinelli M, Gandhi M, Bukusi EA, Baeten JM, dPEP Kenya Study Team. Doxycycline Prophylaxis to Prevent Sexually Transmitted Infections in Women. N Engl J Med. 2023 Dec 21; 389(25):2331-2340. PMID: 38118022. PMCID: PMC10805625

   The dPEP Study was the first clinical trial for doxycycline post-exposure prophylaxis (PEP) to prevent sexually transmitted infections performed among cisgender women, finding null efficacy. This was surprising after a prior study showed high efficacy among men who have sex with men and transgender women. I led the hair doxycycline measurement analysis to examine potential determinants of the lack of efficacy, finding low adherence to study project in the study. This work has supported subsequent clinical trials with additional adherence supports to examine the efficacy of doxycycline PEP among cisgender women with the incorporation of intensive drug level measurement analyses. Furthermore, this work led to my recently awarded R01 to perform pharmacokinetic analyses of doxycycline following a directly observed therapy randomized clinical trial. This work will permit our team to develop adherence measurement benchmarks for doxycycline in hair, plasma, and urine for use in future doxycycline PEP studies.

4. 2022 Spinelli MA, Le Tourneau N, Glidden DV, Hsu L, Hickey MD, Imbert E, Arreguin M, Jain JP, Oskarsson JJ, Buchbinder SP, Johnson MO, Havlir D, Christopoulos KA, Gandhi M. Impact of Multicomponent Support Strategies on Human Immunodeficiency Virus Virologic Suppression Rates During Coronavirus Disease 2019: An Interrupted Time Series Analysis. Clin Infect Dis. 2022 08 24; 75(1):e947-e954. PMID: 35245934. PMCID: PMC9129130

   In this analysis, we examined the impact of procedures put into place to respond to the COVID-19 pandemic within the Ward 86 clinic, including proactive outreach, housing referrals, and case management to see what impact this would have on virologic suppression among the clinic population of people living with HIV, finding that these initiatives led to improved virologic suppression over time using an interrupted time series analysis. This is remarkable as other analyses have documented worsening virologic suppression during COVID-19.

5. 2021 Spinelli MA, Lynch KL, Yun C, Glidden DV, Peluso MJ, Henrich TJ, Gandhi M, Brown LB. SARS-CoV-2 seroprevalence, and IgG concentration and pseudovirus neutralising antibody titres after infection, compared by HIV status: a matched case-control observational study. Lancet HIV. 2021 06; 8(6):e334-e341. PMID: 33933189. PMCID: PMC8084354

   I led this analysis which documented lower SARS-CoV-2 seroprevalence among people living with HIV as compared to the general population, while showing decreased SARS-CoV-2 IgG titers and neutralizing antibody responses following infection, suggesting a diminished humoral response to SARS-CoV-2 infection among people living with HIV. This analysis was cited by the CDC in recommending additional boosters for people living with HIV.

CONFERENCE ABSTRACTS

2024 Heise, MJ, Camp, C, Oskarsson, J, Shiels, M, Mayorga-Munoz, F, Chimezie, A, Nguyen, JQ, Sassaman, KD, Gandhi, M, & Spinelli, MA. (2024, October 6-10). Low-barrier, rapid cabotegravir PrEP initiation and retention within a U.S. municipal health system. Oral Presentation. HIV Research for Prevention (HIVR4P), Lima, Peru.

2024 Sassaman, KD, Heise, MJ, Lisha, NE, Moreira, CV, Glidden, DV, Burkholder, GA, Crane, HM, Jacobson, JM, Cachay, ER, Mayer, KH, Napravnik, S, Moore, RD, Johnson, MO, Christopoulos, KA, Gandhi, M, & Spinelli, MA. (2024, July 22-26) Sexually transmitted infection screening rates did not recover following COVID-19 shelter in place in a multi-site cohort of U.S. HIV primary care clinics. Abstract #TUPEC231. International AIDS Conference, Munich, Germany.

2024 Heise, MJ, Moreira, CV, Jain, JP, Lisha, NE, Sassaman, KD, Glidden, DV, Burkholder, GA, Crane, HM, Jacobson, JM, Cachay, ER, Mayer, KH, Napravnik, S, Moore, RD, Johnson, MO, Christopoulos, KA, Gandhi, M, & Spinelli, MA. (2024, July 22-26). The impact of COVID-19 pandemic on depression and panic symptoms among people living with HIV in the U.S. Abstract #THPEC295. International AIDS Conference, Munich, Germany

2023 Spinelli MA, Johnson MO, Lisha NE, Jain JP, Moreira CV, Glidden DV, Burkholder GA, Crane HM, Jacboson JM, Cachay ER. Mayer KH, Napravnik S, Moore RD, Gandhi M, Christopoulos KA. Viral Suppression Trajectories Destabilized after COVID-19 among U.S. People with HIV. Conference on Retroviruses and Opportunistic Infections, 2023. Feb 16. Poster Presentation #1094.

2023 Spinelli MA, Christopoulos KA, Lisha NE, Jain JP, Moreira CV, Glidden DV, Burkholder GA, Crane HM, Jacboson JM, Cachay ER. Mayer KH, Napravnik S, Moore RD, Gandhi M, Johnson MO. Prevalence and Correlates of SARS-CoV-2 Vaccine Hesitancy among U.S. People with HIV. Conference on Retroviruses and Opportunistic Infections, 2023. Feb 16. Poster Presentation #1011.

2022 Spinelli MA, Rodrigues W, Wang, G, Chen J, Johnson KA, Glidden DV, Morrow M, Okochi H, Anderson PL, Gandhi M. High accuracy of an enzyme-linked immunoasssay for detection of tenofovir alafenamide: implications for point-of-care antiretroviral adherence monitoring. AIDS 2022 Jul 28 Poster Presentation #B9.

2022 Spinelli MA. Increased HIV Viral Suppression During Covid-19 Among U.S. Urban People with HIV. Conference on Retroviruses and Opportunistic Infections, 2022. Feb 15. Poster Presentation #01312.

2021 Spinelli MA. "Lower SARS-CoV-2 IgG and Pseudovirus Neutralization Titers Post-mRNA Vaccination among People Living with HIV." Infectious Diseases Society of America ID Week 2021. Late-Breaker Oral presentation.

2021 Spinelli MA, Lynch KL, Yun CA, Glidden DV, Peluso MA, Henrich TA, Gandi M, Brown L. SARS-CoV-2 Seroprevalence and IgG Levels are Lower among People Living with HIV Conference on Retroviruses and Opportunistic Infections, 2021. Science Spotlight.

2021 Spinelli MA, Glidden D, Morrow M, MaWhinney S, Johnson KA, Okochi H, Rodrigues W, Wang G, Gandhi M, Anderson P. Establishing the Cut-off for a Urine-Based Point-of-Care Test for Adherence to TAF. Conference on Retroviruses and Opportunistic Infections, 2021. Science Spotlight.

2021 Johnson KA, Spinelli M, Niu X, Glidden D, MaWhinney S, Morrow M, Okochi H, Cressey TR, Drain PK, Gandhi M, Anderson P. Urine Tenofovir Concentrations are Lower among Individuals Taking TAF than TDF. Conference on Retroviruses and Opportunistic Infections, 2021. Science Spotlight.

2020 Spinelli MA. "Near-Perfect Accuracy Of A Real-Time Urine Tenofovir Test Compared To Lab-Based ELISA." Conference on Retroviruses and Opportunistic Infections, Boston, March 2020. Oral presentation

2019 Spinelli MA. "Homelessness at diagnosis is the strongest predictor of death among persons with HIV in a population-based study of a U.S. city." IAS 2019, Mexico City. Poster Presentation.

2019 Spinelli MA, Glidden DV, Rodrigues WC, Wang G, Vincent M, Koss CA, Okochi H, Kuncze K, Mehrotra M, Defechereux P, Buchbinder SP, Grant RM, Gandhi M. Low urine TFV by a novel immunoassay is associated with HIV seroconversion on PrEP. Conference on Retroviruses and Opportunistic Infections, Seattle, March 2019; Poster Presentation.

2019 Spinelli MA, Glidden DV, Anderson PL, Veloso VG, McMahan VM, Buchbinder SP, Grant RM, Gandhi M. Dose-dependent decline in bone mineral density by long-term TFV exposure in iPrEx-Ole. Conference on Retroviruses and Opportunistic Infections, Seattle, March 2019; Poster Presentation.

2018 Spinelli MA, Scott H, Vittinghoff E, Liu AY, Gonzalez R, Gandhi M, Buchbinder SP. Examining PrEP interruptions in a safety-net primary care network: missed opportunities to reengage PrEP users accessing non-PrEP services. HIV Research For Prevention, Madrid, Oct 2018; Oral Presentation.

2018 Spinelli MA, Scott H, Vittinghoff E, Liu AY, Gonzalez R, Gandhi M, Buchbinder SP. High interest in doxycycline for sexually transmitted infection (STI) post-exposure prophylaxis in a multi-city survey of men having sex with men (MSM) using a social-networking ap. IDWeek 2018, San Francisco, October 2018; Poster Presentation.

2018 Spinelli MA, Scott H, Vittinghoff E, Liu AY, Morehead-Gee A, Gonzalez R, Gandhi M, Buchbinder SP. Delays in PrEP initiation among at-risk patients in a large network of primary care clinics: panel management/patient navigation is associated with faster PrEP initiation. International AIDS Society Annual Conference, Amsterdam, July 2018; Poster Presentation.

2018 Spinelli MA, Scott H, Vittinghoff E, Liu AY, Morehead-Gee A, Gonzalez R, Gandhi M, Buchbinder SP. Factors impacting appropriate HIV/STI screening and PrEP persistence in primary care. Conference on Retroviruses and Opportunistic Infections, Boston, March 2018; Poster Presentation.

2015 Spinelli MA, Ponath C, Tieu L, Hurstak EE, Guzman D, Kushel M. Substance Use in a population-based sample of older homeless adults. Society for General Internal Medicine Annual Meeting, Toronto, Canada, April 2015; Oral Presentation.

2011 Spinelli M, Bien C, Milliner M, Tadepalli U, Zimmerman J. Education for the Future: Health, Human Rights, and Advocacy at Mount Sinai. Physicians for Human Rights National Conference: Boston, MA, March 2011; Oral Presentation during the Awards Session.

ACADEMIC LEADERSHIP

Since 2023, I serve as the PrEP Medical Lead for Ward 86. I provide clinical consultation and supervision for a team of 2 PrEP navigators based at San Francisco General. The goal of the program is to improve PrEP initiations within San Francisco General Hospital and to support retention on PrEP among PrEP users in the San Francisco Department of Public Health Primary Care Clinics. As of 2022, I serve on the executive committee for the UCSF/SFDPH Implementation Science Center, which involves contributing to decisions on funding and strategic priorities for the center. Finally, I served as the co-director of the UCSF HIV Grand Rounds series based at San Francisco General Hospital from 2021 until 2023

OTHER CREATIVE ACTIVITIES

1. 2022 Since 2022, I serve on the executive committee of the UCSF Department of Epidemiology/SFDPH Partnerships for Research in Implementation Science (PRISE) center. Tasks involve reviewing grant proposals and helping to develop the strategic vision of the Center.

2. 2021 Since 2021, I serve on the education committee for the Division of HIV, ID, and Global Medicine, contributing to educational priorities for the division and approach to the teaching of fellows, residents, and students.

3. 2021 From 2021-2023, I served as co-director of UCSF HIV Grand Rounds based at San Francisco General Hospital, which is a one hour weekly grand rounds session focused on HIV clinical management.

4. 2019 Since 2019 until the present, I serve as the co-course director for DKBmed and Johns Hopkins HIV/STI provider update, which has a national audience, and includes virtual HIV CME activities and a podcast. We produce 5-6 newsletters and podcasts per year, directed towards HIV clinical providers.

5. 2019 In 2019, I produced a national HIV curriculum for antiretroviral therapy management in collaboration with Vindico Medical Education and Harvard University. This curriculum involves five sessions of virtual interactive patient interactions, and is used nationally for primary care HIV antiretroviral therapy education.

Exhibit B

Specific Aims

Rates of sexually transmitted infections (STIs) are increasing globally.[1] Less condom use in the setting of PrEP and knowledge of Undetectable=Untransmittable (U=U), and minimal access to STI diagnostics in the developing world, are major contributors to these trends.[2-6] Comprehensive PrEP care includes STI screening and treatment, but this has not stemmed increased STI rates.[4,7] A 10-fold rise in congenital syphilis in 10 years[8] is one particularly alarming statistic in the worsening STI epidemic among people with and without HIV.[8-14]

Doxycycline (doxy) post-exposure prophylaxis (PEP) is a highly effective intervention to prevent STIs among men who have sex with men (MSM) and transgender women (TGW) with and without HIV, including in the DoxyPEP Study and others,[15-17] leading to rising use and supportive guidance by the CDC and health agencies.[18] Disappointingly, doxy PEP was not effective among cisgender women (CGW) in the Kenyan dPEP Study.[19] These results were puzzling given that doxycycline reaches similar levels in the vagina to the rectum,[20] and self-reported adherence was high.[19] Pill-taking can be challenging with prevention agents, with two initial HIV PrEP trials among CGW returning null results.[21,22] In these studies, pill counts indicated >90% use, but tenofovir (TFV) was detected in only 24-29% of blood samples.[22-24] The UCSF Hair Analytical Laboratory (HAL) pioneered methods for antiretroviral hair analysis,[25-36] developed the first point-of-care (POC) tenofovir test for adherence,[37-41] and has now developed a method to measure doxycycline in hair.[19] In the HAL's preliminary analysis of dPEP, drug was detected in only 29% of visits; low adherence likely explains the null result.[19]

To better interpret the doxy PEP studies and others, we must advance methods to assess dosing patterns of doxy PEP using pharmacologic metrics. As was needed for HIV PrEP to establish the relationship between patterns of tenofovir (TFV) pill-taking and drug levels in various biomatrices (in hair,[42] plasma,[43] dried blood spots,[44] urine[45]), a directly observed therapy (DOT) study is the gold-standard approach to determine the pharmacology of doxy PEP and establish pill-taking thresholds (Aim 1). When combined with sexual behavior data in the trials conducted among MSM/TGW and CGW, doxy PEP coverage of condomless sex acts and pharmacodynamic relationships can be established (Aims 2&3). These data can help interpret: patterns of adherence over time among women in dPEP to interpret the null result (Aim 2); and the potential clinical role of urine or blood metrics amenable to POC test development, which, due to the lower cost of immunoassays, could have broad impact (Aim 3). Finally, this work will establish doxycycline thresholds in hair, urine, and blood to interpret adherence behavior in future roll-out studies (all Aims). We propose the following three aims:

Aim 1: To establish doxycycline dosing benchmarks in urine, blood, hair: We will perform a randomized, crossover DOT study, modelled after the STRAND study conducted for TFV,[22,42] among 12 cisgender men, 12 CGW, and 12 TGW on gender-affirming hormone therapy (GAHT), who will be randomized to 1 of 4 dosing patterns with hair, blood, and urine collection (7 200mg-doses/week, 3 doses/week, 1 dose/week, 1 dose/2 weeks), with cross-over to 2 more of these dosing patterns after washout periods. We will determine the AUC, C_{min}, C_{max}, and pill-taking cut-offs for different doxy PEP dosing patterns (i.e. monthly, weekly, etc.) in different matrices. Leveraging this platform, we will also examine any differences in drug concentrations when comparing by sex and gender, and the potential for doxycycline dosing to impact estradiol levels among TGW on GAHT, given the reported interaction between estrogen and doxycycline in some interaction databases.[46]

Aim 2: To examine relationships between hair doxycycline levels and STI incidence among CGW in dPEP and predictors of high coverage of condomless sex acts: Using the thresholds from Aim 1, we will examine STI incidence and predictors of low adherence in the dPEP study among CGW with low, medium, and high frequency of sexual acts.[19] We will examine the relationship between doxycycline hair levels as doses/week and STI reduction using a case-cohort design, similar to the iPrEx-OLE PrEP Study approach (**2a**).[22,47] We will adjust for demographics and sexual behavior frequency, with all hair samples from participants with an STI analyzed, as well as a 30% random intervention arm subset. We will then examine predictors of high coverage of sex acts and adherence trajectories over time using group-based trajectory models (**2b**).

Aim 3: To examine predictors, patterns, and relative performance of adherence metrics among MSM/TGW with and without HIV: Leveraging stored blood, urine, and hair in the DoxyPEP Study,[17] and the high expected adherence given the high efficacy demonstrated, we will examine adherence predictors over time. After stratifying for frequency of sex acts, we will compare the predictive ability of self-report, urine and blood for long-term adherence measured in hair as a gold standard, potentially supporting future POC test development similar to the HAL's POC TFV test.[37-41] Finally, we will examine drug-levels in each assay among those with and without a breakthrough STI, to understand each assay's relative clinical predictive ability.

By study end, we will have determined dosing cut-offs for doxy PEP in hair, blood, and urine, and will use these cut-offs to examine the relationship between adherence patterns and incident STIs in the dPEP study, and the predictive ability of various metrics in the DoxyPEP trial. These pharmacodynamic analyses and pill-taking benchmarks will enable interpretation of adherence metrics for current and future rollout studies of doxy PEP.

A. Significance

A.1. Rates of sexually transmitted infections are increasing globally across populations. The World Health Organization (WHO) estimates that there were 376 million new episodes of *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG), syphilis, and trichomonas in 2019 alone,[48] with sexually transmitted infection (STI) rates continuously rising over time in all age groups, including among people with and without HIV.[1,49] The Centers for Disease Control and Prevention (CDC) reported this spring, that while chlamydia cases have remained relatively stable since 2017 in the U.S., gonorrhea and syphilis increased for the eighth consecutive year, with a 28% and 74% increase since 2017 respectively.[50] Alarmingly, the CDC cautions that these rises may be underestimates due to COVID-19-related reductions in STI screening.[50] People with HIV (PWH) have a disproportionate burden of STIs.[50] PWH may have greater susceptibility to STIs, in particular syphilis, although it is unclear whether this due to reduced cell-mediated immunity at the site of exposure, increased tissue inflammation, or through behavioral factors which increase transmission of both pathogens.[51]

A.2. The health consequences of rising STI incidence are dire, with the rate of congenital syphilis increasing more than ten-fold since 2012 in the U.S., with 3,761 cases in 2022.[8,50] At the same time there are shortages of benzathine penicillin G, the first-line syphilis treatment for most forms of syphilis and the only syphilis treatment recommended in pregnancy.[52] Rising STI incidence is also associated with increased risk of pelvic inflammatory disease (PID), tubal infertility, pregnancy complications, ocular trachoma and syphilis-related vision loss, and fetal and neonatal death.[9-14] Among individuals who are not consistently using PrEP, or have a partner with HIV and an unsuppressed HIV viral load, STIs increase the risk of HIV transmission.[53]

A.3. Currently recommended STI prevention strategies have been insufficient to reverse rising STI incidence. The WHO currently recommends condoms, partner treatment, and screening and treatment as primary prevention strategies for bacterial STIs,[48] although limited access to STI diagnostics in many lower income settings constrains the latter two approaches.[6] Globally and across populations, consistent condom use has been insufficient to reverse rising STI incidence, with challenges in access and negotiating condom use with partners a major barrier, as well as decreased motivation to use condoms given the efficacy of PrEP and U=U to prevent HIV transmission.[2-5,54-59] Furthermore, among men who have sex with men (MSM), condoms have limited efficacy if not used consistently with all partners.[60,61] Education-based approaches focused on reducing numbers of partners, abstinence, or mutual monogamy have either been ineffective or have had modest impacts.[62] The interim analysis of the DOXYVAC study initially suggested that the Bexsero 4MenC Meningococcal Group B vaccine may reduce NG incidence,[16] but the vaccine did not show efficacy in the final analysis of the study.[63] Doxy PEP, however, remained efficacious in the final analysis.[63]

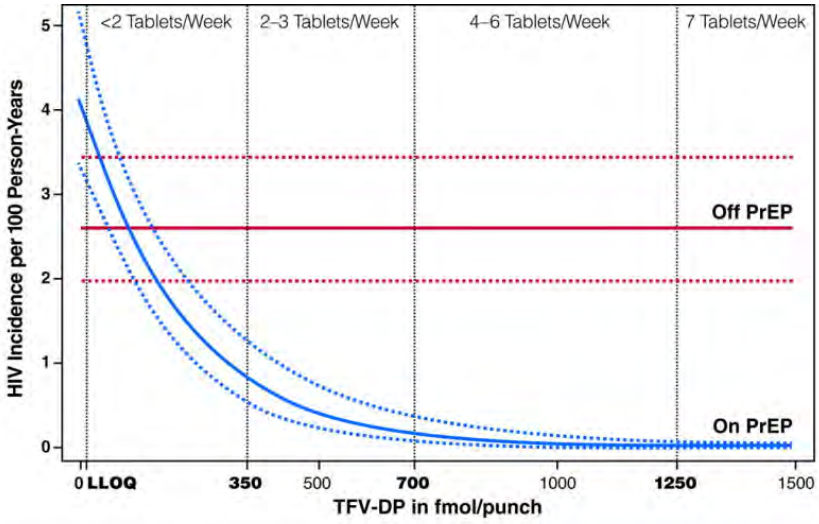
A.4. Doxycycline (doxy) post-exposure prophylaxis (PEP) is a promising STI prevention strategy that has shown high efficacy in preventing CT and syphilis in three studies among MSM and transgender women,[15-17] in two of these studies in preventing NG,[16,17] and in one study among PWH.[17] Doxycycline PEP is an STI prevention strategy in which 200mg of doxycycline is taken within 72 hours of sexual activity, ideally within 24 hours,[15-17] with high acceptability and interest among PWH or those at risk.[64,65] There are three major studies examining this strategy among MSM and transgender women, all showing efficacy in the reduction of bacterial STIs. The DoxyPEP study completed in San Francisco and Seattle notably included both people with HIV (PWH) and without HIV. This study showed similar efficacy against gonorrhea, chlamydia, and syphilis when comparing people with and without HIV.[17] Two studies completed in France showed similar results.[15,16] A sub-study of the IPERGAY trial demonstrated efficacy in reducing chlamydia and syphilis but not gonorrhea among 232 HIV-negative MSM and transgender women. The lack of efficacy against NG was attributed to pre-existing resistance to doxycycline, with intermediate or greater doxycycline resistance detected in all of the 9 of 28 NG samples that were successfully cultured (two in the PEP group and six in the no-PEP group). An interim analysis of the previously discussed DOXYVAC study, which tested both the Bexsero 4 MenC vaccine and doxycycline PEP with a factorial design, is not yet published, but reported an 84% reduction in CT and/or syphilis with doxy PEP, and a 55% reduction in NG incidence, among 546 HIV-negative MSM.[16] These studies demonstrated few adverse effects in the doxycycline arm, without signals for increasing antimicrobial resistance in NG, Staph aureus, or E. coli to date, although the longer-term impact on antimicrobial resistance will need to be tested in future, larger studies, particularly as few isolates of NG have been tested for resistance given that it is a difficult to culture pathogen.[15-17] Following results of these studies a clinical program offering doxy PEP has demonstrated high interest and marked declines in STI incidence.[66]

A doxycycline pre-exposure prophylaxis (PrEP) strategy was also tested in a small study of thirty PWH who were MSM and had at least two prior syphilis diagnoses. Participants were instructed to take doxycycline

100mg daily, whether or not they had sex. The study found decreased incidence of any STI (CT, NG, or syphilis) at 48 weeks, although it was underpowered for examination of the effect on individual STIs.[67]

A.5. Unfortunately, doxy PEP was not effective in reducing STI incidence in a study among young cisgender women in Kenya using HIV PrEP in the dPEP Study.[19] The dPEP Study enrolled 449 women, randomized 1:1 to doxy PEP (a single doxycycline 200mg dose taken within 72 hours of condomless sex) vs. standard care. Participants were followed quarterly over 48 weeks. A total of 109 incident STIs occurred: 50 among 224 women assigned to doxy PEP and 59 among 225 assigned to standard care with no significant reduction in STI incidence (relative risk 0.88, 95% confidence interval: 0.60-1.29). This result was surprising for two reasons: (1) doxycycline achieves similar concentrations in the vaginal mucosa and the rectum with a single dose, with a trend towards faster absorption in the vaginal mucosa;[20] and (2) self-reported adherence in the study was high (>80% doxy PEP coverage of condomless sex acts reported 91% of the time).[19]

A.6. Objective adherence metrics have been critical to the interpretation of HIV prevention studies and can therefore inform DoxyPEP studies. Adherence to medications within clinical trials can be challenging for participants before efficacy has been established.[68] Prevention medications offer an additional challenge, as the participant is tasked to take a medication to prevent a disease they do not currently have.[68] In the original HIV prevention trials with oral once daily tenofovir disoproxil fumarate/ emtricitabine (TDF/FTC), TDF/FTC was found to be modestly effective (44% incidence reduction) among men who have sex with men and transgender women in the initial iPrEx study,[69] and 77% effective among heterosexual men and women with HIV sero-discordant partners in the Partners PrEP Study.[70] The iPrEx Open Label Extension advanced our understanding of the contribution of adherence to HIV prevention efficacy, demonstrating a monotonic relationship between increasing adherence and HIV prevention efficacy, with efficacy increasing from 44% in the original RCT, to 99% when individuals took at least 4 doses per week in the Open Label Extension (**Figure 1**).[47] Conversely, in the VOICE and FEM-PrEP studies, HIV PrEP with TDF/FTC was not effective among cisgender women not in serodiscordant partnerships.[23,24] In these studies, pill counts and self-report both indicated >90% use, but tenofovir (TFV) was detected in only 24-29% of stored blood samples among participants in the active arm, suggesting that sub-optimal adherence was the primary factor which compromised PrEP's efficacy.[22-24] Since that time, pharmacologic metrics of adherence have gained increasing importance, with objective adherence monitoring proactively incorporated in many studies.



TFV-DP in DBS	(fmol/punch)	BLQ	LLOQ to <350	≥350 to <700	≥700 to <1250	≥1250
Estimated Dosing	(Tablets/Week)	None	<2	2–3	4–6	7
Follow-up	(% of Visits)	25%	26%	12%	21%	12%
HIV Infections		18	9	1	0	0
Person Years		384	399	179	316	181
HIV Incidence Rate	(95% CI)	**4.70** (2.99–7.76)	**2.25** (1.19–4.79)	**0.56** (0–2.50)	**0** (0–0.61)	**0** (0–1.06)
HR* Prior Placebo Reference	(95% CI)	**1.55** (0.88–2.56)	**0.69** (0.32–1.32)	**0.19** (0.01–0.88)	**0** (0–0.25)	**0** (0–0.50)
HR* Concurrent Off-PrEP Reference	(95% CI)	**1.25** (0.60–2.64)	**0.56** (0.23–1.31)	**0.16** (0.01–0.79)	**0** (0–0.21)	**0** (0–0.43)

Figure 1: Relationship between HIV Incidence Reduction and Number of TFV Doses Consumed per Week using TFV-diphosphate measurement in Dried Blood Spots (DBS) in iPrEx-OLE

A.7. The University of California, San Francisco (UCSF) Hair Analytical Laboratory (HAL) has pioneered methods for analysis of antiretrovirals and tuberculosis antimicrobials in hair,[25-36] informing HIV treatment, HIV prevention, and tuberculosis clinical studies and demonstration projects. The HAL has now developed a long-term adherence metric for doxycycline via liquid chromatography tandem mass spectrometry (LC-MS/MS) measurement of hair doxycycline levels.[19] Pharmacologic metrics of adherence, where drug levels are measured in various biomatrices, predict the efficacy of HIV PrEP better than other measures such as self-reported adherence.[22,23,42,44,69,71,72] The low correlation between self-report and pharmacologic metrics was seen not just in randomized trials, but also in open label studies after the efficacy of HIV PrEP was known.[73] As a result, pharmacologic metrics of adherence — where drug levels are measured in blood, dried blood spots (DBS), or hair — are now often included in HIV PrEP roll-out projects and demonstration studies to aid in outcome interpretation.[23,24,47,74] Although hair analysis provides a reliable

method of long-term adherence measurement for antiretrovirals and antimicrobials, assays cannot be performed in real-time or at the point-of-care (POC). The UCSF HAL (in conjunction with Abbott) subsequently developed the first point-of-care (POC) TFV test to assess adherence to PrEP/ART through first identifying a highly-selective antibody to TFV and then developing a lateral flow assay (LFA) to measure TFV in urine.[37-41] This POC test predicts HIV seroconversion events in HIV PrEP studies,[40,75] and can be used to motivate adherence interventions to improve adherence to antiretroviral therapy and PrEP.[76,77] POC test development via an LFA could be replicated for doxycycline, permitting wider availability of a low cost doxycycline adherence metric (<$1/test) in the future.

As doxycycline is not concentrated intracellularly in the same fashion as TFV metabolites are, long-term doxycycline adherence measurement cannot be performed in DBS. Vertex scalp hair grows continuously and consistently at a rate of ~1 centimeter (cm) per month, meaning drug level measurement in hair can examine adherence patterns over longer time periods.[78] **In HAL's analysis of hair samples collected in the dPEP Study, doxycycline was detected in only 29% of a random sample of visits (58/200); low adherence could thus explain the null result of this study.[19]**

A.8. Doxycycline is also readily detected in urine and blood,[20,79-81] in addition to hair,[19] but the relationship between blood, urine, and hair concentrations and adherence behavior is unknown. Only single dose doxycycline studies, or multi-dose studies where drug ingestion is not directly observed, have been previously performed in humans, limiting the ability to interpret the relationship between blood or urine doxy concentration and dosing behavior over longer time periods.[20,79-83] Furthermore, most studies did not use LC-MS/MS which is more sensitive and specific as compared to LC/photo diode methods.[84] As was needed for HIV PrEP to establish the relationship between patterns of pill-taking and drug levels (in hair,[42] blood,[43] dried blood spots (DBS),[44] urine[45]), a directly observed therapy (DOT) study must be performed to determine the pharmacology of doxycycline in different biomatrices and establish pill-taking thresholds. These DOT studies were critical to interpretation of HIV PrEP trials, demonstrating that efficacy with adequate adherence was much higher than was estimated in the original clinical trials where adherence varied (see **Figure 1** above). Urine, blood, and hair are the biomatrices that are most likely to be used in doxycycline demonstration and roll-out studies. Urine is the simplest to collect, is preferred to phlebotomy by most participants,[85,86] and does not require a trained phlebotomist. Blood will likely be collected for syphilis detection in most studies and can be potentially banked for future studies. Finally, hair is the only biomatrix amenable to long-term adherence measurement, facilitating analysis of long-term adherence behaviors at the time of quarterly visits.

Urine and blood could also be amenable to POC test development for rapid and low-cost measurement of doxycycline. A monoclonal antibody has been previously developed for doxycycline,[87-90] with accurate and selective enzyme-linked immunosorbent assay (ELISA) development for measurement of doxycycline and/or tetracycline concentrations in animal milk or tissue, given concerns of rising antimicrobial use in livestock.[87-90] Doxycycline is detectable in high concentrations in human blood and urine,[20,79-81] making it potentially amenable to ELISA development in humans, and lateral flow assay POC development. However, without controlled intensive DOT studies to understand the pharmacology of doxycycline, future POC test development cannot proceed.[20,79-82] Assessment of drug exposure is a critical component in understanding determinants of observed antimicrobial resistance (AMR).[91,92] As LC-MS/MS methods are expensive and require specialized processing, availability of an ELISA or POC method would support assessment of drug exposure for examination of AMR in large cohorts, at the population level, and in under resourced settings.[78,87-92] Finally, a POC short-term metric, if used frequently, could be useful in assessing event-driven adherence if the timing of the last sexual encounter is recorded (i.e. NCT05353283 using POC TFV for 2-1-1 or "on demand" HIV PrEP).

B. Innovation

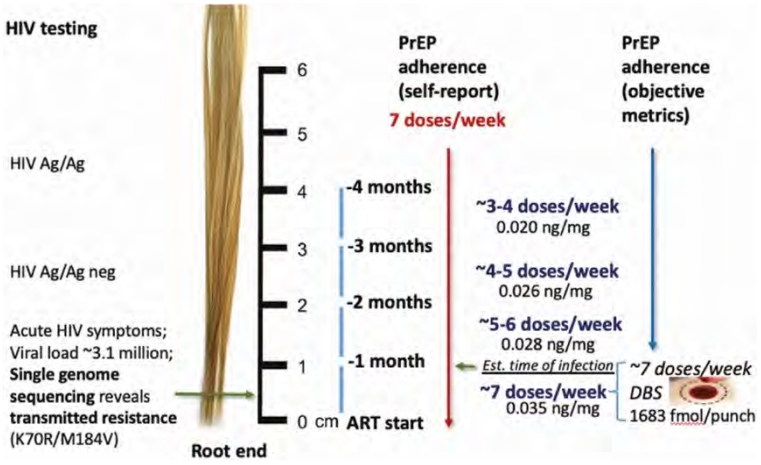
B.1. The DOT-Doxy-PEP Study, discussed in this proposal, will implement the first multi-dose doxycycline directly observed therapy study, critical to interpretation of recently completed clinical trials and future doxycycline PEP roll-out studies. Understanding the relationship of dosing behavior and concentrations of doxycycline in urine, blood, and hair will permit accurate prediction of the pill-taking behavior of participants over approximately a week for urine and blood, and a month or longer for hair depending on the length of the individual's hair assayed. Hair doxycycline levels are the only available long-term adherence metric for doxycycline, given that doxycycline does not concentrate intracellularly as tenofovir metabolites do, excluding DBS analysis as an approach to provide long-term exposure information. Intensive pharmacokinetic (PK) analysis will also allow examination of whether doxycycline concentrations differ when comparing levels among cis- and transgender women and cisgender men. Further, we will examine whether there is an impact

of doxycycline use on gender affirming hormone therapy-related estradiol concentrations for the first time in a controlled, multi-dose crossover randomized PK study.

B.2. The DOT-Doxy-PEP Study will permit pharmacodynamic analyses of the relationship of doxycycline PEP drug concentrations, adherence behavior, and clinical outcomes such as STI incidence for the first time. The availability of dosing cut-offs will permit interpretation of the relationship between adherence behavior and key clinical outcomes such as STI incidence reduction, deepening understanding about the relationship of adherence behavior and doxycycline's impact on STI reduction, both in the already-completed clinical trials, new clinical trials to be conducted among cisgender women, and roll-out studies now and in the future (i.e. NCT04762134, NCT04597424, NCT03709459, NCT02844634). The availability of carefully collected sexual behavior data in the two prior large randomized clinical trials will support these analyses.[17,19]

B.3. Using short-term (urine or blood) and long-term adherence metrics (hair), as well as emerging techniques such as segmental hair analysis,[93-95] we will be able to examine adherence patterns over time, and examine characteristics predictive of recent drop-offs in adherence. We will also leverage biomarkers and multiple assessment strategies to triangulate self-reported sexual behavior data. Self-reported adherence behavior is susceptible to social desirability bias, particularly in randomized clinical trials.[78] Through the combination of short and long-term objective pharmacologic adherence metrics, we can triangulate adherence patterns over time (i.e. high adherence with recent drop-off vs. consistently low adherence vs. consistently high adherence, etc.), similar to approaches combining short and long-term ART adherence data.[22,78,96] Segmental hair analysis is a novel technique in which the hair is cut into 0.5 cm or 1 cm segments, permitting analysis of fortnight by fortnight or month by month adherence behavior. The HAL has previously used this technique to understand the etiology of HIV seroconversions on PrEP (**Figure 2**),[93-95] but it can also be used to measure adherence behavior over time and over discrete periods in other contexts. Similarly, we will use biomarkers such as prostate specific antigen (PSA)[97] to validate sexual behavior data reported among cisgender women in dPEP, and will triangulate weekly text message and timeline follow-back data. Among MSM, we will leverage the higher reliability of sexual behavior data am,[98] which has been the basis of the evaluation of on-demand PrEP,[99] per contact HIV risk for sexual behavior,[100] and the impact of PrEP on sexual behavior,[101] as well as the collection of multiple data points for each individual over time.

Fig. 2: Use of Segmental Hair Analysis to Examine Adherence Patterns over Time and Interpret an HIV Seroconversion on PrEP



C. Approach

C.1. Overview of the Study Design. In **Aim 1**, we will perform a randomized, crossover DOT study, modelled after the STRAND study for TFV (which established hair TFV thresholds for different TFV dosing patterns),[22,42] among 12 cisgender women, 12 TGW on estrogen gender affirming hormone therapy (GAHT), and 12 cisgender men, who will be randomized to 1 of 4 dosing patterns with hair, blood, and urine collection (7 200mg-doses/week, 3 doses/week, 1 dose/week, 1 dose/2 weeks). Participants will cross-over to 2 more of these dosing patterns after washout periods. We will determine the AUC, C_{min}, C_{max}, and pill-taking cut-offs for

different doxy PEP dosing patterns (i.e. monthly, weekly, or near daily adherence) in each of the different biomatrices (hair/blood/urine) and examine differences in concentrations by sex/gender and GAHT use. In **Aim 2**, using the thresholds from the DOT study completed in Aim 1, we will then examine the reduction in STI incidence using hair doxycycline levels as a predictor among women with low, medium, and high number of sexual acts in the recently completed dPEP study, which did not show a benefit of doxycycline in STI reduction in comparison to placebo, likely due to low adherence. In **Aim 3**, we will examine hair, urine, and blood doxycycline levels in DoxyPEP among MSM and TGW and examine the predictive ability of short-term adherence metrics (urine and blood), as well as self-reported adherence, against the gold standard of long-term adherence in hair. We will then compare each metric's ability to predict a breakthrough STI, potentially supporting future POC test development and interpretation of future demonstration projects.

C.2. Overview of the Study Team. The DOT-Doxy-PEP study will be led by Dr. Matthew Spinelli, an infectious diseases physician and NIH-funded researcher, with expertise in sexual health, drug-level adherence measurement in hair and urine, and the relationship of adherence metrics with clinical outcomes for HIV and PrEP. Co-investigators include: Dr. Monica Gandhi, Clinical Director of the UCSF HAL and the UCSF CFAR, and an expert in the development and analysis of adherence measurement techniques for HIV antiretrovirals and TB medications; Dr. Hideaki Okochi, HAL Laboratory Director and an experienced pharmacokineticist who has developed multiple LC-MS/MS methodologies for adherence measurement in various biomatrices; Dr. Jenell Stewart, the dPEP Study first author and an expert in the prevention of STIs and sexual health for cisgender women; Dr. Annie Luetkemeyer, DoxyPEP PI and an expert in the management of large clinical trials in the fields of STI prevention, hepatitis C, HIV, and tuberculosis; Dr. Connie Celum, co-PI of DoxyPEP, Director of the International Clinical Research Center and the CFAR at the University of Washington, and an expert in STI and HIV prevention; and Dr. David Glidden, experienced biostatistician for PK analyses, including as primary biostatistician of the iPrEx study which initially established the efficacy of HIV PrEP.

C.3. Preliminary Data. C.3.1 We have developed a preliminary doxycycline hair analysis method. Hair was collected from the scalp using well-described methods from a patient on doxycycline 100mg twice daily given for hidradenitis suppurativa who reported excellent adherence for 6 months.[102] The 1 cm segment closest to the root, corresponding with approximately 1 month of exposure, was cut and doxycycline extracted into methanol. The limit of detection for this method is 0.0200 ng/mg using LC-MS/MS. We found that the assay was linear up to 100 ng/mg of hair with intra-day and inter-day coefficients of variance of ≦15.0%.

C.3.2 The doxycycline hair analysis method has high reproducibility, doxycycline remains stable for 6 months after extraction in methanol, and is not impacted by hair coloring. Through careful extraction in methanol protected from light, we have found doxycycline concentrations in hair samples to be stable for 6 months or more at -20˚C using segmental hair analysis, providing a reliable long-term adherence metric.

C.3.3 We performed a preliminary analysis of hair samples in the dPEP study among cisgender women ages 18-30 years in Kisumu, Kenya. The dPEP Study enrolled 449 women, randomized 1:1 to doxy PEP (a single doxycycline 200mg dose taken within 72 hours of condomless sex) vs. standard of care. Hair samples were tested from a randomly selected 10% of participants at enrollment, and 22% of those assigned to doxycycline PEP and 5% of those assigned to standard of care at follow-up visits. Participants returned quarterly over one year for STI testing and behavioral surveys; and provided hair samples for objective detection of doxycycline. In the random subset of 50 participants assigned to doxycycline PEP, doxycycline was detected in hair in at least one visit among 56.0% (28/50) participants and 29.0% (58/200) of all quarterly visits, including 32.6% (58/178) of visits excluding study medication holds. Age of 24 years or older, an independent income source, more than one partner, and no primary sex partner were all associated with detection of doxycycline. These results were remarkable, given that self-reported adherence to doxycycline in the intervention arm was high, with at least 80% of condomless exposures covered with doxy PEP at 91% of quarterly timeline follow-back reports.

C.4. Research Design. C.4.1. Aim 1: To establish doxycycline adherence benchmarks in hair, urine, and blood.

Overview: We will implement the first multi-dose DOT study to establish adherence benchmarks in hair, blood, and urine, using a robust randomized cross-over design, and LC-MS/MS to measure drug-level concentrations in each of these biomatrices, among cisgender women, transgender women on GAHT, and cisgender men.

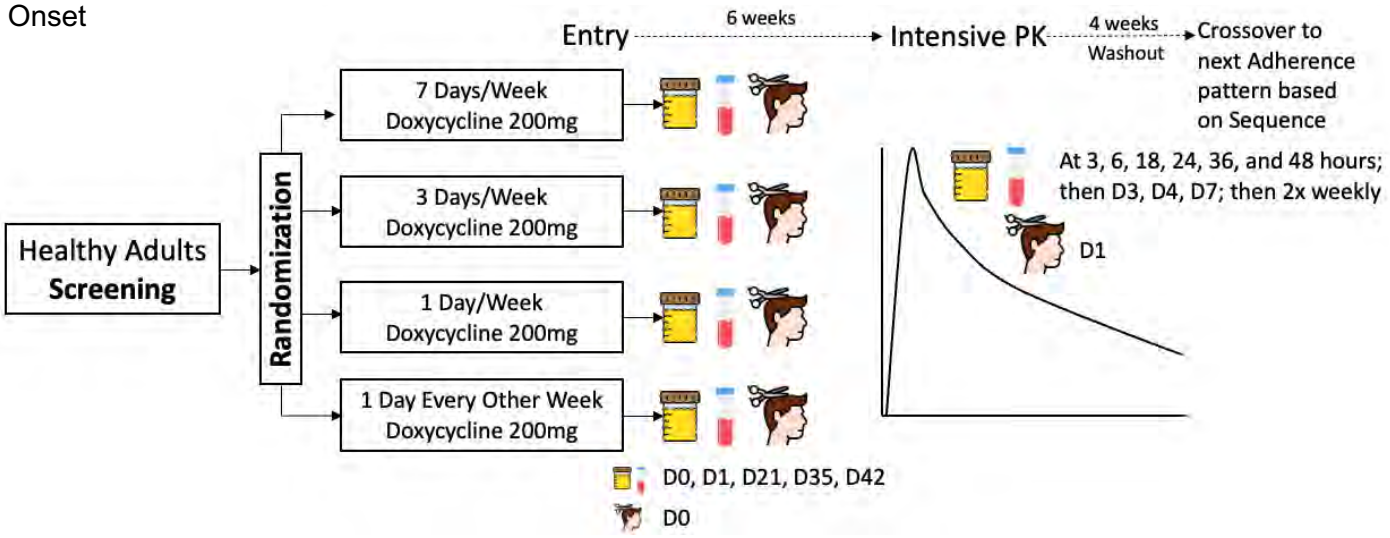
Rationale: Doxycycline post-exposure prophylaxis displayed efficacy in multiple studies in reducing STI incidence among MSM and transgender women,[15-17] including among PWH in the DoxyPEP study,[17] but did

not show efficacy among young women using HIV PrEP in Kenya in the dPEP study.[19] Given that preliminary hair data demonstrated lower than expected concentrations of doxycycline in hair in the dPEP study,[19] deeper understanding of adherence patterns will shed light on the study results. Directly observed therapy (DOT) randomized crossover studies are essential to determine the relationship between pill-taking and drug-level concentrations in biomatrices. These studies involve randomizing participants to adherence patterns with individuals crossing over to alternate patterns after a washout period, to determine pharmacokinetic (PK) parameters and concentration cut-offs for specific pill-taking behaviors. DOT studies for tenofovir[42-44] were crucial to interpretation of HIV PrEP clinical trials,[78] including the pivotal finding that four or more doses/week of oral TDF/FTC PrEP pill-taking conferred 99% efficacy in preventing HIV seroconversion in iPrEx-OLE, as opposed to the 44% efficacy seen in the primary analysis.[47] A DOT study for doxycycline must now be performed to facilitate interpretation of doxycycline clinical trials, including future doxycycline roll-out studies. Finally, few transgender women were included in the doxy PEP randomized clinical trials. Although doxycycline has been invoked as a possible drug-drug interaction with hormonal contraception, and the cause of observed low estradiol levels in case reports, doxycycline is not thought to impact estrogen levels, despite it being listed in most interaction databases.[46] Furthermore, estrogen is not thought to impact doxycycline concentrations.[103] However, it will be important to prove this within a controlled multi-dose pharmacokinetic study to ensure concerns about doxy PEP's impact on gender affirming hormone therapy (GAHT) do not reduce demand or adherence among transgender women, as was the case for some TGW for HIV PrEP and ART.[104]

Eligibility and Recruitment: We will recruit 12 cisgender women (CGW), 12 cisgender men (CGM) and 12 transgender women (TGW) on estrogen-based GAHT, who are: (1) age 18 or older (2) not currently at risk of sexually transmitted infections (3) willing to provide hair, blood, and urine samples; (4) are not currently enrolled in other STI prevention studies; and (5) are not pregnant. We will use established recruitment procedures implemented in prior studies, including advertisements on social network sites (i.e. Instagram, Facebook), referrals from the LGBTQ Health Clinic, Ward 86 HIV Clinic, and Gender Health clinics on campus, and flyers posted in community sites such as the San Francisco and Oakland LGBT Centers. We will also reach out to participants currently part of "consent to contact" databases maintained by the PI who meet the study criteria. As modern HIV medications do not interact with doxycycline, we will permit enrollment of people with and without HIV. We will exclude TGW not on stable estrogen-based GAHT for at least 6 months (oral or injectable), given the desire to examine interactions between GAHT and doxycycline as a secondary outcome.

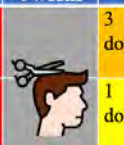
Study Procedures: Participants (n=36; 12 CGW, 12 CGM, 12 TGW) will be randomized to 1 of 4 dosing patterns via 1 of 6 study sequences, and will receive 7 doses of 200mg doxycycline/week, 3 doses/week, 1 dose/week, or 1 dose every other week using block randomization stratified within each group (CGW, CGM, TGW). Participants will receive modified directly observed therapy of oral doxycycline 200mg in a single dose per day, with doses consumed on holidays or weekend confirmed via timestamped video recording. The study will be divided into three periods with 6 weeks of DOT dosing and 4 week breaks for washout, and after Period A only, a 4-week intensive PK study phase (**Figure 3**).

Figure 3: Study Schema of Randomization, Sample Collection Timing, and Intensive PK Phase at Study Onset



Predose hair, blood, and spot-urine specimens will be collected before the first doxycycline dose, with blood and urine also collected on day 2, and the beginning of week 3 and week 5. On the last day of Period A, pre-dose blood and spot-urine specimens will be collected and then each patient will receive their last doxycycline 200mg dose. Time-matched blood and spot urine samples will be collected at 3, 6, 18, 24, 36, and 48 hours and on Days 3, 4, and 7. A time-matched hair sample will be collected on the morning after the final doxycycline dose. Thereafter, time-matched blood and spot urine samples will be collected up to twice weekly until the end of the 4-week washout period. Periods B and C will proceed in a similar fashion, with trough blood and urine collection on weeks 1, 3, 5, and 6, and hair collection in week 6, but without the intensive PK wash-out phases for blood and urine. Participants will crossover to a subsequent pattern based on 6 pre-determined sequences (**Figure 4**). Chemistries including creatinine, complete blood count, and liver function tests will be collected prior to doxycycline dosing, and at least every three weeks while on doxycycline, with urinalysis collected with each urine sample. Weight and height will be collected at the beginning of each period. Trough estradiol levels for TGW on GAHT will be measured around the time of enrollment, prior to the first dose of each dosing period, thrice within each dosing period and will be measured with each sample during the intensive PK phase.

Fig. 4: Allocation Scheme and Sequences for Participants in the Randomized DOT Crossover Intensive PK Study (Aim 1)

Sequence	N	Period A: 6 weeks	Break: Intensive PK 4 weeks	Period B: 6 weeks	Break 4 weeks	Period C: 6 weeks	Break and Final Visit
1	6 (2CGM, 2TGW, 2CGW)	7 doses/week		3 doses/week		1 dose/week	
2	6 (2CGM, 2TGW, 2CGW)	7 doses/week		1 dose/week		1 dose/2weeks	
3	6 (2CGM, 2TGW, 2CGW)	3 doses/week		7 doses/week		1 dose/2weeks	
4	6 (2CGM, 2TGW, 2CGW)	3 doses/week		1 dose/2weeks		1 dose/week	
5	6 (2CGM, 2TGW, 2CGW)	1 dose/week		1 dose/2weeks		7 doses/week	
6	6 (2CGM, 2TGW, 2CGW)	1 dose/2weeks		1 dose/week		3 doses/week	

Drug-Level Measurement: Using previously described methods,[19] the UCSF HAL, a National Institute of Allergy and Infectious Diseases (NIAID) Division of AIDS' Clinical Pharmacology and Quality Assurance Program (CPQA)-certified laboratory[105] (see letter of support (LOS) from the Director of the CPQA) will measure doxycycline concentrations in hair, blood, and urine samples via LC-MS/MS. Doxycycline is separated via reverse-phase high-performance liquid chromatograph (Shimadzu LC-20 system) and quantified by tandem mass spectrometer (Sciex API5000 MS/MS) with electrospray positive ionization (*m/z* 445.2/428.1 [Q1/Q3]). Given the previous development of doxycycline hair analysis, which requires more complex sample processing, we anticipate few challenges in developing blood and urine-based methods (either protein precipitation or simple dilution). The lower limit of quantification for hair is 0.200 ng/mg, and we anticipate it will be 0.0500 µg/mL in blood[106] and 0.200 µg/mL in urine[107] based on the previous literature.

Analysis: The primary parameters of interest in this study will be doxycycline hair, blood, & urine concentrations under each dosing condition. We will determine mean, median, and 95% confidence intervals for this parameter for each dosing condition being tested. We will then estimate ratios of doxycycline levels in blood, urine, and hair of different pair-wise combinations of dosing conditions and determine mean, geometric mean, median, and 95% confidence intervals for these ratios. We will also assess the ability of hair, blood, and urine levels individually to discriminate between conditions, including both dosing patterns and time since the last dose in analyses. PK parameters assessed include clearance (CL/F) estimated by dose/AUC, C_{min} or trough level, C_{max} or peak blood concentration, t_{max} or time to C_{max}, and area under the concentration-time curve (AUC) using non-compartmental methods. Linear and/or non-linear mixed models for doxycycline levels will be used to assess these relations. Random effects for participants will be used to account for within-subject correlation and thus capture the efficiency gains afforded by the crossover design. Finally, we will assess for differences in parameters when comparing individuals by sex at birth and gender, and will assess for differences in geometric mean trough estradiol levels when comparing pre- and post-doxycycline dosing patterns among TGW.

Sample Size: With 36 individuals randomized to 4 different dosing patterns, with 2 crossovers, there will be at least 24 individuals randomized to each of the 4 dosing patterns. Based on an expected approximate mean of 6 ng/mg with a standard deviation of 1.5 of those with daily dosing of doxycycline,[108] assuming independence between dosing patterns, we would have 80% power to detect a 20% difference in means between dosing patterns. The use of a crossover design will increase power and likely allow detection of even smaller differences between dosing patterns.

C.4.2. Aim 2: To examine relationships between hair doxycycline levels and STI incidence among cisgender women in dPEP.

Overview: We will perform a secondary data analysis of the recently completed dPEP randomized clinical trial of doxycycline for prevention of bacterial STIs vs. standard of care among Kenyan women who were currently receiving PrEP through a clinical program.[17] Using sexual behavior data collected every week by SMS and quarterly via timeline follow-back in the trial, and the thresholds established in Aim 1, we will examine the STI incidence among women with low, medium, and high sexual frequency using estimated doxycycline doses consumed per week as a predictor (**Aim 2a**). Given that prior analyses of this data suggested that women over-reported taking doxycycline after unprotected sex acts, we will use doxycycline concentrations in hair as our primary outcome measure in all analyses in Aim 2. We will examine predictors of high coverage of condomless sexual acts, defined as at least 80% of sexual acts covered by doxycycline dosing, and perform group-based trajectory modelling to determine adherence trajectories over time (**Aim 2b**).

Rationale: The dPEP study was the first clinical study of doxycycline PEP among cisgender women, but unfortunately returned a null result.[19] Given that doxycycline achieved similar concentrations in vaginal and rectal tissue,[20] and preliminary hair analysis showed lower than expected detectability of doxycycline,[19] in-depth adherence analysis will be necessary to interpret the trial results.

Hypothesis: We hypothesize that among women with high coverage of condomless sexual acts, as determined by estimated dosing patterns derived from Aim 1, considering weekly sexual behavior data collected within the study, doxycycline PEP will prove effective in reducing STIs when taken with adequate adherence. We also hypothesize that older age, income, education level, having greater than one partner, and absence of a primary sex partner will predict higher doxycycline coverage of condomless sexual acts.

Research Methods:

Description of the Previously Completed dPEP Study: The dPEP study was a randomized, open-label trial of doxycycline PEP compared with standard of care among Kenyan women ages 18-30 years old who were already taking HIV pre-exposure prophylaxis. The study had a primary endpoint of incident CT, NG, or syphilis infection, and hair samples were collected quarterly for anticipated objective assessment of doxycycline use. Hair (50-100 strands) was collected from the occipital scalp using well-described methods.[102] The 1cm segment closest to the root, corresponding to approximately one month of pill-taking, was cut and drug extracted. Sexual behavior was assessed weekly through the use of SMS messaging, and participants completed timeline follow-back calendars on sexual activity, condom use, and doxy PEP use in the prior two weeks at each quarterly visit. STIs were assessed via endocervical swabs for CT and NG using nucleic acid amplification testing (NAAT; Cepheid or Aptima), and syphilis with rapid plasma regain titers with Treponema pallidum confirmatory testing, and all incident infections were preceded by a negative test. All incident chlamydia infections were treated with azithromycin; with doxycycline not used to treat CT in this trial. The frequency of sexual intercourse without condoms will be validated for social desirability biases using archived vaginal samples collected quarterly for prostate specific antigen (PSA) testing as a marker of recent condomless vaginal intercourse[97] using the ABAcard p30 rapid strip tests (Abacus Diagnostics). In the primary analysis, 50 incident STIs were detected in the doxycycline arm out of 109 total incident STIs. Of these STIs, 78% were CT, 28% NG, and 1% were syphilis.

Sample Analysis: Hair samples will be analyzed from all participants who experienced an incident infection of any STI within the doxy PEP arm at each person-visit (N=~125 person-visits), and from a 30% overall random sample of the entire intervention cohort (N=~350 person-visits). We will use LC-MS/MS to measure continuous doxycycline hair levels,[19] with a limit of detection of 0.0200 ng/mg. This case-cohort design offers the efficiency of case-control methods, but also allows assessment of overall adherence within the cohort, permitting additional exploratory analyses such as examining predictors of adequate doxycycline coverage of sexual acts within the intervention arm (**Aim 2b**), mimicking the approach used within the iPrEx-OLE study.[22,47]

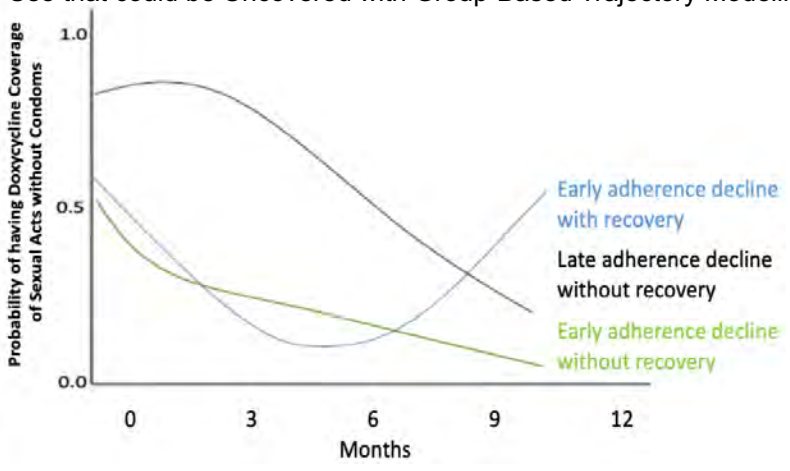
STI Incidence Aims (2a): The primary analysis will examine predictors of STI incidence (CT, NG, syphilis; together and individually) using mixed-effects Poisson regression, with a random effect for the participant across multiple visits and inclusion of sampling weights to acknowledge the case-cohort sampling. Participants will be stratified as having low, medium, or high sexual frequency; time and sexual frequency will be incorporated as offsets. The primary predictor will be estimated number of doses consumed per week using thresholds developed in Aim 1. Multivariable analyses will be adjusted for demographics, including age, education, income; relationship factors, including number of partnerships, duration of partnerships, frequency;

and condom usage. As a sensitivity analysis, we will compare results using weekly SMS sexual frequency data and the quarterly timeline follow-back adherence assessment completed at study visits. An additional sensitivity analysis will account for estimated under-reporting of sexual frequency using the PSA results collected in the primary study, as compared to the self-reported sexual frequency from weekly SMS check-ins and timeline follow-back data collected during study visits. Secondary aims will include predictors of individual chlamydia, gonorrhea, and syphilis incidence.

Adherence Predictors and Adherence Trajectory Aims (2b): The co-primary aim is to examine predictors of high coverage of sexual acts without condoms, defined as 80% of sexual acts (assessed through converging sources of self-report data) covered by doxycycline based on estimated dosing patterns observed in hair established from the Aim 1 DOT study. This approach is more nuanced than exploring predictors of high doxycycline adherence alone, as it accounts for the event-based dosing used with doxy PEP. We will determine coverage of sexual acts without condoms across 12 months, in which participants' coverage will be estimated per month based on doxycycline levels in hair. We will then fit a mixed-effects logistic regression (predictors of ≥80% coverage of sexual acts with doxy PEP vs. less than 80% coverage), with inclusion of a random effect for the participant across study visits. As an alternate modelling strategy, we will examine predictors of percent coverage of sexual acts with doxycycline PEP (on continuous data of % coverage) using a generalized linear model from the binomial distribution; and will use zero-inflated models if needed. We will incorporate the factors discussed in the primary analysis, as well as additional interpersonal factors, including experience of intimate partner violence, fertility desire, and the sexual relationship power scale.[109]

To examine adherence trajectories and coverage of condomless sexual acts over time, we will then perform group-based trajectory modeling, a form of latent class analysis used to detect distinct participant adherence trajectory profiles over time (**Fig. 5**).[110] This approach assumes that the study population is comprised of underlying unobserved subpopulations, each exhibiting unique adherence trajectories in their data. It utilizes the available data to discern these distinctive trajectories, determine which individuals may be associated with a specific subgroup, and understand the distribution of these subgroups within the population.[111] As the exact number of groups is not predetermined, we will systematically examine models with varying group numbers. Subsequently, we will choose a definitive model optimized for both fit and simplicity. This optimization will be determined through model fit indices (e.g. Akaike Information Criterion and Bayesian Information Criterion), as well as considerations of interpretability based on contextual knowledge. From the final model, subgroup membership will be determined using the maximal probability rule.[112] We will then characterize the number of subgroups and characteristics of each trajectory (e.g. see example of possible trajectories of a 3 latent group model in **Figure 5**). We will then use multinomial logistic regression to determine characteristics associated with belonging to one class vs. another. After establishing these classes, we will examine the relationship of these specific classes of adherence typologies with risk of an incident STI, identifying groups who could potentially benefit most from doxycycline PEP adherence interventions. Thus, this analysis will enable future targeted interventions of subpopulations in need of doxy PEP adherence interventions.

Fig. 5: Example of Adherence Trajectories over Time for Doxycycline PEP Use that could be Uncovered with Group-Based Trajectory Modeling



Sample Size: As quantitative drug levels for those with and without an STI are not yet known, we cannot conduct a power analysis to calculate sample size using continuous hair doxycycline concentrations. Therefore, we estimated sample size needed based on the preliminary data from the dPEP study. Knowing that approximately 30% of participants in the previous random sample had doxycycline detected in their hair above the limit of detection,[19] and there were 50 STIs in the intervention group, we would be able to detect a 0.45 risk ratio or less, i.e. a 55% reduction in STI risk if doxycycline was present, lower than the overall efficacy estimates within DoxyPEP (66% reduction in the PrEP cohort and 62% in PLWH).[17] The use of repeated measures across visits and the use of continuous doxycycline concentrations rather than qualitative presence vs. absence of doxycycline will increase power, and is expected to permit detection of smaller risk reductions.

C.4.3. Aim 3: To examine predictors, patterns, and relative performance of hair, urine, and blood-based adherence metrics among MSM/TGW with and without HIV.

Overview: Within the DoxyPEP Study among U.S. MSM and transgender women with and without HIV, leveraging the high expected adherence given the efficacious study, the availability of stored samples of blood, urine, and hair samples, and availability of quarterly sexual behavior data; we will compare the predictive ability of four possible doxycycline adherence metrics (hair, urine, blood, self-report) for STI incidence reduction, and compare correlation between methods. Using hair levels of doxycycline as a gold-standard for long-term adherence, we will examine the predictive ability of blood and urine doxycycline levels for long-term adherence, as well as self-reported adherence data, after stratifying for frequency of sex acts. We will then compare the predictive ability of doxycycline levels in objective metrics for a future breakthrough STI, to help researchers and clinicians understand the potential role of a future urine or blood-based POC assay. Finally, we will combine short-term and long-term adherence data and use novel techniques such as segmental hair analysis (**Figure 2**)[93-95] to understand patterns of adherence over time (recently increasing, recently decreasing, vs. stably high adherence), providing insights for clinical STI prevention programs.

Rationale: The DoxyPEP study demonstrated the efficacy of DoxyPEP among MSM and TGW, is the largest completed study in this population, and the only study to include people with and without HIV, demonstrating similar efficacy among each group.[17] Urine, blood, and hair were banked from this study, but have not yet been analyzed. This sample bank will provide invaluable data to understand the potential clinical predictive ability of doxycycline levels in each sample type, including urine and blood-based metrics which are more amenable to POC or ELISA development given lack of need for prior processing and ready availability within clinical settings. Although shorter-term adherence assays (i.e. blood/urine) would be less useful for those with less frequent sex, they will be relevant for cohorts like DoxyPEP, in which most participants had condomless sex more than weekly. Furthermore, POC tests could measure doxycyline exposure at the time of a symptomatic gonorrhea infection, given NG's typical incubation period of 2-5 days, relevant for AMR investigations. Comparing adherence data among people with and without HIV will help us understand differences in adherence behavior by HIV status, with clinical implications for integrated HIV/STI care programs. This data will also identify populations at higher risk of adherence challenges and breakthrough STIs on doxy PEP.

Hypothesis: We hypothesize that that urine and blood doxycycline concentrations will be predictive of longer-term adherence, except when a recent change in adherence has occurred (recent drop-off or increase) or in individuals with infrequent sexual activity. We hypothesize that adherence assessed via objective biometrics will be similar when comparing people with and without HIV. In addition, we hypothesize that a recent drop-off in short-term adherence detected in urine or blood will predict future breakthrough STIs when controlling for frequency of sexual behavior.[40,75]

Research Methods:

Description of Previously Completed DoxyPEP Study: The DoxyPEP Study was an open-label randomized study of doxycycline PEP vs. standard of care among men who have sex with men and transgender women (n=501). Given the 2:1 randomization to doxycycline PEP or SOC, there were 220 MSM/TGW without HIV using PrEP and 119 PWH included in the study within the doxy PEP arm who were followed for a median of 9 months at the time of early stopping for efficacy of the standard of care arm. NAAT STI testing (Hologic Aptima or Cepheid Xpert) and syphilis serologic testing was performed quarterly. Among the PrEP cohort, doxycycline PEP use conferred a 66% lower risk of any STI (95% confidence interval [CI]: 52%-76%), and among PWH a 62% lower risk of an STI (95% CI: 40-76%). Blood and urine samples were collected quarterly and banked, and hair samples were collected every 6 months in a similar fashion as was described in the dPEP study.[102] Computer assisted self-interview at each quarterly visit was used to ask participants about the number of sexual encounters which occurred without condoms and the number of doxycycline doses taken in the prior quarter. A subset of participants utilized a smartphone app to provide weekly sexual behavior and doxyPEP use which will be utilized for more granular sexual behavior data and doxyPEP use.

Sample Analysis: Hair, blood, and urine samples will be analyzed at all person-visits for participants in the doxycycline arm who experienced a breakthrough STI (n=61) and a 30% overall random sample of the entire cohort (n=342). Analyses will be stratified by HIV status. We will use LC-MS/MS to measure continuous doxycycline hair level using established methods,[19] with a limit of detection of 0.0200 ng/mg, and will measure urine and blood doxycycline concentrations using methods described in Aim 1. In addition, we will perform segmental hair analysis among all person-visits with a breakthrough STI with sufficient hair for analysis (n=~20; **Figure 6**) and among a random sample of the full intervention cohort with sufficient hair length and

quantity available (n=~60).[93-95] Segmental hair analysis involves carefully cutting hair into 0.5cm segments to provide data on doxycycline levels over sequential 2 week periods of pill-taking, more fully capturing adherence patterns over time.[93-95]

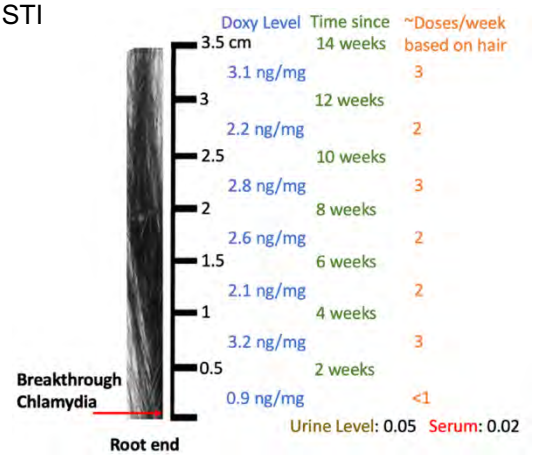
Comparison of Adherence Metrics: We will compare the ability of the short-term adherence metrics (urine and blood), and self-reported adherence, to predict long-term adherence in hair using linear and logistic regression, stratified by sexual frequency tertiles. We will also examine the sensitivity, specificity, positive predictive value, and negative predictive value of doxycycline levels in urine & blood (using cut-offs identified in Aim 1), and self-reported ≥ 80% adherence, to predict long-term adherence via hair concentrations using cut-offs identified in Aim 1. We will then examine the rank correlation between methods and agreement using Bland-Altman plots.

Ability of Metrics to Predict a Future STI: We will then examine the ability each objective adherence metric to predict an incident STI (CT/syphilis/GC combined; individually, and CT/syphilis combined) using mixed-effects Poisson regression. We will censor periods in which doxycycline is used for STI treatment. This clinical data will be particularly useful for future development of a POC metric, as it was for the urine tenofovir assay, which was examined to predict HIV seroconversion events on PrEP or future HIV virologic suppression on ART.[40,75,113] Finally we will compare drug-level concentrations between a sample of the overall cohort and those who have experienced a breakthrough STI, stratified by HIV status and sexual frequency, using Poisson regression. As an exploratory analysis we will compare the drug concentrations needed for STI prevention between MSM/TGW in DoxyPEP and CGW in dPEP.

Adherence Predictors: We will examine predictors of high doxycycline adherence using hair-level LC-MS/MS measurement within sub-strata of individuals with low, medium, and high numbers of sexual encounters (tertiles), and will compare adherence among people with and without HIV using continuous doxycycline concentrations and mixed-effects linear or interval regression. We will next examine doxycycline "coverage," defined by dividing estimated doses of doxycycline ingested by the number of condomless sexual acts reported over that time-period. We will then examine predictors of high coverage of condomless sexual acts using logistic (i.e. >80% coverage) and/or generalized linear models to examine continuous % coverage.

Adherence Patterns: We will combine urine and blood doxycycline levels indicative of recent adherence (each separately), with long-term adherence as indicated by doxycycline hair levels, to examine adherence patterns. We will perform latent class analysis to examine distinct adherence patterns within the data at each clinical visit combining short (high vs. low) and long-term adherence data (low vs. high or within tertiles), as well as sexual behavior frequency. Following our model selection methods in Aim 2, we will methodically assess models with different group numbers using fit indices (e.g. Akaike and Bayesian Information Criteria) and clinical interpretability. We will determine class membership for each participant using multinomial regression. Based on prior HIV research, of particular interest are the potential subgroup of individuals with long-term high adherence who have a recent drop-off in adherence, as this pattern predicts PrEP discontinuation and loss of virologic suppression among people with HIV.[96,114] We will use multinomial logistic regression to determine factors associated with each adherence pattern, and will examine the relationship of each pattern with risk of a future STI using Poisson regression. For the segmental hair analysis samples, we will graph adherence trajectories in a similar fashion to that described in Aim 2 using group-based trajectory modelling (see **Fig. 5**),[110] but in this case using the higher resolution afforded by segmental hair analysis to examine 2 week blocks of past dosing (**Fig. 6**), and compare adherence trajectories between those with/without an STI.

Figure 6: Example of Hair, Urine, and Blood Adherence Patterns Predicting a Breakthrough STI



Interpretation: Recent Drop-off in Adherence with Breakthrough STI

Sample Size: Assuming an average hair level concentration of 3 ng/mg, indicating medium-high use, and a standard deviation of 0.75,[108] we have at least 80% power to detect a 7.5% difference in doxycycline concentrations when comparing people with and without HIV, a 5% difference in the means when comparing hair and blood or urine-based doxycycline metrics, and a 10% difference in mean doxycycline hair concentrations when comparing hair levels in those with a breakthrough STI and levels in those without breakthrough STIs. The use of repeated measures approaches will likely increase power further.

C5. Alternative Design Considerations and Solutions to Potential Problems:

1. What if hair specimens are degraded by light exposure prior to collection, during storage, or analysis? A prior paper which examined doxycycline in hair extracted drug into various solutions using an HPLC-UV/Vis detector system. This paper reported that specimens collected >4 months prior showed decreased levels, which they theorized was due to light exposure.[108] In our analyses we have not seen evidence of photodegradation when extracting hair into 100% methanol, using opaque containers, and with the use of LC/MS/MS methods. When performing segmental hair analysis on a donor's hair who reported high adherence to doxycycline for > 6 months, we did not see differences in levels by segment, suggesting that light exposure did not degrade doxycycline within the hair prior to collection while hair was still on the head. This is not surprising, given that dyeing and coloring also do not interfere with drug-level concentrations.[115]
2. What if doxycycline PEP is not found to be effective among those with high doxycycline hair levels in dPEP? Based on the 30% detectable doxycycline within the preliminary random sample within dPEP, we expect to be sufficiently powered to detect an incidence reduction similar or lower to the magnitude seen in DoxyPEP (i.e. <~50%) in those with high doxycycline adherence. If doxycycline PEP were not found to be effective within dPEP in our analysis, we would still provide actionable data, such as predictors of non-adherence important to improving DoxyPEP adherence within future clinical trials to be conducted among cisgender women. Finally, this proposal will develop adherence assessment approaches that will be critical to the interpretation of future clinical trials to assess doxy PEP's efficacy among cisgender women.
3. What if sexual behavior frequency is biased by social desirability? By performing the primary analyses within substrata of sexual behavior frequency tertiles, we rely on the overall distribution of sexual frequency rather than the absolute number of sexual acts for analyses. Computer assisted self-interview (CASI) was used in both studies when administering questionnaires on sexual behavior to try to reduce social desirability bias. For Aim 2, we will use vaginal PSA levels and compare them to reported sexual behavior, and if discrepancies are noted, we will perform sensitivity analyses to adjust for under-reporting of sexual behavior. Among MSM and transgender women, there is extensive experience using CASIs to study sexual behavior, and this was the primary assessment strategy used in the HIV PrEP studies.[4] Given that each participant will be studied over multiple visits, under/over-reporting can be accounted for to a degree within mixed-effects models.
4. Why not collect rectal/vaginal swabs to measure local drug concentrations? A previous well-conducted analysis found similar doxycycline concentrations among rectal and vaginal swabs between CGW and CGM after a single DOT dose.[20] Rectal swabs have high inter and intra-individual variability for drug-level measurement (e.g. as high as ten-fold),[116] tissue biopsies cannot be performed repeatedly, and systemic levels are good surrogates of antibacterial efficacy for antibiotics with high tissue penetration such as doxycycline, depending on the specific bacteria's minimum inhibitory concentration.[117] Animal studies are therefore likely better suited to test the possibility of differential tissue pharmacology by population. Finally, the study infrastructure will be well-suited to add additional components as understanding of doxycycline PK evolves.
5. What if doxycycline pre-exposure prophylaxis is shown to be effective? We are well poised to add a doxycycline 100mg daily sub-study using the platform developed in Aim 1 if it is shown to be effective in larger studies (i.e. Canadian HIV Trials Network #329). We chose the Aim 1 dosing patterns to cover the range of most concentrations that could be seen with expected use, with statistical modelling allowing us to predict dosing patterns in between and near these ranges.

C6. Summary and Implications: At the conclusion of the study, we will establish dosing thresholds for doxycycline in hair, blood, and urine using a gold-standard randomized, crossover directly-observed therapy (DOT) approach,[42-45] further establishing if there is any difference in doxycycline concentrations when comparing samples collected from cis- and transgender women and cisgender men. These thresholds will be applied to investigate the relationship between adherence patterns and the reduction of sexually transmitted infections in the dPEP study among cisgender women in Kenya,[19] helping us interpret the unexpected null result. Additionally, we will explore potential clinical roles for adherence metrics amenable to POC test development within the DoxyPEP trial, including identifying those likely to have Doxy PEP adherence challenges or experience a future breakthrough STI. Key investigators of the dPEP study and the DoxyPEP trial are co-investigators on this grant and have long experience working together, and the UCSF Hair Analytical Laboratory (which has extensive experience in analyzing hair levels of antiretrovirals and is a CPQA-certified laboratory) will be analyzing the doxycycline concentrations. The outcomes of the benchmark DOT study and subsequent pharmacodynamic analyses examining relationships between drug levels and STI outcomes will serve to define doxycycline adherence metrics for doxycycline post-exposure prophylaxis. Doxycycline PEP is a potentially transformational biomedical STI prevention strategy at the population level[66] and the foundational work of this proposal will help shape adherence assessments in both ongoing and future doxycycline post-exposure prophylaxis studies and roll-out programs.

References:

1. Zheng Y, Yu Q, Lin Y, et al. Global burden and trends of sexually transmitted infections from 1990 to 2019: an observational trend study. *Lancet Infect Dis*. Apr 2022;22(4):541-551. doi:10.1016/s1473-3099(21)00448-5.
2. Marrazzo J. Doxycycline Postexposure Prophylaxis for STIs in Women — Uncertain Benefit, Urgent Need. *New England Journal of Medicine*. 2023;389(25):2389-2390. doi:10.1056/NEJMe2311948.
3. Gandhi M, Spinelli MA, Mayer KH. Addressing the Sexually Transmitted Infection and HIV Syndemic. *Jama*. Apr 9 2019;321(14):1356-1358. doi:10.1001/jama.2019.2945. PMC6615736.
4. Traeger MW, Cornelisse VJ, Asselin J, et al. Association of HIV Preexposure Prophylaxis With Incidence of Sexually Transmitted Infections Among Individuals at High Risk of HIV Infection. *Jama*. Apr 9 2019;321(14):1380-1390. doi:10.1001/jama.2019.2947. PMC6459111.
5. Hamusonde K, Nicca D, Günthard HF, et al. Triggers of Change in Sexual Behavior Among People With HIV: The Swiss U = U Statement and COVID-19 Compared. *The Journal of Infectious Diseases*. 2022;227(3):407-411. doi:10.1093/infdis/jiac459.
6. The diagnostics landscape for sexually transmitted infections. Geneva: World Health Organization; 2023. Accessed Dec 21. Available at: https://who.int/publications/i/item/9789240077126.
7. Spinelli MA, Scott HM, Vittinghoff E, et al. Provider Adherence to Pre-exposure Prophylaxis Monitoring Guidelines in a Large Primary Care Network. *Open Forum Infect Dis*. Jun 2018;5(6):ofy099. doi:10.1093/ofid/ofy099. PMC6016415.
8. Podsadecki TJ, Vrijens BC, Tousset EP, Rode RA, Hanna GJ. "White coat compliance" limits the reliability of therapeutic drug monitoring in HIV-1-infected patients. *HIV clinical trials*. Jul-Aug 2008;9(4):238-46.
9. Van Gerwen OT, Muzny CA, Marrazzo JM. Sexually transmitted infections and female reproductive health. *Nat Microbiol*. Aug 2022;7(8):1116-1126. doi:10.1038/s41564-022-01177-x. PMC9362696.
10. van de Wijgert JH, Morrison CS, Brown J, et al. Disentangling contributions of reproductive tract infections to HIV acquisition in African Women. *Sex Transm Dis*. Jun 2009;36(6):357-64. doi:10.1097/OLQ.0b013e3181a4f695.
11. Ville Y, Leruez M, Glowaczower E, Robertson JN, Ward ME. The role of Chlamydia trachomatis and Neisseria gonorrhoeae in the aetiology of ectopic pregnancy in Gabon. *Br J Obstet Gynaecol*. Dec 1991;98(12):1260-6. doi:10.1111/j.1471-0528.1991.tb15399.x.
12. Zhou J, Zhang H, Tang K, Liu R, Li J. An Updated Review of Recent Advances in Neurosyphilis. *Front Med (Lausanne)*. 2022;9:800383. doi:10.3389/fmed.2022.800383. PMC9530046.
13. Gu X, Gao Y, Yan Y, et al. The importance of proper and prompt treatment of ocular syphilis: a lesson from permanent vision loss in 52 eyes. *J Eur Acad Dermatol Venereol*. Jul 2020;34(7):1569-1578. doi:10.1111/jdv.16347. PMC7496700.
14. Solomon AW, Burton MJ, Gower EW, et al. Trachoma. *Nat Rev Dis Primers*. May 26 2022;8(1):32. doi:10.1038/s41572-022-00359-5.
15. Molina JM, Charreau I, Chidiac C, et al. Post-exposure prophylaxis with doxycycline to prevent sexually transmitted infections in men who have sex with men: an open-label randomised substudy of the ANRS IPERGAY trial. *Lancet Infect Dis*. Mar 2018;18(3):308-317. doi:10.1016/S1473-3099(17)30725-9.
16. Molina et al. ANRS 174 DOXYVAC: an open-label randomized trial to prevent STIs in MSM on PrEP. Conference on Retroviruses and Opportunistic Infections 2023. Seattle, WA, U.S.
17. Luetkemeyer AF, Donnell D, Dombrowski JC, et al. Postexposure Doxycycline to Prevent Bacterial Sexually Transmitted Infections. *N Engl J Med*. Apr 6 2023;388(14):1296-1306. doi:10.1056/NEJMoa2211934. PMC10140182.
18. Anderson PL. Pharmacologic Measures of Adherence and Relationship to Drug Response. Conference of Retroviruses and Opportunistic Infections (CROI); Oral symposium; Boston, MA; February 22–25. 2016; Abstract 96.
19. Stewart J, …Spinelli M, Gandhi M, Bukusi EA, Baeten JM. Doxycycline Prophylaxis to Prevent Sexually Transmitted Infections in Women. *N Engl J Med*. Dec 21 2023;389(25):2331-2340. doi:10.1056/NEJMoa2304007.
20. Haaland, R. Fountain, J. Dingh C. Mucosal Phamacology of Doxycycline for Bacterial STI Prevention in Men and Women. Conference on Retroviruses and Opportunistic Infections. 2023. February 21 Seattle, Washington #118.

21. Corneli AL, Deese J, Wang M, et al. FEM-PrEP: adherence patterns and factors associated with adherence to a daily oral study product for pre-exposure prophylaxis. *J Acquir Immune Defic Syndr*. Jul 01 2014;66(3):324-31. doi:10.1097/QAI.0000000000000158. PMC4059551.
22. Koss CA, Bacchetti P, Hillier SL, et al. Differences in Cumulative Exposure and Adherence to Tenofovir in the VOICE, iPrEx OLE, and PrEP Demo Studies as Determined via Hair Concentrations. *AIDS Res Hum Retroviruses*. Aug 2017;33(8):778-783. doi:10.1089/aid.2016.0202. PMC5564054.
23. Marrazzo JM, Ramjee G, Richardson BA, et al. Tenofovir-based preexposure prophylaxis for HIV infection among African women. *N Engl J Med*. Feb 5 2015;372(6):509-18. doi:10.1056/NEJMoa1402269. PMCID: PMC4341965.
24. Van Damme L, Corneli A, Ahmed K, et al. Preexposure prophylaxis for HIV infection among African women. *N Engl J Med*. Aug 2 2012;367(5):411-22. doi:10.1056/NEJMoa1202614. PMC3687217.
25. van Zyl GU, van Mens TE, McIlleron H, et al. Low lopinavir plasma or hair concentrations explain second line protease inhibitor failures in a resource-limited setting. *J Acquir Immune Defic Syndr*. April 2011;56(4):333-339. doi:10.1097/QAI.0b013e31820dc0cc. PMC3073814.
26. Prasitsuebsai W, Kerr SJ, Truong KH, et al. Using Lopinavir Concentrations in Hair Samples to Assess Treatment Outcomes on Second-Line Regimens Among Asian Children. *AIDS Res Hum Retroviruses*. Oct 2015;31(10):1009-14. doi:10.1089/AID.2015.0111. PMC4576945.
27. Gandhi M, Ameli N, Bacchetti P, et al. Protease inhibitor levels in hair strongly predict virologic response to treatment. *AIDS*. Feb 20 2009;23(4):471-8. doi:10.1097/QAD.0b013e328325a4a9. PMC2654235.
28. Gandhi M, Ameli N, Bacchetti P, et al. Atazanavir concentration in hair is the strongest predictor of outcomes on antiretroviral therapy. *Clin Infect Dis*. May 2011;52(10):1267-75. doi:10.1093/cid/cir131. PMC3079399.
29. Cohan D, Natureeba P, Koss CA, et al. Efficacy and safety of lopinavir/ritonavir versus efavirenz-based antiretroviral therapy in HIV-infected pregnant Ugandan women. *AIDS*. Jan 14 2015;29(2):183-91. doi:10.1097/QAD.0000000000000531.
30. Koss CA, Natureeba P, Mwesigwa J, et al. Hair concentrations of antiretrovirals predict viral suppression in HIV-infected pregnant and breastfeeding Ugandan women. *AIDS*. Apr 24 2015;29(7):825-30. doi:10.1097/QAD.0000000000000619. PMC4438773.
31. Chawana TD, Gandhi M, Nathoo K, et al. Defining a Cutoff for Atazanavir in Hair Samples Associated With Virological Failure Among Adolescents Failing Second-Line Antiretroviral Treatment. *J Acquir Immune Defic Syndr*. Sep 1 2017;76(1):55-59. doi:10.1097/QAI.0000000000001452. PMC5552420.
32. Pintye J, Bacchetti P, Teeraananchai S, et al. Brief Report: Lopinavir Hair Concentrations Are the Strongest Predictor of Viremia in HIV-Infected Asian Children and Adolescents on Second-Line Antiretroviral Therapy. *J Acquir Immune Defic Syndr*. Dec 1 2017;76(4):367-371. doi:10.1097/QAI.0000000000001527. PMC5659884.
33. Baxi SM, Greenblatt RM, Bacchetti P, et al. Nevirapine Concentration in Hair Samples Is a Strong Predictor of Virologic Suppression in a Prospective Cohort of HIV-Infected Patients. *PLoS One*. 2015;10(6):e0129100. doi:10.1371/journal.pone.0129100. PMC4460031.
34. Tabb ZJ, Mmbaga BT, Gandhi M, et al. Antiretroviral drug concentrations in hair are associated with virologic outcomes among young people living with HIV in Tanzania. *AIDS*. Jun 1 2018;32(9):1115-1123. doi:10.1097/QAD.0000000000001788. PMC5945296.
35. Murnane P, Bacchetti P, Currier JS, et al. Tenofovir concentrations in hair strongly predict virologic suppression in breastfeeding women. AIDS 2019 (in press).
36. Gandhi M, Ofokotun I, Bacchetti P, et al. Antiretroviral concentrations in hair strongly predict virologic response in a large HIV treatment-naive clinical trial. *Clin Infect Dis*. Mar 2019;5:1044-1047. doi:10.1093/cid/ciy764. PMC6399433.
37. Gandhi M, Bacchetti P, Rodrigues WC, et al. Development and Validation of an Immunoassay for Tenofovir in Urine as a Real-Time Metric of Antiretroviral Adherence. *EClinicalMedicine*. Aug-Sep 2018;2-3:22-28. doi:10.1016/j.eclinm.2018.08.004. PMC6428441.
38. Gandhi M, Bacchetti P, Spinelli MA, et al. Brief Report: Validation of a Urine Tenofovir Immunoassay for Adherence Monitoring to PrEP and ART and Establishing the Cutoff for a Point-of-Care Test. *J Acquir Immune Defic Syndr*. May 1 2019;81(1):72-77. doi:10.1097/QAI.0000000000001971. PMC6456396.
39. Gandhi M, Wang G, King R, et al. Development and validation of the first point-of-care assay to objectively monitor adherence to HIV treatment and prevention in real-time in routine settings. *AIDS*. Feb 1 2020;34(2):255-260. doi:10.1097/QAD.0000000000002395.

40. Spinelli MA, Glidden DV, Rodrigues WC, et al. Low tenfovir level in urine by a novel immunoassay is associated with seroconversion in a PrEP demonstration project. *AIDS*. April 1, 2019 2019;33(5):867-872. PMC6375797.
41. Spinelli MA, Rodrigues WC, Wang G, et al. High Accuracy of a Real-Time Urine Antibody-Based Tenofovir Point-of-Care Test Compared to Laboratory-Based Elisa in Diverse Populations. *J Acquir Immune Defic Syndr*. Mar 10 2020;doi:10.1097/QAI.0000000000002322.
42. Liu AY, Yang Q, Huang Y, et al. Strong relationship between oral dose and tenofovir hair levels in a randomized trial: hair as a potential adherence measure for pre-exposure prophylaxis (PrEP). *PLoS One*. 2014;9(1):e83736. doi:10.1371/journal.pone.0083736. PMC3885443.
43. Hendrix CW, Andrade A, Bumpus NN, et al. Dose Frequency Ranging Pharmacokinetic Study of Tenofovir-Emtricitabine After Directly Observed Dosing in Healthy Volunteers to Establish Adherence Benchmarks (HPTN 066). *AIDS Res Hum Retroviruses*. Jan 2016;32(1):32-43. doi:10.1089/aid.2015.0182. PMC4692123.
44. Anderson PL, Liu AY, Castillo-Mancilla JR, et al. Intracellular Tenofovir-Diphosphate and Emtricitabine-Triphosphate in Dried Blood Spots following Directly Observed Therapy. *Antimicrob Agents Chemother*. Jan 2018;62(1)doi:10.1128/aac.01710-17. PMC5740314.
45. Drain PK, Kubiak RW, Siriprakaisil O, et al. Urine Tenofovir Concentrations Correlate With Plasma and Relate to Tenofovir Disoproxil Fumarate Adherence: A Randomized, Directly Observed Pharmacokinetic Trial (TARGET Study). *Clin Infect Dis*. May 6 2020;70(10):2143-2151. doi:10.1093/cid/ciz645. PMC7201421.
46. Neely JL, Abate M, Swinker M, D'Angio R. The effect of doxycycline on serum levels of ethinyl estradiol, norethindrone, and endogenous progesterone. *Obstet Gynecol*. Mar 1991;77(3):416-20.
47. Grant RM, Anderson PL, McMahan V, et al. Uptake of pre-exposure prophylaxis, sexual practices, and HIV incidence in men and transgender women who have sex with men: a cohort study. *Lancet Infect Dis*. Sep 2014;14(9):820-9. doi:10.1016/S1473-3099(14)70847-3. PMC6107918.
48. Rowley J, Vander Hoorn S, Korenromp E, et al. Chlamydia, gonorrhoea, trichomoniasis and syphilis: global prevalence and incidence estimates, 2016. *Bull World Health Organ*. Aug 1 2019;97(8):548-562p. doi:10.2471/blt.18.228486. PMC6653813.
49. Zhang J, Ma B, Han X, Ding S, Li Y. Global, regional, and national burdens of HIV and other sexually transmitted infections in adolescents and young adults aged 10-24 years from 1990 to 2019: a trend analysis based on the Global Burden of Disease Study 2019. *Lancet Child Adolesc Health*. Nov 2022;6(11):763-776. doi:10.1016/s2352-4642(22)00219-x.
50. Nel A, Van Niekerk N, Van Baelen B, Rosenberg Z. HIV Incidence and Adherence in DREAM: An Open-Label Trial of Dapivirine Vaginal Ring. Abstract #144LB. 25th Conference on Retroviruses and Opportunistic Infections (CROI); March 4-7, 2018; Boston, MA.
51. Refugio ON, Klausner JD. Syphilis incidence in men who have sex with men with human immunodeficiency virus comorbidity and the importance of integrating sexually transmitted infection prevention into HIV care. *Expert Review of Anti-infective Therapy*. 2018/04/03 2018;16(4):321-331. doi:10.1080/14787210.2018.1446828.
52. U.S. Food and Drug Administration. Current Drug Shortages Reported to the FDA. Accessed Nov 7, 2023. https://www.accessdata.fda.gov/scripts/drugshortages/dsp_ActiveIngredientDetails.cfm?AI=Penicillin%20G%20Procaine%20Injection&st=r&tab=tabs-1.
53. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sex Transm Infect*. Feb 1999;75(1):3-17. doi:10.1136/sti.75.1.3. PMC1758168.
54. Imaledo JA, Peter-Kio OB, Asuquo EO. Pattern of risky sexual behavior and associated factors among undergraduate students of the University of Port Harcourt, Rivers State, Nigeria. *Pan Afr Med J*. 2012;12:97. PMC3489398.
55. Wong WCW, Cheng S, Miu HYH, Ong JJ, Chen J, Loper KA. Contextual factors associated with consistent condom use and condom self-efficacy amongst African asylum seekers and refugees in Hong Kong. *Infect Dis Health*. Mar 2018;23(1):23-32. doi:10.1016/j.idh.2017.08.006.
56. Bryan AEB, Norris J, Abdallah DA, et al. Condom-Insistence Conflict in Women's Alcohol-Involved Sexual Encounters with a New Male Partner. *Psychol Women Q*. Mar 2017;41(1):100-113. doi:10.1177/0361684316668301. PMC5927388.
57. Zhao R, Wang B, Fang X, Li X, Stanton B. Condom use and self-efficacy among female sex workers with steady partners in China. *AIDS Care*. Aug 2008;20(7):782-90. doi:10.1080/09540120701694030.

58. Ajayi AI, Ismail KO, Akpan W. Factors associated with consistent condom use: a cross-sectional survey of two Nigerian universities. *BMC Public Health*. Sep 2 2019;19(1):1207. doi:10.1186/s12889-019-7543-1. PMC6719351.
59. Tibebu NS, Kassie BA, Kebede AA, et al. Consistent condom use and its associated factors among human immunodeficiency virus-positive pregnant women in Ethiopia. *Front Med (Lausanne)*. 2022;9:907879. doi:10.3389/fmed.2022.907879. PMC9386488.
60. Smith DK, Herbst JH, Zhang X, Rose CE. Condom Effectiveness for HIV Prevention by Consistency of Use Among Men Who Have Sex With Men in the United States. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2015;68(3):337-344. doi:10.1097/qai.0000000000000461.
61. Rosenberg ES, Khosropour CM, Sullivan PS. High prevalence of sexual concurrency and concurrent unprotected anal intercourse across racial/ethnic groups among a national, Web-based study of men who have sex with men in the United States. *Sex Transm Dis*. Oct 2012;39(10):741-6. doi:10.1097/OLQ.0b013e31825ec09b. PMC3457013.
62. Petrova D, Garcia-Retamero R. Effective Evidence-Based Programs For Preventing Sexually-Transmitted Infections: A Meta-Analysis. *Curr HIV Res*. 2015;13(5):432-8. doi:10.2174/1570162x13666150511143943.
63. European AIDS Treatment Group. ANRS DOXYVAC: final analysis may modify interim results of this trial assessing the effectiveness of meningococcal B vaccination in preventing gonococcal infections. Accessed Nov 15 2023 at https://www.eatg.org/hiv-news/anrs-doxyvac-final-analysis-may-modify-interim-results-of-this-trial-assessing-the-effectiveness-of-meningococcal-b-vaccination-in-preventing-gonococcal-infections/.
64. Spinelli MA, Scott HM, Vittinghoff E, Liu AY, Coleman K, Buchbinder SP. High Interest in Doxycycline for Sexually Transmitted Infection Postexposure Prophylaxis in a Multicity Survey of Men Who Have Sex With Men Using a Social Networking Application. *Sex Transm Dis*. Apr 2019;46(4):e32-e34. doi:10.1097/olq.0000000000000942. PMC6425754.
65. Fusca L, Hull M, Ross P, et al. High Interest in Syphilis Pre-exposure and Post-exposure Prophylaxis Among Gay, Bisexual and Other Men Who Have Sex With Men in Vancouver and Toronto. *Sex Transm Dis*. Apr 2020;47(4):224-231. doi:10.1097/olq.0000000000001130. PMC7077973.
66. Scott H, Roman J, Spinelli MA, Bena J, Torres T, Buchbinder S. Doxycycline PEP: High uptake and Significant Decline in STIs after Clinical Implementation. Conference on Retroviruses and Opportunistic Infections. March 3. Denver, CO. Oral Presentation. Submission ID 2946. 2024;
67. Bolan RK, Beymer MR, Weiss RE, Flynn RP, Leibowitz AA, Klausner JD. Doxycycline prophylaxis to reduce incident syphilis among HIV-infected men who have sex with men who continue to engage in high-risk sex: a randomized, controlled pilot study. *Sex Transm Dis*. Feb 2015;42(2):98-103. doi:10.1097/olq.0000000000000216. PMC4295649.
68. Baeten JM, Haberer JE, Liu AY, Sista N. Preexposure prophylaxis for HIV prevention: where have we been and where are we going? *J Acquir Immune Defic Syndr*. Jul 2013;63 Suppl 2(0 2):S122-9. doi:10.1097/QAI.0b013e3182986f69. PMC3710117.
69. Grant RM, Lama JR, Anderson PL, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med*. Dec 30 2010;363(27):2587-99. doi:10.1056/NEJMoa1011205. PMC3079639.
70. Baeten JM, Donnell D, Ndase P, et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med*. Aug 2 2012;367(5):399-410. doi:10.1056/NEJMoa1108524. PMC3770474.
71. Anderson PL, Glidden DV, Liu A, et al. Emtricitabine-tenofovir concentrations and pre-exposure prophylaxis efficacy in men who have sex with men. *Sci Transl Med*. Sep 12 2012;4(151):151ra125. doi:10.1126/scitranslmed.3004006. PMC3721979.
72. Gandhi M, Glidden DV, Mayer K, et al. Association of age, baseline kidney function, and medication exposure with declines in creatinine clearance on pre-exposure prophylaxis: an observational cohort study. *Lancet HIV*. Nov 2016;3(11):e521-e528. doi:10.1016/S2352-3018(16)30153-9. PMC5085869.
73. Koss CA, Hosek SG, Bacchetti P, et al. Comparison of Measures of Adherence to Human Immunodeficiency Virus Preexposure Prophylaxis Among Adolescent and Young Men Who Have Sex With Men in the United States. *Clin Infect Dis*. Jan 6 2018;66(2):213-219. doi:10.1093/cid/cix755. PMC5850042.
74. Liu AY, Cohen SE, Vittinghoff E, et al. Preexposure Prophylaxis for HIV Infection Integrated With Municipal- and Community-Based Sexual Health Services. *JAMA Intern Med*. Jan 2016;176(1):75-84. doi:10.1001/jamainternmed.2015.4683.
75. Stalter RM, Baeten JM, Donnell D, et al. Urine Tenofovir Levels Measured by a Novel Immunoassay Predict HIV Protection. *Clin Infect Dis*. Jun 22 2020;doi:10.1093/cid/ciaa785.

76. Bikinesi L, A.Spinelli M, Nyoni N, et al. A LOW-COST, RAPID URINE TEST FOR TFV INCREASES ART ADHERENCE AND VIRAL SUPPRESSION. Conference on Retroviruses and Opportunistic Infections. Seattle, WA. #1038.5. 2023;
77. Spinelli M, Gandhi M. A Point-of-Care Urine Tenofovir Adherence Feedback Intervention Improved PrEP Adherence among Kenyan Women. Adherence 2023. Fajardo, Puerto Rico #1302. 2023;
78. Spinelli MA, Haberer JE, Chai PR, Castillo-Mancilla J, Anderson PL, Gandhi M. Approaches to Objectively Measure Antiretroviral Medication Adherence and Drive Adherence Interventions. *Curr HIV/AIDS Rep*. Aug 2020;17(4):301-314. doi:10.1007/s11904-020-00502-5. PMC7363551.
79. Prévosto JM, Béraud B, Cheminel V, Gaillard Y, Mounier C, Chaulet JF. Determination of doxycycline in human plasma and urine samples by high performance liquid chromatography. Application for drug monitoring in malaria chemoprophylaxis. *Ann Biol Clin (Paris)*. 1995;53(1-2):29-32.
80. Zarghi A, Kebriaeezadeh A, Ahmadkhaniha R. Rapid high-performance liquid chromatographic method for determination of doxycycline in human plasma. *Boll Chim Farm*. Mar-Apr 2001;140(2):112-4.
81. Gschwend MH, Martin W, Erenmemişoğlu A, et al. Pharmacokinetics and bioequivalence study of doxycycline capsules in healthy male subjects. *Arzneimittelforschung*. 2007;57(6):347-51. doi:10.1055/s-0031-1296629.
82. Axisa B, Naylor AR, Bell PR, Thompson MM. Simple and reliable method of doxycycline determination in human plasma and biological tissues. *J Chromatogr B Biomed Sci Appl*. Jul 21 2000;744(2):359-65. doi:10.1016/s0378-4347(00)00261-9.
83. Angelakis E, Armstrong N, Nappez C, Richez M, Chabriere E, Raoult D. Doxycycline assay hair samples for testing long-term compliance treatment. *J Infect*. Nov 2015;71(5):511-7. doi:10.1016/j.jinf.2015.08.003.
84. Abdel-Hamid ME. Comparative LC-MS and HPLC analyses of selected antiepileptics and beta-blocking drugs. *Farmaco*. Feb 2000;55(2):136-45. doi:10.1016/s0014-827x(00)00006-9.
85. Marrazzo JM, Scholes D. Acceptability of urine-based screening for Chlamydia trachomatis in asymptomatic young men: a systematic review. *Sex Transm Dis*. Nov 2008;35(11 Suppl):S28-33. doi:10.1097/OLQ.0b013e31816938ca.
86. Hadland SE, Levy S. Objective Testing: Urine and Other Drug Tests. *Child Adolesc Psychiatr Clin N Am*. Jul 2016;25(3):549-65. doi:10.1016/j.chc.2016.02.005. PMC4920965.
87. Gao F, Zhao GX, Zhang HC, Wang P, Wang JP. Production of monoclonal antibody against doxycycline for immunoassay of seven tetracyclines in bovine muscle and milk. *J Environ Sci Health B*. 2013;48(2):92-100. doi:10.1080/03601234.2013.726856.
88. Adrian J, Fernández F, Sánchez-Baeza F, Marco MP. Preparation of antibodies and development of an enzyme-linked immunosorbent assay (ELISA) for the determination of doxycycline antibiotic in milk samples. *J Agric Food Chem*. Apr 18 2012;60(15):3837-46. doi:10.1021/jf2053355.
89. Le T, Zhao Z, Wei W, Bi D. Development of a highly sensitive and specific monoclonal antibody-based enzyme-linked immunosorbent assay for determination of doxycycline in chicken muscle, liver and egg. *Food Chem*. Oct 15 2012;134(4):2442-6. doi:10.1016/j.foodchem.2012.04.030.
90. Zhang Y, Lu S, Liu W, Zhao C, Xi R. Preparation of anti-tetracycline antibodies and development of an indirect heterologous competitive enzyme-linked immunosorbent assay to detect residues of tetracycline in milk. *J Agric Food Chem*. Jan 24 2007;55(2):211-8. doi:10.1021/jf062627s.
91. Lu W, Pan M, Ke H, et al. An LC-MS/MS method for the simultaneous determination of 18 antibacterial drugs in human plasma and its application in therapeutic drug monitoring. *Front Pharmacol*. 2022;13:1044234. doi:10.3389/fphar.2022.1044234. PMC9679284.
92. Radovanovic M, Day RO, Jones GDR, Galettis P, Norris RLG. LC-MS/MS method for simultaneous quantification of ten antibiotics in human plasma for routine therapeutic drug monitoring. *J Mass Spectrom Adv Clin Lab*. Nov 2022;26:48-59. doi:10.1016/j.jmsacl.2022.11.001. PMC9756784.
93. Cohen SE, Sachdev D, Lee SA, et al. Acquisition of tenofovir-susceptible, emtricitabine-resistant HIV despite high adherence to daily pre-exposure prophylaxis: a case report. *Lancet HIV*. Nov 29 2018;doi:10.1016/s2352-3018(18)30288-1. PMC6541554.
94. Spinelli MA, Lowery B, Shuford JA, et al. Use of Drug-level Testing and Single-genome Sequencing to Unravel a Case of Human Immunodeficiency Virus Seroconversion on Pre-exposure Prophylaxis. *Clin Infect Dis*. Jun 1 2021;72(11):2025-2028. doi:10.1093/cid/ciaa1011. PMC8315126.
95. Thaden JT, Gandhi M, Okochi H, Hurt CB, McKellar MS. Seroconversion on preexposure prophylaxis: a case report with segmental hair analysis for timed adherence determination. *Aids*. Jun 1 2018;32(9):F1-f4. doi:10.1097/qad.0000000000001825. PMC6140333.

96. Frasca K, Morrow M, Coyle RP, et al. Emtricitabine triphosphate in dried blood spots is a predictor of viral suppression in HIV infection and reflects short-term adherence to antiretroviral therapy. *J Antimicrob Chemother*. May 1 2019;74(5):1395-1401. doi:10.1093/jac/dky559. PMC6477969.
97. Aho J, Koushik A, Diakité SL, Loua KM, Nguyen VK, Rashed S. Biological validation of self-reported condom use among sex workers in Guinea. *AIDS Behav*. Dec 2010;14(6):1287-93. doi:10.1007/s10461-009-9602-6.
98. Carballo-Diéguez A, Remien RH, Dolezal C, Wagner G. Reliability of Sexual Behavior Self-Reports in Male Couples of Discordant HIV Status. *The Journal of Sex Research*. 1999;36(2):152-158.
99. Molina JM, Charreau I, Spire B, et al. Efficacy, safety, and effect on sexual behaviour of on-demand pre-exposure prophylaxis for HIV in men who have sex with men: an observational cohort study. *Lancet HIV*. Sep 2017;4(9):e402-e410. doi:10.1016/S2352-3018(17)30089-9.
100. Scott HM, Vittinghoff E, Irvin R, et al. Age, race/ethnicity, and behavioral risk factors associated with per contact risk of HIV infection among men who have sex with men in the United States. *J Acquir Immune Defic Syndr*. Jan 1 2014;65(1):115-21. doi:10.1097/QAI.0b013e3182a98bae. PMC3894586.
101. Traeger MW, Schroeder SE, Wright EJ, et al. Effects of Pre-exposure Prophylaxis for the Prevention of Human Immunodeficiency Virus Infection on Sexual Risk Behavior in Men Who Have Sex With Men: A Systematic Review and Meta-analysis. *Clin Infect Dis*. Aug 16 2018;67(5):676-686. doi:10.1093/cid/ciy182.
102. Hickey MD, Salmen CR, Tessler RA, et al. Antiretroviral concentrations in small hair samples as a feasible marker of adherence in rural Kenya. *J Acquir Immune Defic Syndr*. Jul 1 2014;66(3):311-5. doi:10.1097/qai.0000000000000154. PMC4146734.
103. S.R. G. Influence of female sex hormones on the pharmacokinetics of doxycyline. 6th International Conference on Diabetes and Endocrinology. 2016. Dallas U.S. December 5h.
104. Lieber M, Hamill MM, Pham P, Pine E, Crank J, Shah M. Navigating Human Immunodeficiency Virus and Primary Care Concerns Specific to the Transgender and Gender-Nonbinary Population. *Open Forum Infectious Diseases*. 2022;9(4)doi:10.1093/ofid/ofac091.
105. DiFrancesco R, Tooley K, Rosenkranz SL, et al. Clinical pharmacology quality assurance for HIV and related infectious diseases research. *Clin Pharmacol Ther*. Jun 2013;93(6):479-82. doi:10.1038/clpt.2013.62. PMC3970711.
106. Krishna AC, Sathiyaraj M, Saravanan RS, Chelladurai R, Vignesh R. A novel and rapid method to determine doxycycline in human plasma by liquid chromatography tandem mass spectrometry. *Indian J Pharm Sci*. Nov 2012;74(6):541-8. doi:10.4103/0250-474x.110599. PMC3687924.
107. Penot M, Linard C, Taudon N. A Validated Volumetric Absorptive Microsampling-Liquid Chromatography Tandem Mass Spectrometry Method to Quantify Doxycycline Levels in Urine: An Application to Monitor the Malaria Chemoprophylaxis Compliance. *J Anal Methods Chem*. 2020;2020:8868396. doi:10.1155/2020/8868396. PMC7787799.
108. Angelakis E, Armstrong N, Nappez C, Richez M, Chabriere E, Raoult D. Doxycycline assay hair samples for testing long-term compliance treatment. *Journal of Infection*. 2015/11/01/ 2015;71(5):511-517. doi:https://doi.org/10.1016/j.jinf.2015.08.003.
109. Pulerwitz J, Amaro H, De Jong W, Gortmaker SL, Rudd R. Relationship power, condom use and HIV risk among women in the USA. *AIDS Care*. Dec 2002;14(6):789-800. doi:10.1080/0954012021000031868.
110. Mody A, Eshun-Wilson I, Sikombe K, et al. Longitudinal engagement trajectories and risk of death among new ART starters in Zambia: A group-based multi-trajectory analysis. *PLoS Med*. Oct 2019;16(10):e1002959. doi:10.1371/journal.pmed.1002959. PMC6818762 following competing interests: EHG is a member of the Editorial Board of PLOS Medicine. CBH has received grant funding from the Gates Foundation.
111. Walter SD, Irwig LM. Estimation of test error rates, disease prevalence and relative risk from misclassified data: a review. *J Clin Epidemiol*. 1988;41(9):923-37. doi:10.1016/0895-4356(88)90110-2.
112. Bray BC, Lanza ST, Tan X. Eliminating Bias in Classify-Analyze Approaches for Latent Class Analysis. *Struct Equ Modeling*. Jan 2015;22(1):1-11. doi:10.1080/10705511.2014.935265. PMC4299667.
113. Johnson KA, Okochi H, Arreguin M, et al. Urine Tenofovir Levels Strongly Correlate With Virologic Suppression in Patients With Human Immunodeficiency Virus on Tenofovir Alafenamide-Based Antiretroviral Therapy. *Clin Infect Dis*. Mar 4 2023;76(5):930-933. doi:10.1093/cid/ciac828. PMC10226738.
114. Spinelli MA, Glidden DV, Anderson PL, et al. Brief Report: Short-Term Adherence Marker to PrEP Predicts Future Nonretention in a Large PrEP Demo Project: Implications for Point-of-Care Adherence Testing. *J Acquir Immune Defic Syndr*. Jun 1 2019;81(2):158-162. doi:10.1097/qai.0000000000002005. PMC6530484.

115. Rodriguez VJ, Alcaide ML, Sued O, et al. Detection of Antiretrovirals in Transgender Women With HIV Is Not Altered by Hair Treatments. *J Acquir Immune Defic Syndr*. Nov 1 2023;94(3):e3-e5. doi:10.1097/qai.0000000000003275. PMC10593490.
116. Anderson PL, Glidden DV, Liu A, et al. Emtricitabine-tenofovir concentrations and pre-exposure prophylaxis efficacy in men who have sex with men. *Sci Transl Med*. Sep 12 2012;4(151):151ra125. doi:10.1126/scitranslmed.3004006. PMC3721979.
117. Mouton JW, Muller AE, Canton R, Giske CG, Kahlmeter G, Turnidge J. MIC-based dose adjustment: facts and fables. *Journal of Antimicrobial Chemotherapy*. 2017;73(3):564-568. doi:10.1093/jac/dkx427.

Exhibit C

Recipient Information

1. Recipient Name
REGENTS OF THE UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, THE
1855 FOLSOM ST STE 425
SAN FRANCISCO, CA 94103

2. Congressional District of Recipient
11

3. Payment System Identifier (ID)
1946036493A6

4. Employer Identification Number (EIN)
946036493

5. Data Universal Numbering System (DUNS)
094878337

6. Recipient's Unique Entity Identifier
KMH5K9V7S518

7. Project Director or Principal Investigator
Matthew A. Spinelli, MD
Assistant Professor
Matthew.Spinelli@ucsf.edu
162-820-6240

8. Authorized Official
Ms. Julie C. Tang

Federal Agency Information

9. Awarding Agency Contact Information
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10. Program Official Contact Information
ELEANORE JENNIFER Chuang

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Federal Award Information

11. Award Number
1R01AI186641-01

12. Unique Federal Award Identification Number (FAIN)
R01AI186641

13. Statutory Authority
42 USC 241 42 CFR 52

14. Federal Award Project Title
Randomized Directly Observed Therapy Study to Interpret Clinical Trials of Doxy-PEP

15. Assistance Listing Number
93.855

16. Assistance Listing Program Title
Allergy and Infectious Diseases Research

17. Award Action Type
New Competing (REVISED)

18. Is the Award R&D?
Yes

Summary Federal Award Financial Information	
19. Budget Period Start Date 08/14/2024 **– End Date** 06/30/2025	
20. Total Amount of Federal Funds Obligated by this Action	$76,582
20 a. Direct Cost Amount	$48,158
20 b. Indirect Cost Amount	$28,424
21. Authorized Carryover	
22. Offset	
23. Total Amount of Federal Funds Obligated this budget period	$781,821
24. Total Approved Cost Sharing or Matching, where applicable	$0
25. Total Federal and Non-Federal Approved this Budget Period	$781,821
26. Project Period Start Date 08/14/2024 **– End Date** 06/30/2029	
27. Total Amount of the Federal Award including Approved Cost Sharing or Matching this Project Period	$781,821

28. Authorized Treatment of Program Income
Additional Costs

29. Grants Management Officer - Signature
Chernay L. Rogers

30. Remarks

Acceptance of this award, including the "Terms and Conditions," is acknowledged by the recipient when funds are drawn down or otherwise requested from the grant payment system.

Notice of Award

RESEARCH
Department of Health and Human Services
National Institutes of Health

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

SECTION I – AWARD DATA – 1R01AI186641-01 REVISED

Principal Investigator(s):
Matthew A. Spinelli, MD

Award e-mailed to: cgrasteam@ucsf.edu

Dear Authorized Official:

The National Institutes of Health hereby revises this award to reflect an increase in the amount of $76,582 (see "Award Calculation" in Section I and "Terms and Conditions" in Section III) to The Regents of the UCSF in support of the above referenced project. This award is pursuant to the authority of 42 USC 241 42 CFR 52 and is subject to the requirements of this statute and regulation and of other referenced, incorporated or attached terms and conditions.

Acceptance of this award, including the "Terms and Conditions," is acknowledged by the recipient when funds are drawn down or otherwise requested from the grant payment system.

Each publication, press release, or other document about research supported by an NIH award must include an acknowledgment of NIH award support and a disclaimer such as "Research reported in this publication was supported by the National Institute Of Allergy And Infectious Diseases of the National Institutes of Health under Award Number R01AI186641. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health." Prior to issuing a press release concerning the outcome of this research, please notify the NIH awarding IC in advance to allow for coordination.

Award recipients must promote objectivity in research by establishing standards that provide a reasonable expectation that the design, conduct and reporting of research funded under NIH awards will be free from bias resulting from an Investigator's Financial Conflict of Interest (FCOI), in accordance with the 2011 revised regulation at 42 CFR Part 50 Subpart F. The Institution shall submit all FCOI reports to the NIH through the eRA Commons FCOI Module. The regulation does not apply to Phase I Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) awards. Consult the NIH website http://grants.nih.gov/grants/policy/coi/ for a link to the regulation and additional important information.

If you have any questions about this award, please direct questions to the Federal Agency contacts.

Sincerely yours,

Chernay L. Rogers
Grants Management Officer
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

Additional information follows

Cumulative Award Calculations for this Budget Period (U.S. Dollars)

Salaries and Wages	$226,393
Fringe Benefits	$82,499
Personnel Costs (Subtotal)	$308,892
Materials & Supplies	$34,197
Travel	$10,000
Other	$65,000
Subawards/Consortium/Contractual Costs	$57,684
Publication Costs	$2,000
ADP/Computer Services	$3,812
Federal Direct Costs	$481,585
Federal F&A Costs	$300,236
Approved Budget	$781,821
Total Amount of Federal Funds Authorized (Federal Share)	$781,821
TOTAL FEDERAL AWARD AMOUNT	$781,821
AMOUNT OF THIS ACTION (FEDERAL SHARE)	$76,582

SUMMARY TOTALS FOR ALL YEARS (for this Document Number)		
YR	**THIS AWARD**	**CUMULATIVE TOTALS**
1	$781,821	$781,821
2	$813,232	$813,232
3	$809,765	$809,765
4	$809,624	$809,624
5	$809,624	$809,624

Recommended future year total cost support, subject to the availability of funds and satisfactory progress of the project

Fiscal Information:

Payment System Identifier:	1946036493A6
Document Number:	RAI186641A
PMS Account Type:	P (Subaccount)
Fiscal Year:	2024

IC	CAN	2024	2025	2026	2027	2028
AI	8472338	$781,821	$813,232	$809,765	$809,624	$809,624

Recommended future year total cost support, subject to the availability of funds and satisfactory progress of the project

NIH Administrative Data:
PCC: M37C A / **OC**: 41021 / **Released**: 09/05/2024
Award Processed: 09/06/2024 12:07:51 AM

SECTION II – PAYMENT/HOTLINE INFORMATION – 1R01AI186641-01 REVISED

For payment and HHS Office of Inspector General Hotline information, see the NIH Home Page at http://grants.nih.gov/grants/policy/awardconditions.htm

SECTION III – STANDARD TERMS AND CONDITIONS – 1R01AI186641-01 REVISED

This award is based on the application submitted to, and as approved by, NIH on the above-titled project and is subject to the terms and conditions incorporated either directly or by reference in the following:

a. The grant program legislation and program regulation cited in this Notice of Award.
b. Conditions on activities and expenditure of funds in other statutory requirements, such as those included in appropriations acts.
c. 45 CFR Part 75.
d. National Policy Requirements and all other requirements described in the NIH Grants Policy Statement, including addenda in effect as of the beginning date of the budget period.
e. Federal Award Performance Goals: As required by the periodic report in the RPPR or in the final progress report when applicable.
f. This award notice, INCLUDING THE TERMS AND CONDITIONS CITED BELOW.

(See NIH Home Page at http://grants.nih.gov/grants/policy/awardconditions.htm for certain references cited above.)

Research and Development (R&D): All awards issued by the National Institutes of Health (NIH) meet the definition of "Research and Development" at 45 CFR Part§ 75.2**.** As such, auditees should identify NIH awards as part of the R&D cluster on the Schedule of Expenditures of Federal Awards (SEFA). The auditor should test NIH awards for compliance as instructed in Part V, Clusters of Programs. NIH recognizes that some awards may have another classification for purposes of indirect costs. The auditor is not required to report the disconnect (i.e., the award is classified as R&D for Federal Audit Requirement purposes but non-research for indirect cost rate purposes), unless the auditee is charging indirect costs at a rate other than the rate(s) specified in the award document(s).

This institution is a signatory to the Federal Demonstration Partnership (FDP) Phase VII Agreement which requires active institutional participation in new or ongoing FDP demonstrations and pilots.

An unobligated balance may be carried over into the next budget period without Grants Management Officer prior approval.

This grant is subject to Streamlined Noncompeting Award Procedures (SNAP).

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This award has been assigned the Federal Award Identification Number (FAIN) R01AI186641. Recipients must document the assigned FAIN on each consortium/subaward issued under this award.

Based on the project period start date of this project, this award is likely subject to the Transparency Act subaward and executive compensation reporting requirement of 2 CFR Part 170. There are conditions that may exclude this award; see http://grants.nih.gov/grants/policy/awardconditions.htm for additional award applicability information.

In accordance with P.L. 110-161, compliance with the NIH Public Access Policy is now mandatory. For more information, see NOT-OD-08-033 and the Public Access website: http://publicaccess.nih.gov/.

This award provides support for one or more clinical trials. By law (Title VIII, Section 801 of Public Law 110-85), the "responsible party" must register "applicable clinical trials" on the ClinicalTrials.gov Protocol Registration System Information Website. NIH encourages registration of all trials whether required under the law or not. For more information, see http://grants.nih.gov/ClinicalTrials_fdaaa/

Recipients must administer the project in compliance with federal civil rights laws that prohibit discrimination on the basis of race, color, national origin, disability, age, and comply with applicable conscience protections. The recipient will comply with applicable laws that prohibit discrimination on the basis of sex, which includes discrimination on the basis of gender identity, sexual orientation, and pregnancy. Compliance with these laws requires taking reasonable steps to provide meaningful access to persons with limited English proficiency and providing programs that are accessible to and usable by persons with disabilities. The HHS Office for Civil Rights provides guidance on complying with civil rights laws enforced by HHS. See https://www.hhs.gov/civil-rights/for-providers/provider-obligations/index.html and https://www.hhs.gov/.

- Recipients of FFA must ensure that their programs are accessible to persons with limited English proficiency. For guidance on meeting the legal obligation to take reasonable steps to ensure meaningful access to programs or activities by limited English proficient individuals, see https://www.hhs.gov/civil-rights/for-individuals/special-topics/limited-english-proficiency/fact-sheet-guidance/index.html and https://www.lep.gov.
- For information on an institution's specific legal obligations for serving qualified individuals with disabilities, including providing program access, reasonable modifications, and to provide effective communication, see http://www.hhs.gov/ocr/civilrights/understanding/disability/index.html.
- HHS funded health and education programs must be administered in an environment free of sexual harassment; see https://www.hhs.gov/civil-rights/for-individuals/sex-discrimination/index.html.

For information about NIH's commitment to supporting a safe and respectful work environment, who to contact with questions or concerns, and what NIH's expectations are for institutions and the individuals supported on NIH-funded awards, please see https://grants.nih.gov/grants/policy/harassment.htm.

- For guidance on administering programs in compliance with applicable federal religious nondiscrimination laws and applicable federal conscience protection and associated anti-discrimination laws, see https://www.hhs.gov/conscience/conscience-protections/index.html and https://www.hhs.gov/conscience/religious-freedom/index.html.

In accordance with the regulatory requirements provided at 45 CFR 75.113 and Appendix XII to 45 CFR Part 75, recipients that have currently active Federal grants, cooperative agreements, and procurement contracts with cumulative total value greater than $10,000,000 must report and maintain information in the System for Award Management (SAM) about civil, criminal, and administrative proceedings in connection with the award or performance of a Federal award that reached final disposition within the most recent five-year period. The recipient must also make semiannual disclosures regarding such proceedings. Proceedings information will be made publicly available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)). Full reporting requirements and procedures are found in Appendix XII to 45 CFR Part 75. This term does not apply to NIH fellowships.

Treatment of Program Income:
Additional Costs

SECTION IV – AI SPECIFIC AWARD CONDITIONS – 1R01AI186641-01 REVISED

Clinical Trial Indicator: Yes
This award supports one or more NIH-defined Clinical Trials. See the NIH Grants Policy Statement Section 1.2 for NIH definition of Clinical Trial.

REVISED AWARD: This award is revised to increase the funding level to 100% of the approved budget for the initial budget period. Out-year commitments for continuation awards remain unchanged.

Supersedes previous Notice of Award dated **8/14/2024**. All other terms and conditions still apply to this award.

***

This award includes human subject research studies and must conform to the DHHS policies for the Protection of Human Subjects research, which are a term and condition of award. Human subjects research is covered by the 2018 Common Rule, and may not be initiated until the associated protocols have received IRB approval as specified in 45 CFR 46. Failure to comply with the terms and conditions of award may result in the disallowance of costs and/or additional enforcement actions as outlined in Section 8.5 of the NIH Grants Policy Statement
****
This Notice of Award (NoA) includes funds for University of Washington

This Notice of Award (NoA) includes funds for Hennepin Healthcare Research Institute
****

REMINDER: This grant is funded for HIV/AIDS research. Per the NIH Revitalization Act of 1993, funds are restricted for HIV/AIDS research and cannot be re-budgeted for other purposes.

***

Commitment overlap is not permitted, and occurs when an individual's time commitment exceeds 100 percent (i.e., 12 person months), whether or not salary support is requested. Therefore, no individual's time commitment may exceed 100 percent (i.e., 12 person months). Reductions in NIH support due to commitment

overlap must be made in accordance with NIH policy as outlined in the NIH Grants Policy Statement.

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This award is subject to the NIAID Clinical Terms of Award incorporated by reference, and can be accessed via the following World Wide Web address: https://www.niaid.nih.gov/grants-contracts/niaid-clinical-terms-award All submissions required by the NIAID Clinical Terms of Award must be forwarded electronically to the NIAID Program Official identified on this Notice of Award.

***

The initial budget period has been adjusted to 11 months. See https://www.niaid.nih.gov/grants-contracts/financial-management-plan.

The budget period anniversary start date for future year(s) will be **July 1.**

Data Management and Sharing Policy: Applicable

This project is expected to generate scientific data. Therefore, the Final NIH Policy for Data Management and Sharing applies. The approved Data Management and Sharing (DMS) Plan is hereby incorporated as a term and condition of award, and the recipient shall manage and disseminate scientific data in accordance with the approved plan. Any significant changes to the DMS Plan (e.g., new scientific direction, a different data repository, or a timeline revision) require NIH prior approval. Failure to comply with the approved DMS plan may result in suspension and/or termination of this award, withholding of support, audit disallowances, and/or other appropriate action. See NIH Grants Policy Statement Section 8.2.3 for more information on data management and sharing expectations.

SPREADSHEET SUMMARY
AWARD NUMBER: 1R01AI186641-01 REVISED

INSTITUTION: The Regents of the UCSF

Budget	Year 1	Year 2	Year 3	Year 4	Year 5
Salaries and Wages	$226,393	$256,790	$265,631	$265,631	$265,631
Fringe Benefits	$82,499	$92,862	$96,451	$96,451	$96,451
Personnel Costs (Subtotal)	$308,892	$349,652	$362,082	$362,082	$362,082
Materials & Supplies	$34,197	$34,370	$60,692	$60,606	$60,606
Travel	$10,000	$10,000	$10,000	$10,000	$10,000
Other	$65,000	$59,000	$20,000	$20,000	$20,000
Subawards/Consortium/Contractual Costs	$57,684	$57,684	$57,684	$57,684	$57,684
Publication Costs	$2,000	$2,000	$2,000	$2,000	$2,000
ADP/Computer Services	$3,812	$3,812	$3,812	$3,812	$3,812
TOTAL FEDERAL DC	$481,585	$516,518	$516,270	$516,184	$516,184
TOTAL FEDERAL F&A	$300,236	$296,714	$293,495	$293,440	$293,440
TOTAL COST	$781,821	$813,232	$809,765	$809,624	$809,624

Facilities and Administrative Costs	Year 1	Year 2	Year 3	Year 4	Year 5
F&A Cost Rate 1	64%	64%	64%	64%	64%
F&A Cost Base 1	$469,119	$463,616	$458,586	$458,500	$458,500
F&A Costs 1	$300,236	$296,714	$293,495	$293,440	$293,440

Exhibit D

March 18, 2025

Julie C. Tang
The Regents of the University of California, San Francisco
julie.tang@ucsf.edu

Dear Julie C. Tang:

Effective with the date of this letter, funding for Project Number 1R01 AI186641-01 is hereby terminated pursuant to the Fiscal Year 2024 National Institutes of Health ("NIH") Grants Policy Statement,[1] and 2 C.F.R. § 200.340(a)(2). This letter constitutes a notice of termination.[2]

The 2024 Policy Statement applies to your project because NIH approved your grant on August 14, 2024, and "obligations generally should be determined by reference to the law in effect when the grants were made."[3]

The 2024 Policy Statement "includes the terms and conditions of NIH grants and cooperative agreements and is incorporated by reference in all NIH grant and cooperative agreement awards.[4]" According to the Policy Statement, "NIH may … terminate the grant in whole or in part as outlined in 2 CFR Part 200.340.[5]" At the time your grant was issued, 2 C.F.R. § 200.340(a)(2) permitted termination "[b]y the Federal awarding agency or pass-through entity, to the greatest extent authorized by law, if an award no longer effectuates the program goals or agency priorities."

This award no longer effectuates agency priorities. Research programs based on gender identity are often unscientific, have little identifiable return on investment, and do nothing to enhance the health of many Americans. Many such studies ignore, rather than seriously examine, biological realities. It is the policy of NIH not to prioritize these research programs.

Although "NIH generally will suspend (rather than immediately terminate) a grant and allow the recipient an opportunity to take appropriate corrective action before NIH makes a termination decision,"[6] no corrective action is possible here. The premise of this award is incompatible with

[1] https://grants.nih.gov/grants/policy/nihgps/nihgps.pdf.
[2] 2 C.F.R. § 200.341(a); 45 C.F.R. § 75.373
[3] *Bennett v. New Jersey*, 470 U.S. 632, 638 (1985).
[4] 2024 Policy Statement at IIA-1.
[5] *Id.* at IIA-155.
[6] 2024 Policy Statement at IIA-156.

agency priorities, and no modification of the project could align the project with agency priorities.

Costs resulting from financial obligations incurred after termination are not allowable.[7] Nothing in this notice excuses either NIH or you from complying with the closeout obligations imposed by 2 C.F.R. §§ 75.381-75.390. NIH will provide any information required by the Federal Funding Accountability and Transparency Act or the Office of Management and Budget's regulations to *USAspending.gov.*[8]

Administrative Appeal

You may object and provide information and documentation challenging this termination.[9] NIH has established a first-level grant appeal procedure that must be exhausted before you may file an appeal with the Departmental Appeals Board.[10]

You must submit a request for such review to Dr. Matt Memoli no later than 30 days after the written notification of the determination is received, except that if you show good cause why an extension of time should be granted, Dr. Memoli may grant an extension of time.[11]

The request for review must include a copy of the adverse determination, must identify the issue(s) in dispute, and must contain a full statement of your position with respect to such issue(s) and the pertinent facts and reasons in support of your position. In addition to the required written statement, you shall provide copies of any documents supporting your claim.[12]

Sincerely,

Michelle G. Bulls, on behalf Emily Linde, Chief Grants Management Officer, National Institute of Allergy and Infectious Diseases
Director, Office of Policy for Extramural Research Administration
Office of Extramural Research

[7] *See* 2 C.F.R. § 200.343 (2024).
[8] 2 C.F.R. § 200.341(c); 45 C.F.R. § 75.373(c)
[9] *See* 45 C.F.R. § 75.374.
[10] See 42 C.F.R. Part 50, Subpart D
[11] 11 *Id.* § 50.406(a)
[12] 12 *Id.* § 50.406(b)

Exhibit E

National Institutes of Health
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

Notice of Award
FAIN# R01AI186641
Federal Award Date
07/09/2025

Recipient Information

1. Recipient Name
REGENTS OF THE UNIVERSITY OF CALIFORNIA, SAN FRANCISCO, THE
1855 FOLSOM ST STE 425
SAN FRANCISCO, CA 94103

2. Congressional District of Recipient
11

3. Payment System Identifier (ID)
1946036493A6

4. Employer Identification Number (EIN)
946036493

5. Data Universal Numbering System (DUNS)
094878337

6. Recipient's Unique Entity Identifier
KMH5K9V7S518

7. Project Director or Principal Investigator
Matthew A. Spinelli, MD
Assistant Professor
Matthew.Spinelli@ucsf.edu
162-820-6240

8. Authorized Official
Ms. Julie C. Tang

Federal Agency Information

9. Awarding Agency Contact Information
MATTHEW WILLIAM Gossart

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES
matthew.gossart@nih.gov
(240) 627-3046

10. Program Official Contact Information
ELEANORE JENNIFER Chuang

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES
eleanore.chuang@nih.gov
(240) 747-7858

Federal Award Information

11. Award Number
1R01AI186641-01

12. Unique Federal Award Identification Number (FAIN)
R01AI186641

13. Statutory Authority
42 USC 241 42 CFR 52

14. Federal Award Project Title
Randomized Directly Observed Therapy Study to Interpret Clinical Trials of Doxy-PEP

15. Assistance Listing Number
93.855

16. Assistance Listing Program Title
Allergy and Infectious Diseases Research

17. Award Action Type
New Competing (REVISED)

18. Is the Award R&D?
Yes

Summary Federal Award Financial Information	
19. Budget Period Start Date 08/14/2024 **– End Date** 06/30/2025	
20. Total Amount of Federal Funds Obligated by this Action	$0
20 a. Direct Cost Amount	$0
20 b. Indirect Cost Amount	$0
21. Authorized Carryover	
22. Offset	
23. Total Amount of Federal Funds Obligated this budget period	$781,821
24. Total Approved Cost Sharing or Matching, where applicable	$0
25. Total Federal and Non-Federal Approved this Budget Period	$781,821
26. Project Period Start Date 08/14/2024 **– End Date** 06/30/2029	
27. Total Amount of the Federal Award including Approved Cost Sharing or Matching this Project Period	$781,821

28. Authorized Treatment of Program Income
Additional Costs

29. Grants Management Officer - Signature
Tamia Y. Carter

30. Remarks

Acceptance of this award, including the "Terms and Conditions," is acknowledged by the recipient when funds are drawn down or otherwise requested from the grant payment system.

Notice of Award

RESEARCH
Department of Health and Human Services
National Institutes of Health

NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

SECTION I – AWARD DATA – 1R01AI186641-01 REVISED

Principal Investigator(s):
Matthew A. Spinelli, MD

Award e-mailed to: cgrasteam@ucsf.edu

Dear Authorized Official:

The National Institutes of Health hereby revises this award (see "Award Calculation" in Section I and "Terms and Conditions" in Section III) to The Regents of the UCSF in support of the above referenced project. This award is pursuant to the authority of 42 USC 241 42 CFR 52 and is subject to the requirements of this statute and regulation and of other referenced, incorporated or attached terms and conditions.

Acceptance of this award, including the "Terms and Conditions," is acknowledged by the recipient when funds are drawn down or otherwise requested from the grant payment system.

Each publication, press release, or other document about research supported by an NIH award must include an acknowledgment of NIH award support and a disclaimer such as "Research reported in this publication was supported by the National Institute Of Allergy And Infectious Diseases of the National Institutes of Health under Award Number R01AI186641. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health." Prior to issuing a press release concerning the outcome of this research, please notify the NIH awarding IC in advance to allow for coordination.

Award recipients must promote objectivity in research by establishing standards that provide a reasonable expectation that the design, conduct and reporting of research funded under NIH awards will be free from bias resulting from an Investigator's Financial Conflict of Interest (FCOI), in accordance with the 2011 revised regulation at 42 CFR Part 50 Subpart F. The Institution shall submit all FCOI reports to the NIH through the eRA Commons FCOI Module. The regulation does not apply to Phase I Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) awards. Consult the NIH website http://grants.nih.gov/grants/policy/coi/ for a link to the regulation and additional important information.

If you have any questions about this award, please direct questions to the Federal Agency contacts.

Sincerely yours,

Tamia Y. Carter
Grants Management Officer
NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES

Additional information follows

Cumulative Award Calculations for this Budget Period (U.S. Dollars)

Salaries and Wages	$226,393

Fringe Benefits	$82,499
Personnel Costs (Subtotal)	$308,892
Materials & Supplies	$34,197
Travel	$10,000
Other	$65,000
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Publication Costs	$2,000
ADP/Computer Services	$3,812
Federal Direct Costs	$481,585
Federal F&A Costs	$300,236
Approved Budget	$781,821
Total Amount of Federal Funds Authorized (Federal Share)	$781,821
TOTAL FEDERAL AWARD AMOUNT	$781,821
AMOUNT OF THIS ACTION (FEDERAL SHARE)	$0

SUMMARY TOTALS FOR ALL YEARS (for this Document Number)		
YR	**THIS AWARD**	**CUMULATIVE TOTALS**
1	$781,821	$781,821
2	$813,232	$813,232
3	$809,765	$809,765
4	$809,624	$809,624
5	$809,624	$809,624

Recommended future year total cost support, subject to the availability of funds and satisfactory progress of the project

Fiscal Information:

Payment System Identifier:	1946036493A6
Document Number:	RAI186641A
PMS Account Type:	P (Subaccount)
Fiscal Year:	2024

IC	CAN	2024	2025	2026	2027	2028
AI	8472338	$781,821	$813,232	$809,765	$809,624	$809,624

Recommended future year total cost support, subject to the availability of funds and satisfactory progress of the project

NIH Administrative Data:
PCC: M37C A / **OC**: 41021 / **Released**: 07/08/2025
Award Processed: 07/09/2025 03:20:54 PM

SECTION II – PAYMENT/HOTLINE INFORMATION – 1R01AI186641-01 REVISED

For payment and HHS Office of Inspector General Hotline information, see the NIH Home Page at http://grants.nih.gov/grants/policy/awardconditions.htm

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This grant is subject to Streamlined Noncompeting Award Procedures (SNAP).

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- Recipients of FFA must ensure that their programs are accessible to persons with limited English proficiency. For guidance on meeting the legal obligation to take reasonable steps to ensure meaningful access to programs or activities by limited English proficient individuals, see https://www.hhs.gov/civil-rights/for-individuals/special-topics/limited-english-proficiency/fact-sheet-guidance/index.html and https://www.lep.gov.
- For information on an institution's specific legal obligations for serving qualified individuals with disabilities, including providing program access, reasonable modifications, and to provide effective communication, see http://www.hhs.gov/ocr/civilrights/understanding/disability/index.html.
- HHS funded health and education programs must be administered in an environment free of sexual harassment; see https://www.hhs.gov/civil-rights/for-individuals/sex-discrimination/index.html. For information about NIH's commitment to supporting a safe and respectful work environment,

who to contact with questions or concerns, and what NIH's expectations are for institutions and the individuals supported on NIH-funded awards, please see https://grants.nih.gov/grants/policy/harassment.htm.

- For guidance on administering programs in compliance with applicable federal religious nondiscrimination laws and applicable federal conscience protection and associated anti-discrimination laws, see https://www.hhs.gov/conscience/conscience-protections/index.html and https://www.hhs.gov/conscience/religious-freedom/index.html.

In accordance with the regulatory requirements provided at 45 CFR 75.113 and Appendix XII to 45 CFR Part 75, recipients that have currently active Federal grants, cooperative agreements, and procurement contracts with cumulative total value greater than $10,000,000 must report and maintain information in the System for Award Management (SAM) about civil, criminal, and administrative proceedings in connection with the award or performance of a Federal award that reached final disposition within the most recent five-year period. The recipient must also make semiannual disclosures regarding such proceedings. Proceedings information will be made publicly available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)). Full reporting requirements and procedures are found in Appendix XII to 45 CFR Part 75. This term does not apply to NIH fellowships.

Treatment of Program Income:
Additional Costs

Recipient is compliant with Title IX of the Education Amendments of 1972, as amended, 20 U.S.C. §§ 1681 et seq., including the requirements set forth in Presidential Executive Order 14168 titled Defending Women From Gender Ideology Extremism and Restoring Biological Truth to the Federal Government, and Title VI of the Civil Rights Act of 1964, 42 U.S.C. §§ 2000d et seq., and Recipient will remain compliant for the duration of the Agreement.

- The above requirements are conditions of payment that go the essence of the Agreement and are therefore material terms of the Agreement.
- Payments under the Agreement are predicated on compliance with the above requirements, and therefore Recipient is not eligible for funding under the Agreement or to retain any funding under the Agreement absent compliance with the above requirements.
- Recipient acknowledges that this certification reflects a change in the government's position regarding the materiality of the foregoing requirements and therefore any prior payment of similar claims does not reflect the materiality of the foregoing requirements to this Agreement.
- Recipient acknowledges that a knowing false statement relating to Recipient's compliance with the above requirements and/or eligibility for the Agreement may subject Recipient to liability under the False Claims Act, 31 U.S.C. § 3729, and/or criminal liability, including under 18 U.S.C. §§ 287 and 1001.

SECTION IV – AI SPECIFIC AWARD CONDITIONS – 1R01AI186641-01 REVISED

Clinical Trial Indicator: Yes
This award supports one or more NIH-defined Clinical Trials. See the NIH Grants Policy Statement Section 1.2 for NIH definition of Clinical Trial.

REVISED AWARD:

Effective with the date of this revised Notice of Award, funding for Project Number 1R01AI186641-01 is hereby fully reinstated; therefore, the Notice of Award dated 03/22/2025 that terminated the project is rescinded without conditions. Funds made available to UNIVERSITY OF CALIFORNIA, SAN FRANCISCO used to support Randomized Directly Observed Therapy Study to Interpret Clinical Trials of Doxy-PEP are no longer restricted and are available for use in accordance with the terms and conditions of the award.

Supersedes previous Notice of Award dated **03/22/2025.** All other terms and conditions still apply to this award.

****

REVISED AWARD: This award is revised to increase the funding level to 100% of the approved budget for the initial budget period. Out-year commitments for continuation awards remain unchanged.

Supersedes previous Notice of Award dated **8/14/2024**. All other terms and conditions still apply to this award.

***

This award includes human subject research studies and must conform to the DHHS policies for the Protection of Human Subjects research, which are a term and condition of award. Human subjects research is covered by the 2018 Common Rule, and may not be initiated until the associated protocols have received IRB approval as specified in 45 CFR 46. Failure to comply with the terms and conditions of award may result in the disallowance of costs and/or additional enforcement actions as outlined in Section 8.5 of the NIH Grants Policy Statement
****
This Notice of Award (NoA) includes funds for University of Washington

This Notice of Award (NoA) includes funds for Hennepin Healthcare Research Institute
****

REMINDER: This grant is funded for HIV/AIDS research. Per the NIH Revitalization Act of 1993, funds are restricted for HIV/AIDS research and cannot be re-budgeted for other purposes.

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Commitment overlap is not permitted, and occurs when an individual's time commitment exceeds 100 percent (i.e., 12 person months), whether or not salary support is requested. Therefore, no individual's time commitment may exceed 100 percent (i.e., 12 person months). Reductions in NIH support due to commitment overlap must be made in accordance with NIH policy as outlined in the NIH Grants Policy Statement.

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This award is subject to the NIAID Clinical Terms of Award incorporated by reference, and can be accessed via the following World Wide Web address: https://www.niaid.nih.gov/grants-contracts/niaid-clinical-terms-award All submissions required by the NIAID Clinical Terms of Award must be forwarded electronically to the NIAID Program Official identified on this Notice of Award.

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The initial budget period has been adjusted to 11 months. See https://www.niaid.nih.gov/grants-contracts/financial-management-plan.

The budget period anniversary start date for future year(s) will be **July 1.**

Data Management and Sharing Policy: Applicable

This project is expected to generate scientific data. Therefore, the Final NIH Policy for Data Management and Sharing applies. The approved Data Management and Sharing (DMS) Plan is hereby incorporated as a term and condition of award, and the recipient shall manage and disseminate scientific data in accordance with the approved plan. Any significant changes to the DMS Plan (e.g., new scientific direction, a different data repository, or a timeline revision) require NIH prior approval. Failure to comply with the approved DMS plan may result in suspension and/or termination of this award, withholding of support, audit disallowances, and/or other appropriate action. See NIH Grants Policy Statement Section 8.2.3 for more information on data management and sharing expectations.

SPREADSHEET SUMMARY
AWARD NUMBER: 1R01AI186641-01 REVISED

INSTITUTION: The Regents of the UCSF

Budget	Year 1	Year 2	Year 3	Year 4	Year 5
Salaries and Wages	$226,393	$256,790	$265,631	$265,631	$265,631
Fringe Benefits	$82,499	$92,862	$96,451	$96,451	$96,451
Personnel Costs (Subtotal)	$308,892	$349,652	$362,082	$362,082	$362,082
Materials & Supplies	$34,197	$34,370	$60,692	$60,606	$60,606
Travel	$10,000	$10,000	$10,000	$10,000	$10,000
Other	$65,000	$59,000	$20,000	$20,000	$20,000
Subawards/Consortium/Contractual Costs	$57,684	$57,684	$57,684	$57,684	$57,684
Publication Costs	$2,000	$2,000	$2,000	$2,000	$2,000
ADP/Computer Services	$3,812	$3,812	$3,812	$3,812	$3,812
TOTAL FEDERAL DC	$481,585	$516,518	$516,270	$516,184	$516,184
TOTAL FEDERAL F&A	$300,236	$296,714	$293,495	$293,440	$293,440
TOTAL COST	$781,821	$813,232	$809,765	$809,624	$809,624

Facilities and Administrative Costs	Year 1	Year 2	Year 3	Year 4	Year 5
F&A Cost Rate 1	64%	64%	64%	64%	64%
F&A Cost Base 1	$469,119	$463,616	$458,586	$458,500	$458,500
F&A Costs 1	$300,236	$296,714	$293,495	$293,440	$293,440