

**INTERNAL MEDICINE
COLLEGE OF MEDICINE****SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students****FOR APPLICATION YEAR: 2025****PROJECT TITLE: Evaluation of viral diversity in persons with HIV and opioid use disorder**

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Project Description

HIV includes multiple distinct subtypes that are important predictors of chemokine receptor utilization, disease progression, treatment response, and gene expression. Variability across the entire genome (i.e., multiple distinct viral genes) can impact gene expression and disease progression.

We have previously reported that the synthetic opioid fentanyl causes increased replication of HIV in multiple cell types [Effect of fentanyl on HIV expression in peripheral blood mononuclear cells. *Front Microbiol.* 2024 Sep 25;15:1463441; The synthetic opioid fentanyl increases HIV replication and chemokine co-receptor expression in lymphocyte cell lines. *Viruses.* 2023 Apr 21;15(4):1027; The synthetic opioid fentanyl increases HIV replication and chemokine co-receptor expression in vitro. *J Neurovirol.* 2022 Dec;28(4-6):583-594].

This cross-sectional analysis would optimize the amplification of the full-length HIV and evaluate HIV diversity in persons with HIV and/or opioid use disorder previously enrolled at the University of Cincinnati. HIV diversity will evaluate signature sequences that distinguish opioid-positive versus opioid-negative individuals and for its association with markers of HIV disease progression (e.g., CD4 cell count, HIV RNA level), liver disease (e.g., ALT, AST, FIB-4), and/or the presence/absence of opioid use.

As part of this project, the trainee would:

1. Develop a good working knowledge of viruses and important clinical questions related to viruses
2. Complete Research 101 online

3. Conduct nucleic acid extractions and optimize PCR testing of the full-length HIV genome from the peripheral blood of individuals living with HIV and/or opioid use disorder in Cincinnati
4. Utilize next-generation sequencing and phylogenetic analysis to evaluate HIV diversity
5. Participate in Hepatology Research Group lab meetings
6. Meet with members of the Blackard lab to learn about their projects