

# HIV, Smoking and Oxygen Transfer of the Lungs ($D_LCO$) in the MACS/WIHS Combined Cohort Study

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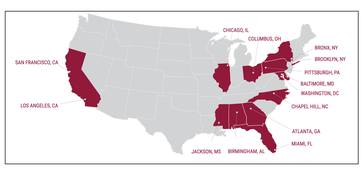
## Introduction

- Chronic lung disease is a common comorbidity in persons with HIV (PWH).
- Diffusing capacity of the lungs for carbon monoxide ($D_LCO$) measures oxygen transfer from air to blood, is a sensitive marker of lung disease, and is the most common lung function abnormality in PWH.
- Prior $D_LCO$ data from PWH have been largely cross-sectional or lacked controls of persons without HIV (PWoH).
- We report here the first study, to our knowledge, to report independent associations between HIV serostatus and longitudinal changes in $D_LCO$.
- ***Aim: determine whether PWH have faster longitudinal decline in $D_LCO$ than PWoH.***

## Methods

- MWCCS is a longitudinal, multicenter cohort study of men and women, with and without HIV.
- Data collection and participants:
  - Standardized $D_LCO$.
  - Central QC blinded to HIV serostatus.
  - Baseline (2017-2019) and follow-up (2021-2024).

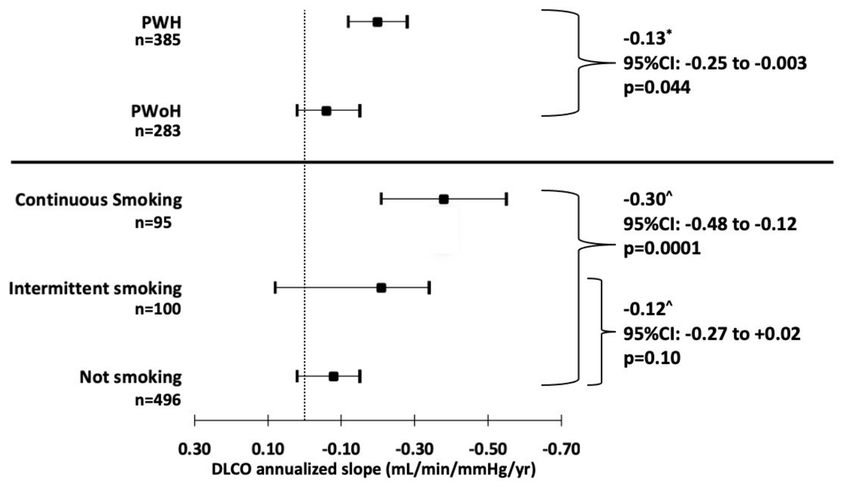





- Primary predictors:
  - HIV serostatus.
  - Smoking status from baseline to $D_LCO$ visit.
- Primary outcome:
  - $D_LCO$ slope (annual rate of change).
- Multivariable linear regression, adjusted for age, sex, race, height, injection drug use, hepatitis C, baseline $D_LCO$ and Hgb.

# PWH Have Faster $D_LCO$ Decline, Even After Controlling for Smoking

**Figure: Associations between HIV serostatus (top) and smoking status (bottom) on outcome of annual rate of change in single-breath lung diffusing capacity of carbon monoxide (DLCO) over a median 5 years of follow-up.**




*Abbreviations: PWH = Persons with HIV; PWoH = Persons without HIV.*
** Comparisons by HIV serostatus utilized multivariable linear regression, adjusted for age, sex, race, height, smoking status (continuous/intermittent/not smoking during interval follow-up between visits), hepatitis C, injection drug use, hemoglobin and baseline DLCO.*
*^ Comparisons by smoking status utilized multivariable linear regression, adjusted for age, sex, race, height, hemoglobin, baseline DLCO and HIV serostatus.*

| | $D_LCO$ slope | 95% Confidence Interval |
|---|---|---|
| **PWH** | **-0.20** | **-0.28 to -0.12** |
| **PWoH** | **-0.07** | **-0.16 to +0.02** |
| **Continuous Smoking** | **-0.38** | **-0.55 to -0.21** |
| **Intermittent Smoking** | **-0.21** | **-0.34 to +0.08** |
| **Not Smoking** | **-0.08** | **-0.15 to +0.02** |

## Results

- **668 participants (385 PWH and 283 PWoH)**.
- Median age 55 years / 39% women / 58% PWH.
  - PWH: 73% HIV-RNA ≤ 20 copies/mL; median CD4+ T-cell count 690 cells/mm$^3$.
- Median time between $D_LCO$ tests:
  - 5.2 (IQR: 4.8, 5.7) years.
- **PWH had faster $D_LCO$ decline than PWoH, even after controlling for the large smoking effects** (Figure).
- Slower $D_LCO$ decline was associated with:
  - *Lower viral copy-years* in the 3 years prior to the last $D_LCO$ test (p=0.008)
  - *Durable viral suppression* between $D_LCO$ visits, defined as HIV-RNA <80 copies/mL at every visit in the 5 years prior to the last $D_LCO$ test (p=0.02).
- Associations w/ decline were borderline for higher CD4+ T-cell counts at baseline (p=0.07) and not significant for nadir CD4 (p=0.43).

## Conclusions

- **PWH experience faster $D_LCO$ decline compared to PWoH, even after accounting for the strong effects of cigarette smoking.**
- **Improved viral control was associated with slower $D_LCO$ decline.**

## Plain Language Summary

- **The lungs of persons with HIV do not pick up oxygen as well as persons without HIV.**
- **Avoiding smoking and keeping HIV under good control may help preserve lung function in PWH.**

MWCCS MACS/WIHS COMBINED COHORT STUDY

VA U.S. Department of Veterans Affairs Veterans Health Administration

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