Background

- Persons living with HIV (PLWH) and diabetes mellitus (DM) may have increased levels of pro-inflammatory cytokines.
- The increased inflammation damages CD4 cells, and can result in more deleterious effects when one or both diseases are uncontrolled.
- However, PLWH with DM have faster CD4 count recovery and higher CD4 counts compared to PLWH without DM.

- Despite PLWH and DM having higher CD4 counts without DM, there has been no research on whether differently glycated hemoglobin (HbA1c) levels are associated with CD4 count trends.

Methods

- Study population: DC Cohort, an observational cohort of PLWH followed from Jan 2011-Mar 2018 at 14 sites in Washington, DC.
- Inclusion criteria: diagnosis of DM ≥18 years old; ≥1 year of follow-up with ≥2 HbA1c results and ≥2 CD4 count results; and prescribed an Ongoing antiretroviral (ART) regimen.
- Glycemic control groups: based on the most recent HbA1c result categorized into one of three control levels:
  - Strict: HbA1c <7.5%.
  - Moderate: HbA1c between 7.5-9.0%.
  - Uncontrolled: HbA1c >9.0%.
- CD4 count: defined as a continuous, time-dependent variable based on repeated laboratory measurements.
- Additional independent variables: age, sex at birth, race/ethnicity, BMI at enrollment, nadir CD4, sustained viral suppression (V5), any CD4 count, time since viral suppression, AIDS diagnosis status, and ever having a cancer diagnosis collected from the participant’s medical record.
- Statistical analysis: linear mixed effects model using an unstructured variance-covariance form in the repeated CD4 count measurements.

Objectives

- To examine the association between different levels of HbA1c control on the patterns of change in CD4 count among PLWH receiving care in Washington, DC.

Results

Table 1. Baseline characteristics and co-morbidities of PLWH and DM, DC Cohort, 2011-2018 (n=554)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>%</th>
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<tbody>
<tr>
<td>Sex</td>
<td>483</td>
<td>86.0</td>
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<tr>
<td>Sex/sexually</td>
<td>392</td>
<td>70.6</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td>74</td>
<td>13.0</td>
</tr>
<tr>
<td>Age, median (IQR)</td>
<td>54</td>
<td>48 (60)</td>
</tr>
<tr>
<td>Age at enrollment (median, IQR)</td>
<td>54</td>
<td>48 (60)</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Co-morbidity</th>
<th>N</th>
<th>%</th>
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<tbody>
<tr>
<td>Cancer</td>
<td>52</td>
<td>9.4</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>813</td>
<td>77.8</td>
</tr>
<tr>
<td>Hypertension</td>
<td>432</td>
<td>78.0</td>
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Summary of Results:

- Among 544 participants, there were 5,122 total CD4 count measurements with a median of nine measurements (IQR 6.12) per participant.
- All three HbA1c groups had a similar increase over time in CD4 count (p=0.49); participants with moderate HbA1c had higher mean CD4 counts over the follow-up period than strict HbA1c control (strict: 678 cells/µL; moderate: 726 cells/µL, p=0.0463).
- PLWH with DM who were female, of younger age, or obesity had a higher nadir CD4 count, were continually viral suppressed, had no history of cancer or an AIDS diagnosis had higher mean CD4 counts over the follow-up period.
- CD4 count change was not affected by duration of HIV diagnosis, being newly diagnosed with diabetes, or use of diabetic medications.

Multivariate analysis: participants with moderate HbA1c control showed a significant difference in CD4 count compared to those with strict control (mean difference=-18.8, p=0.026).

Conclusions

- The rate of increase in CD4 count over the study period was similar between the three HbA1c groups.
- PLWH and DM with moderate HbA1c control had higher CD4 counts than those with strict HbA1c control and similar CD4 counts compared to those with uncontrolled HbA1c levels (strict HbA1c control) may improve other outcomes, such as cancer, however, there was no observed effect on maintaining strict control to benefit CD4 count.

Additional research may help clarify which groups of PLWH benefit most from strict versus moderate glucose control for improving overall outcomes.