Background and Rationale

Physical function impairment and metabolic dysfunction occur more commonly among HIV-infected compared to HIV-uninfected adults.

Antiretroviral therapy (ART) initiation is associated with gain in both total body fat and lean body mass (estimate of skeletal muscle mass) among HIV-infected adults.

Little is known about the effects of ART and weight gain on the quality or function of the muscle (i.e., fat infiltration).

Previous studies have shown that in HIV-uninfected populations, fat infiltration of psoas or thigh skeletal muscle, as measured by CT scan, has been associated with physical function impairment and metabolic dysfunction (Goodpaster, et al.).

How does ART initiation impact muscle quality of HIV+ individuals?

ART initiation would be associated with greater fatty infiltration (lower attenuation) after 96 weeks of therapy, and thus may serve as a marker or possible mechanism underlying physical function impairment and metabolic dysfunction.

Methods

- AIDS Clinical Trials Group study A5260s was a metabolic substudy of a randomized ART initiation study (A5257) among ART-naive participants
- Substudy participants had L4-L5 single-slice CT scans at baseline and week 96
- 285 baseline scans and 235 paired scans were analyzed for psoas muscle attenuation by a body-composition software (IDL)
- Measured differences in CT density (by Hounsfield Units) between adipose tissue and muscle were associated with gain in both total and lean body mass.
- Psoas lean muscle area, intermuscular area (psoas muscle with surrounding fat) and intramuscular (psoas muscle and fat within muscle only) were the outcomes of interest.

Methods (cont.)

- Each muscle group in the CT slice was segmented (in the following steps) and colored in manually in order for the program software to distinguish the muscles from the infiltrating or surrounding fat
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- 
Psoas Muscle

Results

Baseline Participant Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Male</th>
<th>Female</th>
<th>Unmatched p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (median years)</td>
<td>36 (28-48)</td>
<td>25 (20-30)</td>
<td>&gt;0.05</td>
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<tr>
<td>Gender</td>
<td>252 (90%)</td>
<td>29 (10%)</td>
<td>&gt;0.05</td>
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<tr>
<td>Race</td>
<td>White (Non-Hispanic) 118 (42%)</td>
<td>Black (Non-Hispanic) 90 (30%)</td>
<td>Hispanic 66 (23%)</td>
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<tr>
<td>Hepatitis C</td>
<td>20 (30%)</td>
<td>&gt;0.05</td>
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<tr>
<td>Current smoker (baseline)</td>
<td>105 (37%)</td>
<td>&gt;0.05</td>
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<tr>
<td>Body Mass Index (BMI)</td>
<td>Median (IQR): 24.6 (22.1-27.0)</td>
<td>&gt;0.05</td>
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<tr>
<td>CD4 count (baseline), median (IQR)</td>
<td>348 (293-445)</td>
<td>&gt;0.05</td>
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Mean differences of psoas intermuscular intramuscular density, and lean area. No difference between ART arms (all p ≥ 0.37)

Coeficient Effect on Intra and InterMuscluar Psoas Density & Area

<table>
<thead>
<tr>
<th>CD4 &lt;200</th>
<th>Black race</th>
<th>Intramuscular density</th>
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<tr>
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<td>CD4 &lt;200</td>
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Study outcomes were significant predictors of lower intramuscular density and psoas area prior to ART initiation.

Conclusions

- ART initiation has minimal effect on psoas intramuscular fat and area
- The clinical significance of the small but significant differences in intermuscular fat are unknown
- Caucasians and those starting ART with higher CD4 count (ie, less immunocompromised) are at greater risk for fatty muscle infiltration
- Although changes were small in this 96 week period, interventions (diet, exercise, etc.) to limit fat accumulation may be of most importance in this group to prevent functional and metabolic comorbidities

Summary

- **Intermuscular** psoas fat (but not intramuscular fat or psoas area) was minimally but significantly greater (lower HU) following 96 weeks of ART.
- Older age and lower CD4 cell count were significant predictors of lower intramuscular density and psoas area prior to ART initiation.
- Lower CD4 count at baseline and Black race were associated with greater gains in intramuscular density (less fat); lower baseline CD4 count was associated with greater gains in psoas area.

References and Acknowledgements

References


Acknowledgements

The authors thank the AIDS Clinical Trials Group site and participants, Suzanne Fiorillo, Dr. Ann Scherzinger, and most importantly, the Modern Human Anatomy Program.

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