Introduction

- HIV and HCV infection are associated with higher rates of osteoporosis and fragility fractures.1,2
- Our previous analyses from a prospective, cross-sectional cohort demonstrate that HIV and HCV independently reduce bone mineral density (BMD) but likely through different mechanisms: HIV increases serum bone turnover markers (BTMs) while HCV does not; changes in BTMs did not correlate with inflammation by TNF levels.4
- Insulin-like growth factor-1 (IGF-1) and the sex steroids, testosterone (T) and estradiol (E2), play a key role in osteogenesis and BTMs did not correlate with inflammation by TNF levels.4
- Osteoporosis and HCV infection are associated with decreased hepatic production.
- Bioavailable T and E2 levels were higher in HCV, but bioavailable OC and CTX did not attenuate HIV or HCV effects on BMD.
- Differences between groups for bioavailable hormone levels were similar for E2 (p=0.05) but attenuated for T (p=0.15).
- Bioavailable T and E2 levels were associated with lower BSAP (p=0.00) and trend toward higher OC (p=0.09) but no difference in CTX (p=0.13).

Objective

- To evaluate the association of IGF-1 and sex steroid levels with BMD and BTMs in HIV- and HCV-infected patients.

Methods

- Prospective, cross-sectional study of 298 male veterans with uninfected controls (n=107), HIV (n=79), HCV (n=81), and HIV/HCV coinfection (n=53).
- Inclusion criteria: Age ≥ 40; eGFR ≥ 60; no known osteoporosis.
- All HIV patients virologically suppressed on HAART.
- All HIV patients were HIV treatment-naïve.
- Study Measurements:
  - BMD by DXA scan
  - BTMs: serum C-telopeptide (CTX), bone-specific alkaline phosphatase (BSAP) and osteocalcin (OC)
  - Hormones: IGF-1, insulin-like growth factor binding protein 3 (IGFBP3), total T, sex hormone binding globulin (SHBG); Bioavailable T and E2 calculated from published equations5
  - Auto-platelet ratio index – APRI (as marker of liver fibrosis).
- Statistical Analysis:
  - Group means for BMD and BTMs compared by ANOVA and by ANCOVA adjusting for age, race, smoking, and BMI in all models
  - Additional multivariate models controlling for IGF-1, bioavailable T and E2 levels.
  - Correlation between hormones and BMD, BTMs, and severity of liver disease by Spearman’s correlation coefficient

Conclusions

- IGF-1 levels are decreased in HIV and negatively correlated with APRI score, but IGF-1 is increased in HCV.
- Serum T and E2 were higher in HCV (p<0.01 and p=0.05), likely driven by higher levels of SHBG (p<0.01).
- Differences between groups for bioavailable hormone levels were similar for E2 (p=0.05) but attenuated for T (p=0.15).
- Bioavailable T and E2 levels were associated with lower BSAP (p<0.01 and p=0.02), but not with OC or CTX.
- Neither IGF-1, bioavailable T, or E2 levels were associated with femoral neck BMD but did they attenuate HIV and HCV effect on BMD (model 2-4).

References