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# Lack of Association Between Liver Stiffness and Bone Mineral Density in HIV/HCV-Coinfected Patients

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# Background

- Whether HCV infection is a risk factor for the development of bone disease is controversial.
- However, some authors have found HCV to be associated with low BMD even in the absence of cirrhosis[1].
- In addition, HCV has also been identified as a risk factor for bone fractures in HIV-infected persons[2].

# Aims

- To assess the prevalence of osteopenia and osteoporosis in HIV/HCV+ individuals with compensated liver disease
- To study the association between liver fibrosis and bone mineral density (BMD) in this population group.

1. Lai JC et al. Dig Dis Sci 2015; 60: 1813
2. Young B, L et al Clin Infect Dis 2011; 52: 1061

# Methods

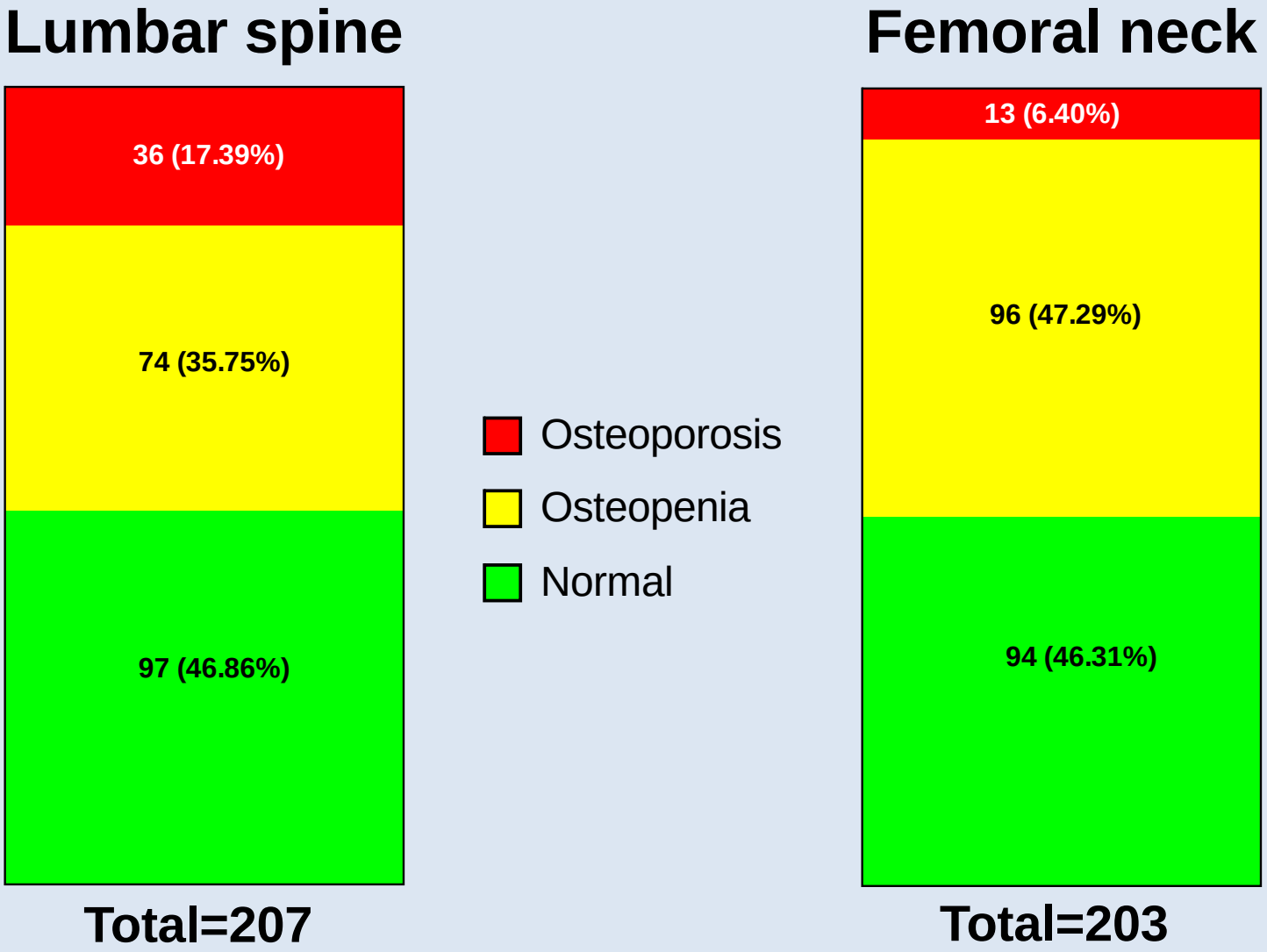
| | |
|---|---|
| **Design** | • We analyzed baseline BMD results in a prospective study of the effects of eradication of HCV on non–liver-related outcomes.<br>• Patients were recruited during 2012 – 2014 in 13 centers |
| **Variables** | • Demographics, BMI, variables related to HIV, HCV & comorbidities, smoking and substance abuse, laboratory parameters (hematology, biochemistry, immunology & virology)<br>• BMD of the lumbar spine (L1 to L4) and femoral neck was measured by DEXA.<br>• As different densitometers were used*, standardized BMD (sBMD) was also calculated using published equations (J Bone Mineral Research 1997;12:1463; Osteoporosis International 2001;12:438).<br>• Liver stiffness (LS) was determined by TE (FibroScan® [EchoSens, Paris, France]) |
| **Definitions** | • Osteoporosis, T score ≤−2.5 SD<br>• Osteopenia, T score between −1 and −2.5 SD.<br>• Cirrhosis, LS >12.5 kPa |

Hologic® (n=8), Lunar® (n=3), and Norland® (n=2)

# Characteristics of Study Population

| Characteristic | N=207 |
|---|---|
| Male sex – n (%) | 148 (76) |
| Age (yrs) – median (IQR) | 47 (50-53) |
| Body mass index – median (IQR) | 22 (24 – 26) |
| Caucasian – n (%) | 201 (98) |
| HIV-acquired by IDU – n (%) | 155 (75) |
| CDC category C – n (%) | 58 (28) |
| cART – n (%) | 205 (99) |
| Tenofovir use – n (%) | 83 (40) |
| HIV-RNA <50 copies/mL – n (%) | 179 (87) |
| CD4+ cells/$mm^3$ – median (IQR) | 521 (371-794) |
| HCV Genotype 1 – n (%) | 128 (62) |
| HBsAg (+) – n (%) | 6 (3) |
| Current smokers – n (%) | 140 (69) |
| Current methadone use – n (%) | 24 (12) |
| Prior history of cocaine use – n (%) | 119 (63) |
| Alcohol intake > 50 g/d at any time – n (%) | |
| Liver stiffness, kPa – median (IQR) | 7.9 (12 – 20.9) |
| Liver cirrhosis (LS > 12.5 kPa) – n (%) | 96 (48) |

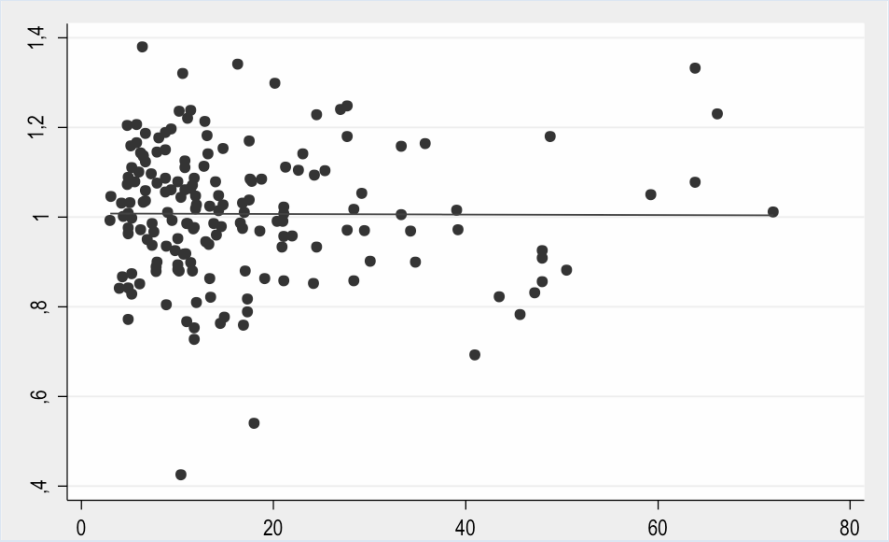
# Prevalence of osteoporosis & osteopenia



# Correlation between Bone Mineral Density and Liver Stiffness

## Lumbar Spine

sBMD g/cm$^2$

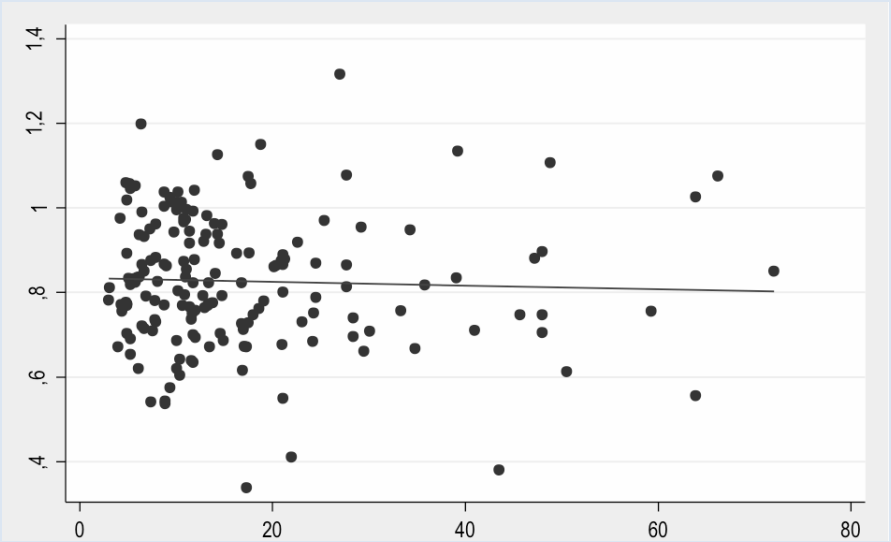



Liver stiffness kPa

Spearman rho –0.074, *P*=.336

## Femoral Neck

sBMD g/cm$^2$




Liver stiffness kPa

Spearman rho –0.067, *P*=.385

sBMD = standardized bone mineral density

# Variables associated with osteoporosis

In univariate analysis the following variables were associated with osteoporosis*: **Lumbar spine**: age, BMI, CD4+/CD8+ ratio, and methadone. **Femoral neck**: IDU, methadone use, and HBsAg positivity. Cirrhosis was not associated with osteoporosis at any site.

**Multivariate logistic regression analysis**

The models included variables associated with osteoporosis in univariate analysis and other variables of clinical relevance.

**Lumbar Spine**

| Variable | OR | 95%CI | *P* |
|---|---|---|---|
| Age | 1.041 | 0.934-1.162 | .468 |
| Male sex | 1.228 | 0.467-3.234 | .677 |
| BMI | 0.877 | 0.764-1.008 | .065 |
| CD4+/CD8+ | 1.165 | 0.955-1.421 | .133 |
| Methadone | 2.225 | 0.797-6.214 | .127 |
| Tenofovir | 0.621 | 0.282-1.366 | .236 |

**Femoral Neck**

| Variable | OR | 95%CI | *P* |
|---|---|---|---|
| Age | 1.140 | 1.015-1.281 | .027 |
| Male sex | 0.429 | 0.085-2.177 | .307 |
| BMI | 0.872 | 0.695-1.093 | .234 |
| IDU | 2.459 | 0.371-16.285 | .351 |
| Methadone | 2.447 | 0.300-19.955 | .403 |
| Tenofovir | 0.978 | 0.268-3.568 | .973 |

***Variables analyzed:** Age, sex, BMI, smoking, alcohol intake, methadone use, HIV transmission category, CDC clinical category, cART, tenofovir use, HIV-RNA, CD4+ cell count, nadir CD4+ cell count, CD4+/CD8+ ratio, HCV genotype, HCV-RNA, prior anti-HCV therapy, liver stiffness, cirrhosis, hemoglobin, albumin, creatinine, calcium, phosphate, vitamin D, T4, TSH, PTH

# Conclusions

1. In this cohort of HIV/HCV-coinfected patients with compensated liver disease, the prevalence of osteoporosis at lumbar spine and femoral neck was 17.4% and 6.4%, respectively

2. No significant correlation was found between liver-stiffness and BMD

3. In this population group, lifestyle and other factors may have a greater impact on BMD than the severity of liver fibrosis.

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