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Bone histomorphometry in HIV-infected men

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BACKGROUND: A high incidence of osteopenia/osteoporosis has recently been observed in HIVinfected individuals. A specific aetiology, and the role, if any, of antiretroviral therapy (ART) has yet to be established.

OBJECTIVE: To characterize the osteopenia associated with potent ART in HIV-infected patients.

METHODS: Transiliac needle bone biopsies with oxitetracycline labelling were performed on nine HIV-infected subjects on ART with evidence of primary osteopenia. Static and kinetic bone histomorphometry indices were obtained in a central laboratory. Biochemical markers of bone metabolism were also obtained.

RESULTS: All patients were male. Mean age was 45 years, median lumbar *t*-score -2.3, median CD4 605 cells/mm^3 and nadir CD4 67 cells/mm^3. Six patients had an undetectable HIV RNA viral load. All patients had nucleoside reverse transcriptase inhibitor use (median 60 months), six had protease inhibitor use (median 29 months) and two had non-nucleoside reverse transcriptase inhibitor use (median 12 months). Biopsy results could be categorized into four distinct groups (two patients incomplete): Group one (one patient) had osteomalacia, characterized by greatly increased osteoid volume, thickness, and surface area (OV/BV, O.Th, OS/BS), increased mineralization lag time, and diffuse, irregular tetracycline labelling. Serum bone alkaline phosphatase and osteocalcin were also greatly increased. Group two (one patient) had high bone turnover osteoporosis, characterized by moderately increased OV/BV, OS/BS, and osteoblast content, elevated indices of bone turnover, including an increased mineralizing surface (MS/BS), increased bone formation rate (BFRlBV, BFR/TV), and extensive double

tetracycline labelling at all osteoid/mineralized bone interfaces. Serum bone alkaline phosphatase was also moderately increased. Group three (two patients) had inactive osteoporosis, characterized by a paucity of osteoblasts and osteoclasts, decreased OV/BV, O.Th, OS/BS, BFRlBV, BFR/TV, MS/BS and minimal tetracycline labelling. Group four (three patients) had osteoporosis with normal remodelling, with relatively normal tetracycline labelling, static and kinetic indices of bone turnover.

CONCLUSIONS: Diverse forms of osteoporosis may be seen in ART-experienced patients, suggesting that multiple mechanisms may underlie the pathogenesis of osteoporosis in HIV-infected individuals. Although the sample size was small, there was no obvious correlation between type and duration of ART and pattern of osteoporosis. Further longitudinal studies of bone histomorphometry in HIV-infected patients are warranted.

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