Vertebral fractures are associated with increased cortical porosity in iliac crest bone biopsy of men with idiopathic osteoporosis

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Résumé en anglais	In men, vertebral fractures are poorly associated with bone density, and both cortical and trabecular micro-architectural changes could contribute to bone fragility. Bone histomorphometry makes it possible to investigate both the thickness and porosity of cortical bone, which has been reported to have a major impact on the biomechanical properties of bone. We therefore conducted a cross sectional study using iliac crest biopsies to investigate the trabecular and cortical bone structure in men with or without vertebral fractures.We selected 93 bone biopsies from men with idiopathic osteoporosis (defined as a T-score <− 2.5), between 40 and 70 years of age. Patients were divided into two groups on the basis of the presence (n = 46) or absence (n = 47) of prevalent vertebral fracture (VFX). We measured micro-architectural indices in trabecular and cortical bone by histomorphometry at the iliac crest. Patients with VFX had lower trabecular bone volume (BV/TV: 12.4 ± 3.8 versus 14.7 ± 3.1 % (m ± SD)), p < 0.01), higher trabecular separation (Tb.Sp: 871 ± 279 versus 719 ± 151 μm, p < 0.01), and higher marrow star volume (V*m.space: 1.617 ± 1.257 versus 0.945 ± 0.466 mm3, p < 0.01). Cortical thickness (Ct.Th) was the same in patients with or without VFX, whereas cortical porosity (Ct.Po) was higher in patients with VFX (6.5 ± 2.6 versus 5.0 ± 2.0 %, p < 0.01), because their Haversian canals had higher mean areas (8291 ± 4135 versus 5438 ± 2809 μm2, p < 0.001). There was no correlation between any trabecular and cortical micro-architectural parameters. Using a logistic regression model, we evaluated the VFX as a function of the V∗m.space and Ct.Po, adjusted for age. The odds-ratio of having a VFX was 3.89 (95% CI 1.19–12.7, p = 0.02) for the third tertile of V*m.space (adjusted on age and Ct.Po), and 4.07 (95% CI 1.25–13.3, p = 0.02) for the third tertile of Ct.Po (adjusted on age and V*m.space). Our data show that both trabecular and cortical bone microarchitecture contribute independently to vertebral fractures in men with idiopathic osteoporosis. In contrast to data reported in women, in men it is cortical porosity, and not cortical width, that is associated with vertebral fractures. This suggests that the cortical deficit is different in men and in women with fragility fractures.
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