

Changes of trabecular bone density in elderly subjects: a 4-year prospective pQCT study

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Introduction

In large cohort studies changes in bone density and mass are often described statistically as mean values over a period of time^{1,2}. This implies that bone loss occurs homogeneously in the study population over the observation period. Also in intervention studies often only mean changes in bone mass and density are reported³. So, for example, information about the number of non-responders are concealed in many studies⁴. Our study aims to clarify if there are temporary and individual variations in the rate of bone loss over a period of 4 years in an elderly population.

Materials and methods

In this study we included 36 females (age 59-74 years, mean 65.4, SD 4.9 years) and 14 males (age 58-78 years, mean 67.6, SD 5.2 years). Baseline trabecular densities were 184.8 ± 38.1 and 225.9 ± 28.3 mg/cm³, respectively. The subjects were scanned every 12 months over a period of 4 years at the distal tibia (4% of the tibia length) with a Stratec XCT 2000 (Stratec Medizintechnik, Pforzheim, Germany). Analysis was performed with standard analysis protocol software version 5.50.

Results

During the first year bone loss occurred in 12 females and 4 males. After 4 years 25 females and 8 males experienced

bone loss. The changes in bone density ranged from +4.4 to -31 mg/cm³ in females and from +5.4 to -10.4 mg/cm³ in males. A significant number of individuals did not lose bone over the whole observation period. In most of the subjects the annual changes were small (below 2 mg/cm³). In 9 females a bone loss of more than 10 mg/cm³ was observed. This bone loss occurred not constantly over the study period but during one or two years only. There was no correlation between age at baseline and amount of bone loss or between trabecular density at baseline and amount of bone loss at any time.

| | 0-1 mg/cm ³ | 1-3 mg/cm ³ | 3-5 mg/cm ³ | 5-10 mg/cm ³ | >10 mg/cm ³ | Total |
|--------|---------------------------|---------------------------|---------------------------|----------------------------|---------------------------|-------|
| Year 1 | 3 | 8 | 3 | 2 | 0 | 16 |
| Year 2 | 5 | 3 | 4 | 2 | 3 | 17 |
| Year 3 | 5 | 4 | 4 | 5 | 3 | 21 |
| Year 4 | 5 | 9 | 6 | 4 | 9 | 33 |

Table 1. Number of subjects that lost bone between baseline and follow-up time for males and females (total 50 subjects).

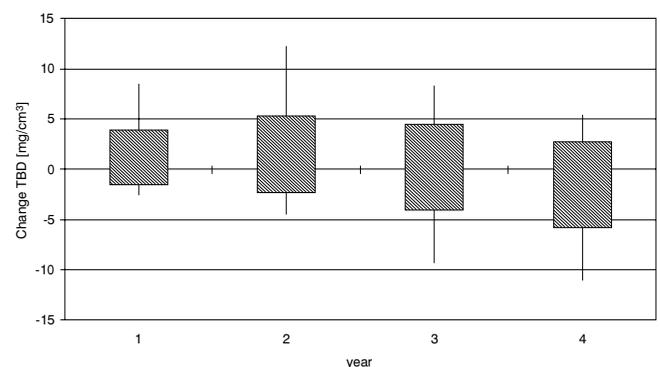


Figure 1. Boxplot of changes in trabecular densities according to years since baseline. Boxes are standard deviations, whiskers 1. to 4. quartiles.

Dr. Schiessl is general manager of Stratec Medizintechnik. Their product has been used in this study. Dr. Schiessl and Dr. Willnecker have corporate appointments with Stratec Medizintechnik. Dr. Runge has consultancies with Roche and Novartis and co-operates with Novotec Pforzheim.

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Conclusions

In this population bone loss showed a high temporary variation within individuals due to inhomogeneity within the subjects. Individual analysis of changes in bone parameters could add valuable information than statistical mean values in clinical studies.

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