absorptiometry (DXA) was used to measure femoral neck and spine L2–4 BMD adjusted for age, weight and height. BMD was expressed in g/cm². To investigate associations between history of N-VF and disease related variables, we used bi-variate (Students t-test, Pearson Chi square test) and multivariate statistical analyses (logistic regression).

Results A total of 25 patients (Oslo 11, Truro 1 and Amsterdam 13 patients) reported a history of previous N-VF (total number of fractures 34). In the Truro patients BMD (adjusted for age, weight and height) in both spine and hip was higher than in Oslo and Amsterdam patients. A statistical difference between those with and without a previous N-VF was found for the variables (mean (SD)) listed in the Table 1 and for disease duration (22.6 vs. 16.6 yrs, $p = 0.01$). BMD in the femoral neck but not in the spine was independently associated with a history of a N-VF after adjusting for age, weight, height, disease duration and Larsen score using logistic regression.

Abstract SAT0159 Table 1

	No N-VF (n = 124)	N-VF (n = 25)	P-value
Age (yrs)	60.4 (5.8)	64.8 (3.9)	<0.001
Larsen score	37.2 (29.5)	59.2 (34.2)	0.002
Fem.neck (BMD)	0.84 (0.09)	0.79 (0.06)	0.009
Spine L2–4 (BMD)	1.10 (0.10)	1.06 (0.07)	0.06

Conclusion Our cross sectional findings indicate that BMD is a risk factor for N-VF in female RA patients. Whether this concerns a causal relationship needs confirmation in prospective studies.

SAT0160 THE EFFECT OF CALCITONIN ON PAIN AND QUALITY OF LIFE IN POSTMENOPAUSAL OSTEOPOROTIC WOMEN

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Background Back pain is the most frequent symptom in osteoporosis.

Objectives The aim of this study was to investigate the effect of calcitonin on plasma beta-endorphin levels, pain and quality of life in postmenopausal women with osteoporosis.

Methods In our study, 100 IU salmon calcitonin with subcutaneous or placebo injection was given for 2 weeks and was continued with same dose of nasal spray or placebo for 3 months to postmenopausal women who had severe back pain due to osteoporosis. All patients took 1000 mg elementary Calcium per day. We investigated the effectiveness of calcitonin on plasma beta-endorphin levels, pain, and quality of life. There were thirty patients with a mean age of 58.17±5.36 years in the treatment group and twenty-six patients with a mean age of 58.77±5.15 years in the placebo group. Baseline plasma beta-endorphin levels were measured and repeated after two weeks and 3 months. Patients' pain was evaluated by visual analogue scale (VAS), and the modified face scale (MFS); and the quality of life was also assessed by Beck Depression Index (BDI) and Nottingham Health Profile (NHP) at the end of the second week and the third month.

Results We found that the measurements of the plasma beta-endorphin level of the treatment group were significantly higher

than those of the placebo group both at the end of the second week and the third month ($p < 0.001$). Visual analogue scale, MFS, BDI and NHP scores were improved at the end of the second week in both groups ($p < 0.05$). However, the improvement of these scores decreased in three months in the placebo group. They did not change in the placebo group at the end of the 3rd month statistically ($p > 0.05$).

Conclusion As a result, we suggest that calcitonin is a very strong analgesic agent via increasing the plasma beta-endorphin levels in postmenopausal osteoporosis and improves their physical activities and the quality of life due to decreasing back pain.

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SAT0161 MENATETRENONE ACTS DIRECTLY ON CIRCULATING HUMAN OSTEOCLAST PRECURSORS

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Background Vitamin K is known to be an essential cofactor in the post-translational gamma-carboxylation of clotting factors. Since the gamma-carboxyglutamic acid-containing protein, osteocalcin, was discovered in bone matrix, vitamin K was thought to play a role in bone metabolism. Both *in vitro* and *in vivo* studies have shown that menatetrenone, a vitamin K2 homologue, can act directly on bone metabolism.

Objectives Although the relationship between menatetrenone and bone resorption appears clear,^{1,2} it is still not certain whether menatetrenone act directly on osteoclast precursors to influence their differentiation into osteoclasts. In this study, we have investigated whether menatetrenone has a direct effect on circulating osteoclast precursors to influence osteoclast differentiation.

Methods Monocytes were cultured with osteoprotegerin ligand (OPGL) in the presence of macrophage stimulating factor (M-CSF) on glass coverslips and dentine slices. Menatetrenone or vitamin K1 was then added to the cultures in 10⁻⁷, 10⁻⁶, 10⁻⁵ (M) respectively. Geranylgeraniol or phytol (alcohol forms of the respective side chain of menatetrenone and vitamin K1) was also added to the cultures. After 7 and 14 days incubation, cultures were assessed for cytochemical and functional evidence of osteoclast differentiation.

Results The number of tartrate-resistant acid phosphatase (TRAP)-positive multinucleated cells (MNCs) and the area of lacunar resorption were decreased when menatetrenone was added. Dose-dependent inhibition of osteoclast formation and lacunar resorption was seen. Vitamin K1, however, did not inhibit the formation of TRAP positive MNCs nor lacunar resorption. The addition of geranylgeraniol in the cultures inhibited osteoclast formation in a dose dependent manner. Phytol did not affect the number of TRAP-positive MNCs nor lacunar resorption.

Conclusion Menatetrenone not only influence osteoclast formation in the presence of bone stromal cells but also act directly on circulating osteoclast precursors to influence osteoclast

differentiation. The inhibitory effect of menatetrenone on osteoclast formation is not due to gamma-carboxylation and the side chain of menatetrenone may play an important role in this inhibitory effect.

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SAT0162 CORRELATION BETWEEN BONE MASS INDEX AND BONE MASS DENSITY MEASURED AT A NON-WEIGHT-BEARING SITE: STUDY ON 712 POSTMENOPAUSAL WOMEN

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Background Body weight is highly related to bone mineral density (BMD), regardless of age, menopausal duration, or any other variables. Low body mass index (BMI) constitutes a risk for fragility fractures. Thin postmenopausal women are more at risk of developing non-traumatic fractures.

Fatness is positively associated with BMD, both at weight-bearing and non-weight-bearing sites. Therefore, it is presumable that the both mechanical load, induced by greater body weight, and hormonal factors, through the effects of adipose tissue on levels of circulating estrogens, are responsible for greater skeletal density in obese people.

Objectives The aim of the present study was to demonstrate the correlation between BMI and BMD evaluated at the distal radius. That site has been chosen because it is a non-weight-bearing area and consequently it is not influenced by the mechanical load.

Methods A total of 712 Caucasian menopausal women, aged 41–100 years (mean age 65, mean duration of menopause 17,4 yrs.) was studied. The sample was divided into 4 groups according to BMI (modified WHO classification): underweight (BMI 18.5–24.9, 315 patients, mean age 64,5 yrs., mean duration of menopause 17,2 yrs.), overweight (BMI >25–29.9, 270 patients, mean age 66.1 yrs., mean duration of menopause 18,6 yrs.), obese (BMI >30; 133 patients, mean age 63.8 yrs., mean duration of menopause 15.3 yrs.).

BMD was studied using dual-energy X-ray absorptiometry (HOLOGIC DTX 100). The examinations were performed on the distal radius of the non-dominant forearm. Diagnosis of osteoporosis was made according to the WHO report (T score <-2.5 SD: osteoporosis. T score ≥1 to -2.5 SD: osteopenia. T score 0 to ≥1 SD: normal). The ANOVA procedure and the Chi square test were used for statistical analysis of the results.

Results Results are reported on Table 1.

Abstract SAT0162 Table 1

	Mean BMD* g/cm ²	Osteoporosis**	Osteopenia**	Normal**
Obese	0.415	18.0%	48.9%	33.1%
Overweight	0.389	29.6%	48.9%	21.5%
Normal	0.378	32.1%	49.2%	18.7%

*p < 0.0000 (ANOVA); **p < 0.004 (Chi square).

Conclusion As expected, the mean value of BMD was higher in the obese group (p < 0.000001). The analysis of prevalence of osteoporosis and osteopenia in all the groups studied showed a negative correlation between body size and bone mass loss. In particular it was observed the finding of a progressive reduction of the number of osteoporotic women with the increasing BMI, while the percentage of osteopenic subjects was almost constant (p < 0.004).

The importance of the present study was the demonstration of a strong positive correlation between BMI and BMD at non-weight-bearing site. The findings confirms the protective role of adipose tissue on the bone independently of the influence of the mechanical load.

SAT0163 RISK FACTORS RELATED TO LOW HEEL BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN

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Background

Objectives To analyse the relationship between risk factors of osteoporosis (OP) and heel bone mineral density (BMD) in postmenopausal women in a Mediterranean area.

Methods 170 postmenopausal women were consecutively selected for an osteoporosis screening. In all women we collected the following data: age, BMI (body mass index), years since menopause, pregnancy, breast-feeding, maternal hip fracture; use of coffee, alcohol and tobacco; daily calcium intake, sun exposure and previous fractures (distal forearm, vertebral, hip and other non-traumatic fractures). A measurement of heel BMD was done in all women with PIXI bone densitometer (Lunar). Dorso-lumbar x-rays were reviewed in all patients. Chi-square, Student or Fisher tests were used for the statistical analysis.

Results Significant differences between patients with normal values of BMD and OP were detected only for the following risk factors:

Conclusion Previous fractures, mother's hip fracture, low BMI, age and years since menopause are factors associated with low heel BMD. So, PIXI is a good method for OP screening in postmenopausal women.

SAT0164 TWO YEAR RESULTS OF ONCE-WEEKLY ADMINISTRATION OF ALENDRONATE 70 MG FOR THE TREATMENT OF POSTMENOPAUSAL OSTEOPOROSIS

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Background The therapeutic equivalence of alendronate (ALN) 70 mg once weekly (OW) (provided by Merck and Co., Inc., Whitehouse Station, NJ, USA), ALN 35 mg twice weekly (TW), and ALN 10 mg once daily (OD) in the treatment of postmenopausal osteoporosis for 1 year has been reported previously.¹ We