SAT0157 THE SEX HORMONE BINDING GLOBULIN IN MALE OSTEOPOROSIS

ER Legrand, C Gibert, Y Gallois, E Mathieu, F Boux de casson, MF Basle, D Chappard, M Audran. *Service de Rhumatologie, Centre Hospitalier Universitaire, Angers, France*

10.1136/annrheumdis-2001.644

Background Several studies have shown that the increase in Sex Hormone Binding Globulin and the decrease in bioavailable estradiol and testosterone can explain age-induced bone loss in healthy men over 70 years.

Objectives To evaluate the role of the Sex Hormone Binding Globulin (SHBG) in the pathophysiology of osteoporosis in middle-aged men.

Methods 80 men with osteoporosis (T-score < -2.5) and 40 age-matched controls were recruited to evaluate the relationships between sex hormone levels, bone markers levels, bone mineral density and vertebral fractures. Fasting serum samples were assayed for total and free testosterone, total estradiol and SHBG. Bone remodelling was evaluated by measurement of urinary levels of the C-telopeptide of type I collagen (CTX) and free deoxyypyridinoline (D-Pyr), serum osteocalcin and bone specific alkaline phosphatase (BSAP).

Results

- There was no difference between controls and osteoporotic men according to age, BMI, total testosterone and estradiol. In contrast, serum SHBG level was significantly higher (+42.2%) whereas free androgen index was lower (-24.8%) in patients with osteoporosis.
- Stepwise linear regression analysis showed that SHBG was significantly correlated with D-Pyr ($r = 0.33$), CTX ($r = 0.25$) and BSAP ($r = 0.30$). (3) After adjustment for age and BMI, hip BMD was not associated with total testosterone or estradiol but only with serum SHBG ($r = -0.35$). (4) Among osteoporotic patients, spinal radiographs evidenced at least one vertebral crush fracture in 36 men and none in 44 patients. Serum SHBG concentration was significantly associated with the presence of vertebral fracture: odds ratio was 2.0 (95% CI: 1.2–3.5) for an increase of one standard deviation of SHBG.

Conclusion The present study showed that serum SHBG concentration is increased in most middle-aged men with primary or secondary osteoporosis and is correlated with bone remodelling markers, hip bone mineral density and vertebral fracture risk. These results might represent a plausible explanation of bone loss in young and middle-aged men with idiopathic osteoporosis and vertebral fractures.

SAT0158 ASSOCIATES WITH AND EXTENT OF REDUCED BONE MINERAL DENSITY (BMD) IN FEMALE RHEUMATOID ARTHRITIS (RA) PATIENTS: THE OSLO, TRURO, AMSTERDAM (OSTRA) COLLABORATIVE STUDY

¹G Haugeberg, ²M Lodder, ³W Lems, ¹T Uhlig, ²B Dijkmans, ¹T Kvien, ³A Woolf. ¹Department of Rheumatology, Diakonhjemmet Hospital, Oslo, Norway; ²Department of Rheumatology, Vrije Universiteit, Amsterdam, Netherlands; ³Department of Rheumatology, Royal Cornwall Hospital, Truro, UK

10.1136/annrheumdis-2001.645

Background

Objectives To examine associates with and occurrence of reduced BMD in female RA patients from three European countries.

Methods 150 (50 from each country) consecutive female RA patients (ACR 1987 criteria, disease duration ≥ 5 yrs, age 50–70 yrs), visiting the out-patient rheumatology clinics were included. Study variables included clinical data, laboratory tests, hand X-ray (Larsen score) and BMD measurement. BMD (g/cm^2) was measured by dual energy X-ray absorptiometry (DXA) and adjusted for age, weight and height. A pooled European/US reference population, showing no substantial differences with published Norwegian, English, and Dutch reference populations, was used to calculate T-scores. Groups were compared by one way ANOVA and cross tabulation (Pearson Chi square test). To investigate associates for BMD reduction bi- and multi-variety statistical analyses were performed.

Results No significant differences between the countries were found for age, disease duration and rheumatoid factor, whereas weight and most disease related variables, including the use of prednisolone and treatment for osteoporosis, differed between the 3 groups. Percentage of patients having osteoporosis (T-score < -2.5 SD) at femoral neck was 21.3% in Oslo, 8.3% in Truro, and 18.4% in Amsterdam ($P = 0.19$) and at the spine 32.0%, 18.4% and 12.0% ($P = 0.04$), respectively. Mean (SD) BMD values are shown in the Table 1. Using multivariate linear regression age, weight, total hand X-ray Larsen score, previous history of clinical fracture and ever use of DMARDs were independent associates for femoral neck BMD. For spine L2–4 weight, mean CRP last 12 months, ever use of DMARDs and current use of prednisolone were independent associates.

Abstract SAT0158 Table 1

	Oslo	Truro	Amsterdam	P-value
Fem. neck	0.80 (0.06)	0.86 (0.10)	0.83 (0.07)	0.001
Spine L2–4	1.06 (0.06)	1.12 (0.12)	1.09 (0.09)	0.002

Conclusion Differences in femoral neck and spine BMD might reflect differences in life styles factors, disease activity and disease management between the countries.

SAT0159 NON-VERTEBRAL FRACTURES AND ITS ASSOCIATES IN FEMALE RHEUMATOID ARTHRITIS (RA) PATIENTS: THE OSLO, TRURO, AND AMSTERDAM (OSTRA) COLLABORATIVE STUDY

¹G Haugeberg, ²M Lodder, ³W Lems, ¹R Ørstavik, ²B Dijkmans, ¹T Kvien, ³A Woolf. ¹Department of Rheumatology, Diakonhjemmet Hospital, Oslo, Norway; ²Department of Rheumatology, Vrije Universiteit, Amsterdam, Netherlands; ³Department of Rheumatology, Royal Cornwall Hospital, Truro, UK

10.1136/annrheumdis-2001.646

Background

Objectives To examine non-vertebral fractures (N-VF) in RA patients, of similar age, disease duration and rheumatoid factor status recruited from three European countries, and their association with bone mineral density (BMD), demographic and disease related associates.

Methods 150 (50 from each country) consecutive female RA patients (ACR 1987 criteria, disease duration > 5 yrs, age 50–70 yrs) visiting the out-patient Department of Rheumatology in the participating centres were included. Data on N-VF occurring after age 25 and after RA diagnosis, demographics and measures of disease activity were collected. Dual energy X-ray

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

D Ofluoglu, G Akyuz, O Kayhan, O Umay. *Marmara University Hospital, Department of Physical Medicine and Rehabilitation, Istanbul, Turkey*

10.1136/annrheumdis-2001.647

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.

REFERENCES

- 1 Cantarelli FB, Szejnfeld VL, Oliveira LM, *et al.* Quality of life in patients with osteoporosis fractures: cultural adaptation, reliability and validity of the osteoporosis assessment questionnaire. *Clin Exp Rheumatol.* 1999;**17**(5):547–51
- 2 Civitelli R. Calcitonin. In: Marcus R, Feldman D, Kelsey J, eds. *Osteoporosis*. San Diego/CA: Academic Press, 1996: 1235–58
- 3 Lyrtyts GP, Ioannidis GV, Karachalios T, *et al.* Pain relief from nasal salmon calcitonin in osteoporotic vertebral crush fractures. A double blind, placebo-controlled clinical study. *Acta Orthop Scand.* 1997;**68**(Suppl 275):112–14

SAT0161 MENATETRENONE ACTS DIRECTLY ON CIRCULATING HUMAN OSTEOCLAST PRECURSORS

T Hirayama, H Taira, O Kudo, I Itonaga, T Torisu, Y Fujikawa. *Department of Orthopaedic Surgery, Oita Medical University, Oita-Gun, Japan*

10.1136/annrheumdis-2001.648

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