which highlighted the relationship between risk factors of osteoporosis and rib fractures in older men aged 65 or above.¹ It was observed that the incidence of rib fractures was 3.5/1000 years. Only 3% of rib fractures occurred with absence of trauma. Bone mineral density (BMD) is an important measure for predicting various bone fractures.² However, prediction of rib fractures using BMD measurement in different body sites is not reported.

Objectives: To determine if reduction in femoral neck and lumbar spine BMD are predictive of rib fractures.

Methods: Patients referred from primary care to a DEXA scanner in the north west of England between January 2006 and December 2016 were used in this study. Patients with a history of rib fractures at first scan were matched with controls who did not have any indication for scanning. Cases and controls were matched for age and gender. Differences in BMD at L1-L4 spine and the femoral neck were analysed using two-sample t test. Logistic regression models were fitted to analyse the association between lumbar spine and femoral neck BMD and rib fracture occurrence. The fit of each model was compared using receiver operating characteristic (ROC) curves.

Results: A total of 1554 patients were included in the study (777 cases of rib fractures and 777 controls). Mean age for both cases and controls were 62.5 years (SD 12.0). 605 patients (77.9%) were female in both the case cohort and the controls. The mean T score in the lumbar spine is 1.00 in cases versus 1.10 in controls (diff 0.100 95% CI 0.0488, 0.142 p<0.001). The mean T score in the femoral neck is 0.812 in cases versus 0.935 in controls (diff 0.123 95% CI 0.108, 0.137 p<0.001). The odds of lumbar spine BMD and femoral neck BMD were 0.111 (95% CI 0.0640, 0.194, p<0.001) and 0.00209 (95% CI 0.000903, 0.00485, p<0.001) respectively. The areas under ROC curve (AUC) for lumbar spine BMD and femoral neck BMD were 0.623 and 0.733.

Conclusions: This study demonstrated that reduction in BMD at the lumbar spine and femoral neck positively correlated to the risk of rib fractures. Reduction in femoral neck BMD is a stronger predictor of the two. Prediction of rib fractures could be affected by other factors influencing lumbar spine and femoral neck BMD. Further work in different demographic groups should be done for comparison and analysis.

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AB0997

CLINICAL CHARACTERISTICS OF NON-RESPONDER TO DENOSUMAB TREATMENT FOR POSTMENOPAUSAL OSTEOPOROSIS IN JAPANESE WOMAN

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Background: Denosumab (d-mab), an anti-receptor activator of nuclear factor kappa-B ligand (RANKL) monoclonal antibody, is now widely used in postmenopausal osteoporosis (OP) treatment. It can attain reliable increase of bone mineral density (BMD) despite any OP drugs previous used, and that can be predicted in a long period. However, sometimes we observe BMP decrease. Factor that suppresses BMD gain is still unclear.

Objectives: This study investigates non-responder to d-mab, and attempted to evaluate factors that concerns non-responder in clinical practice retrospectively.

Methods: 212 postmenopausal OP patients have been treated with d-mab continuously for more than two years under vitamin D supplement and calcium since June 2013. These patients were enrolled, and their clinical background (CBs) such as age at start of d-mab, past history of bone fragility fracture, alcohol habit, current smoking, being treated for rheumatoid arthritis (RA), glucocorticoid steroid thrown, OP drug naïve, length of administration (LA), concurrence of lifestyle disease (LSD) such as diabetes mellitus, hypertension, and chronic obstructive lung disease, and number of comorbidity (N.Com) were investigated (table 1a). BMD of lumbar spine (LS), femoral neck (FN), greater trochanter (GT), and whole femur (WF) at the start and every six months thereafter were measured. Tartrate-resistant Acid Phosphatase 5b (TRACP5b) and total dose of type-one pro-collagen -N-pro-peptide (P1NP) at the same time of BMD measurement, and reduction ratio (RR) of them compared to the first shot were calculated. Patients were divided into two groups whether BMD increased. BMD in each part at final measurement relative to that at start was compared statistically with paired T-test. CBs were statistically evaluated between the two BMD groups (Res and n-Res; Responder and non-Responder) with Mann-Whitney U-test (MWT), and then correlation between the BMD groups and factors of CB that had demonstrated significantly difference,

and TRACP5b and P1NP was also evaluated statistically with Binary Logistic Analysis (BLR). Statistical significance was set less than 5%.

Results: For all patients, BMD in LS, WF, and GT demonstrated significant increase at final measurement than at start (p<0.001), while FN demonstrated no significant increase. However, n-Res counted 30, 89, 46, and 44 for LS, FN, WF, and GT, respectively. LA demonstrated negative significant correlation for being n-Res in all part, while LSD, N.Com, TRACP5b at start, and RR of TRACP5b at second shot and last shot, demonstrated significant positive correlation in LS with MWT. However, with BLR, only RR of TRACP5b at second shot demonstrated significant negative correlation with n-Res in LS (OR:0.0702, 95% CI:0.0051–0.9655) with 0.39 cut-off index (COI), while no other factors but LA demonstrated significant negative correlation with n-Res in WF (OR:0.9669, 95% CI:0.9433–0.9911) and GT (OR:0.9632, 95% CI:0.9391–0.9878) with 26 and 24 months COI, respectively (table 1b).

Table 1a Patient's background. Age at Start, Length Administered, Number of Chronic Comorbidities, and Bone Mineral Density, show average value and standard deviation. The other parameters show numbers.%YAM:% of young adult mean value. LS: lumbar spine, FN: femoral neck, WF: whole femur, GT: greater trochanter, SERM: selective oestrogen receptor modulator.

Table 1b Parameters that demonstrated significant difference between responder and non-responder to denosumab, and their p-values, and results of these parameters with binary logistic regression analysis. LS: lumbar spine, FN: femoral neck, WF: whole femur, GT: greater trochanter, LSD: concurrence of lifestyle disease, LA: length of administration, N.Com: number of concurrent comorbidities, TRACP5b at start; tartrate-resistant acid phosphatase 5b (TRACP5b) at start of administration, rTRACP5b@1stP: reduction ratio of TRACP5b of second shot compared to the first, rTRACP5b@LT: reduction ratio to TRACP5b of last shot compared to the first, Drug Naive: initial drug as osteoporosis treatment, P1NP: total dose of type-one pro-collagen -N- pro-peptide.

Patient's Background		In Mann-Whitney U-test		In Binary Regression Analysis		
Age at Start (year-old)	79.66, 9.47	Part	Parameters	p-value	Odds Ratio	95% CI
Alcohol Habit	4	LS	LSD	0.001700	7.228	0.5880-8.886
Current Smoke	4		LA	0.001700	1.026	0.9708-1.084
Fragility Fracture	79		N.Com	0.000117	0.9291	0.7201-1.199
Operation Experienced	18	FN	TRACP5b at start	0.002894	0.995	0.9897-1.0000
Rheumatoid Arthritis	83		rTRACP5b@1stP	0.001247	0.07015	0.005096-0.9665
Lifestyle Disease	137		rTRACP5b@LT	0.004489	2.913	0.3290-2.580
Glucocorticosteroid	53	WF	LA	0.026510	0.9969	0.9465-1.050
Vitamin-D3 Supplemented	210		Drug Naive	0.016580	1.026	0.2346-4.572
Length Administered (years)	2.99, 0.84		P1NP at start	0.000020	1.01	0.9846-1.037
Number of Chronic Comorbidities	6.75, 3.42	GT	P1NP at second shot	0.000006	0.9872	0.9677-1.007
Bone Mineral Density (NYAM) at start in LS	66.95, 15.81		P1NP at last shot	0.000045	1.014	0.9857-1.043
Bone Mineral Density (NYAM) at start in FN	60.96, 11.47		TRACP5b at start	0.000013	1.002	0.9985-1.006
Bone Mineral Density (NYAM) at start in WF	62.56, 11.94	LA	LA	0.007389	0.9669	0.9433-0.9911
Bone Mineral Density (NYAM) at start in GT	63.43, 14.44		LA	0.003872	0.9632	0.9391-0.9878
Drug Naive	95					
Previous Drug						
Biphosphonate	54					
SERM	22					
Teriparatide	19					

Conclusions: These results suggest that non-responder to d-mab exists. Length of administration works for BMD to increase in femur, and concurrence of LSD, and N.Com are suggested to be risk factors in LS. Less reduction ratio of TRACP5b at second shot is referred for prediction of non-responder. However, there is no parameter that predicts non-responder before administration.

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AB0998

OSTEOPOROSIS PREVALENCE IN POST-MENOPAUSAL PATIENTS TREATED WITH AROMATASE INHIBITORS USING BONE MINERAL DENSITY VALUES FROM A SPANISH POPULATION

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Background: The majority of cases of breast cancer (BC) are hormone receptor positive and are sensitive to antiestrogen therapy. For postmenopausal women, adjuvant hormonal therapy with an aromatase inhibitor (AI) is the standard of care, and is associated with greater prevalence of osteoporosis (OP)¹. Definition of osteoporosis is made depending on the T-Score value, which is calculated according to the bone mass peak obtained from a reference population; in our country, BMD reference values in clinical practice are obtained from the National Health and Nutrition Examination Survey cohort (NHANES III) for femoral neck (FN) and those proportionated by the commercial brand Hologic for lumbar spine (LS), which may not be representative of our population and could be distorting the assessment of OP in our patients.

Objectives: To assess the prevalence of OP in Spanish postmenopausal patients diagnosed with BC and treated with AI using BMD values obtained from a local cohort for T-Score calculation.

Methods: We performed a cross-sectional study with postmenopausal women diagnosed with BC and treated with AI attended in our hospital between August 2011 and December 2014. We estimated BMD for LS and FN using dual X-Ray absorptiometry. The prevalence of OP in our cohort was assessed using BMD reference values from the Spanish cohort of Diaz-Curiel², which included a group of 2442 healthy patients from both genres stratified by age, and compared it with OP prevalence obtained using clinical practice reference values applied in our country (NHANES III/Hologic).

Results: A total of 54 patients were included. The mean age at diagnosis was 61.50±6.50 years. The AI used in both groups was letrozole. For LS we didn't find statistically significant differences between both groups. For FN we found 13 patients (24%) with OP according to NHANES/Hologic, and 8 patients (14.8%) according to Diaz-Curiel values. These values are summarised in the table.

Abstract AB0998 – Table 1

	(NHANES/ Hologic)	Number of patients (%)	(Diaz Curiel cohort)	Number of patients (%)	p-value
Lumbar spine (L2-L4)	Normal	10 (18.6%)	Normal	10 (18.6%)	0.110
	Osteopenia	16 (29.6%)	Osteopenia	15 (27.7%)	
	Osteoporosis	28 (51.8%)	Osteoporosis	29 (53.7%)	
	Mean T-score=-2.16		Mean T-score=-2.28		
Femoral neck	Normal	17 (32%)	Normal	15 (27.8%)	0.018*
	Osteopenia	24 (44%)	Osteopenia	31 (57.4%)	
	Osteoporosis	13 (24%)	Osteoporosis	8 (14.8%)	
	Mean T-score: -1.77		Mean T-score: -1.57		

Conclusions: In our study, we observe statistically significant differences in osteoporosis prevalence for FN, and around 10% of patients could be reclassified using our local BMD values, which highlights the relevance of the use of BMD values obtained from local population for T-score calculation.

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AB0999 OPPORTUNISTIC SCREENING FOR OSTEOPOROSIS USING THORACO-ABDOMINO-PELVIC COMPUTED TOMOGRAPHY FOR ASSESSMENT OF VERTEBRAL DENSITY IN RHEUMATOID ARTHRITIS PATIENTS

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Background: Screening for osteoporosis is crucial in rheumatoid arthritis (RA) patients. Computed tomography (CT) attenuation assessment has been proved to be of interest in general population for detection of osteoporosis.

Objectives: To assess the value of thoraco-abdomino-pelvic CT-derived bone mineral density (BMD) in L1, compared with dual energy X-ray absorptiometry (DXA) for osteoporosis screening in rheumatoid arthritis patients.

Methods: Consecutive RA patients who underwent a CT-scan and a DXA within a two-year period are retrospectively included. CT sagittal images are evaluated from T4 to L5 for vertebral fractures according to Genant classification. CT attenuation values (in Hounsfield units [HU]) of trabecular bone in L1 are measured on axial images and compared to DXA results.

Results: One hundred and five patients (mean age 61.1 years (±9.5), 78.1% women) were included. Twenty-eight patients (26.7%) have DXA-defined osteoporosis and 32 (30%) have osteoporotic fractures (vertebral and/or non-vertebral). According to CT assessment, mean (SD) vertebral L1 attenuation is 142.2 HU (±18.5). The diagnostic performance for vertebral CT-attenuation measurement was good, with an AUC of 0.67 for predicting osteoporotic fractures and of 0.69 for predicting vertebral fractures. Among 31 patients with osteoporotic fractures, 23

(74%) patients are categorised as osteoporotic with L1 CT-attenuation of 135 HU or less, whereas only 13 patients (42%) with DXA.

Conclusions: This technique offers a combined opportunistic screening for osteoporosis by assessing both vertebral fractures and bone density on routine CT-scans. This seems of particular interest in RA patients who are at high risk for osteoporosis.

Disclosure of Interest: None declared

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AB1000 ASSOCIATION OF SERUM URIC ACID LEVEL WITH BONE MINERAL DENSITY AND OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN WITH RHEUMATOID ARTHRITIS

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Background: Previous studies have reported that higher serum uric acid (SUA) levels are associated with higher bone mineral density (BMD) in men and postmenopausal women, and lower risk of fragility fracture in men. However, whether this association is also present in patients with rheumatoid arthritis (RA) has not yet been investigated.

Objectives: To examine the association of SUA levels with BMD and osteoporosis in postmenopausal women with RA.

Methods: We retrospectively evaluated 447 postmenopausal female RA patients (mean age 61.1 years) who underwent measurement of L1–4, femoral neck, and total hip BMD using dual energy X-ray absorptiometry, in addition to SUA levels at a university rheumatology centre in South Korea between 2004 and 2017. Osteoporosis was defined as a T-score of ≤−2.5 according to the World Health Organization classification.

Results: The median (interquartile range) SUA level was 4 (3.3–4.8) mg/dL. The mean (±SD) L1–4, femoral neck, and total hip BMD were 0.93±0.16 g/cm², 0.75±0.12 g/cm², and 0.81±0.12 g/cm², respectively, and the frequencies of osteoporosis in the spine, hip, and either site were 25.6%, 15.9%, and 32.5%, respectively. SUA levels were positively correlated with L1–4 ($p=0.102$, $p=0.032$), femoral neck ($p=0.123$, $p=0.01$), and total hip BMD values ($p=0.146$, $p=0.002$) and body mass index ($p=0.231$, $p<0.001$), and negatively correlated with glomerular filtration rate ($p=-0.363$, $p<0.001$) in Spearman correlation analysis. In multivariable linear regression models adjusted for confounding factors, SUA levels showed a significant positive association with femoral neck BMD ($\beta=0.0099$, $p=0.015$) and total hip BMD ($\beta=0.0118$, $p=0.01$) but not with L1–4 BMD ($\beta=0.0086$, $p=0.159$) as shown in table 1. In addition, multivariable logistic analysis revealed that the third (OR=0.44, $p=0.038$) and fourth SUA quartiles (OR=0.37, $p=0.021$) were associated with lower risk of hip osteoporosis, as compared with the first SUA quartile. However, this association was not observed in lumbar spine osteoporosis.

Abstract AB1000 – Table 1. Linear regression models evaluating the association between serum uric acid levels and bone mineral density in postmenopausal women with rheumatoid arthritis

Independent variables	Dependent variables	Univariable model		Multivariable model	
		Unstandardized β (SE)	p-value	*Unstandardized β (SE)	p-value
Serum uric acid, mg/dL	Femoral neck BMD	0.0125 (0.0045)	0.006	0.0099 (0.004)	0.015
Serum uric acid, mg/dL	Total hip BMD	0.0138 (0.0048)	0.004	0.0118 (0.0045)	0.01
Serum uric acid, mg/dL	L1–4 BMD	0.0127 (0.0063)	0.044	0.0086 (0.0061)	0.159

*Estimated using stepwise multivariable linear regression models adjusting for age, BMI, DAS28-ESR, cumulative GCs dose, disease duration and eGFR

Conclusions: Higher SUA levels were associated with a reduced risk of low BMD and osteoporosis at hip in postmenopausal women with RA, but no significant association between SUA levels and lumbar spine BMD was found. Our data suggests that uric acid may act as a protective factor against hip bone loss in RA patients.

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