Objectives: To compare the ability of FRAX and BMD alone in discriminating patients with and without fracture, and their effectiveness in identifying anti-osteoporotic treatment needs

Methods: 1300 rheumatic disease patients on long-term glucocorticoid were screened for vertebral fracture by radiograph from 7 rheumatology clinics. 220 ambulatory patients (110 with vertebral fracture and 110 without vertebral fracture) were recruited and assessed on CRF with FRAX questionnaire, BMD at the lumbar spine, total hip and femoral neck by dual-energy x-ray absorptiometry (DXA). The ten-year probability of MOF and hip fracture (FRAX score) with and without femoral neck BMD were calculated with the WHO FRAX tool.

Results: Both groups of patients were matched in gender, disease type and cumulative glucocorticoid dose ($p>0.1$). Patients in the fracture group were older (63 ± 14 vs 59 ± 12 years, $p<0.01$), of lower body mass index [22.7 ± 3.5vs 24 ± 3.7kg/m^2, $p<0.05$], with a higher prevalence of previous fracture [38 (34.5%) vs 5 (4.5%), $p<0.01$], use of vitamin D [77 (70%)vs 54 (49.1%), $p<0.01$] and bisphosphonates [23 (20.9%) vs 7 (6.4%), $p<0.01$]. A receiver operating characteristic (ROC) curve analysis was performed to determine the ability of FRAX score with or without BMD and BMD alone to discriminate fracture status (Table 1). BMD at the femoral neck and FRAX score with BMD were able to provide adequate discrimination with their area under curve (AUC) >0.70. With regards to treatment indication, only 53/110 (48.2%) of the patients with vertebral fracture were identified as having osteoporosis (T-score $\leq$ -2.5 at hip/spine) by DXA. In contrast, FRAX with BMD were able to identify 71/110 (64.5%) of the fracture patients whom treatment criteria were met, with a power of 0.97 and effect size of 0.38 (a medium effect) at the 0.05 level.

Table 1. Area under ROC curve on discriminating fracture

		AUC	95% Confidence Interval
BMD at Femoral Neck		0.709	0.640-0.778*
BMD of Total Hip		0.693	0.623-0.763*
BMD of Lumbar Spine		0.654	0.581-0.727*
FRAX with BMD	MOF	0.705	0.635-0.775*
	Hip fracture	0.720	0.651-0.789*
FRAX without	MOF	0.681	0.610-0.752*
BMD	Hip fracture	0.687	0.616-0.758*

*$p<0.001$

Conclusions: In rheumatic patients on long-term glucocorticoid, FRAX score was more effective in identifying patients with intervention needs than BMD alone. It is suggested that FRAX should be used as a routine assessment to identify patients, even asymptomatic, indicated for anti-osteoporotic treatment.

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FRI0577 | **CLINICAL CHARACTERISTICS OF SPONTANEUS FRACTURES IN THE BEDRIDDEN PATIENTS UNINTENTIONALLY CAUSED BY CAREGIVERS**

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Background: The number of bedridden patients in our super-aging society is increasing. We previously studied fractures occurring in bedridden patients during daily activities with caregiver assistance (dry baths, range of motion exercises, transfer to wheelchair, changing diapers, and so forth) and non-traumatic fractures detected by pain, swelling, subcutaneous bleeding, deformity, and so on. These minimal trauma or spontaneous fractures were defined as "*spontaneus fractures in the bedridden patients unintentionally caused by caregivers*". Despite efforts to draw attention to preventing these injuries, the incidence of such fractures has been increasing. Spontaneus fractures caused by caregivers are characterized by the presence of untreated osteoporosis, contracture or spasticity near the lesion, institutionalization or hospitalization, repeated fractures, femur fracture, and other unknown causes.

Objectives: Spontaneus fractures caused by caregivers frequently occur without any noticeable trauma and at present, predicting the risk of occurrence is difficult. This study aimed to explore the usefulness of bone metabolism markers in predicting the risk for spontaneus fractures caused by caregivers.

Methods: Study subjects were selected from a pool of 28 patients (3 men; 25 women) with 33 spontaneus fractures caused by caregivers who were treated in our hospital between April 2006 and July 2016. Patients were selected based on the following inclusion criteria: no renal dysfunction (eGFR $\geq$60) and those who had undergone measurement of bone metabolism markers. Finally, 12 women with a mean age at onset of 90.6 (76–100) years were enrolled in the study. The following markers were evaluated: the bone formation markers bone type alkaline phosphatase and intact procollagen type 1 amino-terminal propeptide; the bone resorption markers tartrate-resistant acid phosphatase (TRACP)-5b, urinary deoxypyridinoline (DPD); and serum N-telopeptide; and the bone quality markers undercarboxylated osteocalcin (ucOC), urinary pentosidine (Pen), and homocysteine (Hcy).

Results: Low levels of bone metabolism markers were not observed in these subjects. However, TRACP-5b levels were high in six subjects while urinary DPD levels were abnormally high in all subjects with a mean value of 23.3 (9.2–41.4) nmol/mmol creatinine (Cr). With regards to bone quality markers, levels of Hcy and ucOC were high in two and three subjects, respectively; while Pen levels were abnormally high in ten subjects with a mean value of 0.183 (0.0774–0.3115) μg/mg Cr.

Conclusions: The majority of subjects with spontaneus fractures caused by caregivers had untreated osteoporosis and some had repeated fractures, indicating that early treatment of osteoporosis is important. Assessing osteoporosis in bedridden patients is challenging as measurement of bone density is often difficult due to spinal deformity and contracture. Our results suggest that among the bone metabolism markers, DPD and Pen may be useful predictors for the risk of spontaneus fractures caused by caregivers.

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FRI0578 | **ODONTOID FRACTURES IN THE ELDERLY: AN UNKNOWN OSTEOPOROTIC FRACTURE?**

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Background: Current WHO definition of osteoporosis excludes cervical fractures. However, in atraumatic odontoid fractures, mainly reported by orthopedic surgeons, bone status has not been described yet [1].

Objectives: To investigate bone status in elderly patients sustaining a low energy odontoid fracture.

Methods: We conducted a prospective study from January 2016 to January 2017 in patients >65 years old, hospitalized in Nice University hospital for low energy odontoid fracture. An evaluation of bone status was proposed within 3 months after fracture event. Evaluation included demographic data, clinical risk factors of osteoporosis, bone mineral density (BMD) at spine and hip and vertebral fracture assessment (VFA) by dual X-ray absorptiometry and serum analysis to detect secondary osteoporosis.

Results: 38 patients were hospitalized for odontoid fracture: 8 patients <65 years always after a major trauma (mean age 37.1±14.5 y) and 30 patients ≥65 years including 3 after a high energy impact. 27 odontoid fractures followed a low energy impact: 18 women and 9 men, mean age 83.8 y. (±10.7). 8 patients died before bone status assessment (5 men and 3 women), 6 died during hospitalization with a mean delay of 3.5 days (±1.87) and 2 after discharge (1 month and 5 month). 3 patients refused bone status evaluation, 5 were lost to follow-up and 1 is awaiting evaluation. Finally 10 patients had bone status evaluation, all women, mean age 84.2 y. (±8.9). None had parental history of hip fracture, 1 had an early menopause, 1 received aromatase inhibitors for breast cancer and 2 had a history of steroid therapy (>3 months). 3 patients had previously received hormone replacement therapy, 1 received bisphosphonate for 5 years and 4 had calcium + vitamin D supplements. Lumbar spine mean T-score was -1.45 (±1.08), femoral neck: -2.37 (±0.040) and total hip: -1.99 (±0.6). VFA analysis revealed 4 unknown vertebral fractures. The table summarizes population bone status: 8 patients out of 10 fulfilled diagnostic criteria of osteoporosis, including 6 with previous fractures. 2 patients with T-score > -1.DS didn't have hip BMD assessment because of bilateral hip replacement but had previous major osteoporotic fractures. No

Lowest T-score	No fracture (n)	Previous minor osteoporotic fracture (n)	Previous major osteoporotic fracture (n)
T-score > -1 DS	0	0	2 (1 patient: 2 femoral neck fracture, 1 patient: pelvic and humeral fractures. Both patients had vertebral fracture on VFA)
-1 DS > T-score ≥ -2.5	1	1 (1 wrist)	2 (1 patient: humeral and vertebral fracture on VFA, 1 patient: 5 ribs fractures)
T-score < -2.5	2	1 (2 wrist fractures)	1 (vertebral fracture on VFA)

secondary osteoporosis was detected. Serum vitamin D concentration was <30 ng/ml in 5 patients, including 2 with concentration <10 ng/ml.

Conclusions: Our study reveals that odontoid fractures mainly occur in elderly osteoporotic patients after a low energy impact. Although WHO osteoporosis definition excludes cervical fractures, odontoid fracture may be considered as an osteoporotic fracture. Further studies are required to confirm these results.

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Disclosure of Interest: None declared

FRI0579 **INFLUENCE OF ORAL PREDNISOLONE ON EFFECT OF DENOSUMAB ON OSTEOPOROSIS IN PATIENTS WITH JAPANESE RHEUMATOID ARTHRITIS; 24 MONTHS OF FOLLOW-UP ~A MULTICENTER REGISTRY STUDY~**

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Background: Denosumab (DMB) is a fully human monoclonal antibody to the RANKL that blocks its binding RANK, inhibiting the development and activity of osteoclasts, decreasing bone resorption, increasing bone density and reducing fracture risk. Osteoporosis (OP) is more frequent in patients with rheumatoid arthritis (RA) than in the general population due to active systemic inflammation as well as the use of glucocorticoid and immobility. However efficacy of DMB is not clear in patirnts with glucocorticoid- induced OP in RA. Therefore we investigated the influence of oral prednisolone on effect of DMB in patients with Japanese RA from initiation to 24 months at this time.

Objectives: This prospective study investigated the efficacy of DMB for 24 months on glucocorticoid- induced OP in RA patients.

Methods: Patients with a diagnosis of RA according to the 2010 ACR/EULAR criteria who had been prescribed DMB from Tsurumai Biologics Communication Registry (TBCR)-BONE between October 2013 and October 2015 were enrolled. The final study cohort of 63 patients received continuous DMB therapy more than 24 months. The DMB dose was 60mg at once every 6 months. In all cases native or activated vitamin D has been used. We reviewed the results for 24 months about the increase and decrease of bone mineral density (BMD) of lumbar spine (LS) and total hip (TH) by DEXA and bone turnover markers, intact n-terminal propeptide type I procollagen (PINP) and tartrate-resistant acid phopshatate form 5b (TRACP-5b).

Results: In the patients receiving oral prednisolone group (n=23, GC+) and not receiving group (n=40, GC-), the number of female was each 21 (91%) and 39 (98%) cases (p=0.548). The mean age was 69.8±7.0 and 71.0±7.3 years old (p=0.622); disease duration was 16.0±8.9 and 15.7±12.6 years (p=0.592); the body mass index was 20.7±3.5 and 19.7±3.0 (p=0.335) and the FRAX was 34.2±19.1 and 24.6±13.9 (p=0.040). Clinical findings related to RA and OP at baseline were as follows; CRP 1.2±1.4 and 0.5±1.0 mg/dl (p=0.009); DAS-CRP 3.16±1.17 and 2.50±1.27 (p=0.025); m-HAQ 1.24±0.90 and 0.82±0.82 (p=0.065); P1NP 60.1±38.6 and 56.9±33.5 μg/l (p=0.711); TRACP-5b 513±257 and 505±202 mU/dL (p=0.689); LS-BMD 0.87±0.18 and 0.80±0.14 g/cm^2 (p=0.074) and TH-BMD 0.60±0.11 and 0.59±0.08 g/cm^2 (p=0.457). The rate of decreased P1NP from baseline to 6, 12, 18 and 24 months were each -25.6% vs -41.6% (p=0.129) at 6 month, -8.0% vs -42.6% (p=0.031) at 12 month, -19.5% vs -27.5% (p=0.235) at 18 month and -13.8% vs -33.8% (p=0.134) at 24 month and TRAC-5b were -26.5% vs -38.7% (p=0.710) at 6 month, -22.0% vs -35.1% (p=0.229) at 12 month, -25.2% vs -28.1% (p=0.792) at 18 month and -20.6% vs -27.3% (p=0.663) at 24 month in the GS+ vs GS- group. The rate of increased LS-BMD from baseline to 6, 12, 18 and 24 months were each 4.1% vs 4.6% (p=0.671) at 6 month, 5.3% vs 7.0% (p=0.361) at 12 month, 8.1% vs 8.1% (p=0.438) at 18 month and 10.0% vs 7.7% (p=0.104) at 24 month and TH-BMD were 3.3% vs 2.7% (p=0.690) at 6 month, 1.4% vs 3.8% (p=0.804) at 12 month, 6.4% vs 4.0% (p=0.259) at 18 month and 5.7% vs 4.3% (p=0.945) at 24 month in the GS+ vs GS- group (Fig.1,2).
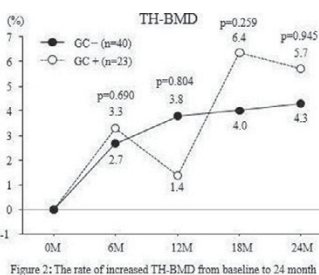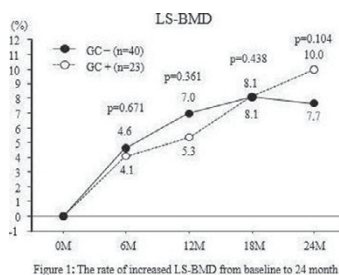

Figure 1: The rate of increased LS-BMD from baseline to 24 month

Figure 2: The rate of increased TH-BMD from baseline to 24 month

Conclusions: DMB was effective in OP of RA patients. Oral prednisolone use did not influence the efficacy of DMB for 24 months.

Disclosure of Interest: Y. Kanayama: None declared, Y. Hirano Speakers bureau:

FRI0580 **PREDICT SARCOPENIA BY SONOELASTOGRAPHY OF QUADRICEPS MUSCLE IN OSTEOPOROTIC PATIENTS**

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Background: Reduced muscle mass had associated with high mortality. So it is urgent for simple techniques to early detection sarcopenia. Our objective was to examine the validity of sonoelastography to predict sarcopenia in osteoporotic patients.

Objectives: To evaluate the association of sonoelastography and dual-energy X-ray absorptiometry in patients with sarcopenia and osteoporosis.

Methods: We conducted an observational study in Kaohsiung Chang Gang Memorial Hospital. Sarcopenia was determined using a dual-energy X-ray absorptiometry. Osteoporosis was defined through estimated bone mass (BM). Sonoelastography was performed over mid thigh over quadriceps muscle. We measure hardness and elastography ratio of quadriceps over subcutaneous fat tissue. ROC analysis was used to find best cut-off point.

Results: A total 47 (23 sarcopenia, 24 non-sarcopenia) osteoporotic patients were enrolled. The mean age was 71.04±9.64 years, and most patients (88.9%) were women. Sonoelastography showed sarcopenia patients had more soft than non-sarcopenia patients, furthermore the elastography ratio of quadriceps over subcutaneous tissue was lower than non-sarcopenia patients. When the cut points determined by receiver operating characteristic (ROC) curve analysis were applied, The best cut-point of hardness was 42.5 (sensitivity, 0.969; 1-specificity, 0.066), while the best cut-point of quadriceps over subcutaneous tissue was 70.5% (sensitivity, 1.00; 1-specificity, 0.079).

Characteristics of study patients

Variables	Sarcopenia (n=23)	Non-sarcopenia (n=24)	P-value
Age (years)	71.04 ±9.64	70.82±8.624	0.316
Body mass index (kg/m^2)	23.80±3.45	23.83±4.56	0.977
Gender (Female %)	22 (75.9%)	78 (84.8%)	0.624
EX2/1	0.37±0.15	1.36±0.57	**<0.001**
Hard%	15.44±13.15	76.70±20.12	**<0.001**
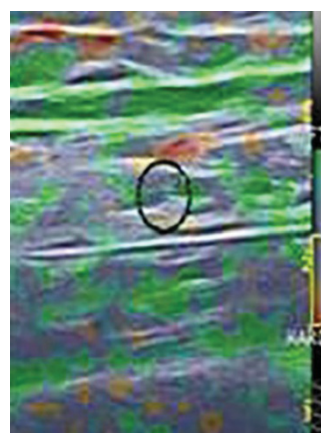
Conclusions: Sonoelastography was easily applicable in patients with sarcopenia and osteoporosis. Using hardness content and elastography ratio of quadriceps over subcutaneous ratio render more information of muscle character. Early detection of sarcopenia with sonoelastography in patients with osteoporosis afford future trend of preventive medicine in geriatric patients.

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