Disclosure of Interests: Giovanni Adami Shareholder of: Theramex, Galapagos, Marco Pontalti: None declared, Angelo Fassio: None declared, Camilla Benini: None declared, Davide Gatti: None declared, Stefano Negrì: None declared, Pietro Olivi: None declared, Maurizio Rossini Shareholder of: Abbvie, Amgen, Novartis, Pfizer, Sandoz, Theramex, UCB.

Objectives:

- Determine which fractures are most common in patients who present for dual-energy X-ray absorptiometry (DEXA) scan
- Apply a factor analysis to establish any patterns in the incidence of fractures

Methods:

- Between 1996 and 2017, 31546 patients presented to a district general hospital in the North West of England for bone mineral density estimation by DEXA scan. Demographic details, risk factors, incidence of fractures and site of fractures were recorded at time of scan. These data were retrospectively studied to identify patients who had sustained at least one fracture. STATA was used to conduct a factor analysis using the principal component factors (PCF) method. Ethical approval was granted by the Northwest Regional Ethics Committee.

Results:

- 11839 patients were identified to have had at least one fracture (14756 total fractures). Mean age was 67.96, with 9993 females and 1846 males. Mean height was 161.21 cm, mean weight was 70.41 kg and mean BMI was 27.04 kg/m². Mean T-scores at femoral neck, total femur and lumbar spine were -1.55, -1.38 and -1.30 respectively. The most common fracture site was at the wrist/forearm with 5421 (36.74%) cases. Further, there were 2795 tibia/fibula (18.94%), 2530 spine (17.15%), 1363 femur (9.24%), 1224 humerus (8.29%), 1063 rib (7.20%), 315 pelvis (2.13%), 43 elbow (0.29%) and 2 ankle (0.01%) fractures. 9390 patients had 1 fracture and 2449 patients had more than 1, with 9 patients sustaining 5 fractures. Factor analysis on fracture sites revealed 6 factors with an eigenvalue > 1. Fracture sites were grouped together based on these fractures which loaded most heavily on each factor. Loading was as follows: spine and ribs on Factor 1; spine, pelvis and wrist/forearm on Factor 2; humerus and femur on Factor 3; elbow and ankle on Factor 4; ribs and humerus on Factor 5; ribs and femur on Factor 6 (Table 1).

Table 1. Factor analysis on sites of fractures using the PCF method.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Factor 4</th>
<th>Factor 5</th>
<th>Factor 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tibia/fibula</td>
<td>0.0862</td>
<td>-0.9485</td>
<td>-0.0530</td>
<td>0.1182</td>
<td>0.0325</td>
<td>-0.0866</td>
</tr>
<tr>
<td>Spine</td>
<td>0.6906</td>
<td>0.3263</td>
<td>-0.4535</td>
<td>-0.1501</td>
<td>-0.2681</td>
<td>-0.1837</td>
</tr>
<tr>
<td>Ribs</td>
<td>0.2128</td>
<td>0.1089</td>
<td>-0.0689</td>
<td>-0.0957</td>
<td>0.7535</td>
<td>0.6074</td>
</tr>
<tr>
<td>Pelvis</td>
<td>0.0810</td>
<td>0.2050</td>
<td>0.1185</td>
<td>-0.0158</td>
<td>0.2113</td>
<td>-0.3663</td>
</tr>
<tr>
<td>Humerus</td>
<td>0.0386</td>
<td>0.1433</td>
<td>0.5578</td>
<td>0.0892</td>
<td>0.3832</td>
<td>-0.5101</td>
</tr>
<tr>
<td>Femur</td>
<td>0.1227</td>
<td>0.0946</td>
<td>0.7052</td>
<td>0.0571</td>
<td>-0.4814</td>
<td>0.4532</td>
</tr>
<tr>
<td>Elbow</td>
<td>0.0391</td>
<td>0.1300</td>
<td>-0.0740</td>
<td>0.7306</td>
<td>0.0305</td>
<td>0.3683</td>
</tr>
<tr>
<td>Ankle</td>
<td>0.0547</td>
<td>0.1082</td>
<td>-0.1084</td>
<td>0.7189</td>
<td>-0.0365</td>
<td>0.0716</td>
</tr>
<tr>
<td>Wrist/forearm</td>
<td>-0.8856</td>
<td>0.2389</td>
<td>-0.2461</td>
<td>-0.0479</td>
<td>0.0608</td>
<td>0.0071</td>
</tr>
</tbody>
</table>

Conclusion: In-keeping with published data, the most common site for fracture was forearm (3). Factor analysis grouped together sites of fractures into 6 factors, suggesting that these fractures are more likely to co-exist. Moving forward it would be beneficial to ascertain differences between the groups in terms of demographics, risk factors and any bone protection measures taken. This may highlight clinically relevant data in order to make evidence based decisions in the identification and management of patients at risk of fragility fractures.

REFERENCES:


Disclosure of Interests: None declared


A CONCORDANCE STUDY OF CT DENSITOMETRY WITH DXA DENSITOMETRY

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Background: Osteoporosis is a skeletal disorder characterised by compromised bone strength resulting in an increased risk of fracture. Although DXA is the only technology that can be used for diagnostic classification of osteoporosis according to WHO, computed tomography imaging (CT) densitometry of the spine has equal or superior ability to predict vertebral fractures in postmenopausal women. Therefore the continued use of DXA as the primary modality of calculating BMD may lead to inaccurate exclusion of osteoporosis and prognostication.

Objectives: To assess the concordance of spinal CT densitometry with current standard of assessment through DXA-derived densitometry.

Methods: 50 patients who had had both a DXA scan of the lumbar spine and CT lumbar spine/thorax/abdomen performed within 18 months of each other were included. The CT images were analysed to attain the mean Hounsfield score of the lumbar vertebrae and this was compared to DXA derived T-scores. A Hounsfield score of 131 was used as the threshold for diagnosing osteoporosis akin to a DXA-derived T score of -2.5. The final data was analysed to find correlation values of Hounsfield score with T-score using Pearson correlation coefficient.

Results: The mean Hounsfield score was 108.4 (osteoporotic) compared to a mean T-score of -1.22 (osteopenic) with a statistically significant correlation coefficient of 0.447 (p=0.01).Using T score ≤ -2.5, 15 (30%) of the patients included on our study would have a diagnosis of osteoporosis whereas this would be 36 patients (72%) if using the threshold of Hounsfield score <131. Out of the 50 patients included, 15 had vertebral fragility fractures. The mean T-score for these patients was -1.2 (indicating osteopenia) and mean Hounsfield score was 108 (indicating osteoporosis).

Conclusion: Our study showed a moderate positive correlation between the DXA-derived T-scores and CT Hounsfield scores. This further validates previous studies that suggest CT scans can be used to identify patients with osteoporosis. 93% of patients with vertebral fragility were identified as having osteoporosis using CT densitometry whereas only 40% were identified via DXA. These findings highlight the limitations of DXA, particularly in terms of overestimation of bone mineral density related to degenerative changes. CT images of the thorax, abdomen or lumbar spine that have already been performed for other indications can be used to opportunistically screen
for osteoporosis without additional radiation exposure, waiting time or cost. This may allow for more accurate diagnosis and subsequent treatment and fracture risk reduction.

REFERENCES:

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FIVE-YEAR TREATMENT OUTCOME OF DENOSUMAB ON OSTEOPOROSIS IN PATIENTS WITH RHEUMATOID ARTHRITIS, IN CLINICAL PRACTICE

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Background: Osteoporosis (OP) is a frequent complication identified in patients with rheumatoid arthritis (RA). Effective treatment must be provided to treat OP in RA (RAOP). Denosumab (DMB) is a promising drug, currently being used for the treatment of RAOP. Although DMB was determined to be effective in a long-term FREEDOM extension trial [1] for treating postmenopausal OP, its efficacy in the treatment of RAOP in real-world is not be fully evaluated.

Objectives: This retrospective study assessed the five-year treatment outcome of DMB in Japanese patients with RAOP.

Methods: Data from the Toyohashi RA Database (TRAD) was used, which is a collection of single-center retrospective data. Our study included 65 female patients with RAOP for whom DMB treatment was initiated between October 2013 and May 2016. The following information was collected: 1) baseline characteristics, 2) DMB continuation rates using the Kaplan–Meier method and reasons for stopping DMB, 3) fracture occurrence during DMB treatment, and 4) time-course of bone mineral density (BMD) (lumbar spine (LS) and total hip (TH)) and bone turnover markers (BTM) (bone-specific alkaline phosphatase (BAP), type I procollagen-N-propeptide (P1NP), type I procollagen-N-propeptide (NTX), and tartrate-resistant acid phosphatase-5b (TRACP-5b)) in 38 patients who underwent DMB treatment over a period of five years.

Results: 1) The mean age and RA duration were 69.4 years (46–86) and 17.2 years (1–49), respectively. Prednisolone and biologics were administered in 21 (32.3%) and 20 (30.8%) patients, respectively. Twenty-seven patients (41.5%) had a history of fragility fractures, and 24 patients (36.9%) had a history of vertebral fractures. Pretreatment drugs for OP were as follows: bisphosphonate in 22 patients; teriparatide; 17; none, 16; activated vitamin D, 7; and selective estrogen receptor modulator, 3.
2) Continuation rates of DMB were 96.9% at one year, 95.4% at two years, 85.8% at three years, 79.4% at four years, and 71.1% at five years. DMB treatment was terminated in 24 patients due to lack of efficacy in nine patients, death in seven patients (unknown reason in four, pneumonia in two, and sepsis in one), adverse events except death in five patients (worsening of dementia in two, brain hemorrhage in one, necrosis of jaw in one, and pneumonia in one), and other reasons in three patients.
3) Nine patients (13.8%) experienced fractures during DMB treatment; vertebral and non-vertebral fractures occurred in three and four patients, respectively. Two cases of fractures remained undefined.
4) Both mean LS-BMD and TH-BMD significantly increased in 38 patients for whom DMB administration was continued for five years. Average percent changes of LS-BMD and TH-BMD were 3.9% and 3.0% at six months, 5.5% and 3.8% at one year, 7.6% and 4.1% at two years, 9.8% and 5.7% at three years, 10.8% and 6.5% at four years, and 12.9% and 6.8% at five years (Figure 1). Four BTMs, BAP, P1NP, NTX, and TRACP-5b, significantly decreased from six months to five years when compared to baseline values, with average changes at 5 years equaling −38.4%, −37.8%, −23.8%, and −24.6%, respectively.

Conclusion: DMB treatment of RAOP proved effective and reasonably safe, and it increased BMD by a percentage similar to that observed in the FREEDOM extension trial. However, DMB administration was ceased in 13.8% of cases due to fractures and lack of efficacy. Although DMB is recommended for the treatment of RAOP, future evaluations should be conducted to predict its efficacy and determine alternative treatment strategies.

REFERENCES:

Disclosure of Interests: None declared

INCREASED EXPRESSION OF RECEPTOR FOR ADVANCED GLYCACTION END-PRODUCTS IN SARCOPENIC PATIENT SKELETAL MUSCLE

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Background: Animal studies suggest that advanced glycation end-products (AGEs) and their interaction with receptor for AGEs (RAGE) are involved in sarcopenia, but their relationship in human skeletal muscles has yet to be elucidated.

Objectives: We aimed to determine whether RAGE expression in human skeletal muscle is associated with serum AGE levels and sarcopenia-related changes.

Methods: We reviewed 33 consecutive women (mean age, 65 years) with distal radius fracture who had consented to donate a sample of forearm flexor muscle for research purposes, which was taken during surgical fracture repair. The muscle RAGE expression was measured with immunohistochemistry staining and serum AGE levels using ELISA method. We compared RAGE expression and AGE levels in patients with and without sarcopenia. We also correlated RAGE expression with such clinical parameters as age, body mass index, bone mineral density (BMD), as well as sarcopenia-related changes, including grip strength, appendicular skeletal muscle mass, and muscle cross-sectional area (CSA) ratios.

Results: Twelve patients (36%) were diagnosed with sarcopenia according to the Asian Working Group for Sarcopenia. They had a significantly higher RAGE expression (p = 0.044) and AGE level (p < 0.001) than those without sarcopenia. The RAGE expression correlated significantly with a high serum AGE level (r = 0.510, p = 0.011) and correlated inversely with a muscle CSA ratio (r = 0.696, p < 0.001).

Conclusion: This study shows that RAGE expression increases in sarcopenic patient skeletal muscles. This expression also correlates positively with serum AGE levels and inversely with muscle CSA ratios. Further studies are necessary to determine whether targeting RAGEs can be a therapeutic option for sarcopenia.

REFERENCES: