Methods: Thirty-one community dwelling men (age > 72 years) were randomly assigned to a training group (T, n = 15) or an inactive control group (C, n = 16). MRI scans at mid-thigh were performed (3T, MAGNETOM Skyrafit, Siemens) before and after 16 months of training. Fat fraction (FF) and texture parameters of muscle tissue and of the intra-fascia volume (IF) were obtained from a 6 point Dixon sequence (length 10 cm, 160x160, 34 slices, 1.5x1.5x3.0 mm³). Parameters included global and local inhomogeneity, degree of anisotropy and compactness. Significance of longitudinal changes and between-group differences were determined by t-tests for parameters that did not correlate higher than R^2>0.7 with FF.

Results: Table 1 shows base line (BL) values, absolute changes (Δ) and significance of longitudinal changes for both groups. Training effects were significant with exception of the degree of anisotropy (p=0.07).

Parameter	Group	BL	Δ	p
FF IF [%] **	C	15.3 (4.1)	1.2 (0.78)	<0.01
	T	17.1 (5.6)	0.06 (1.0)	0.8
Local Inhom. IF **	C	48.0 (9.0)	1.8 (2.0)	<0.01
	T	50.8 (9.8)	–0.42 (2.3)	0.49
Degree Aniso. IF	C	1.56 (0.1)	0.001 (0.05)	0.9
	T	1.59 (0.1)	–0.04 (0.07)	0.04
FF MT [%] *	C	7.7 (1.9)	0.5 (0.2)	<0.01
	T	8.0 (2.2)	0.2 (0.4)	0.03
Local Inhom. MT *	C	33.2 (6.3)	0.9 (1.2)	<0.01
	T	34.1 (6.9)	0.03 (1.3)	0.9
Compactness MT *	C	0.02 (0.006)	–0.0009 (0.001)	<0.01
	T	0.02 (0.006)	0.00004 (0.001)	0.9

Conclusion(s): After 16 months, FF increased significantly more in the control than in the training group. After HIRT the AT distribution appeared to be smoother and more ordered than in the control group. While a final confirmation using a multivariate analysis is still pending our data indicated the power of a texture analysis to obtain additional information about muscle quality.

doi:10.1016/j.bonr.2021.100953

P115

Skeletal muscle cell oxidative stress as a possible therapeutic target in a sarcopenia

Hideyuki Kinoshita[a], Sumihisa Orita[b], Kazuhide Inage[b], Seiji Ohtori[b]
[a]*Chiba Cancer Center, Orthopaedic Surgery, Chiba, Japan*
[b]*Chiba University, Orthopaedic Surgery, Chiba, Japan*

Background/Introduction: Oxidative stress has been reported to be involved in a number of pathologies, including musculoskeletal disorders. Its relationship with sarcopenia, one of the potential origins of lower back pain, however, is not yet fully understood.

Purpose: To elucidate the contribution of oxidative stress to muscle degeneration and the efficacy of antioxidant treatment for sarcopenia using an animal model of neurogenic sarcopenia.

Methods: Myoblast cell lines (C2C12) were treated with H2O2, an oxidative stress inducer, and N-acetyl-L-cysteine (NAC), an antioxidant. Apoptotic effects induced by oxidative stress and the antioxidant effects of NAC were assessed by western blotting, immunocytochemistry, and 3-(4,5-dimethylthiazol-2-yl)- 2,5-diphenyltetrazolium bromide (MTT) cell viability assays. An animal model of sarcopenia was produced via axotomy of the sciatic nerves to induce muscle atrophy. Twenty-four male Sprague-Dawley rats were divided into sham, sham + NAC, axotomy, and axotomy + NAC groups. Rats were provided water only or water containing NAC (1g/L) for 4 weeks. The gastrocnemius muscle was isolated and stained with hematoxylin and eosin (H&E) 2 weeks after axotomy, from which muscle cells were harvested and protein extracted for evaluation.

Results: Mitogen-activated protein kinases (MAPKs) were significantly activated by H2O2 treatment in C2C12 cells, which was ameliorated by NAC pretreatment. Furthermore, H2O2 induced apoptosis and death of C2C12 cells, which was prevented by NAC pretreatment. The weight of the gastrocnemius muscle was reduced in the axotomy group, which was prevented by NAC administration. Lastly, although muscle specimens from the axotomy group showed greater reductions in muscle fiber, the oral administration of NAC significantly inhibited amyotrophy via antioxidant effects.

Conclusion(s): The current *in vitro* and *in vivo* study demonstrated the possible involvement of oxidative stress in sarcopenic pathology. NAC represents a potential anti-sarcopenic drug candidate, preventing amyotrophy and fatty degeneration.

doi:10.1016/j.bonr.2021.100954

P117

Detection of low bone mineral density using radiofrequency echographic multi-spectrometry (REMS) in a pregnant woman with progressive scleroderma

Elena Kirilova[a], Nikola Kirilov[b]
[a]*UMBAL Dr. Georgi Stranski, Rheumatology, Pleven, Bulgaria*
[b]*UMBAL Dr. Georgi Stranski, Orthopedics and traumatology, Pleven, Bulgaria*

Background/Introduction: REMS is a non-ionizing innovative approach for the assessment of REMS-based bone mineral density (BMD) of the axial skeleton. In previous published studies it was envisaged to apply this technology for examination of the axial BMD in pregnant women. Systemic connective tissue diseases, such as scleroderma, are often treated with corticosteroids and other medications that cause bone loss.

Purpose: The aim of the current study is to assess REMS-based BMD, T- and Z-score values of both femora and lumbar spine in a pregnant woman with progressive scleroderma.

Methods: We present a clinical case of a 30-year-old Caucasian 12 weeks pregnant woman with a body mass index of 14.1 kg/m². She has been diagnosed for eight years with progressive scleroderma, myositis, Raynaud's phenomenon and digital ulcers. The patient was treated with D-penicillamine 300 mg daily and prednisolone 10 mg daily within five years before pregnancy and with cyclophosphamide pulse therapy within one year before pregnancy. REMS approach was used to assess REMS-based BMD and REMS-based Z-score values of the femoral neck, trochanter and total hip of both femora, as well as of the lumbar spine.

Results: T- and Z-score values were equal to -2.5 standard deviations (SD) on the both femora. BMD (g/cm²) was significantly reduced. These values of the lumbar spine were also outside the normal range. Although the spinal T-score remained under -2 SD, Z-score was “below the expected range for her age”.

Conclusion(s): The case demonstrates BMD, T- and Z-score values of both femora and lumbar spine in a pregnant woman with advanced progressive scleroderma assessed with the radiation-free REMS technology. This method could be very helpful for making decision about the treatment of pregnant women who are at risk of lower BMD due to concomitant diseases and/or medications that cause bone loss.

doi:10.1016/j.bonr.2021.100955

P118

Forearm bone densitometry by radiography with a step-wedge phantom: A pilot study

Ling Wang[a], Xiaoguang Cheng[a], Pengjun Huang[a], Du Hui[b], Xinghua Yin[b], Tanuj Puri[c], Xieyuan Jiang[d], Klaus Engelke[e], Glen M. Blake[c]
[a]*Beijing Jishuitan Hospital, Radiology, Beijing, China*
[b]*Beijing Jishuitan Hospital, Department of Orthopedics, Beijing, China*
[c]*King's College London- St Thomas' Hospital, School of Biomedical Engineering & Imaging Sciences, London, United Kingdom*
[d]*Beijing Jishuitan Hospital, Department of Traumatic Orthopedics, Beijing, China*
[e]*FAU University Erlangen-Nürnberg and Universitätsklinikum Erlangen, Department of Medicine 3, Erlangen, Germany*

Background/Introduction: Radiographic absorptiometry (RA) is one of the earliest methods of bone densitometry and has been used to measure the phalanges and metacarpals where soft tissue attenuation is minimal.

Purpose: The aim of this study was to determine whether the technique can be adapted to correct for soft tissue and measure areal bone mineral density (aBMD) in the forearm.

Methods: Digital X-ray images of the left forearm and a step phantom were acquired in a training cohort of 30 subjects (21 F, 9 M) (mean age (SD): 62 (13) years) referred for routine dual-energy X-ray absorptiometry (DXA) examinations. Forearm DXA scans were performed on a GE-Lunar iDXA densitometer. Identical regions of interest (ROIs) in the proximal radius and ulna were measured on the X-ray and DXA images and a soft tissue ROI measured on X-ray images between the radius and ulna. X-ray measurements were expressed as equivalent step phantom thickness and used to estimate forearm aBMD using a linear equation calibrated against the GE-Lunar iDXA scans. Digital X-ray images were acquired in a second validation cohort of 30 subjects and the aBMD estimates compared with results of iDXA scans.

Results: Digital X-ray estimates of radius and ulna aBMD in the proximal forearm in the validation cohort showed a good correlation with iDXA measurements ($r = 0.795$). The Bland-Altman plot had a mean bias of -0.011 g/cm^2 and 95% limits of agreement -0.195 to +0.173 g/cm^2.

Conclusion(s): Digital X-ray estimates of proximal forearm aBMD corrected for soft tissue attenuation correlated with DXA measurements with correlation coefficients comparable to those seen for other peripheral bone densitometry technologies.

doi:10.1016/j.bonr.2021.100956

P119

Comparison of methods to improve fracture risk assessment in Chinese diabetic postmenopausal women: A case-control study

Zhangxin Wen[a], Na Ding[a], Rong Chen[a], Qinyi Wang[a], Zhifeng Sheng[a], Hong Liu[b]
[a]*the Second Xiangya Hospital of Central South University, Department of Metabolism and Endocrinology, hunan, China*
[b]*the affiliated Zhuzhou Hospital Of Xiang Ya School Of Medicine of Central South University, Department of Metabolism Endocrinology, hunan, China*

Background/Introduction: Osteoporosis is a systemic skeletal disease characterized by low bone mass and microarchitectural deterioration of bone tissue that leads to increased fracture risk, disability, financial burden, and mortality.The number of patients with osteoporosis in China is increasing with the aging population. Most widely used assessment instrument is the Fracture Risk Assessment Tool (FRAX®).Hpwever,the current FRAX formulation does not include T2DM among the risk factors, evidence suggests that the FRAX algorithm does not reflect the risk of fractures in T2DM patients correctly.There are several proposals to improve the FRAX performance for those with T2DM.

Purpose: This study compared the performance of three proposed Fracture Risk Assessment Tool (FRAX) alternatives to the current standard Chinese FRAX in predicting bone fracture risk in type 2 diabetic (T2DM) postmenopausal women, and to explore the optimal strategy to better predicted fracture risk in postmenopausal women with diabetes in China.

Methods: We recruited 434 patients from community-medical centers, 217 with T2DM and 217 without T2DM (non-T2DM). All participants completed self-reported questionnaires detailing their characteristics and risk factors. Bone mineral density (BMD) and spinal radiographs were evaluated. The China FRAX model calculated all scores. The area under the receiver operator characteristic curve (ROC-AUC) evaluated the sensitivity, specificity, and accuracy for predicting 10-year risk for major (MOF) and hip (OHF) osteoporotic fractures in T2DM patients.

Results: T2DM patients had higher BMD but lower average FRAX values than non-T2DM patients. The unadjusted FRAX ROC-AUC was 0.774, significantly smaller than that for 0.5-unit femoral neck T-score-adjusted FRAX (0.800; $p = 0.004$). Rheumatoid arthritis (RA; AUC = 0.810, $p = 0.033$) and T-score (AUC = 0.816, $p = 0.002$) adjustments significantly improved fracture prediction in T2DM patients.

Conclusion(s): Femoral neck T-score adjustment might be the preferred method for predicting MOF and OHF in Chinese diabetic postmenopausal women, while RA adjustment only effectively predicted HF risk.

doi:10.1016/j.bonr.2021.100957

P120

Vfrac – a simple clinical tool that identifies older women with back pain at high risk of osteoporotic vertebral fractures

Emma Clark[a], Sarah Davis[b], Rachael Gooberman-Hill[a], Linda Hunt[a], Tarnjit Khera[a], Paskins Zoe[c], Peters Tim[a], Tobias Jon[a]
[a]*University of Bristol, Bristol Medical School, Bristol, United Kingdom*
[b]*University of Sheffield, School of Health & Related Research, Sheffield, United Kingdom*
[c]*Keele University, Arthritis Research UK Primary Care Centre, Keele, United Kingdom*

Background/Introduction: Osteoporotic vertebral fractures (OVFs) identify people at high risk of future fractures, but despite this, less than a third come to clinical attention. This is due to a variety of reasons including inadequate understanding of the clinical triggers necessary to refer high risk individuals for spinal radiographs.

Purpose: To develop a simple clinical tool to aid in deciding which older women with back pain should have a spinal radiograph.

Methods: 1634 women aged 65+ with back pain in the previous four months were recruited from primary care in two parts of the United Kingdom (NRES 18/WS/0061). Data were collected through self-completion questionnaires, physical examination and spinal radiographs. Exposure data included descriptions of back pain, traditional risk factors for osteoporosis, basic anthropometry and reported height loss. The outcome was the presence/absence of OVFs identified using the Algorithm-Based Qualitative method. Those with spinal metastases (n=3) or surgical fusion (n=30) were excluded. Logistic regression models identified independent predictors of OVFs. AUC for the final model was calculated. The choice of final cut-off for identification of which older women with back pain should have a spinal radiograph because of a high risk of fracture was based on a maximised sum of sensitivity and specificity.