microarchitecture parameters were correlated to each other but not correlated with BMD. Multiple regression analysis demonstrated that the combination of the microarchitecture parameters and BMD improved the prediction of the failure load with for example an improved fracture risk prediction from R^2 = 0.418 to 0.688 when combining BMD and Euler Ch. Overall, femur bone microarchitecture assessed with UHF MRI was significantly correlated with biomechanical parameters. The multimodal assessment of BMD and trabecular bone microarchitecture using UHF MRI improved the fracture risk prediction of femoral bone and might be of interest for the future investigation of selected osteoporotic patients.

Conclusion: We demonstrated that femur bone microarchitecture assessed with UHF MRI was significantly correlated with biomechanical parameters. The multimodal assessment of bone mineral density and trabecular bone microarchitecture using UHF MRI improved the fracture risk prediction of femoral bone and might be of interest for the future investigation of selected osteoporotic patients.

Disclosure of Interests: None declared

DOI: 10.1136/annrheumdis-2019-eular.2556

AB1145 FULLY CONVOLUTIONAL NEURAL NETWORK-BASED SEGMENTATION OF INDIVIDUAL MUSCLES IN MR IMAGES USING MUSCLES AND BORDERS PARCELLATIONS

Joris Fournel[1], Arnaud Le Troter[1], Sandrine Guis[2], David Bendahan[1], Badih Ghattas[3]. *[1]Aix-Marseille Univ, CNRS, CRMBM UMR 7339, Marseille, France*; *[2]Aix-Marseille Univ, CNRS, AP-HM, CRMBM UMR 7339, Rheumatology, Marseille, France*; *[3]Aix-Marseille Univ, CNRS, Institut de Mathématiques de Marseille, UMR 7373, Marseille, France*

Background: Segmentation of individual muscles in MR images is challenging considering the poor contrast between muscles and the large variability between and within subjects.

Objectives: The segmentation performance of the Bayesian SegNet network was assessed for the four individual muscles of the quadriceps group. In addition to the classes corresponding to each muscle, we analyzed the effect of adding four additional classes corresponding to muscle borders. We also investigated the network performance taking into account each muscle individually or the whole set of muscles. The corresponding results were compared with those obtained using a conventional multi-atlas method.

Methods: For the training phase, a dataset of 500 images was used while the testing phase was performed for two other datasets with 140 images each. Four different variants of the same network were assayed considering simultaneous segmentation of individual muscles (On5), separate segmentation of individual muscles (Fn2) and the use of additional classes related to muscle borders in both cases (On9 and Fn3).

Results: All approaches largely outperformed the results of a multi-atlas strategy. The higher DSI values i.e. 0.96 ± 0.01 for the *rectus femoris* muscle, 0.93 ± 0.01 for the *vastus intermedius* muscle, 0.94 ± 0.03 for the *vastus lateralis* muscle and 0.96 ± 0.01 for the *vastus medialis* muscle were obtained with the On9 and Fn3 networks i.e. taking into account the muscle borders labels in addition to the muscle labels.

Conclusion: Deep-learning based methods are optimal for the segmentation of thigh muscles and the corresponding efficiency can be improved when considering labels for muscles together with borders.

Disclosure of Interests: None declared

DOI: 10.1136/annrheumdis-2019-eular.2804

AB1146 PREVALENCE OF STRUCTURAL CHANGES AT THE POSTERIOR PART OF THE SPINE IN AXIAL SPONDYLOARTHRITIS EVALUATED WITH MR

Andreas Haidmayer[1], Gabriel Adelsmayr[2], Rusmir Husic[1], Franz Quehenberger[3], Angelika Lackner[1], Joesf Hermann[1]. *[1]Medical University of Graz, Internal Medicine, Division for Rheumatology and Immunology, Graz, Austria*; *[2]Medical University of Graz, Radiology, Division for general Radiology, Graz, Austria*; *[3]Medical University of Graz, Institute for Medical Information, Statistics and Documentation, Graz, Austria*

Background: In clinical trials radiographic damage is frequently quantified by conventional x-ray but neither the thoracic spine nor the posterior parts of the vertebral column including the intervertebral joints, the vertebral arch and the spinous process can be evaluated reliably with this instrument. Bone inflammation and areas of enthesitis can easily be detected by magnetic tomography imaging (MRI) and the introduction of high-resolution 3-tesla MRI allows analysis of bone structures more precisely than with x-ray without radiation exposure [1].

Patients with axial SpA frequently present with reduced spinal mobility and functional impairment, but radiographic signs of ankylosis are missing on plain radiographs. These particular clinical findings are reinforced by data in the literature showing, that the relation between radiographic damage, spinal mobility and function is low. Radiographic damage to the posterior parts of the vertebral column may be responsible for the discrepancy found between clinical and radiographic results as suggested by a Dutch group [2].

Objectives: To evaluate the localisation and incidence of new bone formation in the posterior part of the vertebral bodies with MRI.

Methods: In a cohort of 56 patients with diagnosed axial SpA (mean age 50.29y, mean disease duration 14.4y, 76.4% men, 88.7% HLA-B27 positive) we performed a MRI (*3 Tesla scanner Skyra, Siemens Healthcare, Erlangen, Germany)*. The whole spine was scanned with T1 weighted and Turbo-Inversion Recovery Magnitude (TIRM) sequences in sagittal planes and each segment of the vertebral column was divided into four areas (ventral and posterior part of the vertebral bodies, intervertebral joints andspinous processes) to assess osseous changes like sclerosis, erosion, syndesmophytes, ankylosis, (partial) fusion of intervertebral joints and fibroostosis of spinous processes.

Results: Syndesmophytes and ankylosis of the ventral segments were present from C7/Th1 down to L5/S1 with a maximum in Th5/6 (62.5%). In the posterior segments of the vertebral bodies we detected a contrary accumulation inside the cervical and lumbar spine with a max. in C5/6 (55.4%) respectively L2/3 (66.1%). Erosions were mainly found at the ventral edges with an accumulation in middle cervical, lower thoracic and the whole lumbar spine (max. Th9/10 24.5%)

Ankylosis of the intervertebral joints was present over the whole spine with a preference of the cervical (max. C5/6 27.7%) and lumbar column (max. L2/3 47.3%). Fibroostosis of the spinous processeswere rarely found in the middle and lower thoracic spine (Th5-11, each 2.7%).

In up to 57.10% of the cervical spine (54.78% for lumbar, 32.18% for thoracic spine) with detectable new bone formation of the posterior segments we found no changes of the ventral part.

Conclusion: With high resolution MRI we were able to detect structural in the dorsal part of the spine, which can hardly be assessed by conventional radiographs. These findings may explain functional disability in patients with non-corresponding findings in x-ray.

REFERENCES

[1] Lee CH, et al. (2015) Correlation of structural abnormalities of the wrist and metacarpophalangeal joints evaluated by high-resolution peripheral quantitative computed tomography, 3 Tesla magnetic resonance imaging and conventional radiographs in rheumatoid arthritis. International journal of rheumatic diseases

[2] Maas F, et al. (2015) Comparison of radiographic damage of the zygapophyseal joints and the vertebral bodies of the cervical spine in patients with ankylosing spondylitis before and after 4 years of TNF-alpha blocking therapy. Annals of the rheumatic diseases

Disclosure of Interests: Andreas Haidmayer Speakers bureau: Roche, MSD, BMS, Abbvie, Celgene, Gabriel Adelsmayr Speakers bureau: BMS, Rusmir Husic Speakers bureau: BMS, UCB, Celgene, MSD, Franz Quehenberger: None declared, Angelika Lackner: None declared, Joesf Hermann Speakers bureau: Abbvie, MSD, UCB, BMS, Celgene

DOI: 10.1136/annrheumdis-2019-eular.7267

AB1147 VERTEBRAL FRACTURE ASSESSMENT : A SIMPLE TOOL TO DETECT VERTEBRAL FRACTURE IN THE OSTEOPOROSIS ASSESSMENT OF PATIENTS WITH TYPE2 DIABETES MELLITUS

Nassima Hanouchine[1], Salah Ouhadj[2], Chafia Dahou-Makhloufi[3]. *[1]chu tizi ouzou, TIZI OUZOU, Algeria*; *[2]EPH DELLYS, BOUMERDES, Algeria*; *[3]CHU BAB ELOUED, ALGIERS, Algeria*

Background: Vertebral fracture assessment (VFA) has several benefits, including substantially lower radiation dose, lower cost, higher patient convenience, and less operator-dependent variance,VFA can be directly assessed during bone mineral density (BMD) measurement

Objectives: evaluate the accuracy of VFA performed in the supine position by using conventional visual radiography of the spine as the reference standard in patients with type 2 diabetes mellitus

Methods: A total of 207 patients with type 2 diabetes mellitus (mean age, 46,59 ±7,53years; range, 21–60 years) consisting of 102 women