Objectives: We wished to assess volumetric bone mineral density (BMD) by forearm QCT in conjunction with dual-energy X-ray absorptiometry (DXA) and bone biomarkers in RA and AS.

Methods: Forty RA and AS patients treated with etanercept (ETN) or certolizumab pegol (CZP) were included in a 12-month follow-up study. Peripheral QCT and DXA BMD were determined. Bone biomarkers, such as PTH, osteocalcin, RANKL, 25-hydroxyvitamin D (VITD), P1NP, CTX, sclerostin, DKK-1 and cathepsin K (CATHK) were assessed by ELISA.

Results: There was no further bone loss during anti-TNF treatment. Volumetric and areal BMD showed significant correlations with each other ($p < 0.05$). Total QCT BMD after 12 months was inversely determined by disease activity at baseline in the full cohort ($p = 0.030$). Cortical BMD was negatively determined by baseline disease activity ($p = 0.005$) and CATHK ($p = 0.025$). In RA, VITD-0 determined QTRABMD-12 ($p = 0.005$). In the full cohort, the one-year change in QTRABMD was related to TNF inhibition together with higher VITD-0 ($p = 0.031$). Therapy and lower CATHK determined QCORTBMD changes ($p = 0.006$). In RA, treatment together with VITD-0 ($p < 0.01$) or CATHK-0 ($p = 0.002$), while in AS, treatment together with RANKL-0 ($p < 0.05$) determined QCT BMD changes.

Conclusion: QCT confirmed that biologics may attenuate bone loss. Disease activity, CATHK, RANKL and VITD may predict the effects of anti-TNF treatment on volumetric BMD changes. There may be differences between RA and AS in this respect.

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POS0044 T315 SUPPRESSES OSTEOGENIC DIFFERENTIATION IN SAOS-2 CELLS BY INHIBITING PHOSPHORYLATION OF AKT

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Background: New bone formation is common in the late stage of various inflammatory arthritis, while osteoblasts play a vital role in this process. Activation of PI3K/ Akt pathway promotes the differentiation and enhances the function of osteoblasts [1]. T315 is a novel small molecule drug, which may induce apoptosis and suppress the expression of cellular markers of chronic lymphocytic leukemia cells by disrupting PI3K/ Akt pathway [2]. However, the lack of study focuses on the influence of T315 on the other cells, except tumor cell lines.

Objectives: We aimed to assess the effect of T315 on human osteoblast-like Saos-2 cells, while its potential mechanism in PI3K/ Akt pathway was evaluated as well.

Methods: (1) Saos-2 was stimulated with an osteogenic reagent which contained L-ascorbic acid, β -glycerophosphoric acid, and dexamethasone. The concentration of T315 was adjusted to 0 μ g/ml, 1 μ g/ml, and 2 μ g/ml in the culture medium. (2) Alizarin red stain and alkaline phosphatase (ALP) stain were performed at d0, d7, d14, and d21 after being treated with T315. (3) Cellular protein was extracted at d0, d3, and d6 after being treated with T315, then ALP activity was tested based on a recommendation from the manufacturer of the kit. (4) Collagen type 1 α 2 Chain (Col1 α 2) and osteocalcin (OCN), two osteogenic markers, were measured through western blot, with glyceraldehyde 3-phosphate dehydrogenase (GAPDH) as an endogenous control. (5) Phospho-phosphoinositide 3-kinase (pPI3K), phospho-protein kinase B (pAkt), and runt-related transcription

factor 2 (Runx2) was tested through western blot as well. GAPDH or protein kinase (Akt) was chosen as an internal reference as appropriate. (6) Analysis of variance with the least significant difference was used to analyze the data. A $P < 0.05$ was considered statistically significant.

Results: (1) The higher concentration of T315 related to the less relative mineralized area and the positive area of ALP, while longer incubation time with T315 decreased these regions as well (Figure 1A-C). (2) T315 reduced the activity of ALP accordingly (Figure 1D). (3) T315 suppressed the protein expression of Col1 α 2 and OCN in a dose-dependent and time-dependent manner (Figure 1E, F). (4) T315 did not alter pPI3K, but it inhibited the phosphorylation of Akt (Figure 1G, H). (5) Runx2 was reduced because of the greater dose or longer incubation time with T315 (Figure 1).

Conclusion: T315 inhibits the differentiation of osteoblasts through inhibiting the phosphorylation of Akt. Surprisingly, pPI3K seldom changes in this process, so its detail mechanism should be investigated in further.

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Figure 1. Effect of T315 on Saos-2 cells and PI3K/Akt pathway. (A) Alizarin red stain and ALP stain at d21. (B) Relative mineralized area in Alizarin red stain. (C) Positive area in ALP stain. (D) ALP activity. Western blot analysis and its bands at d6 for Col1 α 2 (E), OCN (F), pPI3K (G), pAkt (H), and Runx2 (I). Results were normalized by GAPDH or Akt. ALP: Alkaline phosphatase; Col1 α 2: Collagen type 1 α 2 Chain; GAPDH: Glyceraldehyde 3-phosphate dehydrogenase; OCN: Osteocalcin; pPI3K: Phospho-phosphoinositide 3-kinase; pAkt: Phospho-protein kinase B; Akt: Protein kinase; Runx2: Runt-related transcription factor 2. ^a Compared with d3 in the same concentration of T315, $P < 0.05$. ^b Compared with d0 in the same concentration of T315, $P < 0.05$. ^c Compared with 1 μ g/ml T315 in the same incubation time, $P < 0.05$. ^d Compared with 2 μ g/ml T315 in the same incubation time, $P < 0.05$.

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POS0045 LEAST SIGNIFICANT CHANGE IN BONE DENSITOMETRY IN PATIENTS WITH OBESITY

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Background: Dual energy X-ray absorptiometry is the reference method to measure bone mineral density (1). Loss of bone mineral density is significant if it exceeds the least significant change. The threshold value used in general population is 0.03 g/cm² (2). Patients with obesity are known for having a higher bone mineral density due to metabolism and physiopathology characteristics (3,4).

Objectives: The aim of our study was to determine the least significant change in bone densitometry in patients with obesity.

Methods: We conducted an interventional study in 120 patients with obesity who performed a bone densitometry. We measured twice the bone mineral density at the lumbar spine, the femoral neck and the total hip in the same time (5,6). We determined the least significant change in bone densitometry from each pair of measurements, using the Bland and Altman method. We also determined the least significant change in bone densitometry according to each stage of obesity.

Results: The least significant change in bone densitometry in patients with obesity is 0.046 g/cm² at the lumbar spine, 0.069 g/cm² at the femoral neck and 0.06 g/cm² at the total hip.

Conclusion: The least significant change in bone densitometry in patients with obesity is higher than in general population. These results may improve DXA interpretation in this specific population, and may personalize their medical care.

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POS0046

MICRO-CT ANALYSIS OF SACROILIAC JOINT AS A NEW TOOL FOR STUDYING TRABECULAR BONE AND OSTEO-ARTICULAR LESIONS IN MURINE MODELS

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Background: Skeletal disorders affect the skeleton in different ways with some bones being very impaired while others less severely. In translational studies using murine models of human disorders, the bone phenotype is mainly evaluated at distal femur or proximal tibia. The sacroiliac joint (SIJ), which connects the spine to the pelvis, is involved in the balanced transfer of mechanical energy from the lumbar spine to the lower extremities. Its role in biomechanical stress makes it of particular interest in various bone diseases. For instance, patients with X-linked hypophosphatemia (XLH), who mainly display osteomalacia, are frequently affected with early osteoarthritis of the SIJ. Interestingly, we recently showed that the *Hyp* mouse, a murine model of XLH that greatly mimics the human disorder, displayed early and severe osteoarticular alterations of the SIJ [1].

Objectives: Here, using the *Hyp* mouse as a model, we show that the SIJ constitutes a highly reliable joint to investigate in murine models of skeletal disorders.

Methods: SIJ and distal femur were evaluated in 3-month-old *Hyp* mice compared to wild-type (WT) mice (n=10 per group). using high-resolution microCT. Measurements of trabecular and cortical bone parameters at sacral and iliac sides and trabecular bone parameters at distal femur were performed with the CTAnalyzer software.

Results: *Hyp* mice displayed a significant reduction in parameters of trabecular bone at distal femur, compared to WT mice (Figure 1A). Similarly, a reduction in trabecular bone was shown in *Hyp* SIJ compared to WT at sacral side (Figure 1B). There was a significant positive correlation between trabecular bone parameters of distal femur and sacral side of SIJ in *Hyp* mice (e.g. bone volume to total volume [BV/TV]: $r = 0.763$ $p < 0.01$). Bone parameters such as sacral BV/TV were higher in comparison to femoral parameters (Figure 1C). No difference was observed on trabecular bone parameters at iliac side of *Hyp* and WT mice. However, regarding the cortical bone of SIJ, significant alterations were noticed especially at iliac side of SIJ in *Hyp* mice compared to WT mice. An increase in open cortical porosity, and a decrease in cortical area fraction, as well as in average cortical thickness at iliac side of SIJ in *Hyp* mice were suggestive of osteo-articular lesions, characteristic for XLH.

Conclusion: Trabecular bone parameters at the SIJ, in comparison to the femur, appear to be a relevant alternative to evaluate bone alterations in *Hyp* mice. Our

study suggests that the SIJ represents a valuable tool to investigate both bone and local osteo-articular alterations for murine models of skeletal disorders.

Figure 1. A) Bone to total volume ratio in the trabecular bone of distal femur, expressed in percent. B) Bone to total volume ratio in the trabecular bone of sacral slope of the SIJ, expressed in percent. C) Bone to total volume ratio in the trabecular bone of distal femur and sacral slope of the SIJ of *Hyp* mice, expressed in percent. *: $p < 0.05$; **: $p < 0.01$; ***: $p < 0.001$; ****: $p < 0.0001$.

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New Developments in COVID research

POS0047

OUTCOMES IN INFLAMMATORY ARTHROPATHY PATIENTS HOSPITALIZED FOR COVID-19

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Background: Covid 19 is a new and rapidly spreading corona virus which has reached pandemic proportions. As of 5/22/20 there are 5.08 million confirmed cases and 332,000 deaths worldwide. Primary manifestations are respiratory, with a subset developing severe hypoxic respiratory failure. Several risk factors predispose patients to worse outcomes including age, obesity, hypertension, chronic kidney disease, COPD, asthma, CHF, and diabetes. This is a retrospective cohort analysis of patients with Rheumatoid arthritis, Ankylosing spondylitis, or Psoriatic arthritis who were hospitalized for COVID-19 infection across 165 HCA hospitals from 1/1/2020 to 5/30/2020. We compared endpoints and calculated odds of ICU admission, invasive ventilation, mortality compared to control as well as length of stay and discharge location.

Objectives: Our objectives include measuring the outcome of Patients in two arms, the first being those with Rheumatoid arthritis, Ankylosing spondylitis, and Psoriatic arthritis who are infected with COVID 19 to an age matched and comorbidity matched arm (using the Charlson comorbidity index) for the composite endpoint of ICU admission, invasive ventilation, and death. We believe the inflammatory arthropathy arm will have a worse composite endpoint than the control arm. We will also attempt to calculate a hazard ratio of this arm vs the control to the composite endpoint. We will also examine the length of stay as well as inflammatory markers mentioned in between the two arms. We suspect initial inflammatory markers will be lower in the inflammatory arthropathy arm, particularly CRP and LDH, due to chronic immune modulating medication and these markers will not correlate as closely with severe illness represented by the composite endpoint as in the control arm.

Methods: We analyzed 86,217 patients admitted with COVID-19 comparing 751 patients who had inflammatory arthropathy to patients who did not. T tests were used for parametric outcome and chi square tests for non-parametric outcomes. Multivariate analysis included potential confounders such as age, and comorbidities such as diabetes, heart disease, etc.

Results: The odds ratio for mortality in the arthropathy arm was 1.37 with a confidence interval of 1.09 to 1.71 with a p value of 0.006. The odds ratio for ventilation was 1.35 with CI of 1.09 to 1.67 and p value of 0.006. The odds ratio of ICU admission was 1.46 with CI of 1.24 to 1.72 and P value of 0.000. The average length of stay of the arthropathy arm was 8.51 days +/- 10.02 vs 4.59 days +/- 8.26 of the control, $p < 0.001$. The discharge disposition of the arthropathy arm vs control group is as follows, 13.32% died inpatient vs 5.87% in the control, 56.72% were discharged home vs 77.19%, 6.79% went to hospice care vs 3.10%, 4.79% remained inpatient at the end of the study interval vs 3.45%, 17.18% were discharged to rehab vs 8.43%, and other discharges not included in the above groupings were 1.2% vs 1.96%, $p < 0.001$. 31.29% of the arthropathy