**Conclusion:** In RA patients in strict clinical remission, PD assessment at baseline but not clinical joint count could help identify patients who will relapse after the cessation of a bDMARD. Due to insufficient recruitment and limited power of the present trial, however, no definitive conclusion can be made.

**REFERENCES:**

[1] Smolen JS, Landewé RBM, Bijlsma JWJ, *et al.* EULAR recommendations for the management of rheumatoid arthritis with synthetic and biological disease-modifying antirheumatic drugs: 2019 update. *Ann Rheum Dis* 2020;**79**:685-99.
[2] Naredo E, Valor L, De la Torre I, *et al.* Predictive value of Doppler ultrasound-detected synovitis in relation to failed tapering of biologic therapy in patients with rheumatoid arthritis. *Rheumatology (Oxford)* 2015;**54**:1408–14.
[3] Lamers-Karnebeek FB, Luime JJ, Cate DFT, *et al.* Limited value for ultrasonography in predicting flare in rheumatoid arthritis patients with low disease activity stopping TNF inhibitors. *Rheumatology (Oxford)* 2017;**56**:1560–5.
[4] Terslev L, Brahe CH, Hetland ML, *et al.* Doppler ultrasound predicts successful discontinuation of biological DMARDs in rheumatoid arthritis patients in clinical remission. *Rheumatology (Oxford)* 2021;**60**:5549–59.

**Acknowledgements:** This study was funded by a grant of the Austrian Research Fund (KLI514-B30)

**Disclosure of Interests:** Christian Dejaco Speakers bureau: Pfizer, AbbVie, MSD, Roche, BMS, UCB, Consultant of: Pfizer, AbbVie, MSD, Roche, BMS, UCB, Grant/research support from: Pfizer, Irina Gessl: None declared, Rusmir Husic Speakers bureau: MSD, Lilly und Abbvie, Thomas Deimel: None declared, Angelika Lackner: None declared, Gabriela Supp: None declared, Josef Hermann Speakers bureau: Novartis, Lilly, AbbVie, Janssen, Consultant of: GlaxoSmithKline, Otsuka Pharmaceutical Europe Ltd, Josef S. Smolen Speakers bureau: AbbVie, Amgen, AstraZeneca, Astro, Bristol-Myers Squibb, Celgene, Celltrion, Chugai, Gilead, ILTOO, Janssen, Lilly, Merck Sharp & Dohme, Novartis- Sandoz, Pfizer, Roche, Samsung, Sanofi, and UCB, Consultant of: AbbVie, Amgen, AstraZeneca, Astro, Bristol-Myers Squibb, Celgene, Celltrion, Chugai, Gilead, ILTOO, Janssen, Lilly, Merck Sharp & Dohme, Novartis- Sandoz, Pfizer, Roche, Samsung, Sanofi, and UCB, Grant/research support from: Abbvie, AstraZeneca, Lilly and Roche, Martin Stradner Speakers bureau: Eli Lilly, Pfizer, MSD, BMS, AbbVie, Janssen, Consultant of: Eli Lilly, AbbVie, Janssen, Daniel Aletaha Speakers bureau: Abbvie, Amgen, Lilly, Janssen, Merck, Novartis, Pfizer, Roche, Sandoz, Consultant of: Abbvie, Amgen, Lilly, Janssen, Merck, Novartis, Pfizer, Roche, Sandoz, Grant/research support from: Abbvie, Amgen, Lilly, Novartis, Roche, SoBi, Sanofi, Gerold Schwantzer: None declared, Peter Mandl Speakers bureau: AbbVie, Janssen and Novartis, Grant/research support from: AbbVie, BMS, Novartis, Janssen, MSD and UCB

**DOI:** 10.1136/annrheumdis-2022-eular.2158

## POS1391 DEEP LEARNING-BASED PANNUS LOCALIZATION SOFTWARE IN THE HANDS OF INFLAMMATORY ARTHRITIS USING TIME-INTENSITY CURVE (TIC) SHAPE CLASSIFICATION ON DYNAMIC MRI DATASET

W. Fang[1], Y. An[2], H. Sugimori[1], S. Kiuch[3], T. Kamishima[1]. [1]*Faculty of Health Sciences, Hokkaido University, Sapporo, Japan;* [2]*Graduate School of Health Sciences, Hokkaido University, Sapporo, Japan;* [3]*AIC, Yaesu Clinic, Tokyo, Japan*

**Background:** Rheumatoid arthritis (RA) is a chronic inflammatory disease associated with significant functional impairment and disability, linked to inflammatory and structural articular and peri-articular damage [1]. Synovitis is a characteristic feature of RA, and is considered an important factor in disease activity and the best predictive marker of joint damage [2]. Therefore, accurate quantification of synovitis can play an important role in clinical evaluation and treatment serving as a biomarker. Pixel-by-pixel time–intensity curve (TIC) shape analysis is a dynamic contrast-enhanced magnetic resonance imaging (DCE-MRI) technique to help visualize differently shaped TICs [3]. Pixels having TIC shape type 4, which is characterized as early enhancement followed by washout phase, were regarded as synovitis pixel [4]. A deep residual network called ResNet-50 model, a convolutional neural network (CNN) that is 50 layers deep, might effectively classify TIC shapes.

**Objectives:** This study aimed to develop software that can automatically demonstrate the distribution of enhancing synovial pannus of patients with inflammatory arthritis on DCE-MRI.

**Methods:** Modified ResNet-50 was used on MATLAB. Two investigators drew regions of interest (ROIs) of muscle, bone, and synovitis under expert guidance and obtained TICs for each tissue on DCE-MRI of ten rheumatoid patients. Through cross-validation and batch evaluation, we verified the confusion matrices for the performance of the classifier. Then we identified the pixels of enhancing synovial pannus by image classification from the obtained pixel-by-pixel TIC shape and displayed them in color. The software performance was evaluated using a visual assessment on seven hand joints of one patient.

**Results:** 150 ROIs for muscles, 150 ROIs for bones, and 59 ROIs for synovitis on DCE-MRI of the hand joints were drawn in ten patients and obtained 4049, 3825, and 1041 TIC shape images, respectively. The classifier's accuracy, precision, sensitivity, and specificity were 99.6%, 99.3%, 98.4%, and 99.7%, respectively. Out of seven joints, four were assessed as good, two as fair, and one as fail.

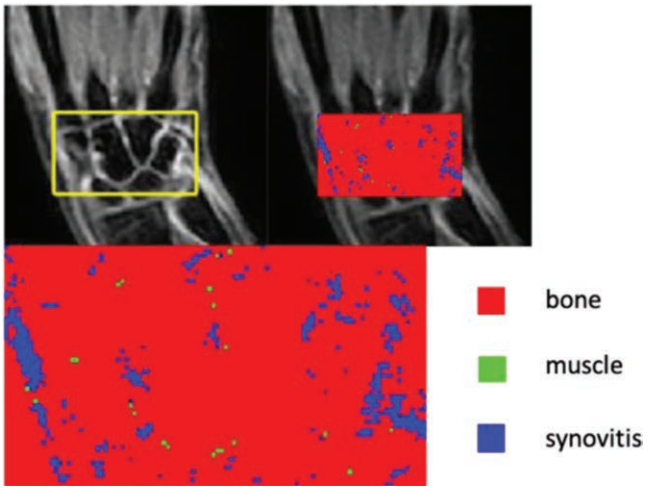


**Figure 1.** Software performance on contrast enhanced dynamic MRI of the wrist

**Conclusion:** Our classifier showed high accuracy, precision, sensitivity, and specificity. And through the comparison between manual outlining and the result of software, our software had relatively good performance. This automatic software developed using deep learning with CNN might accurately display the enhancing synovial pannus in RA.

**REFERENCES:**

[1] Micu MC, Fodor D. Concepts in monitoring the treatment in rheumatoid arthritis- the role of musculoskeletal ultrasound. Part I: synovitis. Med Ultrason. 2015;17(3):367-76.
[2] Carotti M, Galeazzi V, Catucci F, Zappia M, Arrigoni F, Barile A, et al. Clinical utility of eco-color-power Doppler ultrasonography and contrast enhanced magnetic resonance imaging for interpretation and quantification of joint synovitis: a review. Acta Biomed. 2018;89(1-s):48-77.
[3] Sakashita T, Kamishima T, Kobayashi Y, Sugimori H, Tang M, Sutherland K, et al. Accurate quantitative assessment of synovitis in rheumatoid arthritis using pixel-by-pixel, time-intensity curve shape analysis. Br J Radiol. 2016;89(1061):20151000.
[4] Kobayashi Y, Kamishima T, Sugimori H, Ichikawa S, Noguchi A, Kono M, et al. Quantification of hand synovitis in rheumatoid arthritis: Arterial mask subtraction reinforced with mutual information can improve accuracy of pixel-by-pixel time-intensity curve shape analysis in dynamic MRI. J Magn Reson Imaging. 2018.

**Disclosure of Interests:** None declared

**DOI:** 10.1136/annrheumdis-2022-eular.2196

## POS1392 TISSUE DOPPLEROGRAPHY AS A DIAGNOSTIC TOOL FOR MYOCARDIAL DYSFUNCTION IN PATIENTS WITH RHEUMATIC DISEASES

L. Feiskhanova[1]. [1]*Kazan State Medical University, Department of Hospital Therapy, Kazan, Russian Federation*

**Background:** Pathology of the cardiovascular system has a significant impact on the mortality rate in the population of patients with rheumatic diseases, including rheumatoid arthritis (RA) and ankylosing spondylitis (AS). Involvement of the cardiovascular system determines the course and prognosis of many rheumatic diseases. In the general population, left ventricular diastolic dysfunction is an independent predictor of mortality and symptomatic chronic heart failure. However, routine screening for diastolic dysfunction is rarely performed in patients with RA and AS, especially in those who do not have clinical symptoms.

**Objectives:** to identify early preclinical signs of myocardial dysfunction in patients with RA and AS.

**Methods:** 142 people with verified rheumatic diseases were examined. All patients were divided into 2 groups. The first group consisted of patients with RA - 95 pts (average age 46.5±11.1 years). The second group consisted of patients with AS, 47 pts (average age 42.3±10.3 years). The control group included 70 healthy individuals (average age 43.7±12.1 years). All patients underwent standard laboratory and instrumental diagnostic tests, which included joint radiography