

## Digital X-ray Radiogrammetry: A promising predictor of joint destruction in early RA.

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*Purpose:* Recently, measurement of hand BMD (bone mineral density) by DXR, (Digital X-ray Radiogrammetry) has been proposed as a potential predictor of outcome in RA.

*Objective:* To assess the predictive role of hand BMD DXR for radiological outcome in patients with early RA.

*Patients and methods:* Hand BMD DXR was measured in 102 of 105 patients consecutively enrolled into the BARFOT randomized low dose prednisolone study. In that study 250 patients with early RA (one year or less) were randomized to have DMARDs plus prednisolone 7.5 mg daily or only DMARDs for two years. 49 of the patients in the present study received prednisolone and 53 did not. X-rays taken at inclusion into the study (baseline) and after one year were scanned for DXR using the -online Pronosco X-posure System. Hand bone loss during the first year (HBL<sup>1yr</sup>) was defined as a value above 0.0048g/cm<sup>2</sup>, the smallest detectable difference (1).

X-rays of hands and feet at baseline and after 2 years were read by the van der Heijde modified Sharp score. Radiographic progression was defined as a change in total Sharp score above the SDC over 2 years (>5.8).

*Results:* HBL<sup>1yr</sup> was found in 66 % of the patients. There was no difference in baseline characteristics besides that patients with HBL<sup>1yr</sup> were significantly older (p=0.001). HBL<sup>1yr</sup> was significantly less frequent in patients treated with prednisolone for two years than in patients not treated with prednisolone (48% vs 84%, p=0.001).

Patients with HBL<sup>1yr</sup> had more increase over 2 years in total Sharp and erosion scores than patients without (mean 9.3 vs 5.5, p=0.018 and mean 3.9 vs 1.0, p=0.003, respectively) but this was not the case for joint space narrowing score (mean 5.4 vs 4.1, p=0.17).

In patients with radiographic progression at 2 years, the change in hand BMD DXR over the first year (ChBMD<sup>1yr</sup>) was significantly larger than in patients without progress, mean -0.0239 vs -0.0102, p=0.008. To explore the predictive capacity of ChBMD<sup>1yr</sup> for radiographic progression, a multiple stepwise logistic regression was performed; adjusting for age, sex, disease duration, anti-CCP, rheumatoid factor, baseline DAS28, CRP and total Sharp score and HAQ score at 1 year. In this model ChBMD<sup>1yr</sup> (p=0.043) together with anti-CCP (p=0.058) remained in the last step as independent predictors of radiological progression.

*Summary and conclusion:* Hand bone loss measured by DXR was associated with progression of radiological joint damage, in particular with the development of erosions. The change in DXR BMD after 1 year of follow-up was shown to be an independent predictor of radiological progression after 2 years. DXR may thus be a promising instrument in the prediction of joint destruction in early RA.

This study was performed on behalf of the BARFOT study group.