

4) TITLE: Relation of articular cartilage morphometry and meniscal position by MRI to JSW in the Lyon schuss radiograph of the knee

AUTHORS: Hunter DJ^{*}, Buck R^{**}, Vignon E^{***}, Eckstein F^{***}, Brandt K^{***}, Mazzuca S^{***}, Wyman BT^{**}, Otterness I^{***}, and Hellio Le Graverand-Gastineau MP^{**}

* Division of Research, New England Baptist Hospital.

** Pfizer, Global Research and Development, New London, CT, U.S.A.

*** Pfizer A9001140 co-investigator

INTRODUCTION: Advances in imaging techniques and assessment methods, in particular quantitative assessment of cartilage thickness on MRI and radiographic JSW could facilitate a more accurate assessment of the contribution of hyaline articular cartilage and meniscus to the radiographic joint space.

OBJECTIVE: To ascertain the contribution of articular cartilage morphometry and meniscal position on MRI to JSW measured in the Lyon schuss radiograph of the knee.

METHODS: 161 female participants were imaged at 7 clinical centers using Siemens Magnetom Trio and GE Signa Excite magnets. Double oblique coronal acquisitions were obtained at baseline, using water excitation spoiled gradient echo sequences (1.0x 0.31x 0.31mm³ resolution). Segmentation of femoro-tibial cartilage morphology was performed using proprietary software (Chondrometrics GmbH, Germany). Using EFilm workstation software we measured the meniscal position. Medial minimum joint space width (mJSW) was measured by computer on Lyon Schuss radiograph of the knee, and Kellgren and Lawrence grades (KLG) were observed on standing anteroposterior knee films. The relative contribution of regional cartilage thickness and meniscal position to mJSW was assessed initially in univariate models and subsequently with multivariable modelling.

RESULTS: 65% of the variation in mJSW was explained by KLG, regional thickness measures (cMT + ccMF + eMT + pMT + iMT) and meniscal position, and meniscal coverage. Of these measures the medial tibia cartilage thickness measures (in particular cMT, eMT, pMT and to a lesser extent iMT) and central region of the weight-bearing region of the femoral condyle (ccMF) play a consistent and small role in general changes in mJSW observed across all KLG. This however explains only approximately one third of variation in mJSW that exists between KLG2 subjects and those without OA. In contrast the addition of ccMF and percent meniscal coverage to this model explains the large portion of the remaining variation in mJSW found between those subjects with definite joint space narrowing (KLG3) and those without OA.

CONCLUSION: The variation in radiographic mJSW is comprised of 5 cartilage thickness measures and percent meniscal coverage. The magnitude of this contribution differs according to radiographic severity with more variability explained by ccMF cartilage thickness and percent meniscal coverage with increasing disease.

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CORRESPONDENCE CONTACT INFORMATION:

Name: David Hunter

E-mail: djhunter@caregroup.harvard.edu

Phone: 617 754 6655

Institution: NEBH

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