

## Paper #50

### DIAGNOSTIC AND PROGNOSTIC VALUE OF DELAYED GADOLINIUM ENHANCED MAGNETIC RESONANCE IMAGING (dGEMRIC) IN EARLY OSTEOARTHRITIS OF THE HIP

Antony Palmer, Scott James Fernquest, Ines Rombach, Daniel Park, Tom Pollard, John Broomfield, Neal Bangerter, Andrew J. Carr, Sion Glyn-Jones  
Oxford University, Oxford, UK

FDA Status: Not Applicable

**Summary:** dGEMRIC is able to detect the earliest cartilage damage in asymptomatic patients with FAI, the results of this study confirm that cam morphology is associated with progressive localised cartilage damage within the superior lateral acetabulum and that dGEMRIC scanning is able to predict radiographic progression of osteoarthritis secondary to cam morphology.

**Background:** The diagnosis of early osteoarthritis is essential to enable the development of new therapies. Delayed Gadolinium Enhanced MRI of Cartilage (dGEMRIC) can detect cartilage damage in asymptomatic hips with cam morphology but without radiographic evidence of degenerative change. Furthermore, the degree of glycosaminoglycan depletion correlates with the magnitude of the cam deformity. It may eventually be possible to select asymptomatic individuals with cam morphology for intervention to prevent future osteoarthritis, yet at present there remains only limited evidence that baseline dGEMRIC values predict disease progression.

**Objective:** To explore whether dGEMRIC values correlate with the size and position of cam morphology and determine whether baseline dGEMRIC predicts radiographic osteoarthritis progression at five-year follow-up.

**Design:** Prospective study of individuals with a family history of osteoarthritis who underwent clinical evaluation, radiographic, and dGEMRIC assessment at baseline and five year follow-up. Cam morphology was defined as an alpha angle >60 degrees and radiographic osteoarthritis progression was defined as joint space narrowing >0.5 mm between baseline and follow-up. dGEMRIC values of different acetabular and femoral cartilage regions were compared between patients with and without cam lesions, and at baseline and follow-up. We tested for significant difference in GAG content between groups, and for significant loss of GAG over time. dGEMRIC values were correlated with alpha angle at different points on the femoral neck to determine if cam position effected where GAG content was lowest. Baseline variables dGEMRIC value, alpha angle, and positive impingement test underwent ROC analysis for radiographic progression to determine their predictive value.

**Results:** Study comprised 34 individuals (26 cam) at baseline, 29 at follow-up. 9 showed radiographic progression. The superoanterior acetabular cartilage dGEMRIC value was significantly lower with cam morphology than normal ( $p < 0.001$ ), and was significantly lower at follow-up compared to baseline in those with cam morphology ( $p = 0.018$ ). Negative correlation was seen between both the size and position of the alpha angle and the dGEMRIC value of the adjacent acetabular cartilage, which was greatest superoanteriorly ( $r = -0.697$ ). Positive correlation was seen between baseline dGEMRIC value and the degree of radiographic progression in the lateral joint ( $r = 0.392$ ). ROC analysis for predication of radiographic progression showed predicative capability for baseline variables dGEMRIC value, alpha angle, and positive impingement test. When combined, these variables gave an AUC of 0.75 and can provide a sensitivity of 55.6% and specificity of 90.0% where 79.2% of individuals are classified correctly.

**Conclusions:** The results of this study confirm that cam morphology is associated with progressive localised cartilage damage within the superior lateral acetabulum. The severity and location of the cartilage damage correlates with the position and size of the cam lesion. dGEMRIC scanning is able to predict radiographic progression of osteoarthritis secondary to cam morphology, and this predicative value is increased when baseline dGEMRIC ratio, alpha angle, and positive impingement test are combined.

This is the first study to demonstrate that baseline physiological MRI can predict the development of radiographic osteoarthritis secondary to cam morphology, but further validation of both dGEMRIC and other physiological MRI sequences is required.