progression among medication users in the Osteoarthritis Initiative (OAI) to identify interventions or pathways that may be of interest for future clinical trials.

Methods: An exploratory analysis was conducted using OAI participants with annual medication inventory form data between baseline and the 36-month (mo) follow-up visit (n = 2,938). Consistent medication nonusers were defined for each medication class (classification) as a participant reporting at every annual visit that they were regularly using an oral prescription medication at the time of the clinic visit. Two definitions of consistent medication nonuser were assessed: 1) definite nonusers: participants never reported regularly using an oral prescription medication at the time of the clinic visit. The exploratory analysis focused on medication classes with ≥ 40 users. Key outcome measures were 12-mo quantitative joint space width at x = 0.250 (JSW250), JSW250 change (12-mo to 36-mo visits), 12-mo WOMAC pain score, and WOMAC pain score change (12-mo to 36-mo visits). Change was calculated as follow-up minus baseline. Each medication class was analyzed separately. We explored finite nonusers, 1) matched and restricted to only participants with JSW250 data: users to de


575 LONGITUDINAL EVALUATION OF VISCOSUPPLEMENTATION THERAPY ON OA PATIENTS USING T1(RHO) MRI


Purpose: To quantify changes to articular cartilage in patients following viscosupplementation therapy with mild to moderate osteoarthritis using T1ρ MRI.

Methods: Following IRB guidelines, 10 subjects (mean age, 56 ± 10 yrs) with Kellgren-Lawrence Grades 1 and 2 OA, and who never had prior VOS or knee surgery, were scanned at baseline, 6 weeks post-, and 3 months post-VOS using Hylan G-F 20 (3T, Siemens Medical Solutions, Malvern, PA). T1-weighted isotropic MPRAE images were acquired for segmentation of cartilage, and T1ρ-weighted 3D TrueFISP images were acquired to calculate spatial T1ρ relaxation maps. Sixteen T1ρ-weighted slices were acquired in each aspect to allow for volumetric analysis. Image acquisition parameters have been described previously. Isotropic sagittal MPRAE images were re-sliced along coronal and axial views and interpolated to match the resolution of T1ρ-weighted images. Inter- and intra-scan motion was corrected 3D rigid-body co-registration algorithms (Analyze, AnalyzeDirect, Inc., KS). Femoral and tibial images were co-registered separately due to discrepancies in flexion angle between imaging sessions. ROI analysis was performed on the same locations for three time points to accurately quantify changes in T1ρ through mean compartmental analysis and percent change maps from baseline images. Cartilage was segmented using the SiconOmatic (Tomovision, Quebec, CA) software package. Co-registered T1ρ-weighted images were fit pixelwise to the linearized, mono-exponential signal decay equation ln(S) = -T1ρ/T1ρ + ln(S0). Volumetric T1ρ means were calculated by layer depth (superficial, middle, deep) as well as by region (medial and lateral patella, femoral condyles, and tibial plateau). Statistical analysis was performed using a one-tailed paired t-test between time points. Additional data to be analyzed but not present for this abstract include the visual analog pain, WOMAC, and IKDC subjective scores before injection and at the time of follow-up MRI. WOMRS scoring for each patient is currently being performed and will be correlated to quantitative findings. Statistical significance was accepted when p<0.05.

There were significant differences in volumetric T1ρ scores in both the medial and lateral compartments of the superficial patella (p<0.05) 6 weeks following but not after three months (Med. - p<0.1, Lat. - p 20% across the entire patella while Figure 2 has no significant difference in average between two following time points. There is a large region across the middle of the lateral facet with an average T1ρ score < 20% versus the volumetric mean. This trend of non-uniform spatial changes to T1ρ following VOS regimens is prevalent among all patients.

Conclusions: These data suggest that VOS has a quantifiable physiological effect on knee articular cartilage. This effect is greater in the superficial layers than in the deep layers. Intuitively, direct contact between VOS and cartilage occurs at the superficial layer, and there may be a subsequent physical mechanism of action for VS. Interestingly, the greatest effects were observed in the patella-femoral compartment which may be due to lower load-bearing activities and increased cartilage thickness. Future work will assess methods to predict homogenous or heterogeneous changes within the articular cartilage through correlation analysis with WOMRS, WOMAC, and other qualitative assessments. While some patients responded positively to the VS, as calculated through lower T1ρ scores, there were some who did not or had higher T1ρ values. There may be both placebo effects as well as anti-inflammatory mechanisms associated with the VOS which allowed patients to push through pain more than before thereby causing increased damage to the cartilage tissue.

Table 1. Summary of Sample Sizes for Continuous Medication User and Nonuser and as a Cohering Effect Sizes (median) Based on Joint Space Width (JSW) or JSW250 Analyzed Among the Five Sets of Comparisons

<table>
<thead>
<tr>
<th>Medication Class</th>
<th>JSW250 Score</th>
<th>JSW250 Score Change</th>
<th>JSW250 Interquartile Range</th>
<th>JSW250 Matched</th>
<th>JSW250 Nonmatched</th>
<th>JSW250 Matched Restricted</th>
<th>JSW250 Nonmatched Restricted</th>
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<tbody>
<tr>
<td>Anti-estrogen</td>
<td>0.250</td>
<td>0.250</td>
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<td>Anti-convulsants</td>
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<td>Anti-diabetic</td>
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</table>

Note: JSW250 = joint space width at x = 0.250 – 0.500. Med. = median, SD = standard deviation, p = 0.05. Mean changes were calculated through lower T1ρ mean - JSW250 mean/JSW250 SD. WOMAC pain change = 0.350 or 0.150, WOMAC function change = 0.350 or 0.150, WOMAC function change = 0.350 or 0.150, WOMAC pain change = 0.350 or 0.150. WOMAC function change = 0.350 or 0.150.