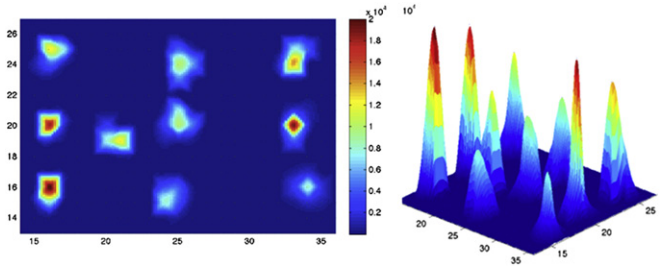
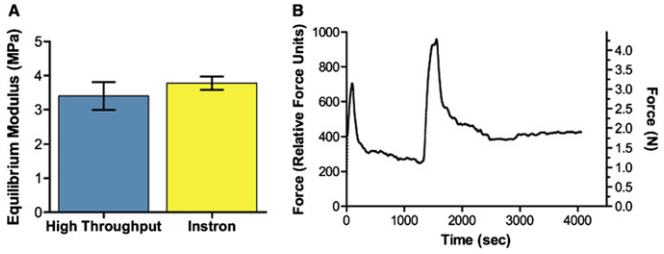
compressive displacement to the HT adapter (Fig 1). Protocol Development: Samples were evaluated by establishing a pre-load to ensure that all indenters were in contact with the IFSR sensor. Subsequently, a nominal 10% compressive strain was applied. With loading, the sensor sampled data at a frequency of 1Hz. Equilibrium force readings were base-lined against the initial force readings; this protocol mitigates the influence of slight differences in sample or indenter heights. Prior to testing, the IFSR sensor was calibrated to ensure accurate conversion of the relative force units outputted to engineering units (Newtons). System Validation and Sample Testing: Multiple polydimethylsiloxane (PDMS) cylinders were tested simultaneously in both the HTMS device and an Instron (with the same testing parameters). To illustrate the capacity of the device to capture time-dependent properties, bovine cartilage cylinders were evaluated by sequential stress-relaxation (5% strain, 20min hold, 10% strain, 40 min hold).

Results: The HTMS testing device accurately captured both equilibrium and dynamic reaction forces from compression of both synthetic and natural materials (Fig 2).



The modulus of PDMS samples tested individually (~3.8 MPa, n=8, Fig 3A) was slightly higher than that found for samples tested simultaneously using the HTMS system (~3.4 MPa, n=8, within ~10% of the individual measures).



As the HTMS will be used for primary screening, slightly lower thresholds for accuracy are acceptable, as secondary screens follow on from 'hits' identified in primary screens. When the device was used to mechanically compress articular cartilage, the IFSR sensor captured the time-dependent stress-relaxation response (Fig 3B).

Discussion: We have developed a HTMS platform for analysis of native and engineered tissues which also can apply a uniform compression force on multiple samples. In this prototype device, transient and equilibrium reaction forces were acquired simultaneously from up to 24 samples and allows for parallel and reliable mechanical evaluation, and in a cost effective manner (~$700). Our current HTMS device evaluates 24 samples at the same time, and is being scaled to accommodate 96- and 384-well plate designs. This validated testing platform will accelerate evaluation of mechanical properties and molecular responses to compressive injury in cartilage tissue engineering, and may help to identify disease-modifying agents in post-traumatic OA.

482
DIFFERENCES IN THE OSTEOARTHRITIC SYNOVIAL FLUID COMPOSITION AND RHEOLOGY BETWEEN PATIENTS WITH OR WITHOUT FLARE-UP. A PILOT STUDY

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Purpose: To study the influence of the inflammatory status (flare or not) on hyaluronic acid (HA) and protein composition and on the intrinsic viscosity of the synoviol fluid (SF) from patients with knee osteoarthritis (KOA)

Patients and Methods: Patients with KOA were classified as having flare (F+) when they fulfilled the 4 following clinical criteria: 1) sudden aggravation of knee pain, 2) whose beginning was identifiable, 3) causing nocturnal awakenings 4) with clinical evidence of knee effusion. Patients were classified F- (no flare) if they do not fulfill any of the 3 first criteria. 44 SF were obtained by arthrocentesis and assayed using Steric Exclusion Chromatography, which allows HA to be separated from the proteins and to determine both molecular weight (Mw) and and concentration (C) of both HA and proteins. SF rheology was determined using a rheometer at 25° C using a cone and plate geometry. Steady-state viscosity was determined in Pa.s, as a function of the shear rate at 1s-1. Correlations between Steady-state viscosity(Pa.s) and HA and Pr (Mw, C and Mw x C) were calculated.

Results: Among the 44 assayed SF, 25 were classified F- and 19 F+. There were statistically significant differences between F- and F+ for most of the studied variables: HA concentration and Mw ($p=0.01$ and 0.001 respectively), protein concentration and Mw (p 0.02 and 0.001 respectively), product Mw x C of the proteins ($p<0.0001$) and viscosity($p=0.0005$). The product [(Mw xC) HA x (MwxC) proteins] was highly discriminating between F+ and F- ($p<0.0001$). The steady state viscosity was highly related to HA concentration ($p= 0.0002$) and HA Mw ($p=0.01$) and was negatively correlated with (Mw x C) proteins ($p=0.0005$), protein concentration ($p=0.0007$) and protein Mw ($p=0.03$).

Conclusion This pilot study shows significant differences of SF composition in patients having a flare-up compared to that of patients who do not have flare. These differences relate to both protein and HA composition and suggest that SF analysis makes possible to distinguish patients with and without flare.

483
CARTILAGE DAMAGE AFTER ACL RUPTURE; "BARCODE-LIKE LESION" AT THE MEDIAL FEMORAL CONDYLE

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Purpose: This is the first report to identify horizontal articular cartilage fissures at the medial femoral condyle found arthroscopically in ACL-deficient knee, which can be called "Barcode-like lesion (BCL)". The purpose of this study is to describe BCL in details and to find out which factors correlate to its presence.

Methods: 26 cases of primary ACL reconstruction was performed between March and September, 2010. Of these, six were excluded because of lack of precise data, and twenty cases (male 17 knees and female 3 knees) with average age of 22.7±4.5 years old were enrolled in this study. Cases with meniscus tear and Grade-1 MCL injury were included. Cases with PCL and/or postero-lateral corner instability and with Grade-2 or -3 MCL injury were excluded from the study. Medical records were retrospectively reviewed regarding duration between initial trauma and the operation, pre-operative instability (side to side differences), and intraoperative findings (presence of BCL and its number, cartilage damage of tibial side, and presence of meniscal tear).

Results:BCL was found at weight-bearing portion of medial femoral condyle in 11 cases (9 males,2 females)out of 20. The number of BCL includes one in one case, two in seven cases and three in two cases. ICRS grade-IV was found in one case. Duration between initial trauma and the surgery in BCL (+) group was significantly longer than that in BCL (-) group (BCL (+), 18.9±13.3 months; BCL (-), 2.3±0.5 months;P=0.0095). All knees in BCL (-) group had intact medial meniscus, but five out of 11 BCL (+) knees had bucket-handle tear including posterior body of medial meniscus. Cartilage damage at tibial side was none or minimal. There was no difference in pre-operative instability evaluated by Telos-SE between two groups. Lysholm score of each group at one year follow-up did not significantly differ from each other. Second look arthroscopy was done in