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ated with cartilage volume loss (p=0.284, rho=-0.60). Similarly, the increase in GCA correlated significantly with less severe cartilage defect (p=0.001, rho=-0.99), joint effusion (p=0.041, rho=-0.89) and BML (p=0.004, rho=-0.97). At week 26, higher PVF significantly (p=0.013, rho=0.95) correlated with more severe meniscal tears while higher CGA correlated (p=0.037, rho=-0.90) with cartilage volume loss. In line with these findings, the evolution of meniscal tears significantly correlated with less osteophytosis (p=0.013, rho=-0.95) and joint effusion (p=0.028, rho=-0.92).
Conclusions: his exploratory study reveals multiple binary associations between a number of joint structural defects and the extent of OA-induced functional disability. Data revealed that PVF and GCA are mainly affected by BML and cartilage defects, whereas meniscal integrity is more affected by gait biomechanics. These results highlight the need for a physiopathologically- based statistical analysis strategy to better understand the structure-activity relationships of the injured joint.

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EARLY SYNOVIAL RESPONSES TO ANTERIOR CRUCIATE LIGAMENT AUTOGRAFTING IN THE OVINE STIFLE JOINT

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Purpose: Anterior cruciate ligament (ACL) reconstruction using tendon autografts aims to restore the function of a completely damaged ACL. However, evidence suggests that such grafts may be less than ideal due, in part, to abnormal graft tensioning and perhaps-related post-surgical inflammation. We have developed a biomechanically idealized ACL autograft model (using the native ACL itself as an immediate replacement with and without excessive 'graft' tensioning) to study the biological responses to such surgery. The present study focussed on identifying the alterations to early markers of synovial inflammation and tissue remodelling proteinases. The hypothesis for this study was that all grafts would induce inflammation but overtensioning of ACL grafts would further increase the expression of inflammatory and tissue remodelling bio-markers.
Methods: All surgeries were performed using protocols approved by the animal care committee of the University of Calgary. Fifteen skeletally mature 3-4 year old female Suffolk-cross sheep were allocated equally into 5 groups: anatomical ACL-core, twist tight ACL-core, twist loose ACL-core, sham, and non-operated controls. The ACL core surgeries were accomplished via arthrotomy to the right stifle joint. The patella was dislocated medially to expose the ACL. The proximal head of the lateral femoral condyle was the entry point for a guide pin that was inserted to mark the femoral insertion of the ACL. A dry nitrogen drill was used to core down to the marked insertion. After the ACL insertion was freed, the core was either a) immediately fixed in place (anatomical), b) pulled 1mm away from the joint while being twisted 90 degrees and then fixed (twist tight), or c) pushed 1mm into the joint while being untwisted 90 degrees and then fixed (twist loose). For shams, the core was stopped at the halfway mark between the surfaces of the proximal femoral condyle to the femoral ACL insertion, a distance of roughly 1.5cm. The non-operated controls were age matched and housed for the same duration of time as the experimental subjects. All animals were sacrificed 2 weeks post-injury. At dissection, synovium from both left and right stifle joints were isolated and examined for different matrix metalloproteinases, interleukins and lubricin using real-time RT-PCR.
Results: Synovial tissue from the treated joint of the anatomical, twist tight and twist loose core groups all exhibited significant increases in the mRNA levels of the matrix metalloproteinases examined. MMP-1 and MMP-3 mRNA levels exhibited maximum elevation in the twist-tight core groups, followed by anatomically placed ACL and twist-loose core group. However MMP-13 mRNA levels exhibited maximum elevations in the anatomical core group followed by twist tight and twist loose groups. The matrix metalloproteinases mRNA levels did not change in either the contralateral limbs of the treated groups or the limbs of the non-operated controls. Investigation of IL-1β mRNA levels revealed an 8-10 fold increase in the three treated groups respectively with not much variation between the groups. Interestingly the IL-6 did not exhibit any change in the mRNA levels in any of the groups. Lubricin mRNA levels followed the same pattern as MMP-1 and MMP-3.
Conclusions: The tension of an ACL graft can influence the mRNA levels of certain MMPs, interleukins and lubricin in the synovium, which in turn may influence the structure and biomechanical properties of the graft.

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A NEW INSULT TECHNIQUE FOR A LARGE ANIMAL SURVIVAL MODEL OF HUMAN INTRA-ARTICULAR FRACTURE

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Purpose: To model human intraarticular fractures (IAFs) in the porcine hock joint (human ankle analogue) *in vivo*, a new fracture insult technique/system has been developed. In this technique, a joint is subjected to an injurious transarticular compressive force pulse, so as to replicate the most typical mechanism of human distal tibial "plafond" fracture. Figure 1 shows the custom interface device developed for this technique. The "tripod" of pins connects the distal impact face to the talus without soft tissue intervention, while the proximal fixator holds the tibial shaft tilted posteriorly. In this "offset" condition, a force pulse applied to a joint causes sudden elevation of vertical shear stresses in the anterior tibial juxtaarticular bone. With guidance from a stress-rising sawcut placed at the anterior cortex, well-controlled, reproducible anterior malleolar fractures are created (Figure 2). For an animal model of IAF to be scientifically meaningful, pathophysiological realism of fracture-associated cartilage injury is essential. The purpose of this study was to document the cell-level cartilage pathology introducible using this "offset" fracture impact technique.

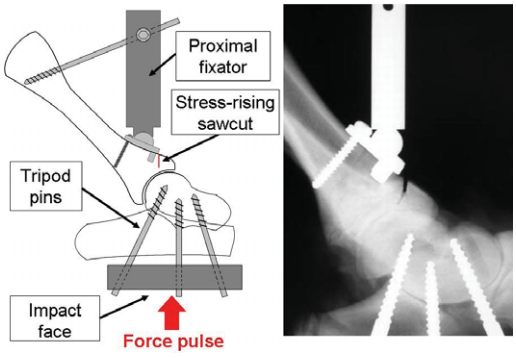

Figure 1. The "tripod" device-to-bone interface system.

Methods: Four fresh porcine hock specimens, in which chondrocytes were fully viable, were utilized. Of these, two were subjected to fracture insult using the offset impact technique, with a force pulse (30 joules) delivered by a drop-tower device. In the other two, morphologically similar distal tibial simulated fractures were created using a sharp osteotome (non-impact osteotomy control). Macroscopic fracture morphology was recorded by means of digital photography. The fractured distal tibial surface, harvested as osteoarticular fragments, was then incubated in culture medium.