**Methods:** This was an IRB approved, prospective study, with data gathered on thirty-six healthy volunteers. All participants were male, healthy (high school) students with ages between 15 to 18 years (average 16 years) with no history of any neuromuscular disorders or lower limb injuries. Data regarding proprioception was measured with the Biometrics Electrogoniometer, Model ADU301. The Electrogoniometer was secured to the subject's dominant leg. Each subject was then verbally instructed to squat to a specific angle. Once the desired angle was reached, the subject was instructed to hold the angle for 3-5 seconds and then to return to a standing position. From the standing position, subject was asked to replicate the angle previously positioned. The protocol was carried out for a knee flexion range between 10 degree and 60 degrees at 5 degree intervals, where these target angles were chosen in a randomized order for each subject. Measurements were taken before and after a reproducible fatigue protocol. "Proprioceptive error" was defined as the achieved angle, minus the target angle. Proprioceptive error was evaluated in a two-way repeated-measures ANOVA, examining the effect of fatigue state and target angle. Alpha=0.05 for main effects, alpha=0.1 for interactive effects, and post-hoc Fishers LSD tests were performed at alpha=0.05 for all significant effects.

**Results:** There was a significant effect of target angle on proprioceptive error ($p<0.001$); subjects consistently overshot the target angle at lower target angles. Proprioceptive error was significantly greater ($p<0.001$) in the fatigued state. There was a significant target angle/fatigue interaction ($p=0.071$); post-fatigue errors were significantly greater than pre-fatigue errors at target angles of 10-30, and 45-50 degrees.

**Conclusion:** Study subjects demonstrated statistically significant worsening of proprioception abilities with fatigue when measured in a closed chain, double leg stance, i.e., a functionally relevant position. Our study suggests that a fatigue mediated alteration in proprioception is a cause for an altered ability of body to dynamically stabilize the knee joint suggesting an increased incidence of sports related injuries with fatigue. This is particularly evident at the knee flexion angles that generally correlate with the risk of non-contact ACL injury, namely less than 30 degrees of knee flexion.

**Anterior Cruciate Ligament Reconstruction Using Autologous Platelet Concentrate: Clinical, Functional Arthrometric and MRI Evaluation (SS-44)** *David Figueroa, M.D., Rafael Calvo, M.D., Alex Vaisman, M.D., Patricio Melean, M.D., Gonzalo Espinoza, M.D., Francisco Figueroa, M.D., Nicolas Zilleruelo, M.D.*

**Introduction:** To evaluate clinical,functional and arthrometric outcomes as well as integration and maturation of STG grafts with Magnetic Resonance Imaging (MRI) in Anterior Cruciate Ligament reconstruction in two groups of patients that underwent ACL reconstruction with and without the use of Autologous Platelet Concentrate(APC) Hypothesis: The use of APC in ACL reconstruction could improve the maturation and the integration of the grafts.

**Methods:** A randomized single blinded evaluator prospective study was performed, two consecutive series of patients reconstructed in 14 months period; 30 with APC use (A) and 20 as control (B). At 6 months Lysholm, IKDC scores,Isokinetic and arthrometric parameters and an MRI evaluation was performed, observing the graft's maturation and presence or absence of synovial fluid in bone tunnel-graft interface. To facilitate interpretation a scoring scale was designed to evaluate graft integration and maturation ANOVA and Chi square test were performed

**Results:** There was no statistical difference between Lysholm, IKDC scores and Isokinetic and KT 1000 test. Presence of synovial fluid in bone graft interface: Negative: A 86.84%, B 94.74%. Average scores: A 1.9, B 1.96 points ($p=0.720$). Autograft signal pattern: Disorganized: A 2.63%, B 5.26%. Hypointense: A 63.16%, B 42.11%. Isointense: A 34.21%, B 52.63%. Hyperintense: 0% in both groups. Average scores: A 2.58, B 2.32 points ($p=0.316$). Final average scores: A 4.45, B 4.2 points ($p\geq0.05$). Poor integration: A 2.63%, B 5.26% ($p=0.214$). Good integration: A 97.37%, B 94.74% ($p=0.784$).

**Conclusion:** No significant differences were found between groups related to clinical, functional or arthrometric outcomes. No differences were found when observing graft's signal pattern. A trend to more positives was found when evaluating the presence of synovial fluid in group A which could mean less integration. A trend to a more hypointense graft signal was also found in this group; this could be interpreted as better ligamentization.

**Anterolateral Transtibial PCL Reconstruction Combined with Reconstruction of Posterolateral Corner Insufficiency: Comparison of Single-bundle vs Double-bundle PCL Reconstruction over a 2-6 Year Period (SS-45)** *Byoung-Yoon Hwang, M.D., Sung-Jae Kim, M.D., Yong-Min Chun, M.D., Sul-Gee Kim, M.D., In-Kee Cho, M.D., Sung-Hwan Kim, M.D., Duck-Hyun Choi, M.D., Dae-Young Lee, M.D.*

**Introduction:** There is a paucity of clinical studies comparing single- and double-bundle posterior cruciate ligament (PCL) reconstruction combined with posterolateral corner reconstruction. The purpose of this study is to compare the clinical outcomes of single- and double-bundle transtibial PCL reconstruction combined with reconstruction of the lateral collateral ligament (LCL) and popliteus tendon for posterolateral corner insufficiency.

**Methods:** The study population consisted of 42 patients who had undergone PCL reconstruction between March 2002 and July 2006, and for whom a minimum of two years of follow-up data were available. We compared clinical outcomes of two surgical techniques: a single-bundle technique with remnant preservation (23 patients, single-bundle group) or a double-bundle technique (19 patients, double-bundle group), each combined with reconstruction of the lateral collateral ligament and popliteus tendon for posterolateral corner insufficiency.

**Results:** There were no difference between the single- and double-bundle groups in the mean side-to-side difference of posterior translation measured with Telos stress radiography (4.2 ± 1.7 vs. 3.9 ± 1.6 mm, p = 0.628), and rates greater than 5 mm were 22% in single-bundle group and 21% in double-bundle group. Regarding the posterolateral rotatory laxity, there were no differences between the two groups in the mean side-to-side difference in the dial test. (5.3° ± 2.7° vs. 5.1° ± 2.4° at 30°, p = 0.801; 6.7° ± 2.7° vs. 6.7° ± 2.4° at 90°, p = 0.917), or in varus stress radiography (1.2 ± 1.2 mm vs. 1.3 ± 1.4 mm, p = 0.722). The Lysholm knee scores were 85.7 ± 7.6 in the single-bundle group and 87.7 ± 7.3 in the double-bundle group (p =0.392). There was a trend of no difference between the groups in IKDC knee score (p =0.969). The rates of abnormal and severely abnormal categories in IKDC were 30% in single-bundle group and 26% in double-bundle group.

**Conclusion:** Double-bundle PCL reconstruction combined with posterolateral corner reconstruction does not appear to have advantages over remnant preserving single-bundle PCL reconstruction combined with posterolateral corner reconstruction with respect to the clinical outcomes or posterior knee stability.

**Tension Changes within the Bundles of Anatomic Double Bundle ACL Reconstruction at Different Knee Flexion Angles: An In Vivo Study using Three Dimensional Finite Element Model (SS-46)** *Yon Sik Yoo, M.D., Bishnu Prasad Patro, M.D., Heon Young Kim, Ph.D., Hak Jin Kim, MS, Young Jin Seo, M.D.*

**Introduction:** Recent studies dispute the previous notion of reciprocal relationship between the bundles and advocate that both bundles shorten with flexion. The purpose of this study is to evaluate the tension change and biomechanical behavior of the reconstructed AM and PL bundles during knee range of motion, after an anatomical double bundle ACL reconstruction using 3D in vivo finite knee model.

**Methods:** An in-vivo study was conducted in five males, with a mean age of 29.4±5.3years without history of previous knee pathology. Subjects' right knee was scanned using high resolution CT scanner at 4 different knee positions (0°, 45°, 90° and 135°). Software was used to create, manipulate, and analyze the 3D model. The model was assembled and meshed using Hyperworks (Altair engineering). Bone/ligament and ligament/ligament contact were modeled using penalty formulation assuming a frictional coefficient of 0.1. Finite element analysis was performed with ABAQUS/Explicit code. In 0°analytic model, four 7mm diameter tunnels were drilled at center of each AM and PL footprint of femur and tibia leaving a bone bridge of 1.5mm. Bundles with a pretension of 40N put into respective tunnels and fixed at middle of each tunnel. Next, reconstructed knee was superimposed to discrete 45°, 90° and 135° of knee flexion with the positional information of the coordinates. Digital length of virtual bundles measured from centre of each tunnel. The change of stress distribution within the ligaments and contact between the bundles and surrounding bony structure during different knee positions was assessed.

**Results:** In both AM and PL bundles, the digital length was longest in full extension (3.88±0.43 and 2.93±0.31 cm respectively). With flexion i.e. at 45° and 90°, both bundles lose their linearity more so with PL bundle, the loss in tension of PL bundle was regenerated by its internal twisting and impingement to the tibial lateral intercondylar tubercle acting as bridge and that of AM bundle due to minimal change in its length. In full flexion, knee attains a stable position likely due to restoration of ligament length and twisting of the ligaments. In extended knee, the maximum principal stresses were located in the mid-anterolateral portion of the AM and PL bundles reaching maximum values of 11.45 and 12.21Mpa, respectively.

**Conclusion:** The length of both bundles were maximum at extension, gradually decreasing with flexion; still both the bundles maintain sustained tension at 45 degree, 90 degree and 135 degree of knee position. The regain of ligament tension with flexion by internal twisting and impingement between the bundles and with surrounding bone suggest final tensioning of bundles in extension would regain joint stability at various knee positions.