RESULTS: Pain at exercise (on a visual analogue scale 0-10) was reduced from 6±2 to 2±2 at six weeks and 1±1 after 12 weeks of treatment. Morning stiffness was reduced at six weeks by 56% and 87% after 12 weeks. The degree of neovascularisation in PowerDoppler ultrasound was reduced from Öhberg degree 3+ to 0-1 after 12 weeks as was the tendon diameter by 38% in grey scale ultrasound. VISA-P scores improved by 32% at six weeks and 51% at 12 weeks. Players were able to return to sport at mean 18±12 days after initiation of the weekly therapy.

CONCLUSIONS: Combined focused shockwave & low level laser tendon therapy accompanied by daily eccentric training are able to improve patella tendon function with a sustained effect in soccer athletes with an early return to game play.

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**REFERENCES**

1. Board #3: June 2 9:30 AM - 11:30 AM

**Progenitor Cells From Cartilage: Grade Specific Differences In Stem Cells Markers Expression**

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**BACKGROUND**: Recent research confirmed the presence of Mesenchymal stem cell (MSC) - like progenitors (MPC) in both normal and osteoarthritic cartilage. However, there is only limited information concerning how MPC markers develop with osteoarthrosis progression. The purpose of this study is to determine the prevalence of MPC markers in different OA grades.

**MATERIALS AND METHODS**: Human osteoarthritic tibial plateau were obtained from 10 patients undergoing total knee replacement. Each sample had been classified into a mild or severe group according to OARSI scoring. Tissue was taken from each specimen and mRNA expression levels of CD105, CD166, Notch 1, Sox9, Acan and Col II A1 were measured at day 0 and day 14 (2 weeks in vitro). Furthermore, MSC markers: Nucleostemin, CD90, CD73, CD166, CD105 and Notch 1 were studied by immunofluorescence.

**RESULTS**: mRNA levels of MSC markers did not differ between mild and severe OA at day 0. At day 14, protein analysis showed that proliferated cells from both sources express all 6 MSC markers. Only cells from mild OA resulted in a significant increase of mRNA CD105 and CD166 after in vitro expansion. Moreover, cells from the mild OA showed significantly higher levels of CD105, Sox9 and Acan than from those severe OA.

**CONCLUSION**: Results confirmed the presence of MSC markers in mild and severe OA tissue on both mRNA and protein levels. We found potential differences between cells obtained from mild compared to severe which suggests that mild OA derived cells may have a greater MSC potential.

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**REFERENCES**

2. Board #4: June 2 9:30 AM - 11:30 AM

**Relaxin Influences Knee Laxity Changes Across the Menstrual Cycle**

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Greater knee laxity is associated with an increased risk for anterior-cruciate ligament (ACL) injury, particularly in women. Research suggests that the hormone relaxin may influence the structural integrity of the ACL, rendering a weaker and more lax ligament.

**METHODS**: College-aged females (166±65.7cm, 65.9±8.5kg, 20.8±2.9yr) provided blood samples for the first 6 days of menses and first 10 days of luteal phase of one menstrual cycle. Knee laxity was recorded as anterior knee laxity (AKL; mm), genu recurvatum (GR; mm), and general joint laxity (GJL; score, 0-9), and dependent variables were calculated as mean (X), cyclic Δ (max – min), coefficient of variation (CV), and standard deviation (SD). Progesterone (P; ng/ml), testosterone (T; ng/dl); and relaxin (R; pg/ml) were analyzed via ELISA assays. The sum of the 6 greatest hormone concentrations during menses (M) and luteal phase (L) was calculated. Only subjects with captured R and P peak were included in analysis (n=18). M and ΔL for each hormone were entered into backward stepwise (inc; p=.05, out; p=.20) multiple linear regression models to predict each laxity measure.

**RESULTS**: R and P were significantly different between M and L (p<.001, R_0=22.2±29.4 vs. R_1=147.0±96.3; p<.001, R_0=5.8±1.8 vs. R_1=89.7±36.6), whereas T was less variable (p=.07, T_0=203.8±63.0 vs. T_1=222.7±82.6). All laxity showed variation across the menstrual cycle (range [min-max]: AKL=5.9-7.6; GR=2.6-5.6; GJL=8-2.1). Significant models were observed for GR: (p=.014; R^2=4.18; GR_0=5.501±1.024*M_0.L_0.757*P_0.R_0.395*T_0); GJL_0 (p=.044; R^2=2.53; GJL_0=4698*R_0.640*T_0.440); and GJL_0 (p=.035; R^2=79; GJL_0=317*R_0.235+440*T_0.507). Models for AKL_0, AKL_0, GR_0, and GJL_0 approached significance (all p<.075).

**CONCLUSION**: Once controlling for P and T, R was a significant predictor of knee laxity mean and cyclic changes. These findings would suggest that, combined with other sex hormones, may affect the structural integrity of the ligament and impact injury risk. Further study is needed to explore potential mechanisms for this association.

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**REFERENCES**

3. Board #5: June 2 9:30 AM - 11:30 AM

**The Human Piriformis Muscle: Sensory, Postural, Or Just A Pain**

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Piriformis syndrome is a form of low back pain that is debilitating and difficult to treat. Physical therapy is often effective but in some cases the Piriformis muscle is disconnected or removed entirely through surgery. The short term consequences of this procedure are negligible but the long term consequences have not been studied. Furthermore, because of its size and anatomical location, it is not thought to be a primary mover of the body. The purpose and necessity of the muscle is an area of speculation. We hypothesized that it is a sensory and postural muscle, which could explain why short term consequences of its removal are minimal.

**PURPOSE**: To determine the density of muscle spindles and fiber type composition of the human Piriformis muscle.

**METHODS**: Six human cadavers (male = 3, female = 3) had their right and left Piriformis muscles removed for histological analysis. Whole muscles were paraffin embedded, sectioned, H&E stained or stained with myosin heavy chain antibodies. Microscopy analysis examined spindle density and fiber type composition.

**RESULTS**: The average spindle density per muscle was 3.4±1 and was not significantly different between male and female (p=0.46). Fiber type composition was 84±8% slow twitch and was not different between male and female (p=0.23).

**CONCLUSIONS**: The human Piriformis muscle does not appear to be a sensory muscle due to the low concentration of muscle spindles but is very likely a postural muscle. The results of this characterization may better inform treatments including the surgical removal and long term rehabilitation.