(22.7±5.4%) compared with swimmers (11.9±2.6%), runners (8.4±1.4%), soccer (10.3±2.6%) and basketball players (13.7±4.6%) while female non-athletes had the highest total percent body fat (29.1±7.1%) compared with swimmers (22.9±3.9%), runners (18.6±2.2%), volleyball (23.3±4.3%) and basketball players (19.4±3.8%).
**CONCLUSIONS:** 1) Athletes in sports requiring short bursts of high intensity activity have higher BMD compared with endurance athletes. 2) Non-athletes had the lowest BMD and highest %body fat compared with athletes. Male non-athletes demonstrate Z-scores within the osteopenic range (<-1), likely attributed to unhealthy diets plus inactivity.

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3625 Board #64 June 4, 9:30 AM - 11:00 AM

**MRI Findings of Bone Marrow Edema in a Division I NCAA Women's Soccer Team During a Competitive Season**

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*(No relationships reported)*

**PURPOSE:** The purpose of this study was to evaluate the prevalence of BME (Bone Marrow Edema) at the knee joint over the course of a competitive soccer season, and the effect of a recovery period on the prevalence of BME.
**METHODS:** A convenience sample of Division I female collegiate soccer players between the ages of 18 and 22 years of age were recruited for participation in this study. The bilateral tibiofemoral joints of 18 subjects were imaged at baseline (one week prior to start of preseason training), post-season (one week after the season conclusion) and post-recovery (3 months after post-season). All examinations were performed by an experienced MRI technologist, using a 1.5-T MRI unit, and were read by an experienced musculoskeletal radiologist and orthopedic surgeon/sports medicine physician. The Knee Osteoarthritis Scoring System (KOSS) rating scale was used for scoring.
**RESULTS:** Pairwise contrasts between time periods resulted in a significant difference between preseason and post season (p=.028) as well as postseason and recovery (p-.016). 29% of knees were found to have BME at baseline, 47% post-season, and 23% post-recovery demonstrating that bone marrow edema was found to be significantly more widespread in the same population after a competitive soccer season
**CONCLUSION:** BME is occasionally found in asymptomatic athletes however, the clinical significance and time course of development is poorly understood. To date, no study has tracked a female athletic population over the course of a competitive season to assess the incidence of BME. Our findings suggest the BME prevalence increases in response to repetitive high impact loading. Future research needs to determine if there is a link between BME and injury risk.

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3626 Board #65 June 4, 9:30 AM - 11:00 AM

**Longitudinal Effects Of Swimming On Bone Mass, Structure And Strength**

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*(No relationships reported)*

**PURPOSE:** To investigate the changes over a swimming season in bone mineral density (BMD), bone mineral content (BMC), bone strength and bone structure in adolescent swimmers and compared them to normo-active controls (CG).
**METHODS:** BMD and BMC were measured longitudinally (8 months) by Dual Energy X-ray Absorptiometry at the whole body, lumbar spine and non-dominant hip. Bone strength was measured at the midshaft radius and tibia with peripheral quantitative computed tomography (pQCT). Swimmers were divided into two groups; swimmers that swam and performed an extra-weight bearing sport (SWI-SPORT; n=11) and swimmers that only swam (SWI; n=23). Both groups were compared between them and to CG (n=28). ANCOVA for repeated measures x 2 (time) were performed between pre- and post-intervention to determine the effects of swimming on BMC and BMD values adjusting by change in height and subtotal lean, initial age and final Tanner stage and calcium intake for DXA values. For pQCT the same analyses were performed adjusting by change in object length, initial age and final Tanner stage.
**RESULTS:** Eight months of swimming training had no effect on BMD or BMC, as no differences were found between SWI-PURE and CG acquisition. Nevertheless, practicing an extra-weight bearing sport in addition to swimming seemed to positively stimulate bone mass acquisition as SWI-SPORT was the only group that improved all measured skeletal sites and also a group by time interaction was found for the trochanter and total hip BMD when comparing SWI-SPORT to CG ($p<0.05$). Regarding pQCT measures, no group by time interactions were found for the radius. For the tibia, SWI-SPORT presented higher improvements in cortical thickness, resistance to fracture load (X-axis), and polar strain index than CG (all group by time interactions $p<0.05$). SWI-PURE also presented higher improvements in polar strain index when compared to CG (group by time interaction $p<0.05$).
**CONCLUSION:** Swimming seems to be a neutral sport to practice regarding BMD and BMC acquisition. Nevertheless, it might entail some minor improvements in bone strength. Practicing a weight bearing sport in addition to swimming improves both bone mass acquisition and bone strength.
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3627 Board #66 June 4, 9:30 AM - 11:00 AM

**A Longitudinal Assessment Of Bone Mineral Density And Content In Competitive Cyclists**

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Weight supported physical activity, such as cycling, is thought to provide insufficient stimuli to promote osteogenesis even though it incorporates significant muscular loading of bones. Furthermore, auxiliary factors such as dietary restrictions and low body mass in conjunction with confounders such as age, sex, competition level and the type of racing cloud the mechanisms of skeletal adaptations to cycling.
**PURPOSE:** The purpose of this study was to investigate, in a diverse group of competitive cyclists, how age (18-49 years), sex, USA Cycling Category (elite-4) and racing type (road and multiple bike), influenced bone mass across a season.
**METHODS:** In February, 2014, 42 participants (22 males, 20 females) completed a health history questionnaire, four day dietary log and a Dual-energy X-ray absorptiometry (DXA) scan. In September, 180 +/- 11 days later, participants repeated the measures.
**RESULTS:** Pre-season subgroup analysis (age, sex, competition level and racing type) revealed significant differences in body composition, diet and cycling characteristics. Bone mineral density (BMD) T-Scores were within healthy limits and not different between groups ($P \geq 0.053$). Pre-season Body Mass was a significant correlate of T-Scores for older cyclists (R=0.584) and males (R=0.485), while BMI was a correlate for males (R=0.464). A significant time*group interaction with age suggests older cyclists may increase BMD across the season compared to younger cyclists. Post-season, Body Mass (R=0.623) and Total kcal (R=0.607) were significantly correlated with older cyclist's T-Score, Total kcal was correlated with T-Score in males (R=0.601), and vitamin D was a correlate in females (R=-0.535).
**CONCLUSION:** The results of this study suggest that participation in competitive cycling might not have deleterious effects on BMD and BMC as previously demonstrated. T-Score and regional BMD measurements did not significantly decrease across the season for any group; however, certain variables such as body composition, insufficient nutrition and time spent cycling are deserving of further investigation. More importantly, we must work to understand when, where and why cycling may shift from a safe osteogenic activity, as demonstrated by this study, to a possibly dangerous osteoporotic sport, as demonstrated by many others.