eralization. The fact that these changes exist within the BMEL regions but not in adjacent regions (also from an osteoarthritic joint) imply a localized imbalance in bone formation and mineralization specific to the BMEL region. These results suggest that BMEL may be implicated in abnormal bone turnover in regions underlying cartilage defects, and therefore may be a therapeutic target and prognostic marker of OA progression.

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IS THE FEMORAL SHAFT-TIBIAL SHAFT ANGLE A RELIABLE SUBSTITUTE FOR THE HIP-KNEE-ANKLE ANGLE IN KNEE OSTEOARTHRITIS?

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Purpose: Varus and valgus angulations of the Hip-Knee-Ankle (HKA) angle are potent risk factors for osteoarthritis (OA) progression. They also strongly influence surgical outcomes for osteotomy and Total Knee Arthroplasty. The Femoral Shaft-Tibial Shaft angle (FS-TS) is often used to estimate HKA when full-length radiographs are not available. While studies suggest a good correlation between HKA and FS-TS, this may not be the case for different varus/valgus angulations, and various image types (short versus full limb images). The purpose of this study was to determine if FS-TS measured using different femoral and tibial shaft lengths on a radiograph obtained in knee extension is a valid and clinically-useful substitute for HKA.

Methods: 120 full-length radiographs were chosen from a large cohort study of persons with and at risk of knee osteoarthritis, 30 in each of 4 groups based on HKA (≥5.0° varus, 0.0°-4.9° varus, 0.1°-4.9° valgus, ≥5.0° valgus). HKA and 4 versions of FS-TS, using 2/3, 1/2, and 1/3 of the femoral and tibial shaft lengths, and 10 cm from the knee, were measured from each full-length radiograph using custom computer software (Horizon Surveyor, OAISYS Inc.). Using HKA as the gold standard, we determined the appropriate offset corrections (with confidence intervals) for the different lengths of FS-TS. We computed Pearson correlations of HKA with different FS-TS lengths, for all knees and for each alignment group. The extent of the femoral and tibial shafts seen on a typical knee radiograph was also evaluated.

Results: The mean offset between HKA and all lengths of FS-TS for all knees was 5.4° and correlations between HKA and FS-TS were excellent (r range 0.88 to 1.00). However for each of the four alignment groups the correlations were much lower, especially for 10 cm FS-TS (r range 0.41 to 0.66). The offset between HKA and FS-TS for varus knees increased from 5.1° to 7.0° as the shaft length for FS-TS decreased. The opposite was true for valgus knees (from 5.0° to 3.7°). The 95% confidence intervals for the difference between HKA and FS-TS increased from less than 3.0° for the full-length FS-TS to over 8.3° for the 10 cm FS-TS, indicating that the shorter the FS-TS, the less consistent its relation with HKA even with an offset correction. Only 1/3 FS-TS and 10 cm FS-TS points were visible on a typical knee radiograph.

Conclusions: Using an offset based on anatomic alignment (FS-TS) measured from short knee radiographs does not provide a consistently accurate estimate of HKA. As knee deformity increases with OA progression, the offset between FS-TS and HKA changes. Full limb films, either with a long FS-TS image or, ideally, revealing the whole limb are needed to consistently estimate HKA.