Purpose: Previous studies that used semi-quantitative scoring of hand radiographs suggest that hand osteoarthritis (OA) puts a person at risk for knee OA. One possible mechanism to explain a relationship between hand and knee OA is a systemic cartilage loss. Therefore, we used a semi-automated, custom software to delineate the joint margins metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints of digits 2 to 5 on the dominant hand. The software divided each joint into 5 regions to derive a region-specific JSW measurement (JSW1 to JSW5; inter-tester ICC [2,1 model] = 0.82 to 0.92; see Figure). Due to anatomical considerations the outermost regions (JSW1 and JSW5) of the MCP joints could not be reliably replicated and were excluded from calculations. Mean MCP JSW, mean PIP JSW, and mean DIP and JSW of the MCP joints could not be reliably replicated and were excluded. If the participant had two case knees or two control knees, then the control knee was excluded. If the participant had two case knees or two control knees, then the right knee was selected. 276 knee-, cohort-, age-, gender-, and body mass index-matched participants met this criteria. Two readers used a semi-automated, custom software to delineate the joint margins metacarpophalangeal; PIP; and DIP joints of digits 2 to 5 on the dominant hand. The software divided each joint into 5 regions to derive a region-specific JSW measurement (JSW1 to JSW5). Results: Of the 276 participants, 121 matched case-control pairs had readable hand radiographs. Case participants were 62.5 ± 8.6 years of age, had a body mass index of 29.7 ± 8.4 years of age, had a body mass index of 29.4 ± 8.6 years of age, and 5 (4.13%) were left handed. Of the 276 participants, 121 matched case-control pairs had readable hand radiographs. Case participants were 62.5 ± 8.6 years of age, had a body mass index of 29.7 ± 8.6 years of age, and 5 (4.13%) were left handed. Both groups were 68.6% female, included 65 (54%) right knees, and 63 (52%) participants from the Incidence cohort. Paired sample t-tests revealed no significant differences in all mean JSW measurements between the case and control groups (see Table). Conclusions: We found that baseline mean hand JSW is not significantly different among those who develop a definite knee osteoarthritis over 48 months and those who do not. Our results indicate that systemic loss of cartilage is not an explanation of the relationship of hand and knee OA.

Mean Hand JSW Measurements among Controls and Cases

<table>
<thead>
<tr>
<th>Variables</th>
<th>Controls Mean</th>
<th>Controls Std. dev.</th>
<th>Cases Mean</th>
<th>Cases Std. dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean MCP JSW</td>
<td>1.79</td>
<td>±0.28</td>
<td>1.80</td>
<td>±0.29</td>
</tr>
<tr>
<td>Mean PIP JSW</td>
<td>1.17</td>
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<td>±0.19</td>
</tr>
<tr>
<td>Mean DIP JSW</td>
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<td>±0.22</td>
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Notes: JSW – joint space width; Std. dev. – standard deviation; MCP – metacarpophalangeal; PIP – proximal interphalangeal; DIP – distal interphalangeal.

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**QUANTIFICATION OF BASELINE HAND JOINT SPACE WIDTH DOES NOT DIFFERENTIATE INDIVIDUALS WHO DEVELOP INCIDENT KNEE OSTEOARTHRITIS FROM CONTROLS: DATA FROM THE OSTEOARTHRITIS INITIATIVE**

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**Purpose:** Previous studies that used semi-quantitative scoring of hand radiographs suggest that hand osteoarthritis (OA) puts a person at risk for knee OA. One possible mechanism to explain a relationship between hand and knee OA is a systemic cartilage loss. Therefore, we used a semi-automated, custom software to delineate the joint margins metacarpophalangeal; PIP; and DIP joints of digits 2 to 5 on the dominant hand. The software divided each joint into 5 regions to derive a region-specific JSW measurement (JSW1 to JSW5; inter-tester ICC [2,1 model] = 0.82 to 0.92; see Figure). Due to anatomical considerations the outermost regions (JSW1 and JSW5) of the MCP joints could not be reliably replicated and were excluded from calculations. Mean MCP JSW, mean PIP JSW, and mean DIP JSW were calculated by averaging the joint JSW measurements across regions within joint and across fingers. Mean hand JSW was averaged across all regions, joints, and fingers to develop a composite hand measurement. Four paired sample t-tests (p < 0.05) were performed to compare the four mean JSW measurements between cases and controls.

**Results:** Of the 276 participants, 121 matched case-control pairs had readable hand radiographs. Case participants were 62.5 ± 8.6 years of age, had a body mass index of 29.7 ± 4.1 kg/m², and 8 (6.67%) were left handed. Control participants were 62.5 ± 8.4 years of age, had a body mass index of 29.4 ± 5.0 kg/m², and 5 (4.13%) were left handed. Both groups were 68.6% female, included 65 (54%) right knees, and 63 (52%) participants from the Incidence cohort. Paired sample t-tests revealed no significant differences in all mean JSW measurements between the case and control groups (see Table). **Conclusions:** We found that baseline mean hand JSW is not significantly different among those who develop a definite knee osteoarthritis over 48 months and those who do not. Our results indicate that systemic loss of cartilage is not an explanation of the relationship of hand and knee OA.

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Notes: JSW – joint space width; Std. dev. – standard deviation; MCP – metacarpophalangeal; PIP – proximal interphalangeal; DIP – distal interphalangeal.

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**DO LOCATION AND EXTENT OF BONE SHAPE ABNORMALITIES DIFFERENTIATE NORMAL KNEES FROM THOSE WITH END-STAGE DISEASE? DATA FROM THE OAI**

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**Purpose:** Bone shape changes are associated with the development of OA. Bone curvature of knees immediately prior to total knee replacement (TKR) may represent an extreme in the extent and degree of bone shape deformation in end-stage OA. The purpose of this study was to locate and measure bone shape abnormalities in the knees that underwent a TKR in comparison to knees from the normal non-exposed reference group.

**Methods:** We studied the 4,796 participants from the Osteoarthritis Initiative (OAI), a multicenter population-based cohort study designed to identify biomarkers of knee OA development and/or progression. Knees that underwent a TKR between 12 and 48 months of follow-up, confirmed by radiography and/or review of hospital records, were selected. Right knees of the non-exposed cohort were used as a control group to detect and quantify bone abnormalities in KR knees. Quantitative bone curvature measures were obtained from sagittal 3D WE DESS MRI series. Maps of bone curvature including mean, and standard deviation were created for the time point prior to the advent of TKR (T0) (Qmetrics, Rochester, NY). Similar maps of knees from the non-exposed cohort were used as a normal reference to detect the location of abnormal bone shape using statistical parametric mapping (SPM) analysis via point by point z-test adjusted for false discovery. The size of the detected abnormalities was quantified and their location was studied using prevalence maps. The relevance the average curvature at different regions of interest (Femur, Tibia, cLF, cMF, MT, LT and Trochlea) to predict TKR was tested using the Wilcoxon signed rank test, and reported using ROC analyses.

**Results:** A total of 127 case knees of OAI participants that received a KR, had central X-ray readings, and MRI data at T0 (76 women, 46 men, age