For the coxarthrosis stage, we employed the classification by the Japanese Orthopaedic Association's committee. It defined five groups: almost normal, prearthrosis, the initial stage, the advanced stage, and the terminal stage. The committee focused on three roentgenographic features, namely the width of the joint space, the structure of bony architecture, and the shape of the acetabular roof and the femoral head. One of the authors, whose institution did not participate in film reading, performed the statistical analysis. On the coxarthrosis stage, he computed the value of the kappa statistics and evaluated the strength of observer agreement. On the roentgenographic indexes, he set up a mixed linear model to calculate the coefficient of variation. Based on this premise, he calculated the coefficient of variation using the analysis of variance (ANOVA).

Study 2: To overcome the difficulty in staging coxarthrosis, we defined the description of stages from our own point of view and selected typical radiographs for reference. The same 12 authors assessed the roentgenographic stage on the same radiographs again 1 month after *Study 1.*

Results: *Study 1*: (a) Roentgenographic stages of coxarthrosis. Disagreement was most apparent among the three groups of almost normal, prearthrosis and the initial stage. Moreover, several observers classified some hips as "almost normal or prearthrosis". Considering the power of statistical analysis, we dealt with these two categories as one unit. Consequently, the kappa statistics was calculated as 0.448 and the strength of agreement was evaluated as *Moderate.* (b) Roentgenographic indexes of acetabular dysplasia. The value of coefficient of variation was smallest in the acetabular angle and increased in the following order; the AHQ, the acetabular roof obliquity, the CE angle, and the AAQ.

Study 2: The value of the kappa statistics was calculated as 0.600.

Conclusions: For the multi-center survey, clear description of the stages of coxarthrosis and selection of appropriate indexes may be helpful for collecting dependable results.

336 USING ESCAPE ANALGESIA DURING AN OSTEOARTHRITIS TRIAL (OA): CORRELATION WITH PAIN SCORES & ITS RELATION TO TRIAL RESULTS

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Purpose: Trials in OA examining pain outcomes often allow use of escape analgesia, which may minimize treatment (Tx) differences. Little is known about the pattern of escape analgesia use & its relation to pain in such trials. Using data from a null randomized cross-over trial of shoe inserts (SIS) for pain Tx of OA where escape analgesia was permitted & documented by daily diaries, we describe the pattern of analgesic use, its correlation with pain scores & if there was a difference in escape analgesic usage between Tx & placebo. Previous studies have not had detailed information that would permit comprehensive evaluation of the quantity of analgesia used & its relation to pain

Methods: During the SIS trial, subjects recorded daily pain medication use via a diary which was collected at each study visit. All of the 90 randomized subjects who had at least 1 visit (maximum 4 visits) with both a completed diary & WOMAC pain subscale (n = 77) were used in the analysis. Analgesics, NSAIDS & COX-2 meds used 7-days prior to study visit (to reflect the same recalled time period of the WOMAC pain VAS subscale) were transformed to acetaminophen equivalencies (AEq). AEq transformation was based on methods used by Allen (JAGS 51:534 2003). We evaluated the correlation between pain score & AEq use with a Spearman rank test & tested the difference between Tx & placebo in escape analgesia with a Wilcoxon paired signed rank test

Table 1: WOMAC Pain & medication usage (n = 77 Subjects)

WOMAC pain, past 7 days (range 6–489)	% visits taking meds	Treatment visits		Placebo visits	
		# visits	median MG/ day of AEq	# visits	median MG/ day of AEq
<100	52%	32	46	30	164
100–199	54%	45	93	24	58
200–299	65%	34	223	62	429
300–399	77%	30	650	18	650
400–489	77%	6	1,433	7	929
Total	62%	147	325	141	371

Results: Table 1 highlights AEq use stratified by WOMAC Pain score & visit type. The direct correlation between WOMAC pain & AEq for the Tx & placebo visits was 0.25 (p = 0.03) & 0.26 (p = 0.03) respectively. Wilcoxon paired signed ranked test indicated there was no significant difference in analgesic use between Tx & placebo (p = 0.59). Since Pain score & analgesic use were not inversely related, analgesics did not reverse any effect of treatment.

Conclusions: Pain score & analgesic use were modestly correlated, but analgesic use did not differ between Tx & placebo therefore did not affect the directionality or magnitude of the Tx effect.

337 FACTORS THAT MEDIATE THE RELATIONSHIP BETWEEN RACE AND PATIENT PREFERENCE FOR ELECTIVE JOINT REPLACEMENT

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Purpose: There are marked racial/ethnic differences in the utilization of total joint replacement (TJR) for osteoarthritis (OA). Racial differences in patient preference may be an explanation for the observed variation in utilization rates, but the factors that mediate the relationship between patient race and preference for joint replacement (JR) have been understudied. Therefore, we sampled primary care patients who were clinical candidates for JR to examine potential mediators of the relationship between race and patient preference for TJR.

Methods: The sample consisted of 894 veterans (451 African-American [AA], 443 white) 50 years of age or older who receive primary care in two VA Medical Centers and had moderate to severe hip or knee OA as indicated by WOMAC score >39. We used the previously validated Hospital for Special Surgery Joint Replacement Expectations Survey (JRES) to assess patients' expectations for pain relief, functional improvement, and psychological well-being after surgery and a previously published willingness question to assess patient preference. Structured interviews were used to collect information on demographic, psychosocial (health literacy level, social support, mental health well-being, pain coping, religiosity, and risk preference), and patient knowledge regarding JR. We a priori identified variables as covariates (age, income, educational level, WOMAC score and SF-12 mental status subscale) and others as potential mediators (knowledge, JRES, social support and pain coping). We performed bivariate analyses to examine the relationships between race, patient preference, and potential mediators. Those factors associated with both race and preference were analyzed using multiple logistic regression modeling preference as a function of race and the potential mediators, adjusted for patient covariates. Non-significant mediator variables ($P > 0.05$) were removed using backwards stepwise-selection. Comparison of the adjusted race effect in this model to the unadjusted race effects without the mediator variables were made to assess whether these variables mediated the relationship between race and patient preference. All models were adjusted for site of study.

Results: In this sample, AA patients were slightly younger ($P < 0.001$) and reported lower educational level ($P < 0.001$); lower household income ($P < 0.001$); and lower literacy level ($P < 0.001$). White patients reported higher preference for JR (72% vs 60%, $P < 0.001$); were more likely to have received a referral for surgery (32% vs 26%, $P = 0.05$); and less likely to have tried prayer to treat their chronic pain (56% vs 73%, $P \leqslant 0.001$). Compared to patients with high preference for surgery, those with low preference had lower scores on social support scale ($P < 0.001$); pain coping measure ($P = 0.04$); and knee and hip JRES ($P < 0.001$ for both). They also reported less understanding of JR and expected longer hospital stay, more pain and difficulty walking after JR surgery, were less likely to report having had a discussion with a doctor about surgery, and less likely to have received a recommendation for surgery ($P \leqslant 0.005$ for all).

AA to white unadjusted odds ratio (OR) for willingness to consider surgery (preference) was 0.69 (95% CI = 0.51−0.93) and was unchanged after adjusting for patient covariates. However, after the addition of the statistically significant potential mediators (patient knowledge, JRES and social support), the OR became 0.88 and was no longer statistically significant (95% CI = 0.62−1.24).

Conclusions: In this sample, the relationship between patient race and preference for JR is mediated by patient knowledge and expectations regarding surgery and social support.

338 DIABETES AND SITE-SPECIFIC OSTEOARTHRITIS

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Purpose: Diabetes can affect the musculoskeletal system in a variety of ways. Hormone disturbances have been associated with early cartilage

wear and secondary osteoarthritis. The investigation of this relationship using epidemiologic data can enhance our understanding of the underlying biologic mechanisms which may be at play. We sought to quantify the association between site-specific radiographic osteoarthritis (ROA) and self-reported diabetes.
Methods: Site-specific OA status was radiographically-confirmed among subjects drawn from the Clearwater Osteoarthritis Study (COS) (N = 3438). The COS is a 25-year longitudinal cohort begun in 1988 to investigate risk factors for the incidence and progression of OA among men and women ages 40 years and older. Biennial physical exams including site-specific radiographs were conducted. The Kellgren & Lawrence ordinal scale was used to determine radiological evidence of the study outcome, ROA.
Results: After adjusting for age, gender and body mass index (BMI), subjects who self-reported a history of diabetes were 40% more likely to have hand OA (OR = 1.4; 95% C.I. 1.1−1.6; p-value <0.002) than were those without diabetes. Likewise, those subjects with diabetes were 20% more likely to have foot OA, although this was not statistically significant (OR = 1.2; 95% C.I. = 0.98−1.5; p-value 0.08).

Table 1: Self-Reported diabetes and site-specific radiographic osteoarthritis

	Odds Ratio (95% Confidence Interval)		
	Unadjusted	Age-adjusted	Age, gender and BMI-adjusted
Knee OA	1.2 (0.9−1.4)	0.97 (0.8−1.2)	0.90 (0.7−1.2)
Hand OA[a]	1.7 (1.4−2.0)***	1.4 (1.1−1.7)**	1.4 (1.1−1.6)*
Foot OA[b]	1.4 (1.2−1.8)**	1.2 (1.0−1.5)	1.2 (0.98−1.5)

Radiographic OA status determined by the Kellgren and Lawrence scale (2+).
*p-value <0.002; **p-value <0.001; ***p-value <0.0001.
[a]Hand OA includes evidence of OA at one, or more, of the following joints: 2nd DIP, 3rd PIP, 1st CMC. [b]Foot OA as determined by evidence of OA at the first meta-tarsal phalangeal joint (1st MTP).

Conclusions: The findings from our investigation support those previously reported in the literature. While diabetes is an important systemic risk factor for OA, further study is needed to determine the underlying biologic mechanisms.

340 THE INFLUENCE OF LIFETIME HIP JOINT FORCE ON THE RISK OF SELF-REPORTED HIP OSTEOARTHRITIS: A NEW METHOD TO QUANTIFY PHYSICAL ACTIVITY

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Purpose: The purpose of this study was to examine the association between lifetime hip joint force and the development of hip osteoarthritis.
Methods: *Design*: Prospective cohort with retrospective self-reports of physical activity. *Setting*: Canada-wide population study. Participants and Data Collection:
Data source: Data was drawn from the *Physical Activity and Joint Health* cohort, a population-based, 3-cycle Internet study (baseline, 1 year, 2 year).
Source population: Canadian Association of Retired Persons
Lifetime Physical Activity Questionnaire: Data on lifetime sport, occupation and domestic activities was self-reported retrospectively via a validated online computer-adaptive survey. For each specific activity type (e.g., each individual sport, each occupation held) detailed questions were asked regarding *frequency, duration and intensity*. Activities were further deconstructed by time spent in major body movement type (e.g., walk, run, squat).
Outcome: Hip osteoarthritis (OA) – self reported as diagnosed by a health professional
Exposures:

- *Hip joint force* was estimated as the product of lifetime bodyweight, typical hip force for specific activities and time spent in specific activities, and reported in kg-hours/week. The lifetime bodyweight trajectory was derived using current weight, weight at age 20, maximum weight, and interpolated using a lowess (non parametric smooth) curve. Mean values for 5-year intervals over a person's lifetime, averaged over all subjects, were calculated. Force was then considered in two ways:
  – *Average force over the lifetime.* Lifetime mean hip force was calculated by averaging all 5 year periods for a subject from the age of 20 to their current age. This variable was then categorized into quintiles based on the overall distribution in the population; and
  – *5-year period with maximum force*: The 5-year period of a person's life with the maximum hip force was also categorized into quintiles.

Other variables: Age, gender, Body Mass Index (BMI), previous hip joint injury, hip OA risk factors
Analysis: Bivariate analysis was carried out using modified Kaplan-Meier survival times for time to hip OA diagnosis by gender, previous hip injury and mean lifetime hip force. A multivariable survival analysis was performed to obtain adjusted effects. The hazard rate ratio was the measure of association.
Results: Complete baseline data was collected on 4,269 subjects. At baseline, the sample was 63% female with a mean age of 61.5 years and BMI of 27.5. The final dataset at the last follow up included 1163 men and 1755 women (68.4% of baseline). Of these, 176 (6.03%) of the participants developed OA during the follow up period (43 men and 133 women). Overall, women had slightly higher mean hip force over the lifetime than men. In the final adjusted model, previous hip injury and female sex were associated with incident hip OA. Regarding hip force, only the highest quintile of mean lifetime hip force was a risk factor for development of hip OA (Hazard ratio 2.33; 95% CI 1.34, 4.02). The 5-year period with maximum hip force was not significantly associated with hip OA.
Conclusions: Only the highest quintile of mean lifetime hip force was significantly associated with the development of hip OA. Maximum force from any 5-year period in a person's lifetime was not significantly associated with OA, suggesting that high sustained force over the lifetime may be more informative than shorter periods with high force.

341 ASSOCIATION OF RADIOGRAPHIC SEVERITY OF KNEE OSTEOARTHRITIS WITH SYMPTOMATIC PARAMETERS: THE ROAD STUDY

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Purpose: Although knee osteoarthritis (OA) is a major public health issue causing pain and functional disabilities in the elderly, the relationship between the radiographic severity and the symptoms is controversial. Using the baseline database of a large-scale nationwide cohort study ROAD (research on osteoarthritis against disability), this study investigated the association of the radiographic severity of knee OA with several symptomatic parameters.
Methods: From the 3,040 participants in three cohorts of the ROAD study, this study analyzed the baseline data of 1,448 subjects in the mountainous and seacoast cohorts who are 50 years or older and had not undergone lower extremity surgery (523 men & 925 women, average 68.0 yrs.). The radiographic severity of knee OA was determined by the Kellgren/Lawrence (KL) grade (0−4), and the higher grade in bilateral knees was designated as that of the individual. As symptomatic parameters, we used the WOMAC scores and two physical performance tests. The presence of knee pain, stiffness, or dysfunction was designated as the respective WOMAC subscale score$\geqslant$1. Physical performance was assessed by the test of time to walk the 6-m test (TW) and that to rise from a chair 5 times (RC), and the participants were divided into short and long subgroups based on the median value. Logistic-regression analyses were used to estimate odds ratio and the associated 95% confidence interval (CI) of KL = 2, 3, and 4 for the presence of knee pain, stiffness, and dysfunction, as well as for long TW and long RC, as compared with KL = 0 or 1 after adjustment for age, gender, and body mass index. Furthermore, association between the physical performance parameters and the WOMAC parameters were also examined by logistic-regression analyses after adjustment for the background data above.
Results: Prevalence of radiographic knee OA with KL = 2, 3, and 4 was 32.8, 15.3 and 7.3%, respectively; and that of presence of knee pain, stiffness, and dysfunction (respective WOMAC subscale score$\geqslant$1) was 30.0, 25.1, and 34.2%, respectively. KL=2 OA was significantly associated with none of the parameters as compared to KL = 0 or 1. KL = 3 OA was moderately associated with knee pain (OR = 2.08; 95% CI = 1.44−2.99) and dysfunction (1.54; 1.07−2.21); and KL = 4 OA was strongly associated with all WOMAC parameters (pain = 6.89; 4.12−11.80, stiffness = 2.85; 1.77−4.58, dysfunction = 6.08; 3.51−10.95). For physical performance parameters, all KL = 2, 3 and 4 OA were significantly associated with long TW (OR = 1.58, 1.56 and 2.82, 95% CI = 1.18−2.11, 1.07−2.27 and 1.67−4.85, respectively), while only KL = 4 was associated with long RC (OR = 1.79, 95% CI = 1.09−2.97). Both long TW and long RC were significantly associated with all WOMAC parameters: knee pain (TW: