Running and the Development of Osteoarthritis, Part II: Human Studies

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The most complete longitudinal study of running and osteoarthritis (OA) was a prospective 9-year longitudinal study performed by the Stanford Arthritis Center. An article describing the progress of the study was published after 2 years, and at the completion of the 9-year study. The three reports examined varying numbers of the same group of participants, and the researchers examined various aspects at different time points during the study. The results are broken down into the three time periods of the reports. The study was started in January 1984 to determine the effect of running on the development of OA in aging runners. Thirty-four members of a running club, age 52–74, and 34 community controls were matched for age, sex, occupation, and years of schooling, and all underwent rheumatologic examinations. Radiographs of the hands, lateral lumbar spine, and knees were assessed in pairs in 1984 and 1986, with examiners blinded to running status. All joints were evaluated and scored for spur formation, sclerosis, and joint-space narrowing. Computer scans of the first lumbar vertebrae were also tested for bone-mineral density (BMD). Radiographs of 11 hand joints were used as non-weight-bearing control joints.

Over the first 2-year period, there was a statistically significant decrease in bone density for nearly all participants, but the runners maintained greater bone density at the 2-year measurement. According to the Stanford Health Assessment Questionnaire, the runners had lower disability scores than the controls did. In 1986, on a scale from zero to 100, the runners averaged 88, and the community controls averaged 82. In 1984, the female runners showed significantly more spur formation in knee X rays, with a score of 4.0 in runners and 2.1 in controls. In 1986, the runners' scores remained higher, at 4.7, and the controls had a mean score of 2.3. Although the female runners had more spur formation in knee roentgenograms than the controls, this initial report found little difference between the prevalence of OA in the runners and the controls. The runners had greater spinal bone density, and the study showed that those who stopped running or decreased their running time over the 2 years had a loss of bone mineral in the spine.

The Stanford Arthritis Center also reported results after 5 years. Thirty-five running participants and 38 community controls, with a mean age of 63 years for both groups, were...
matched for age, years of education, and occupation. The participants underwent rheumatologic examination, completed questionnaires, and had radiographs taken of the hands, lateral lumbar spine, and knees in 1984 and 1989. Fifteen percent of the community controls were runners, although the magnitude of their running was not nearly as high as that of the running group. Both groups spent a similar number of minutes per week in other sports-related activities. In 1984 and 1989, the average weight of the running-association members was lower than that of the controls, and the runners had lower disability scores. From a self-reported health questionnaire, scored from zero to 100, the runners scored an average of 91, and the controls, an average of 84 in 1984 (p < .01); the runners scored an average of 85, and the controls, 76 in 1989. Joints were evaluated as 0, 1, 2, or 3 for spur (osteophyte) formation, sclerosis, and joint-space narrowing, with an increasing score meaning increasing severity. The spur score for the paired knee radiographs increased 15% in the runners and 44% in the controls (p < .01) over the 5-year period. For the spur score in the lumbar spine, the runners increased 16% and the controls increased 17% (p < .001). Nine of the 73 participants developed OA of the knee over the 5-year period, according to the American College of Rheumatology criteria. Five of the participants were controls, and 4 were runners. The results of this study indicated that runners did not have an accelerated development of radiographic or clinical OA compared with matched controls in weight-bearing knee joints, lumbar spine, or hand joints.

The 9-year longitudinal study by Lane et al. performed at the Stanford Arthritis Center examined the associations between running and radiographic hip OA, the progression of radiographic knee OA, and changes in BMD. The study examined 28 members of a running club, age 50–72, and 27 nonrunner controls, with a mean age of 66 for both groups. The participants were matched for age, years of education, and occupation, and they all underwent rheumatologic examination, completed annual questionnaires, and had radiographs taken of their knees in 1984, 1986, 1989, and 1993 and of their hips in 1993. Initial data showed that the runners had greater lumbar-spine BMD and lower body weight and body-mass index than the controls did. Results showed that both runners and controls had statistically significant increases in radiographic scores over the course of the study for OA, without significant differences between the two groups. BMD of the first lumbar vertebrae was obtained in 36 participants by quantitative computed tomography, and in 1984, the BMD of the lumbar spine was 20% higher in the runners than in the nonrunners. The lumbar-spine BMD remained higher in runners than in controls after 9 years, although decreases were apparent in both groups. Over the 9-year period, radiographic progression in the knee showed that osteophytes increased 178% (p = .002) in the runners and 142% (p = .05) in the nonrunners. Total knee scores were evaluated by averaging the radiographic progression of joint-space narrowing, osteophytes, and subchondral sclerosis. The total knee-score progression was 64% (p = .02) for runners and 66% (p = .02) for nonrunners. Radiographic progression of joint-space narrowing was 22% (p = .06) in runners and 32% (p = .01) in nonrunners. Progression of knee osteophytes and joint-space narrowing was present in both groups, and hip radiographic scores in 1993 were similar for both groups. The results of this study indicated that runners averaging 66 years of age showed no accelerated development of radiographic OA of the knee or hip when compared with nonrunner controls.

Lane et al. tested the theory that joints “wear out” from repetitive impulse loading by examining 41 long-distance runners, age 50–72, in comparison with 41 community controls. The groups were matched for age, sex, occupation, and years of schooling. Radiographs of the hands, lateral lumbar spine, and knees were assessed, with examiners blinded to running status. Computed tomographic scans of the first lumbar vertebrae were also performed to measure bone-mineral content. Disability, as measured by the Stanford Health Assessment Questionnaire, was lower in the runner group. The hand-joint X rays, which were included as non-weight-bearing data, showed no significant differences between the two groups. There was increased width of joint space in both male and female runners, but the increase was not statistically significant. The female runners seemed to have more sclerosis and spur formation on the X rays of the spine and knees (p < .001) than did the matched controls. No differences were seen