

Collagen-deficient mice show signs of osteoarthritis

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Osteoarthritis (OA) and degenerative disc disease (DDD) are common, chronic musculoskeletal disorders. Both diseases cause joint pain, loss of function, and decreased quality of life for the more than 27 million OA and 59 million DDD sufferers in the US. According to a 2003 Medical Expenditure Panel Survey, arthritis such as OA costs the U.S. economy nearly \$128 billion per year in medical care and indirect expenses including lost wages and productivity.

Researchers at Duke University Medical Center, under a grant from the National Institutes of Health (NIH), conducted a study of mice to determine the effect of Type IX [collagen](#) (Col9a1) deficiency on functional ability. The authors found that mice with the Col9a1 gene inactivated prematurely develop OA and DDD. Findings of this study appear in the September issue of *Arthritis & Rheumatism*, a journal of the American College of Rheumatology, published by Wiley-Blackwell.

Duke University researchers led by Kyle Allen, Ph.D. compared the behavioral abilities of Col9a1 deficient mice to wild-type (WT) mice. Mice of advanced age (9-11 months) were selected because they represent an age at which there is histological evidence of OA and DDD. Functional tests of reflexes, posture, strength, coordination, balance, sensorimotor skills, and gait were conducted to measure physical capabilities that could be impaired due to OA or DDD. Symptomatic pain was assessed through mechanical and thermal withdrawal thresholds.

"We observed a pattern of behavioral changes in the collagen deficient mice that suggests a relationship to OA- and DDD-like degeneration," stated Dr. Allen. The data shows that mice deficient in Type IX collagen clearly displayed behavioral characteristics of pain and functional loss. These mice had delayed righting reflex (ability to regain footing from a back position), decreased sensorimotor skills, and altered gait compared with WT mice. Collagen deficient mice also had elevated levels of knee and intervertebral disc structural changes.

According to the study, collagen deficient mice chose movements that limited peak joint forces and behaviors that reduced pain sensations. "In future work, these measures may help track signs and symptoms as degeneration progresses," added Dr. Allen. "Further studies of the mouse model could provide useful data for evaluating the efficacy of therapeutic interventions for musculoskeletal disorders."

More information: "Decreased Physical Function and Increased Pain Sensitivity in Mice Deficient for Type IX Collagen," Kyle D. Allen, Timothy M. Griffin, Ramona M. Rodriguez, William C. Wetsel, Virginia B. Kraus, Janet L. Huebner, Lawrence M. Boyd, Lori A. Setton. *Arthritis & Rheumatism*; Published Online: August 27, 2009 ([DOI 10.1002/art.24783](https://doi.org/10.1002/art.24783)); Print Issue: September 2009.

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