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MU Researchers Beginning to Identify Genetic Culprits of Arthritis

COLUMBIA, Mo. - Arthritis affects one in three Americans and is the leading cause of disability in people over the age of 15, according to the Arthritis Foundation. While doctors have been able to treat the disease and offer tips to avoid it, University of Missouri-Columbia researchers have identified telltale, genetic signs that indicate the early onset of arthritis. Researchers hope to identify arthritis as early as possible in an effort to reverse its progression.

"There's no current cure for arthritis, but that's because we can't diagnose the disease while it is in a stage that is reversible," said James Cook, a professor of veterinary medicine and surgery and the William C. Allen Endowed Scholar for Orthopaedic Research. "While some researchers are looking at various biomarkers in blood and other bodily fluids, we've identified 16 genes in the cartilage that may be involved with the onset of the disease."

Arthritis may occur due to injury, overloading of the joint, or genetic and environmental causes. In his current study, Cook is examining dogs that have the disease. While it might take years for humans to develop arthritis, dogs develop the signs and symptoms of the disease at a much faster rate. In his study, Cook uses specific MRI, arthroscopy and biochemical techniques to identity problems associated with arthritis, such as bone and cartilage damage. Then he identifies the genetic changes that correlate with the damage.

"The specific injury that we are studying leads to articular cartilage degradation, or damage to the cartilage in the knee," Cook said. "This degradation is the hallmark of osteoarthritis, and while we can accurately assess clinical changes associated with the degradation of arthritis, we cannot clinically assess the initiating events that occur in the potentially reversible stages of disease. Through our research, we have found specific genes that are expressed in the areas where degradation will subsequently occur, which may allow us to accurately predict the extent and severity of how the arthritis will develop."

Cook is collaborating with Aaron Stoker, the Robert B. Gordon Arthritis Research Fellow in the MU Comparative Orthopaedic Laboratory (COL) and expert in cartilage gene expression. Using the expertise in the COL and collaborations with researchers from Virtual Scopics, LLC in Rochester, N.Y., Stoker and Cook are determining the extent of abnormal gene expression in the knees of dogs and correlating it to MRI results, a clinically relevant assessment of arthritis.

The implications of determining if a person will have arthritis are enormous. Lifestyle changes could be started before the disease even appears, preventing the mechanical grinding of bone from starting. Physicians could preemptively prescribe pharmaceuticals known to slow cartilage degeneration, and researchers could develop new pharmaceuticals to interrupt the disease process.

Cook and Stoker have presented their research at the Orthopaedic Research Society meeting, the Osteoarthritis Research Society International meeting and the Veterinary Orthopaedic Society meeting, and the data have been published in those proceedings. An initial manuscript is also accepted for publication in the Journal of Orthopaedic Research and Surgery. The research is being funded by The Bob and Judi Reeves Endowment for Arthritis Diagnostics, The Gordon Family Arthritis Research Endowment and a $300,000 grant from Pfizer.
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