COLUMBIA MISSOURIAN

MU builds ties between veterinary and human researchers

By Tim Lloyd
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James "Jimi" Cook, left, of the MU College of Veterinary Medicine and Sonny Bal, orthopedic surgeon at the MU School of Medicine, have been collaborating for more than seven years on research to create biological joints for hip and knee replacements — as opposed to the standard metal and plastic parts. The process is currently being used in dogs, but, Bal said, it is likely to take "about five years" before it can be perfected enough for human use. ¦ Ivy Ashe

COLUMBIA — Jimi Cook's grandfather was one of the first patients in the U.S. to have artificial knee replacement surgery.

"From the time I was 8 years old, I have always wanted to find a better way to treat arthritis after watching him go through six knee replacements," Cook said. He is an associate professor of small animal surgery and director of the Comparative Orthopaedic Laboratory at the MU School of Veterinary Medicine.

Nearly three decades after his grandfather's surgeries, Cook is developing new technology that might make repeat surgeries things of the past. But his discovery didn't only come from studying the human

skeletal system.

“Dogs are the closest replicas of humans for us when it comes to studying clinical problems in knees and hips,” he said.

Cook's new technique involves growing cartilage in a lab that can be molded into permanent joint replacements. It’s just one in a growing number of human medical advancements made by researchers studying their canine companions.

Growing knees, hips and shoulders

In the sterile petri dishes of a walk-in-closet sized lab, cells divide and multiply into living cartilage that Cook plans to mold into new knees and hips for dogs.

“The goal is to make replacement parts,” said Sonny Bal, an associate professor of orthopedic surgery at the MU School of Medicine. Bal is working with Cook on the human application of his technique.

The collaboration between Cook and Bal is welcome news to Bob Reeves, a retired Columbia resident who in the last four years has had both of his knees replaced with metal transplants. The surgeries are the most recent in a series of medical procedures that are likely the result of injuries he suffered in a construction accident almost 50 years ago, Reeves said.

“I was working to pay my way through college when a scaffold broke and I fell 35 feet,” Reeves said. “I’m sort of like 'The Six Million Dollar Man,' but my wife says I’m more like $49.95.”

Reeves said that even though he has worked hard to regain strength and motion in his body, the metal replacement parts have limited the improvements.

“My body has healed around the metal parts, but metal won’t improve with the rest of my body,” Reeves said.

Cook’s technique replaces damaged joints with living tissue, meaning patients like Reeves could get a new set of knees that would heal with the rest of their bodies.

“That would be extremely helpful for people who need transplants,” said Robert Kimble, a 78-year-old who has had three knee transplants in the last eight years. “That would be a heck of an improvement.”

The technique being developed by Cook mimics the natural process of cartilage and bone formation during growth and development of the joints. Molds of joints are then made and filled with lab-grown cartilage, forming exact replicas of joints in need of replacement.

Because conditions like arthritis progress month to years faster in dogs, Cook is able to more rapidly test the effectiveness of his technique.

“In dogs with arthritis, everything happens much faster,” Cook said. “This allows us to see the results of our research sooner than if we were working on humans.”

The Food and Drug Administration recognizes physical similarities between dogs and humans, and if a new treatment is proved effective for dogs, it can more quickly be tested in humans.

“We’ve been working on this for seven years,” Cook said. “It would have taken 15 to 20 years if we were working on humans.”

This summer, Cook will begin testing his technology on dogs in need of new hip joints. If effective, the tests will continue into long-term studies. Human testing is the final phase.

New horizons

Cook and Bal are widening the scope of previous collaborations to include engineers from the Missouri University of Science and Technology and researchers at Columbia University in New York City.

The multidisciplinary approach puts MU in line with a worldwide effort to strengthen ties between veterinary medical and human medical research, said Bruce Kaplan, a Florida veterinarian and co-founder of the Web site Onehealthinitiative.com.

The site promotes the One Health movement, which advocates collaboration between veterinary and human research. The concept has received endorsements from the American Medical Association and the American Veterinary Medical Association.

“The campuses that have veterinarians and physicians working together are where a good deal of biomedical research is done,” Kaplan said. “Dr. Cook has become a giant in the field.”

Recently discovered neurological similarities between dogs and humans could lead to treatments for degenerative brain diseases.

Veterinary neurologist Joan Coates is part of a research team that found a genetic link between hereditary degenerative myelopathy (DM) in dogs and amyotrophic lateral sclerosis (ALS), commonly referred to as Lou Gehrig’s Disease.

“There is a potential that this discovery may assist with finding new treatments that will slow the progress of some forms of hereditary ALS,” Coates said.

She is quick to point out that years of study are needed before a treatment for humans can be developed.

“We still have a lot of work to develop markers of disease in dogs in order to evaluate disease progression and response to potential treatments,” Coates said.

Working with dogs could shorten the time frame.

“ALS takes two to five years to progress in humans; it takes six months to a year in dogs,” Coates said. “We may be able to test and see more results more quickly when evaluating potential therapies in dogs.”

Kaplan said Cook and Coates' advances could just be the beginning of new advances in the field of veterinary and human medicine.

“If you combine the brains and minds of different medicines, you will come up with things that would have not come about otherwise,” Kaplan said. “It could be miraculous.”