ORTHOPEDIST MARTHA MURRAY | MEETING THE MINDS

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Researcher seeks better fix for knees

By Keith O'Brien, Globe Correspondent | January 2, 2006

Dr. Martha Murray admits that she's never been much of an athlete -- unless you count chasing her toddlers around their Sherborn home. But in her lab at Children's Hospital Boston, Murray spends a lot of time thinking about athletes, specifically those with torn ACLs, and how she might improve their lives.

The ACL -- or anterior cruciate ligament -- is the mother of all ligaments in the knee, connecting the back and outside of the femur with the front and inside of the tibia. It stabilizes the knee, preventing hyperextension. And when it gets torn -- as it does roughly 200,000 times a year in the United States -- it means months of rehabilitation and sometimes years of problems.

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That's where Murray comes in. Years ago she set out to discover why surgeons have such difficulty repairing torn ACLs, or, at least, why those repairs come with long-term complications such as arthritis. Now, Murray says, she may be getting close to developing a technique that would not only make the surgery far less complicated but also far more successful.

And that pleases a woman who set out years ago to be an engineering professor, not a doctor. Murray just wanted to fix stuff.

"I loved the idea of teaching and the whole idea of research," she said. "Spending your life finding new fixes for problems -- what could be cooler than that? I just didn't realize there were still so many problems in medicine that needed to be fixed."

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The ACL, as it turned out, was one such problem. Attempts to sew it back together in the 1970s failed. "You end up with a gap every time," Murray said. "You can't sew it back together." And so, surgeons began reconstructing the ligament using tendons from elsewhere in the body. This, for the most part, is still what doctors do today. But Murray said it doesn't restore complete function to the knee. The question for her and others was: Why doesn't the ACL heal itself, like, say, a cut on your hand or even a torn medial collateral ligament on the outside of the knee?

The problem, said Murray, is location. The joints are filled with synovial fluid, a lubricant that helps people move. "It's great stuff," said Murray. But the fluid also keeps blood clots from growing, an important step in the healing process. Murray needed to create something -- "scaffolding," she said -- onto which new cells could grow. After much trial and error, she and colleagues concocted a mixture of collagen and platelet-rich plasma, hoping this was the scaffolding they needed. "We tried it," Murray said, "and it was unbelievable."

For the first time, Murray said, doctors saw the ACL fusing back together as the collagen and plasma mixed together to form a glue, which helps hold the edges of the torn tissues together so they can heal. About five years later, tests still continue, this time in the knees of pigs. It has been successful; Murray says the ACLs in her studies heal at a rate similar to that of other ligaments. But it's also still preliminary. Murray pointed out that it could be 18 months or longer before they could try the technique in human clinical trials.

Years removed from her engineering classes, Murray still wants to fix things. But she said she doesn't want to take any chances with her patients, who are, for the most part, young, talented athletes hobbled and devastated by their ACL injuries. She hopes to be able to fix them completely one day. Until then, she works and waits, treating her patients while she monitors the results of the tests that could change their lives.

"Every time it works," she said, "we're that much closer to getting it to the patients."

FACT SHEET

Home: Born, raised, and still living in Sherborn.

Family: Her husband, Dr. Mike Murray, is the clinical chief of genetics at Brigham and Women's Hospital. They have two children, ages 2 and 3.

Education: Earned a bachelor's degree in mechanical engineering from the University of Delaware in 1987, a master's degree in material science and engineering from Stanford University in 1990, and a medical degree from the University of Pennsylvania in 1994.

To hear her: Murray and other sports medicine experts

will speak this Saturday from 8 a.m. to noon at the Chapel Hill-Chauncy Hall School in Waltham. The free seminar, titled "ACL Prevention in the High School Athlete," will give coaches, trainers, physical education teachers, and others a chance to learn more about how to prevent knee injuries. Preregistration is required. Call 617-355-7497 or sign up online at www.childrenshospital.org/ortho.

Her science: A torn anterior cruciate ligament, or ACL, doesn't heal like its neighbor the medial collateral ligament, or MCL. To change that, Murray has created a gel that she hopes will allow the flaps of the torn ACL to grow back together when inserted into the knee joint. ■

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