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Overcoming knee pain through cartilage repair

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Many people have knee pain during some phase of their life. For children, it usually occurs during growth as the body is getting used to its new size. For teenagers and young adults, knee pain usually occurs as part of a trauma, sports injury or overuse. For older adults, knee pain is usually part of osteoarthritis, which is damage to tissues that are not resistant or resilient to the wear and tear of modern life.

“The knees are often outside the body’s center of gravity,” said Dr. Daniel B.F. Saris, an orthopedic surgeon and sports medicine specialist at Mayo Clinic Sports Medicine in Minneapolis and Rochester. “When people walk up or down stairs, the knee is hit with five to seven times the body’s weight. That’s why many people have pain in their knees, and why it’s an important joint.”

Articular cartilage serves as the knee’s shock absorber and provides a smooth, gliding surface. “The role of cartilage in the body’s joints, and especially in the knee, is to make sure the joint glides smoothly,” said Saris.

In addition to the femur in the thigh and the fibula and tibia in the lower leg, the anatomy of the knee includes:

patella, known as the kneecap.

articular cartilage.

meniscus.

ligaments – anterior cruciate (ACL), posterior cruciate (PCL), lateral collateral (LCL), medial collateral (MCL)

“The knee is the most frequently damaged joint because there are so many tissues that need to be working at peak function,” said Saris.

Articular cartilage does not contain nerves or blood cells and cannot repair itself when it’s damaged. As a result, once articular cartilage becomes damaged, it can rapidly deteriorate to osteoarthritis.

Young athletes who tear their ACL or meniscus are most at risk for articular cartilage injuries. “Without a secure ligament to keep it stable, the knee will be more apt to dislocate. With a torn meniscus, the knee makes a lot of unnecessary motions. In both situations, cartilage will get damaged or be worn down quicker,” said Saris.

Repairing the knees’ damaged cells

There are multiple techniques to repair cartilage damage caused by trauma, injury or disease. Studies have shown these three techniques can help the majority of athletes return to their pre-injury playing level.

Microfracture surgery – Used when there is a small defect in the knee, multiple small holes are drilled into the bone under the cartilage. This causes a small blood clot to form, and the body takes over with its natural healing process to repair the wound. This is a safe, simple procedure that temporarily fixes the hole and will last for several years.

Allograft transplant – Tissue from a recently deceased person, whose cartilage was otherwise healthy, is transplanted into the patient’s knee. This therapy has obvious limitations due to a limited supply of cartilage cells that can only be stored for a few weeks. It’s also technically difficult to match the donor with the patient.

Matrix-associated chondrocyte implantation (MACI) – Used for larger cartilage defects, this is the therapy of choice in the U.S. and involves two surgeries. In the first surgery, cartilage cells from the patient’s knee are removed and sent to a lab where the



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cells are cultivated. This results in the production of millions of healthy cells. In a second surgery, these cells are implanted into the defect in the patient's knee. While a successful transplant can last 15-20 years, without treatment, the patient can develop osteoarthritis within five to 10 years.

Following surgery, the patient will no longer feel pain from their cartilage defect, but they will have pain and swelling from the surgery. Recovery includes the use of crutches for six to eight weeks, followed by nine to 12 months of rehab.

New therapies on the horizon

New discoveries in research are leading to the development of a number of promising therapies that may be available in the near future. These include potential treatments involving the body's own cartilage cells, stem cells or blood components that may be faster and more cost effective than current therapies.

"Our understanding of the biology of cells is much better now, and we're able to develop individualized medicine and personalized cartilage care," said Saris. "It's no longer a one-size-fits-all solution. We can zoom in on what the patient needs and cater to that much better."

"For the younger patient with a damaged joint that isn't yet worn down, there are innovative and successful solutions that can make a difference," Saris notes.

Mayo Clinic Sports Medicine in Minneapolis and Rochester offer a premier continuum of care that ranges from prevention and treatment to rehabilitation and performance enhancement whether you are a top athlete or an active individual. Learn more at <https://sportsmedicine.mayoclinic.org/>.

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