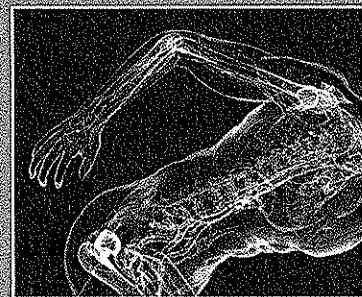


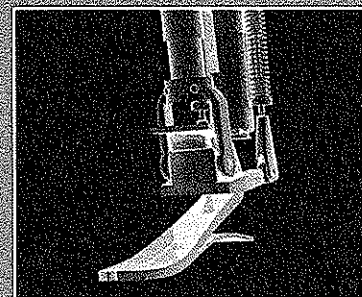
SPORTS MEDICINE'S NEW FRONTIERS

Surgeries that were once repairs are now reconstructions, enabling athletes to return to the field sooner and even better. Novel prostheses are allowing maimed soldiers to compete at the elite level of sports. Researchers of motor skills and pain tolerance, who once relied on crude measures, now study brain imagery to analyze neural activity. Many long-held axioms of sports physiology have been exposed as myths. And yet, as always with serious scientific inquiry, the journey so far has shown us how much farther there is to go—and how much more there is to learn

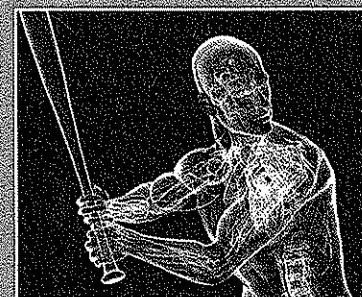
BY DAVID EPSTEIN
ILLUSTRATIONS BY BRYAN CHRISTIE



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REBUILT AT THE BODY SHOP

Thanks to enhanced surgical techniques, more and more athletes are being sent back into action after suffering injuries that were once considered career-ending

BY DAVID EPSTEIN

1 PLATELET-RICH PLASMA THERAPY

This procedure, in which a patient's blood is extracted and spun in a centrifuge to separate the concentrated platelets, which are then injected at the site of an injury, has been used since the 1970s, but new portable technology has made it easily available outside hospitals. "Nobody knows just what injuries respond to platelets," says David Altchek, orthopedic surgeon at the Hospital for Special Surgery in New York City and medical director for the Mets. "There's a very good case for tennis elbow, and we know if you cut yourself with a razor, platelets work [by clotting]. But there are no side effects. It's as safe as medical treatments come."

4 TOMMY JOHN SURGERY

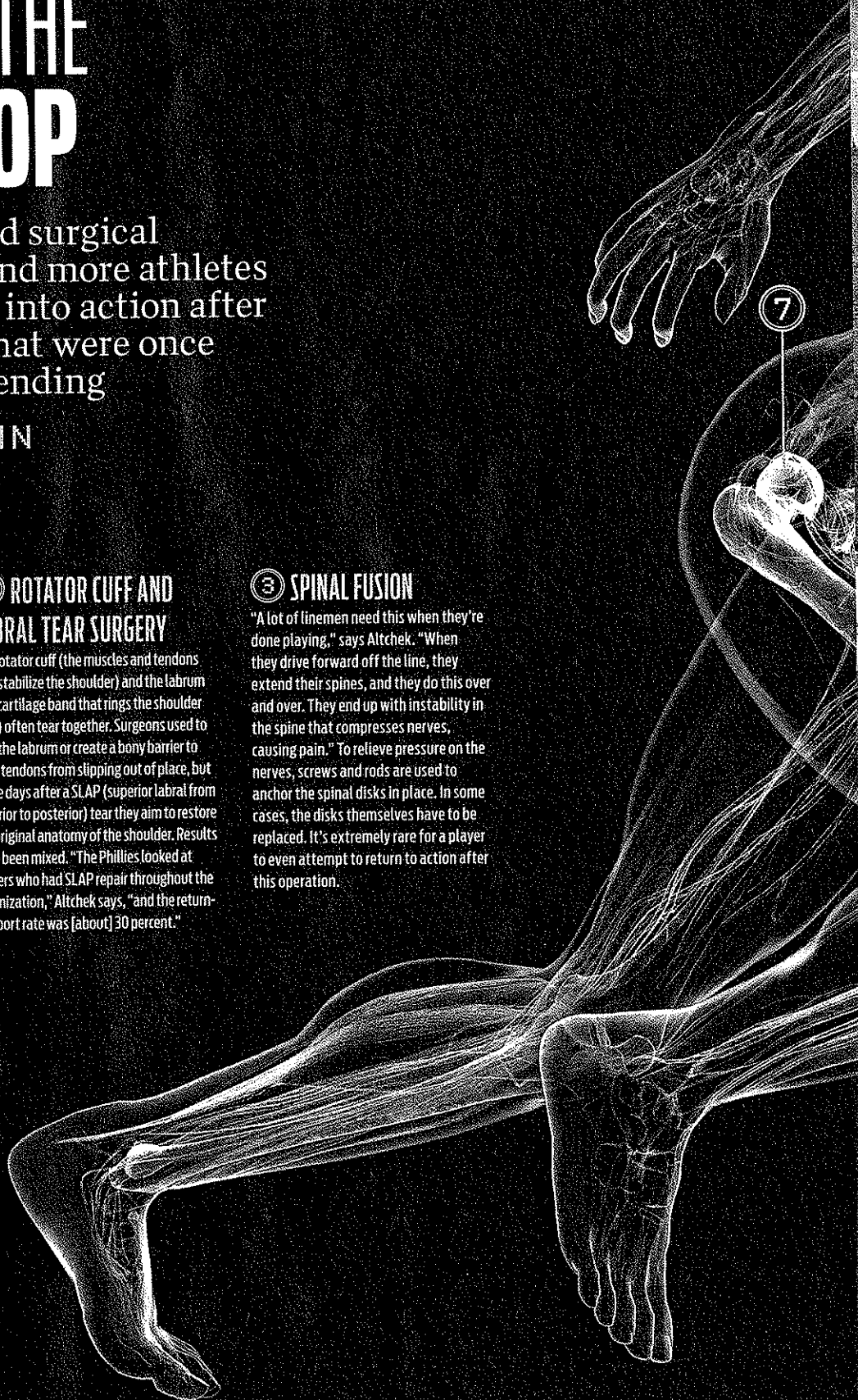
In this procedure, first performed in 1974, a tendon taken from elsewhere in the body (most often the forearm but also the ankle or hamstring) is threaded through holes drilled in the arm bones to replace the ulnar collateral ligament. Twenty years ago just over half of Tommy John patients returned at least to the same level of performance, but now the rate is near 90%. "They used to move the ulnar nerve and make more holes in the humerus," Altchek says. "Now they don't move the nerve, and they make fewer and smaller holes to reduce the surgical injury."

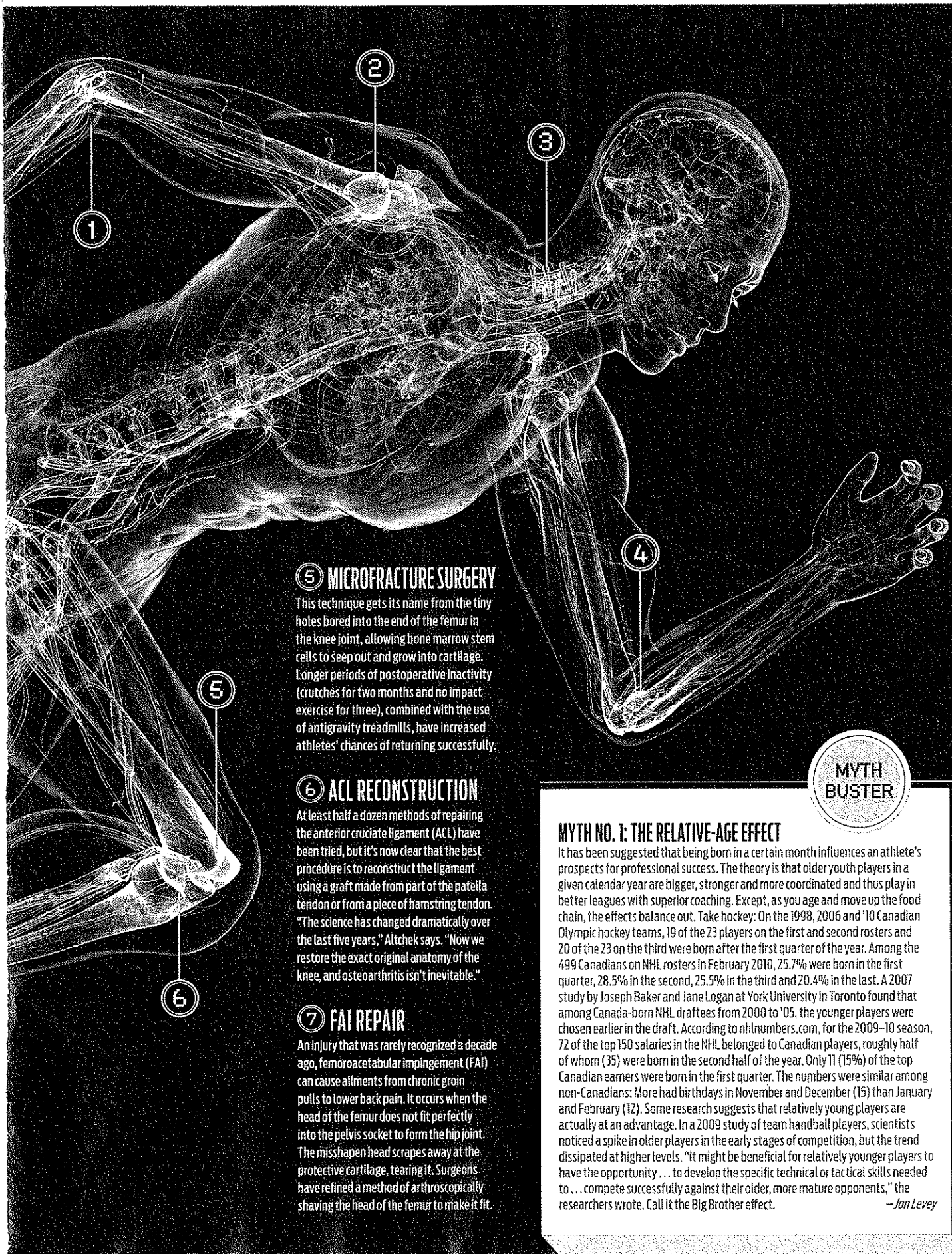
2 ROTATOR CUFF AND LABRAL TEAR SURGERY

The rotator cuff (the muscles and tendons that stabilize the shoulder) and the labrum (the cartilage band that rings the shoulder joint) often tear together. Surgeons used to trim the labrum or create a bony barrier to keep tendons from slipping out of place, but these days after a SLAP (superior labral from anterior to posterior) tear they aim to restore the original anatomy of the shoulder. Results have been mixed. "The Phillies looked at players who had SLAP repair throughout the organization," Altchek says, "and the return-to-sport rate was [about] 30 percent."

3 SPINAL FUSION

"A lot of linemen need this when they're done playing," says Altchek. "When they drive forward off the line, they extend their spines, and they do this over and over. They end up with instability in the spine that compresses nerves, causing pain." To relieve pressure on the nerves, screws and rods are used to anchor the spinal disks in place. In some cases, the disks themselves have to be replaced. It's extremely rare for a player to even attempt to return to action after this operation.





5 MICROFRACTURE SURGERY

This technique gets its name from the tiny holes bored into the end of the femur in the knee joint, allowing bone marrow stem cells to seep out and grow into cartilage. Longer periods of postoperative inactivity (crutches for two months and no impact exercise for three), combined with the use of antigravity treadmills, have increased athletes' chances of returning successfully.

6 ACL RECONSTRUCTION

At least half a dozen methods of repairing the anterior cruciate ligament (ACL) have been tried, but it's now clear that the best procedure is to reconstruct the ligament using a graft made from part of the patella tendon or from a piece of hamstring tendon. "The science has changed dramatically over the last five years," Altchek says. "Now we restore the exact original anatomy of the knee, and osteoarthritis isn't inevitable."

7 FAI REPAIR

An injury that was rarely recognized a decade ago, femoroacetabular impingement (FAI) can cause ailments from chronic groin pulls to lower back pain. It occurs when the head of the femur does not fit perfectly into the pelvis socket to form the hip joint. The misshapen head scrapes away at the protective cartilage, tearing it. Surgeons have refined a method of arthroscopically shaving the head of the femur to make it fit.

MYTH BUSTER

MYTH NO. 1: THE RELATIVE-AGE EFFECT

It has been suggested that being born in a certain month influences an athlete's prospects for professional success. The theory is that older youth players in a given calendar year are bigger, stronger and more coordinated and thus play in better leagues with superior coaching. Except, as you age and move up the food chain, the effects balance out. Take hockey: On the 1998, 2006 and '10 Canadian Olympic hockey teams, 19 of the 23 players on the first and second rosters and 20 of the 23 on the third were born after the first quarter of the year. Among the 499 Canadians on NHL rosters in February 2010, 25.7% were born in the first quarter, 28.5% in the second, 25.5% in the third and 20.4% in the last. A 2007 study by Joseph Baker and Jane Logan at York University in Toronto found that among Canada-born NHL draftees from 2000 to '05, the younger players were chosen earlier in the draft. According to nhlnumbers.com, for the 2009-10 season, 72 of the top 150 salaries in the NHL belonged to Canadian players, roughly half of whom (35) were born in the second half of the year. Only 11 (15%) of the top Canadian earners were born in the first quarter. The numbers were similar among non-Canadians: More had birthdays in November and December (15) than January and February (12). Some research suggests that relatively young players are actually at an advantage. In a 2009 study of team handball players, scientists noticed a spike in older players in the early stages of competition, but the trend dissipated at higher levels. "It might be beneficial for relatively younger players to have the opportunity . . . to develop the specific technical or tactical skills needed to . . . compete successfully against their older, more mature opponents," the researchers wrote. Call it the Big Brother effect.

—Jan Levey