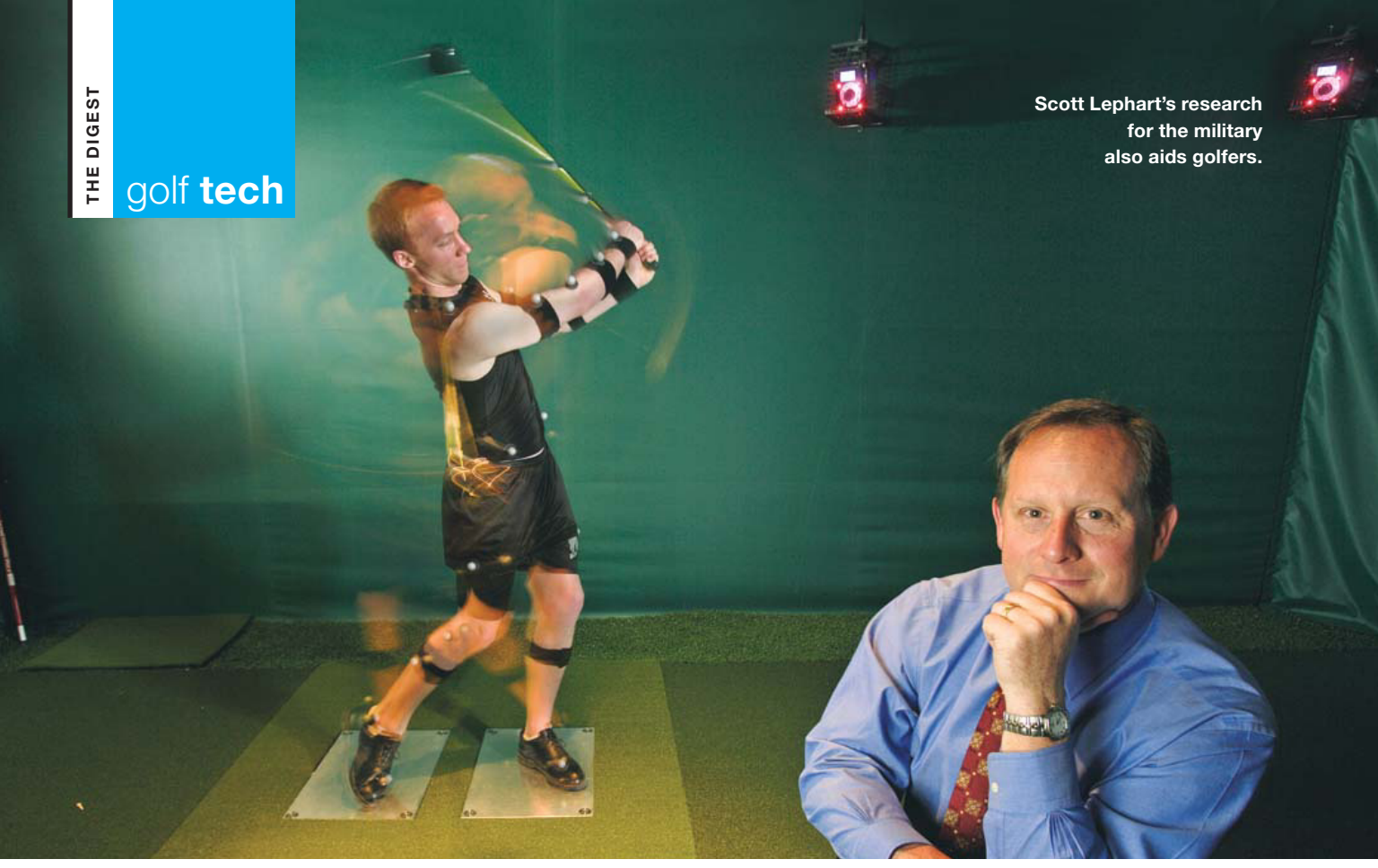


Scott Lephart's research for the military also aids golfers.

# Golf's muscle man

A research pioneer takes on the golf swing / by Max Adler

This article is part of a series on technology in golf covering people and innovations that are changing the game.

Dr. Scott Lephart isn't the type to chitchat about his 6-handicap, especially during the middle of a workday. He's a lifelong academic, and his distaste for idleness gives off a certain gruff, militaristic vibe. Which makes sense, because if you ask Lephart what he does for a living, he'll tell you that as director of the Neuromuscular Research Lab at the University of Pittsburgh Medical Center (UPMC) Center for Sports Medicine, he spends most of his time operating two human-performance and injury-prevention laboratories for the U.S. Army and U.S. Naval Special Operations. If after digesting those titles you have the nerve to ask for details, the doctor will reply, simply, "That's classified."

What isn't classified is that the U.S. Department of Defense recently put Lephart in charge of $4.8 million in funding to develop injury-prevention training programs specific to the motions of combat. When Special Operators are injured, the cost of their lost time, rehabilitation and compensation gets expensive. The UPMC lab equipment can quantify the velocities and motion patterns of any movement, so in addition to the military work, Lephart and his associates have created injury-prevention and training programs for several sports, including baseball, football, basketball and swimming.

"In every activity, links exist between physical weaknesses and mechanical flaws," says Lephart. "Identifying and strengthening specific muscles not only improves performance, it pre-empts injury. We will uncover these links for our soldiers."

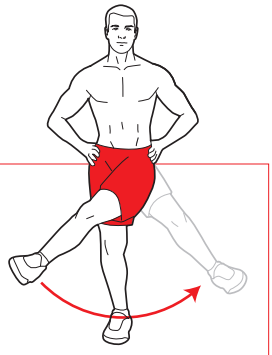
With the military being Lephart's priority, golfers are lucky he has a soft spot for the game. In 2000, UPMC set out to become the leading institute



PHOTOGRAPH: BEN VAN HOOK

## THE APPLICATION

Of the muscles responsible for creating power in the swing, none separates elite players from average golfers more than the hip abductors.



### HOW TO GAIN HIP STRENGTH

The following exercise is a simple way to strengthen your hip abductors.

**1** Standing on one foot with your hands on your hips, slowly move your elevated leg from side to side in front of you.

**2** Do 10 times, and hold each full-stretch position. Then switch legs to work the other abductor.

**3** For a more strenuous workout, attach resistant tubing to the ankle you're moving.

for understanding the golf swing, and now the product of its research is ready for the public. Par Without Pain, an eight-week fitness program based on analysis of a player's swing, is available at the David Leadbetter Golf Academy near Orlando and Dick's Sporting Goods store in Pittsburgh. First, the player's swing is biomechanically measured and a golf-specific musculoskeletal assessment is done, then a customized exercise program is prescribed. Two months later the player returns to be re-tested and might be given a follow-up exercise regimen. Programs differ, but the full-length cost is generally $850. To date, the average increases experienced by participants are 11 percent torso-rotation strength, 10 percent hip strength, 8 percent shoulder flexibility and 10 percent driving distance—numbers Lephart soberly refers to as "scientific validation."

Quantifying the forces in the golf swing—finding out when and how much certain muscles and joints work—wasn't easy. In fact, Lephart and his team found it more complex than any athletic motion they had studied. His team had to develop customized software that works with super-fast Vicon cameras and work hand-in-hand with AboutGolf, a leader in indoor simulators with built-in launch monitors, to create a test center. As in animation studios, subjects wore tight-fitting black clothing with 38 strategically positioned reflective markers to record every movement of the swing. Lephart says the twisting action of the modern swing "is like ringing out a wet towel."

After plowing through data collected from more than 700 golfers, including 35 PGA Tour pros, the time had come to reap the discoveries. As expected, strength and flexibility of the shoulders and torso were important in golf, but Lephart also identified a specific pair of muscles, the hip abductors, which engage when you move your legs apart, as a key discriminator in power. Immediately before impact, stress equal to two to three times the golfer's body weight is placed on the hips. On average, Lephart found elite players to be 30 percent stronger in the hip abductors.

"The balance and trunk stability provided by the hips is often overlooked in golf," says Lephart. "Golfers with weak hips are predisposed to commit swing errors that hinder their game and make them prone to injury over time. Even players with perfect swings can be susceptible from heavy amounts of practice."

Though the program is now a commercial product, Lephart stands to benefit only modestly. Because the program originated in the academic setting, UPMC will ultimately take 85 percent of all profits. Which is fine by Lephart. In addition to overseeing 15 faculty members and the projects of five doctoral students, he has the health of U.S. combat forces to worry about.

For more on innovators and technology, click golfdigest.com/tech.

## TECH UPDATE

### TIRED OF LOOKING FOR BALLS?

The Ballfinder Scout is a handheld device that uses digital imaging to find golf balls. It works with any standard ball and weighs about as much as a cell phone.

To find a ball, you wave the Scout from side to side in the general area until the LCD screen indicates a hit. It can spot a ball from 35 feet with only three dimples visible, but it picks up other bright-colored objects such as paper and Styrofoam. $215, sandersongolf.com.




ILLUSTRATION: JASON LEE