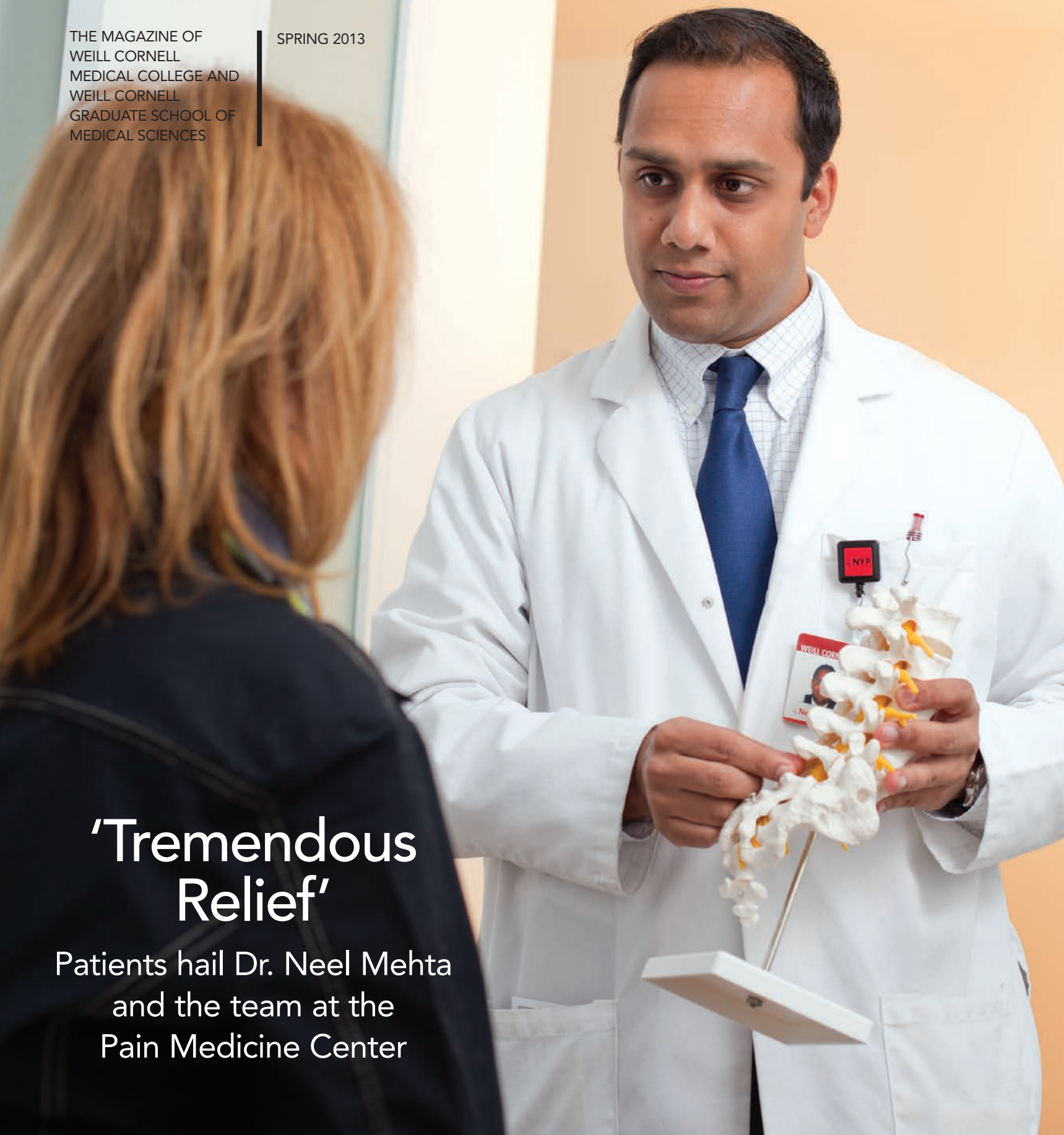
weillcornellmedicine

THE MAGAZINE OF
WEILL CORNELL
MEDICAL COLLEGE AND
WEILL CORNELL
GRADUATE SCHOOL OF
MEDICAL SCIENCES

SPRING 2013

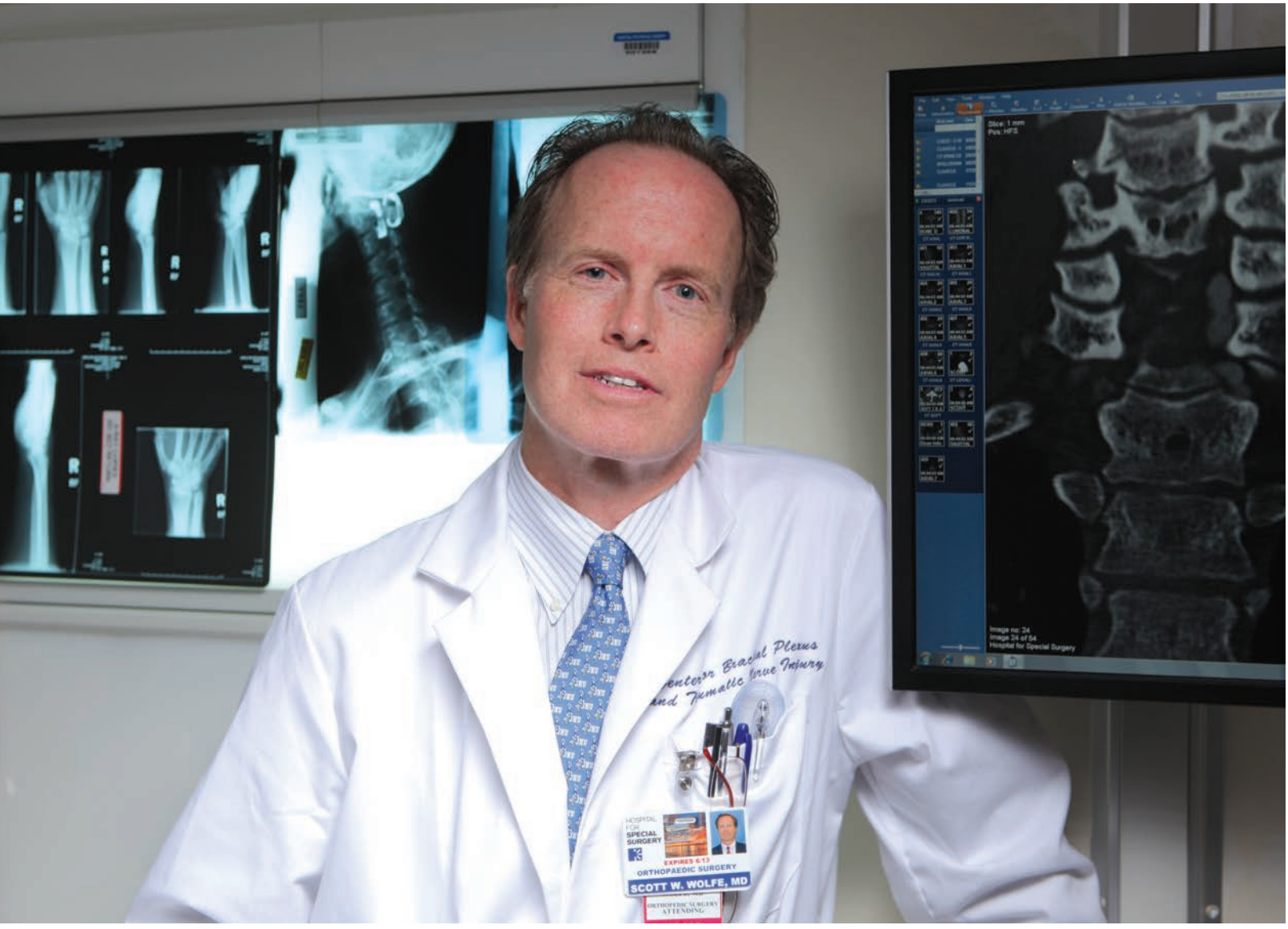


‘Tremendous Relief’

Patients hail Dr. Neel Mehta and the team at the Pain Medicine Center

Helping Hand

Scott Wolfe, MD ’84, pioneers techniques in peripheral nerve and wrist surgery



ABBOTT

Scott Wolfe, MD ’84

An accident during a training exercise had left the military officer severely injured. Having suffered both thoracic spine and brachial plexus damage, he was paraplegic and couldn’t use his right arm. With little hope of recovery, he’d come to Hospital for Special Surgery six months later hoping to regain some arm function.

Not long ago, patients with this type of brachial plexus injury—which affects the nerves that conduct signals to the shoulder, arm, and hand—faced a grim prognosis; treatment options mainly consisted of amputation or shoulder fusion. But today, using advanced microsurgical techniques, upper extremity surgeon Scott Wolfe, MD ’84, can offer them the chance of a far better outcome. “The use of surgical nerve transfers has revolutionized our approach to these patients,” says Wolfe, director of HSS’s Center for Brachial Plexus and Traumatic Nerve Injury and a professor of orthopaedic surgery at Weill Cornell.

In brachial plexus reconstructive surgery, which can take up to twelve hours, surgeons bor-

row a cable, or fascicle, of a functioning motor nerve and transfer it to restore function to a nerve that has been irreparably damaged. "With the operating microscope, we can transfer a portion of an intact nerve from a functioning muscle and re-attach it to the undamaged portion of a nerve from another," he says. The rewired nerves immediately begin to grow toward the atrophied muscle, typically at a rate of a millimeter a day. In other situations, the surgeon will use non-critical sensory nerves, typically from the leg, to bridge or graft traumatic defects of injured nerves in the neck.

In the military officer's case—which used 100 centimeters of grafting from his leg to reconstruct the nerves in his arm—they used both long nerve grafts and nerve transfers. "We used all the techniques in our basket to try to get him back anything we could," says Wolfe, chief emeritus of hand and upper extremity surgery at HSS. "From a technical aspect, the surgery went very well, but it will be probably six months to a year before we can assess his outcome."

Every year, thousands of people are incapacitated by brachial plexus damage, often as the result of car or motorcycle accidents, athletic injuries, or falls, and occasionally due to head and neck cancers or surgeries. The Center for Brachial Plexus and Traumatic Nerve Injury brings together a variety of specialists to provide comprehensive, coordinated care for patients with these conditions and to promote research leading to new and improved treatments. "Peripheral nerves have tremendous capacity to regenerate, but that process is relatively poorly understood on a scientific level," says Wolfe. "Our goals are to address nerve regeneration from both the clinical and basic science fronts, and to expand the frontiers of what we can offer our patients."

That includes how surgeons measure their results. At present, little uniform data exists on the long-term outcomes for brachial plexus surgery. Peripheral nerve surgery is conducted by specially trained neurosurgeons, plastic surgeons, and orthopaedists—and each may interpret the results using different factors. "One person may talk about range of motion while another might talk about strength," Wolfe says. "It's difficult to compare one outcome to another if we're not using the same instrument of measure." So Wolfe and HSS colleagues designed one. Their system, first presented at the 2011 International Symposium on Brachial Plexus Surgery, includes standardized measurements of motion, strength, and function for seven critical domains of the upper extremity, as well as assessments of sensation and pain. "You could have an otherwise excellent result in terms of motion and strength," notes Wolfe, "but if the patient is incapacitated with pain, they can't use their arm."

Wolfe began conducting brachial plexus surgery in the early Nineties while chief of hand and upper extremity surgery at Yale. After encountering several severe nerve injuries that few local surgeons at the time had the skills to treat, Wolfe did additional training in microsurgery specifically to tackle complex peripheral nerve procedures. He was recruited to HSS in 2000, in part because of that expertise. It was a homecoming of sorts for the Weill Cornell alumnus, who did his orthopaedic residency training at the hospital.

In addition to his work on the cutting edge of brachial plexus treatment, Wolfe's long-term research expertise is in wrist surgery and motion analysis. Editor-in-chief of the definitive *Green's Operative Hand Surgery*, Wolfe holds a patent on a new total wrist replacement that could be a game changer in the treatment of wrist injuries, particularly for younger, active patients.

With eight bones that articulate to create movement, the wrist is arguably the most complex joint in the body. Previous wrist replacements have attempted to simplify wrist anatomy into a one-joint hinge, which has been unsuccessful in duplicating normal wrist movement and has had high rates of failure. With $5 million in NIH sponsorship to study how the wrist moves, Wolfe and colleague Joseph Crisco, PhD, developed 3-D motion tracking software to study what Wolfe calls the "dart-throwers motion," based on the movement you'd use to flick a dart, which happens in multiple planes simultaneously. "We think we've located the part of the wrist that allows that motion to occur and designed the wrist replacement around that particular joint," says Wolfe, who studied baboon hands to better understand the evolution of the wrist.

The KinematX Total Wrist Implant—which Wolfe says will allow many patients to return to activities such as golf, tennis, and other sports—has been approved for use in Europe and implanted in nearly twenty patients in England. Wolfe expects FDA approval within the year.

—Renée Gearhart Levy

'One person may talk about range of motion while another might talk about strength. It's difficult to compare one outcome to another if we're not using the same instrument of measure.'