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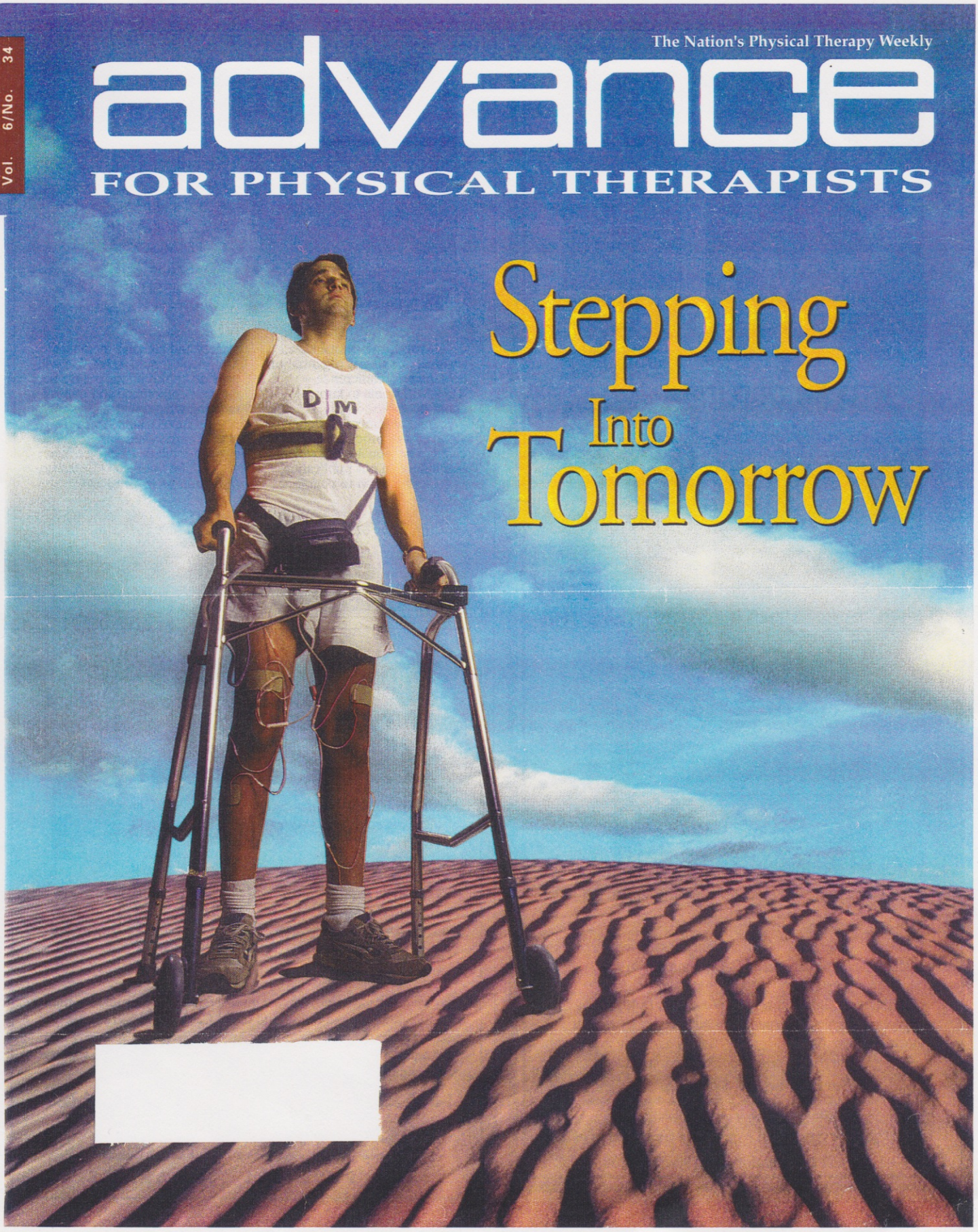

Stepping Into Tomorrow

COVER STORY

New Technology Offers People With SCI a Chance To Walk

By Melissa L. Reichley
SPECIAL TO ADVANCE

Will I be able to walk again? That's probably the No. 1 question newly injured patients with spinal cord injuries ask their physicians and therapists, said Margie Roos, PT, clinical specialist, SCI, at Magee Rehabilitation, Philadelphia.

That question haunts medical providers who break the bad news to their patients that walking might not ever be a possibility almost as much as it affects the patients who hear it. But thanks to new technology, the answer to that question may not have the bleak answer as often as it used to. The reason: Parastep®.

Parastep is an FDA-approved ambulation program that uses electrical stimulation via surface electrodes on the quadriceps and gluteal muscles to allow a person to stand and on the peroneal nerve below the knee to elicit a withdrawal reflex that allows an individual to take steps, explained Roos, who has directed the Parastep program at Magee since the equipment was first purchased through a state grant last year.

The whole system includes a small microcomputer controlled stimulator (about the size of a portable radio), a rechargeable battery pack worn in a pouch around the waist called the Parapack™, an electromechanically modified walker with controls on the handles that activate the microcomputer, and up to 32 physical therapy sessions.

The program is for people with complete upper motor neuron lesions at T1 to T10. However, people with complete paraplegia at the T4 level and below find success with it, as do those with incomplete paralysis at C7 or below as long as they have good hand function, adequate balance and enough strength to tolerate standing for extended periods of time, said Roos.

MANUFACTURED by Sigmedics Inc. (Northfield, IL), Parastep is currently being used by more than 25 rehab facilities across the country, including the Rehabilitation Institute of Chicago, Chicago; Woodrow Wilson Hospital in Fishersville, VA; the Dallas Rehabilitation Institute, Dallas; the Miami Project, Miami; and Craig Hospital in Englewood, CO.

Frank Zeiss, vice president of operations and administration for Sigmedics, told *ADVANCE* that the person credited with the Parastep concept is Daniel Graupe, PhD, a professor of computer science and electrical engineering at the University of Illinois, Chicago, who conducted the research on the system along with Kate H. Kohn, MD, chairperson emeritus of the department of rehabilitation medicine at Humana-Michael Reese Hospital and Medical Center in Chicago. Together they began developing in 1981 what has evolved to be today's Parastep.

Roos said the first step in determining if someone might benefit from the program is an evaluation. An interested individual is tested for joint contractures and other possible orthopedic problems that might impede them from being electrically stimulated, as well as their ability to extend their knee against gravity and stand without becoming dizzy or falling from lack of strength. "We actually test to see if they respond to stimulation depending on where the SCI is," said the PT. "If they do respond, we (a PT and physician) either decide they're ready for the program and the patients must get insurance clearance, or we can refer them to PT for work on a specific goal [prior to program entry]."

In today's health care environment, the issue of insurance is a large one and Roos said payment for Parastep is far from a given. She explained that insurance companies are cautious about payment for Parastep primarily because it's still such a new program.

One plus, however, is that payment for the actual equipment is not made to Sigmedics until patients have completed the bulk of their sessions, so that in the event patients decide they don't want to go through with purchasing the equipment, they can at least learn and practice on the hospital's system. And, noted Roos, insurance companies then have time to learn about the progress of the patient on the program.

Zeiss said Sigmedics packaged the training on Parastep with the actual durable medical equipment on purpose so that insurance companies would accept it more readily, without the typical discrepancies often found in the prices charged by facilities for similar treatment. "We did it because insurers complained that often when manufacturers would come up with new durable medical equipment, training costs for patients learning to use the equipment varied substantially from center to center. For example, total costs at one facility may have amounted to $3,000 of therapy, as compared to $5,000 at another facility. [We wanted] to safeguard for this and provide a cost-effective, all-inclusive, finite cost to insurers. A predefined outcome at a predetermined cost: they like that," said Zeiss of insurance companies.

Regardless of whether insurance covers Parastep, the program is not for everyone. As with most electrical stimulation devices, there are some situations in which it is not recommended. If patients have severe scoliosis, severe osteoporosis, uncontrolled dysreflexia, spasticity that gets worse with stimulation or any type of heart condition, they may not be eligible to use Parastep.

Roos said if a patient's leg bones are too brittle to stand on for extended periods of time, or if, patients have ligament laxity, the program also may not be a good idea for them. Sigmedics recommends newly injured patients wait six months before trying it, to make sure any medical complications have decreased and that patients are medically stable.

When patients are deemed physically capable of handling the program their goals are discussed. "We're looking to see what their goals are and [compare them to] ours so that everything's cohesive. Some people may have unrealistic expectations, like wanting to walk [full time] and never use their wheelchair again. It's more to be used for cardiovascular fitness activity," she clarified, adding that sometimes patients have special goals, which therapists do their best to accommodate.

With the physical evaluation complete and goals established, the next step is "hook up." Patients may choose from a six- or four-channel system, the former is recommended. (The four-channel system leaves out stimulating the gluteal muscles, but according to Roos that's less efficient.) Using a six-channel system, four electrodes are placed on the gluteal muscles, two electrodes are placed on the front of each leg and two electrodes are placed below the knee on each leg, making a total of 12 sites.

Roos said that when patients begin learning to use Parastep, they often only try to stand a few times or take a few steps. However, she noted that it is recommended that patients are stimulated as much as they can tolerate from the very beginning. As strength and endurance increase, sessions may last for a 20- to 30-minute walk, or up to an hour and a half of instruction.

It is up to the physician and therapist to decide when patients are ready to buy their own system. The major determining factor is simply that they can operate the system properly, stimulating the different muscles in the correct sequence; being able to sit, stand and transfer safely; recognizing fatigue and knowing when to stop; and being able to achieve the goals established upon the initial evaluation.

THE TIME AT which patients are typically authorized to purchase the

ADVANCE PHOTO BY JAY WILEY/PHOTOILLUSTRATION BY TODD GERBER

durable medical equipment is after completing 20 to 30 sessions (assuming their insurance companies approve it). The system costs approximately $15,980 for the six-channel unit and includes all the therapy sessions. Roos noted that it generally takes patients the whole 32 sessions to become safe and efficient users of the system.

AS WITH ANY PT program, education is a large part of the process of learning to walk with Parastep. Roos said patient education is the key to successfully using Parastep, because it ensures that patients know how to use the equipment—and their bodies—properly and therefore most efficiently.

While most facilities teach patients to use Parastep through outpatient programs, there are some facilities, such as Craig Hospital, that do so by employing an "accelerated" inpatient program. Zeiss said in these cases, patients from out-of-state, for example, will come to the facility and learn to use the technology in a matter of four to six weeks, as opposed to the more standard 10 to 12 weeks in an outpatient facility.

The benefits of Parastep are many, including increased respiratory and circulatory function. Perhaps most important, however, is the increased cardiovascular and muscular function, and the decreased prevalence of many of the complications often associated with lack of physical activity and movement, such as osteoporosis, atrophy and pressure sores. The increased circulation to and loading of the long bones in the lower extremities decreases the amount of calcium loss, which in turn decreases the chances of developing kidney stones and urinary tract infections.

Roos noted that Parastep's advantage over long leg braces, is that patients actively use their legs to do the work, whereas with KAFOs they're relying on their arms for most of the work, while their legs remain passive.

In addition to the many physical benefits, the psychological benefits of using Parastep are tremendous. Roos has witnessed on many occasions the leaps in growth of self-esteem by patients on the program. "They feel they can accomplish more. Normally with exercise you get an adrenalin boost and increased self-esteem, but people who've used this system say it makes them feel better because they're doing it themselves," she said.

There are a few points therapists should be aware of when teaching patients to use Parastep. The main problem patients have when they begin learning the system is fatigue, which Roos said is very common and occurs very easily. "They get very tired. And many times they're so nervous about their leg strength (not being enough) that they tend to overuse their arms, which is not as efficient," she remarked, emphasizing that patients are constantly educated as to how to get the most out of their muscles.

At Magee Rehabilitation Hospital in Philadelphia, physical therapist, Margaret Roos, stands ready to assist as Jonathan Yurchak takes steps with help of the Parastep. *(ADVANCE photo by Jay Wiley)*

Still, seeing patients walk who entered rehabilitation uncertain as to whether they might ever be able to do that again, is a wonderful and rewarding experience for the therapists and patients.

AS THE ONLY FDA-approved ambulation program of its kind, the Parastep system offers many people who might have never stood or walked again, a means of doing so. Now that its merits are gaining recognition, its uses soon may be extended. Zeiss revealed that a pilot study is under way to determine how effective Parastep technology may be for people with other disabilities, i.e., multiple sclerosis, cerebral palsy, CVA, TBI. Although it is too soon into the study to release any formal results, he said the system (using modified intensity, pulse width and frequency parameters) is proving to be helpful for people with multiple sclerosis.

For now, however, at least some patients with SCI have one more option available to them, making their outlook a little brighter, and their *step* a little lighter.

• *For more information, contact Sigmedics at (708) 501-3500 or (800) 582-WALK.*

• *Melissa Reichley is a free-lance writer from Las Vegas.*