



## Neurotechnology for Cerebral Palsy

Cerebral Palsy is a prevalent neurological condition in our society. It is estimated that 2 of every 1,000 children have some form of cerebral palsy.<sup>1</sup> The effects are wide ranging; the condition may impact speech, breathing, walking, balance or bladder function, just to name a few. In this issue of *The Current*, we explore the neurotechnology applications for cerebral palsy. These therapies and treatments are not a cure for the disorder or a prevention tool. Neurotechnology applications have proven to reduce spasticity, increase passive and active range of motion, improve bladder function, provide independent breathing, and aid with walking and balance. In essence, they assist with combating the secondary conditions related to cerebral palsy and provide enhanced function and rehabilitation. Not all therapies, devices or treatments are appropriate for all types of cerebral palsy and neurological diseases or disorders. Approved applications will vary. A medical evaluation should be conducted prior to use. This issue is for informational purposes only; a medical professional should be consulted prior to participating in any therapy, regimen or treatment. With that said, let's explore the many options of neurotechnology for cerebral palsy.

<sup>1</sup> D. Hirtz, D. J. Thurman, K. Gwinn-Hardy, M. Mohamed, A.R. Chaudhuri, and R. Zalutsky, "How common are the 'common' neurologic disorders?", *Neurology*, Jan 2007; 68: 326-337

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## Educate: Applications for Cerebral Palsy

Neurotechnology applications for cerebral palsy is well documented in the medical literature. Using medical electronics interacting with the human nervous system, neurotechnology application have revolutionized the tools used for scientific analysis, functional rehabilitation and activities of daily living. Electrical stimulation was the pioneering application and has been studied in cerebral palsy for nearly 50 years. Investigators studying these applications have observed reduced spasticity, improved motor control, increased range of motion and muscle strength, improved bladder function, better coordination of breathing and fewer respiratory infections, as well as better walking and balance. No one technology can achieve all of these observations but the applications are available.

Systems are segmented into three main areas implanted, external or hybrid (a combination) of both. Implanted systems tend to be more "invasive" and therefore require a surgical or other procedure to install the system into the body of a potential user. Whereas, external systems are applied outside the body or on the surface of the skin. Finally, hybrid systems have components that are both implanted and external. As systems move from the lab to the clinic, there are a variety of things to consider before participating into a treatment, therapy or device protocol. Individuals must consider the time commitment, financial requirements and

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health benefits and risks that come with any program. Proper evaluation and supervision by a trained clinician, such as a physician or therapist is essential.

### **Applications**

Just as there are many aspects to cerebral palsy, there are as many applications of neurotechnology. Below are descriptions of applications for different areas. This includes technology that is currently available, as well as some progress in research for what is coming in the near future. Lists of devices are available in the Resources section of this newsletter.

### **Spasticity and Pain Management**

Involuntary muscle contractions or spasticity can restrict movement and cause rigidity for people with cerebral palsy. Common among people living with cerebral palsy, spasticity has a direct impact on daily living. Neurotechnology applications for CP may relieve pain and movement restrictions. The advantages of reducing spasticity without causing paralysis or weakness is that some previously undetected movement abilities may be discovered. Applications range in type and complexity. An example of a simple system is the use of surface electrical stimulation, such as a TENS (Transcutaneous Electrical Nerve Stimulation) or NMES (Neural Muscular Electrical Stimulation) unit. Using electrodes on the surface of the skin to deliver electrical stimulation creating a muscle contraction may reduce spasticity if used over a period of 1-3 months. Other more complex systems for reducing spasticity or pain include implanted intrathecal baclofen pump therapy or implanted spinal cord stimulation devices. Realizing that these are treatments to reduce spasticity and pain, they may unmask increased voluntary control of muscles, improve range of motion or impact hand use or walking.

### **Respiratory, Cough and Swallowing Assistance**

In some cases of cerebral palsy, breathing, coughing and swallowing are difficult to achieve. In the case of breathing assistance, current neurotechnology alternatives to mechanical ventilation are hybrid systems that include either a phrenic nerve stimulator or diaphragmatic stimulator. Unlike ventilator systems, which use mechanical pressure to force air into the lungs, the stimulation system pulls air into the lungs by stimulating the diaphragm muscle or the phrenic nerve. As the diaphragm contracts, the chest cavity expands and air is pulled into the lungs. Moreover, coughing is another respiratory function that may be difficult. Cough assistance systems (CAS) that are currently available use different pressures to clear the lungs through an external breathing mask attached to a separate control unit. Under investigation is a new hybrid system that uses an external controller and implanted electrodes to achieve a cough. The goal of this electrical stimulation system is to create a 'cough on demand'. Also using electrical stimulation, surface electrodes may be applied to allow a person to swallow. The electrical stimulation contracts the muscles along the neck thus allowing a person to swallow offering a potential alternative to a feeding tube.

### **Hand Function and Upper Extremity Rehabilitation**

Hemiplegia is one impact of cerebral palsy, leaving a person with the use of only one hand. Commercially available electrical stimulation systems to improve hand function have been developed for hemiplegia as a result of a stroke. Severely paralyzed people with CP may be candidates to use these same systems to improve hand function. The systems use surface electrodes to stimulate muscles in the forearm, thus providing gross hand grasp functions. Also using surface electrical stimulation is the area of rehabilitation for the upper extremities including the shoulder, elbow and wrist. Studies are currently being conducted to observe improvements in wrist muscle strength using NMES and improved arm movements using electrical stimulation handcycling.

### **Urinary Incontinence**

Neurotechnology applications for urinary incontinence have been widely studied and many options are commercially available. For people living with cerebral palsy reduced bladder control can be a life altering experience. Neurotechnology devices offer several different approaches of bladder management that use electrical stimulation for hyper-reflexive or flaccid functioning bladders. Appropriateness of each specific device for cerebral palsy is now being researched but not specifically approved for cerebral palsy. The various types are worth noting as they may become viable treatment options for people living with cerebral palsy. There are five basic types of devices using electrical stimulation in different ways. 1) Sacral nerve stimulator is an implanted device that manages the bladder by sending electrical impulses to the nerve that controls the bladder, sphincter, the muscles around it, and the sacral nerve roots. 2) Tibial nerve stimulator controls the bladder through percutaneous stimulation (an electrode in-

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serted through the skin) of the tibial nerve in the lower leg. 3) Pelvic stimulator uses electrical stimulation applied to the pelvic floor muscle, which is generally delivered by a vaginal or anal probe connected to an external pulse generator. 4) Bladder muscle stimulator is a device that directly stimulates the bladder muscle with an implanted electrode. 5) An implanted device, soon to be in clinical trials, uses an electrode to stimulate the pudendal nerve to provide bladder function. These approaches should be discussed with your urologist and evaluated for your individual situation to determine which may or may not be appropriate for you.

### ***Walking and Movement Analysis***

In cerebral palsy, there may be many reasons why the person is not walking with a normal gait. A skilled team of rehabilitation specialists can make a required assessment as to what is causing the impaired walking function and how it may be improved. To help these professionals in their analysis, there are new neurosensing tools available. Motion Analysis Laboratories across the country are beginning to use monitoring systems; such as camera systems similar to those used for animation or kinematic measurements, that can assist rehabilitation professionals to make treatment recommendations. One of the prominent laboratories is the [Motion & Gait Laboratory at Stanford](#). New wireless monitoring systems use EEG and EMG signals to capture the movements not in laboratories but in the real world while people are doing every day life activities. While wearing sensors on the surface of the skin, medical professionals can monitor a person's movements at home as well as during specific exercises. Once a thorough analysis is complete to understand what is interfering with walking then proper treatments may be applied.

The neurotechnology systems available for ambulation are wide and varied. The earliest introduction of neurotechnology to voluntary movement and walking was a combination of external electrical stimulation and bracing. New external systems are being developed that include full exoskeletal suits. More advanced hybrid systems for those with complete and partial paralysis are being developed by researchers. There are many commercially available options for assisted stepping for persons with walking ability but who need assistance with ankle and foot control. Using external electrical stimulation, these small systems stimulate the calf muscles in coordination with the gait of the user, thus, eliminating the need for ankle-foot orthotic bracing. Implanted assisted stepping systems are currently available in Europe and will begin to be studied in the United States.

### ***Exercise and Rehabilitation Systems***

Exercise and rehabilitation is vital to people living with cerebral palsy but not as simple as going to the gym or taking a stroll around the neighborhood. Exercise is essential to prevent secondary conditions in the cardiovascular and circulatory systems of the body. Exercise can be achieved using Electrical Muscle Stimulation (EMS) which relies on the peripheral nervous system. EMS devices send pulses of electricity into the user's skin that result in a contraction of the muscles. Whenever possible, it is beneficial to encourage voluntary movement. Exercise programs can be accomplished by starting one at home or in a specialized facility. Using EMS, such as FES (Functional Electrical Stimulation) cycling or rowing, will help minimize the loss of muscle bulk, improve muscle size and performance, and boost physical fitness. Before starting an EMS exercise regime, you should consult a physician or professional therapist.

For those with CP who are ambulatory, muscles may be reconditioned through rehabilitation. Movement enhancement systems are devices that are used to assist with exercise or the work of muscles in a limb. They reinforce the concept behind rehabilitation therapy which is to improve the function of a weakened muscle or to "boost" the voluntary function that already exists. Treadmill systems and robotics technology may improve locomotor skills and upper extremity function with repetitive motion therapy. These systems represent potential tools to augment the work of physical therapists, who are often unable to provide the extensive amount of therapy needed. Starting an exercise regime is not a short term commitment. Several studies discovered that over the long term, improvements in walking, balance and speed of the gait can occur. At Florida International University, a new exercise program for children is being developed and studied using a variety of activities. See the Personal Experience section of this newsletter to learn more about this emerging program.

### ***Summary***

The variety of neurotechnology applications for cerebral palsy has expanded over many years of development. Devices, therapy programs and treatment options have improved and research has expanded; however neurotechnology has not gained the "standard of care" status. You may find resources in the Resources section of this newsletter. For more information, visit the Educate page of our website, [www.NeurotechNetwork.org](http://www.NeurotechNetwork.org)

## Personal Experiences: Giant Steps

Children with cerebral palsy spend countless hours going to traditional therapy. For one mother, she heard "I love it!" from Ilana, her daughter. In search of a new way for Ilana to exercise, Marci Gutman helped to gather the equipment and the talent to offer an alternative for children with CP. Combining fitness and fun in one place, Ilana was excited about joining a new program through Creative Children Therapy. Inspired by three parents of children with special needs and a team of therapists, Creative Children Therapy is a non-profit organization giving a new light to therapy programs for children. Based in Miami, Florida, the center offers traditional services such as physical, occupational and speech therapy; complementary services including fitness training and massage therapy; as well as activity programs through dance, aquatics and martial arts. Their services are developed to encourage children with disabilities to actively explore new interests and broaden their involvement in the community.

Born from a research idea, Dr. Leonard Elbaum from Florida International University teamed up with Creative Children Therapy to create an intensive exercise program; now called the Giant Steps program. As with any skill such as playing soccer or performing on stage, frequent practice is needed for development and improvement of that skill. As with physical fitness, daily exercise is the order of the day. For children with disabilities, their case for daily exercise and practice is no different. But how that is accomplished may be different. Bringing neurotechnology into the Giant Steps program was a natural fit.

The customized six-week therapy and fitness program is offered for teens and pre-teens with spastic cerebral palsy and related conditions. The first pilot program was last summer and consisted of eight children and adolescents. Prior to joining the program, each participant underwent an extensive evaluation including fitness, strength and balance testing, activities of daily living, gait analysis and goal setting. Once a youth is accepted into the program, the two hour sessions begin five days per week. Each session is segmented into 30 minute sections consisting of

1. Traditional physical therapy
2. Functional Electrical Stimulation Cycling
3. Locomotor training (treadmill walking with assistance to support body weight & leg movements as needed)
4. Interactive video games (eg. the Wii) modified to challenge specific skills.

The unique feature of the program is teaming up participants in groups of 3-6, in effect creating the Curves of the CP world. These interactive teams add a social level to the program not available in traditional environments. Each group has at least one physical therapist and other support staff to achieve a one to one ratio of participants and staff members. At the conclusion of the six-week program, participants are re-evaluated and discussions ensue to repeat the program, discontinue it or extend it on a three-day per week basis.

"We are restricted to offering the program in the summer to not interfere with our participants' school schedules," states Ivette Quintana, a physical therapist with Creative Children Therapy. "Results from the pilot program were so encouraging that we are now looking to expand participants and enhance the program for the summer of 2009." Significant gains by the participating children included overall muscle strength and endurance. Other improvement observations included independent sitting, ambulation with a walker and walking without the aid of an orthosis; which were not achievable by these individuals prior to completing the program. "When I would periodically walk through and meet the participants, I was amazed at their accomplishments," boasts Dr. Elbaum. "This idea started as a research project and turned into a service project." Seeing the results that were beyond his expectations, Dr. Elbaum is seeking to add a further research component by conducting some case studies, studying quality of life impact and seeking collaborations to observe the presence of neuroplasticity in the brain of the participants.

Twenty year old, Ilana is one of those achievers at Giant Steps. Living with cerebral palsy since she was four months old, traditional therapy became borrowing and mundane. Giant Steps offered her a new way to exercise and work toward becoming more independent. Prior to joining the program, Ilana's main mobility was with a wheelchair but she was able to take 3 steps with a walker and assistance. After completing the program, she can now walk 40 feet with a walker; something unexpected since she was recently diagnosed with arthritis. Inspired to tell her story and those of others, Ilana started Disability News, <http://www.disabilitynews.org/>, a source for information of how disabilities prove ability. Eager to participate in the program this summer, Ilana can't wait to get back on the FES bike. "Never stop thinking out of the box," advises Marci, Ilana's mother, to other parents of special needs children. "Our kids do everything that other kids do, but just in other ways."

A further description of the Giant Steps Program is available on the [Cerebral Palsy Educate Page](#) of our website. For more information about Creative Children Therapy, call Lissette Menendez at 305.412.4177 or visit <http://www.creative-children.org/>.

## Resources For Cerebral Palsy

There are many resources available for those with cerebral palsy. The following is a listing of neuro-technology organizations offering solutions. They are segmented by various applications related to cerebral palsy. Note that some are not FDA approved and some are being tested in clinical trials. More may be found in our website database accessed from the [Educate Page](#).

### Walking & Movement Systems

- NeuroStep—[Victhom Human Bionics](#)
- ReWalk—[Argo Medical Technologies](#)
- NESS L300—[Bioness, Inc.](#)
- STIMuSTEP—[FineTech Medical, Ltd](#)
- WalkAide—[Innovative Neurotronics](#)
- ActiGait—[Neurodan A/S](#)
- Odstock Dropped Foot Stimulator—[Odstock Medical Ltd.](#)

### Exercise & Rehabilitation Systems

- RT100, RT300—[Restorative Therapies, Inc.](#)
- SpinoFLEX—[Advanced Fitness Components](#)
- Wearable Therapy—[Bioflex, Inc.](#)
- 300PV, Advance Dynamic ROM, EMS+2—[Empi, Inc.](#)
- Reo Therapy—[Motoika](#)
- NeoTone—[Neotonus, Inc.](#)
- RehaMove, MOTomed—[RECK Technik GmbH & Co. KG](#)
- StepGain GRF—[Robomedica, Inc.](#)
- RS-2m—[RS Medical](#)
- REGYS, ERGYS, NeuroEDUCATOR, SpectroSTIM—[Therapeutic Alliances, Inc.](#)
- Electronic Muscle Stimulation—[Zynex Medical, Inc.](#)

### Breathing, Cough & Swallowing Assistance

- Avery Breathing Pacemaker System—[Avery Bio-medical Devices, Inc.](#)
- Atrostim Phrenic Nerve Stimulator v2—[Atrotech, Ltd](#)
- NeuRx Diaphragm Pacing Stimulation—[Synapse Biomedical, Inc.](#)
- Cough Assist—[Respironics, Inc.](#)
- VitalStim Therapy—[Chattanooga Group](#)

### Hand Grasp & Rehab for Upper Extremities

- NESS H200—[Bioness, Inc.](#)
- STIMuGRIP—[FineTech Medical, Ltd.](#)

### Pressure Sore Prevention & Wound Therapy

- POSIFECT—[Biofisica](#)

### Spasticity & Pain Management

- Renew, Genesis, GenesisXP—[St. Jude Medical Neuro-modulation](#)
- Precision Plus System—[Boston Scientific Neuromodulation](#)
- RestoreULTRA, RestoreADVANCED, PrimeADVANCED—[Medtronic Inc.](#)(SCS)
- PTM, SynchroMed II—[Medtronic, Inc.](#) (ITB)
- Dyatron STS Rx—[Dynatronics Corporation](#)
- Alpha Stim—[Electromedical Products International](#)
- Epix VT, Hybresis, IF 3WAVE, Infinity Plus, ProMax, Select TENS, Vectra Genisys Laser—[Empi, Inc.](#)
- MSP TENS, Microcurrent Stimulator, EZ STIM TENS, Electric Muscle Stimulator—[Medical Science Products](#)
- RS-4i Sequential Stimulation, RS-2i, RS-TENS Plus—[RS Medical](#)

### Urinary Incontinence

- FineTech Brindley Vocare—[FineTech Medical, Inc.](#)
- InnoSense Minnova—[Empi, Inc.](#)
- Evadri—[Hollister, Inc.](#)
- InterStim—[Medtronic, Inc.](#)
- NeoControl—[Neotonus, Inc.](#)
- NeuroBionix Urinary Implant—[Victhom Human Bionics](#)
- Conti4000—[Zynex Medical, Inc.](#)

### Other Applications

- NeuroSwitch—[Control Bionics](#)
- Kinesia, Pressure Step—[CleveMed](#)

### Noted Programs

- [Motion & Gait Analysis Laboratory at Lucile Packard Children's Hospital](#)
- [Creative Children Therapy](#)
- [Giant Steps Program](#)

Prior to considering any new therapy, treatment or device, a proper evaluation must be conducted with a knowledgeable medical professional. There are health, medical and financial risks. Out of pocket costs and available insurance coverage for any treatment must be considered prior to starting a protocol. Finally, this is an evolving field of science and technology development. Updated information regarding these devices and organizations is available in the Educate section of our website at [www.NeurotechNetwork.org](http://www.NeurotechNetwork.org)

*\*\*Neurotech Network, The Society to Increase Mobility and its representatives do not rate, endorse, recommend or prescribe any products, procedures or services. This fact sheet is for informational purposes only.*

## On the Horizon: Updates in the World of Neurotech

- ◆ [Cyberonics, Inc.](#), the Houston, TX manufacturer of vagus nerve stimulation systems, announced that the Centers for Medicare and Medicaid Services has published the 2009 CMS Outpatient Prospective Payment System Final Rule and Ambulatory Payment Classification rate for VNS Therapy, a treatment for epilepsy.
  - ◆ The Agency for Healthcare Research and Quality recent published a technology assessment for the treatment of stroke survivors. Titled "[Methodological Issues in Evaluation of Innovative Training Approaches to Stroke Rehabilitation](#)", the assessment will be used by the Centers for Medicare and Medicaid. [Neurotech Network](#) was a reviewer for this influential publication.
  - ◆ The results of a long-term clinical trial revealed a new treatment for intractable epilepsy. Reported in the journal *Neurology*, UCLA neurology professor Christopher DeGiorgio and his colleagues demonstrated that a non-invasive trigeminal nerve stimulation treatment can reduce the number of seizures by more than 50 percent. Further studies will begin sponsored by [The Epilepsy Research Foundation-Therapy Development Program](#) and [Boston Scientific](#).
  - ◆ [EnteroMedics Inc.](#), the St. Paul, MN manufacturer of obesity neuromodulation devices, announced that it has received CE Mark approval of its VBLOC therapy delivered via the Maestro system for the treatment of obesity. The Maestro system is the first to treat obesity using neuroblocking technology and represents a less invasive alternative to existing surgical weight loss procedures, which alter digestive system anatomy, lifestyle and food choices and may present significant risks.
  - ◆ Duke University Medical Center researchers discovered a novel stimulation method for the treatment of Parkinson's Disease. The first potential therapy to target the spinal cord instead of the brain, may offer an effective and less invasive approach, according to pre-clinical data published in the journal *Science*. Researchers developed a prosthetic device that applies electrical stimulation to the dorsal column in the spinal cord.
  - ◆ [Victrom Human Bionics Inc.](#), the Quebec, Canada manufacturer of neural prostheses, announced that it has obtained CE Mark approval for its Neurostep system, the first ever approval for a closed-loop system used on peripheral nerves. CE Mark represents regulatory approval needed for the sale of the Neurostep in the European Union. Neurostep, a fully implantable device designed to treat gait disorders such as foot drop, uses the patient's own nervous system as the source for detection of intention to move and control their leg.
  - ◆ [Second Sight Medical Products, Inc.](#), the Valencia, CA developer of retinal prostheses, announced that it will increase patient enrollment for the Argus II retinal implant study throughout clinical trials sites within Europe. The three-year feasibility study is currently underway in the U.S., Europe, and Mexico for people with retinitis pigmentosa.
  - ◆ The [National Spinal Cord Injury Association](#) and Neurotech Network provide a new resource for spinal cord injured individuals. NSCIA offers Fact Sheets on various areas important to SCI. Together the organizations have created the *Neurotechnology for Spinal Cord Injury Fact Sheet* which will be posted on both organization's websites.
  - ◆ [Neuronetics, Inc.](#), the manufacturer of transcranial magnetic stimulation systems, announced that the U.S. Food and Drug Administration has cleared its NeuroStar TMS therapy system for the treatment of depression. The therapy is specifically indicated for the treatment of major depressive disorder in adult patients who have failed to achieve satisfactory improvement from one prior antidepressant medication at or above the minimal effective dose and duration in the current episode.
  - ◆ Scientists at Karolinska Institutet and Lund University in Sweden have succeeded in inducing people with an amputated arm to experience a prosthetic rubber hand as belonging to their own body. The results can lead to the development of a new type of touch-sensitive prosthetic hands.
- Updates are available on our website. Stay updated by signing up for email notifications too. Visit our website at [www.NeurotechNetwork.org](http://www.NeurotechNetwork.org).

## Come See Us! Neurotech Education Series

The Neurotechnology Education Series is designed to build awareness and understanding of neurotechnology among people that have impairments resulting from neurological disorders and diseases as well as caregivers and medical professionals. The series includes featuring neurotechnology presentations at disability and medical professional conferences, building strategic alliances within the disability community, developing public relations with the disability media and enhancing information dissemination using our dynamic website.

If you missed us at the United Cerebral Palsy Annual Conference on April 23, then join us at these upcoming events:

- ◆ [Abilities Expo Midwest](#), Chicago, IL—June 25, 2009
- ◆ [United Spinal Association's Independence Expo](#), Orlando, FL—August 8, 2009
- ◆ [Abilities Expo Southeast](#), Atlanta, GA—November 5 & 6, 2009

More presentations are being schedule. Check out our website for an updated listing.

Sponsorship for one of the above events and future events are available. Members of the Neurotech Awareness Coalition have gain priority status. *Join us in this important effort to build awareness. Contact Jennifer French, [jfrench@neurotechnetwork.org](mailto:jfrench@neurotechnetwork.org) or call 727.321.0150.*

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## Neurotech Vendors Target Cerebral Palsy Market

Neurotechnology vendors are beginning to target new and existing products to the cerebral palsy market. Though the disorder is not as large nor as homogenous as some other conditions, there seems to be a good fit with some devices originally targeted for individuals with stroke, spinal cord injuries, movement disorders, and other neurological conditions.

The term cerebral palsy represents a number of disorders of the developing brain affecting body movement, posture, and muscle coordination. The United Cerebral Palsy Research and Educational Foundation estimates between 1.5 and 2 million children and adults have cerebral palsy in the U.S., and 10,000 babies and infants are diagnosed with cerebral palsy annually. Individuals with the disorder frequently exhibit spasticity, dyskinesia, and ataxia. Researchers in the field are looking to advances in neuroplasticity, neural regeneration, and neuroprotection as long-term treatment strategies.

At the [United Cerebral Palsy](#) 2009 Annual Conference, held in San Francisco, CA earlier this month, several neurotech vendors participated in a conference track organized by Neurotech Network executive director Jennifer French. [Medtronic Inc.](#), which manufactures an intrathecal baclofen pump to treat spasticity, made a presentation describing their device. The company also had one of their users and her parent on hand to describe their experiences with the system.

Another firm that participated in the session was [Restorative Therapies Inc.](#), the Baltimore, MD manufacturer of neurorehabilitation systems. RTI CEO Andrew Barriskill described his company's RT300 FES cycle and spoke of the company's recent activities within the cerebral palsy community. A Florida-based wellness center called Creative Children Therapy, Inc. began a program called Giant Steps, which combines traditional physical therapy with time on the RT300 and treadmill walking.

After a six-week pilot program last year with seven children with CP, one was able to sit independently for the first time, one was able to walk with a walker for the first time in seven years, one was able to stand independently for the first time, and a fourth was able to walk without an orthosis for the first time, according to Barriskill. Barriskill said that users of the RT300 are successful in obtaining reimbursement for the device in about 40 percent of cases. The device costs about \$15,000.

Also presenting at the UCP conference was Nader Kameli, COO of [Victrom Human Bionics'](#) Neurobionix division. Kameli described the company's Neurostep implanted stimulator to treat drop foot gait disorders, which recently received CE Mark approval in Europe. He also disclosed details about the second generation of the Neurostep device currently under development.

The new system will have the capability to address more gait disorders than currently available surface stimulation devices, which are geared to ankle dorsiflexion. The new Neurostep system will be able to treat individuals with spasticity or balance disorders, and will also be able to help with knee flexion. Neurostep will likely cost between \$15,000 and \$20,000 when it is available in the U.S.

*Commentary provided by Jim Cavuoto, Neurotech Reports*