

"The Clinical Advantage"™

Parkinson's Disease

Biodex Balance & Mobility

Improve Ambulation. Increase Function. Reduce Falls.

Neurorehabilitation for Parkinson's Disease

High-tech medical devices attract, and better serve,
the patient with neurological involvement

BIODEX

Assessing balance issues in patients with Parkinson's disease

Locomotor disturbance is among the early signs of Parkinson's disease. Cardinal indicators include hand tremors, rigidity, bradykinesia and postural instability. These symptoms effect locomotion and, as the disease progresses, can lead to an increased risk of falling. Footsteps become asymmetrical and small; patients display hypokinesia (deterioration in speed), akinesia (difficulty in initiating gait), and difficulty in initiating stepping – collectively termed freezing of gait (FOG).



Nearly 70% of people with Parkinson's experience a fall, and 15% of those falls result in a fracture.¹ Referral of patients with Parkinson's to either inpatient or outpatient rehabilitation clinics typically follows either a traumatic fall with serious injury, or a troubling history of increasing fall incidence that threatens a potential traumatic event. In one study published in the Journal of Neurology, Neurosurgery & Psychiatry, falls occurred in 68.3% of the 109 studied subjects.²

Ideally, physical therapists will employ a rigorous protocol for evaluating such patients prior to initiation of rehabilitation. Many clinics begin evaluation with assessment of general strength, range of motion, gait and balance.

Parkinson's disease on the rise

According to the Parkinson's Foundation, Parkinson's disease affects one million people in the United States and ten million worldwide; about 60,000 new cases are reported annually. These figures are expected to increase as the average age of the population increases. The disorder appears to be slightly more common in men than women. The average age of onset is about 60. Both prevalence and incidence increase with advancing age; the rates are very low in people under 40 and rise among people in their 70s and 80s.

1. Roller, W.C., Glatt, S., Vetere-Overfield, B., Hassanein, R. (1989). Falls and Parkinson's Disease. *Clinical Neuropharmacology*, 12(2):83-145.

2. Wood B., Bilclough J., Bowron A., Walker R. (2002). Incidence and prediction of falls in Parkinson's disease: a prospective multidisciplinary study. *J Neurol Neurosurg Psychiatry*, 72 (6): 721-725. doi: 10.1136/jnnp.72.6.721.

A growing, underserved population

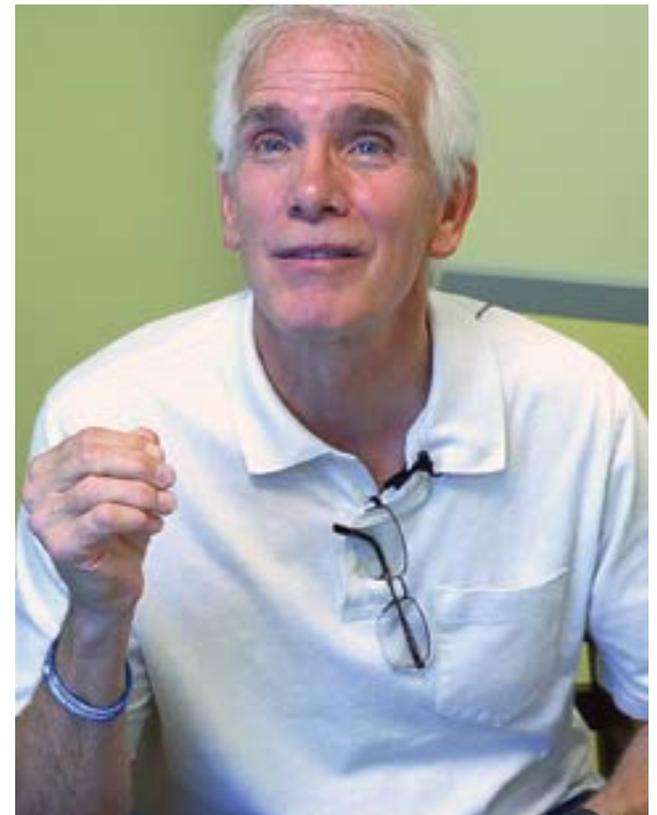
Rehabilitation centers of all types, ranging from the most comprehensive inpatient/outpatient services to the smallest physical therapy clinics, can equip themselves to manage the symptoms of Parkinson's. Periodic physical therapy and regular exercise is required to slow progression of the symptoms and maintain quality of life.

Objective documentation proves need for reimbursement

This surge in neurologic conditions coincides with the most challenging economic environment healthcare providers have seen in decades. Both public and private payers are reducing reimbursement fees and schedules, and demanding more objective documentation of intervention efficacy.

Clinics concerned about competing under Medicare's "episode of care" reimbursement regulations recognize that, to operate effectively, they must acquire technology that makes them "providers of choice" for managed care insurers and ACO partners.

Biodex technology will help you justify need, demonstrate progress and improve outcome. The integration of Biodex Balance & Mobility devices can help you meet the challenges of serving this growing population.



Improve outcomes and reduce the time and costs necessary to operate effectively while serving managed care patients, and Medicare Part A and B subscribers.

Balance System™ SD

In practice, the patient stands on the Balance System™ SD and is asked to shift their weight left and right. The Balance System can capture, quantify and document relative tendency to overcompensate to one side or the other. As a result, therapists can often determine if an inappropriate response is a unilateral strength issue – for example, weak abductors – or an initiation or stabilization issue, a footwear issue, or even a visual issue. To tease out those possibilities, therapists can use the Balance System in its random weight shift mode to challenge a patient's weight-shifting capability.

In the Balance System's objective motor control mode, therapists not only evaluate weight shifting capabilities, but can establish a baseline of their tendency to be repulsive (inappropriately distribute weight to the heels).

Many therapists have determined that the balance issues characteristic of Parkinson's disease can be more easily and accurately identified and documented with the Biodex Balance System SD, a multifunction diagnostic and therapeutic instrument used in thousands of clinics across the United States.

Vibrotactile cueing provides a means to enhance postural control with eyes closed and improves balance rehabilitation by directly engaging the motor-learning system, reinforcing neuroplasticity, and providing sensory enrichment to therapy tasks. While audio and visual biofeedback are inherent to the Biodex Balance System SD, the VibroTactile System™ is offered as an option. Using wireless technology, the tactile belt delivers a vibration sensation when a patient sways outside their therapist-set parameters.

Once the patient's balance issues are assessed, therapists can initiate treatment

The Balance System SD offers a wide range of therapist-programmable functions. For example, to rehabilitate a patient's weakness in shifting to the right, a patient can be positioned off-center on the platform, forcing an over shift to the right to maintain the positioning dot centered on the touchscreen.

The Balance System provides visual feedback for each weight shift, helping patients to clearly focus on that component of their balance, while also working on general and isolated strengthening. This precise visual feedback of even the smallest movements gives both the patient and therapist a clearer idea of how altered proprioception may be affecting the patient as well as a better appreciation of what the patient needs to do in order to achieve certain goals. This helps to guide the direction of home exercises with caregivers – for example, turning and rotating while walking, Tai Chi exercises, kicking a ball in a specified direction, or catching a ball tossed to their predetermined side.



www.biodex.com/balance

Unique features of the Biodex Balance System SD

- Platform – the technologic heart of the Balance System SD is an instrumented platform offering 12 dynamic levels for assessment and training of patients with different degrees of instability. A locked mode allows static measurements and initiation of balance therapy.
- Software – linked to the instrumented platform, the intuitive interface and 15.6" touchscreen provides an improved user experience. Choose from six test protocols and six training modes, each therapist-selected and adjusted from simple menus.
- Neuro-specific protocols – for patients with neurological involvement, useful modes include *Fall Risk* screening, *Motor Control*, *Postural Stability*, and *Clinical Test of Sensory Integration of Balance (CTSIB)*.
- Microsoft® SQL Database – Allows clinician to easily store and retrieve patient data, multiple tests per patient. Export to Excel® for reporting and analytics.
- Normative data - each patient's performance can be captured, printed and compared to age-matched normal ranges; documents for PTs, insurers and patients the functional gains from session to session.



Gait Trainer™ 3

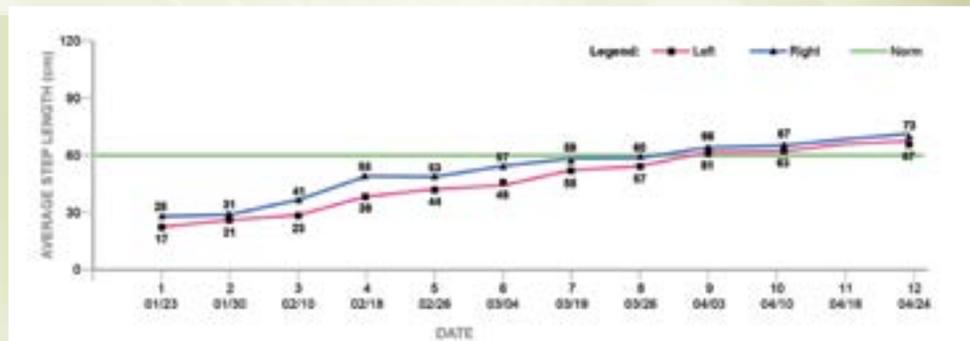
The benefits of rhythmic walking for neurologic conditions such as Parkinson's is what drove the development of the Biodex Gait Trainer 3. Treadmill training combines with biofeedback and therapist-informed music compositions to enhance neuroplasticity, reorganizing neural pathways to regain motor function.

If patients with Parkinson's enter therapy while still reasonably stable, most can safely use the Gait Trainer™ 3 with one of several optional handrail configurations. Those with significant instability due to the disease process or with fall-related injuries can benefit from body-weight support provided by the NxStep™ Unweighing System or security of the FreeStep SAS.



Unique features of the Biodex Gait Trainer 3

- Instrumented deck – the Gait Trainer 3 monitors and records step length, step speed and right-to-left time distribution (step symmetry) – all gait factors that must be corrected in Parkinson's disease, if patients are to reduce their fall risk.
- Audio cueing and visual biofeedback – motivates patients with metronome and biofeedback, prompting proper gait patterns.
- Music-Assisted Therapy Package – Rhythmic Auditory Cueing (RAC) is available with optional music therapist-informed compositions. High-quality recordings use specific musical components and correct beats per minute to facilitate desired gait patterns and enhance neuroplasticity. Results of music-supported therapy can be documented.
- Objective documentation – after each therapy session an exercise summary report is available to track progress and document outcomes. The Gait Trainer 3 compares the tested patient's step length, step speed, and step symmetry to age- and gender-based normative data.



Document changes over time (average walking speed, exercise time, distance, steps, average step length, step length variability, and time on each foot) via progress reports.

www.biodex.com/gait

Music-Assisted Therapy

The Science of Sound Driving Functional Movement

For many years, investigators and clinicians worldwide have observed that individuals with Parkinson's disease display improved gait when provided musical audio pacing and cues during gait training. Today, music-based therapy is gaining momentum as a powerful evidence-based treatment for Parkinson's and other movement disorders.

While Rhythmic Auditory Cueing (RAC) is the most widely researched neurological music therapy application, new studies are emerging that show non-rhythmic elements in music can be applied to improve not only temporal gait measures such as stride length and gait velocity, but functional movements such as arm swing, hip flexion, and postural alignment.

The Music-Assisted Therapy option for the Gait Trainer 3 features compositions written and performed by music therapists to facilitate desired movement patterns. Repetition of correct movement through gait training enhances neuroplasticity. The advanced technology built into the Gait Trainer 3 documents progress, proving the value of treatment.

Studies have shown adapting music tempo to the patient's cadence is more effective than fixed-tempo music application. The music therapist-informed compositions in the Music-Assisted Therapy Package can be adjusted to a range of beats per minute (bpm) without degrading music quality – even accommodating lower bpm for late stages of Parkinson's.

Gait + Biofeedback + Informed Music = Better Outcomes

www.biodex.com/musictherapy

Download White Paper

Rehabilitation of Neurologically Affected Gait
with Music Enhanced Treadmill

www.biodex.com/wp/music



NxStep™ Unweighing System

The Biodex NxStep™ Unweighing System enables full and partial weight-bearing therapy without compromising proper gait kinematics. The open frame design encourages therapist assistance and observation.

Body-weight support treadmill training (BWSTT) has demonstrated benefits in many studies of patients with Parkinson's disease, some of the earliest by Miyai and colleagues.³ The team found BWSTT patients had significantly greater improvement in ambulation speed, number of steps and performance in activities of daily living than those individuals of the same age and disease-stage receiving conventional physical therapy.



Body-weight support treadmill training (BWSTT) with the NxStep Unweighing System and Gait Trainer 3

Unique features of the Biodex NxStep Unweighing System

- Dynamic suspension – unlike simple lift devices, the NxStep Unweighing System incorporates a patented dynamic suspension that maintains constant weight offloading while accommodating up to 4 inches of the patient's vertical displacement that occurs during normal gait.
- Normal pelvic rotation – ordinary unweighing systems typically use two-point suspensions, which tend to resist natural pelvic rotation, much the way a playground swing attempts to return to neutral after being twisted. The single-point suspension of the NxStep permits functional pelvic rotation when walking, sidestepping, retro walking and turning.

3. Miyai, I. MD, Fujimoto, Y. RPT, Ueda, Y. RPT, Yamamoto, H. RPT, Nozaki, S. MD, Saito, T. MD, Kang J. MD (2000). Treadmill training with body weight support: its effect on Parkinson's disease. Archives of Physical Medicine and Rehabilitation, 81(7): 849-852.



"At Lifecare of Elkhorn, we have an inter-disciplinary program designed to meet the needs of folks that have Parkinson's disease. As part of the program we utilize the Biodex FreeStep SAS.

The FreeStep provides total assistance, so if you have someone lose their balance, they won't fall. It allows the patient to feel like they can move very freely.

Because there is no need to support the patient, the therapist can step away and [perform] manual techniques without helping them actually stand up.

With the FreeStep, they know they're safe and won't fall; giving them the confidence to work a lot harder."

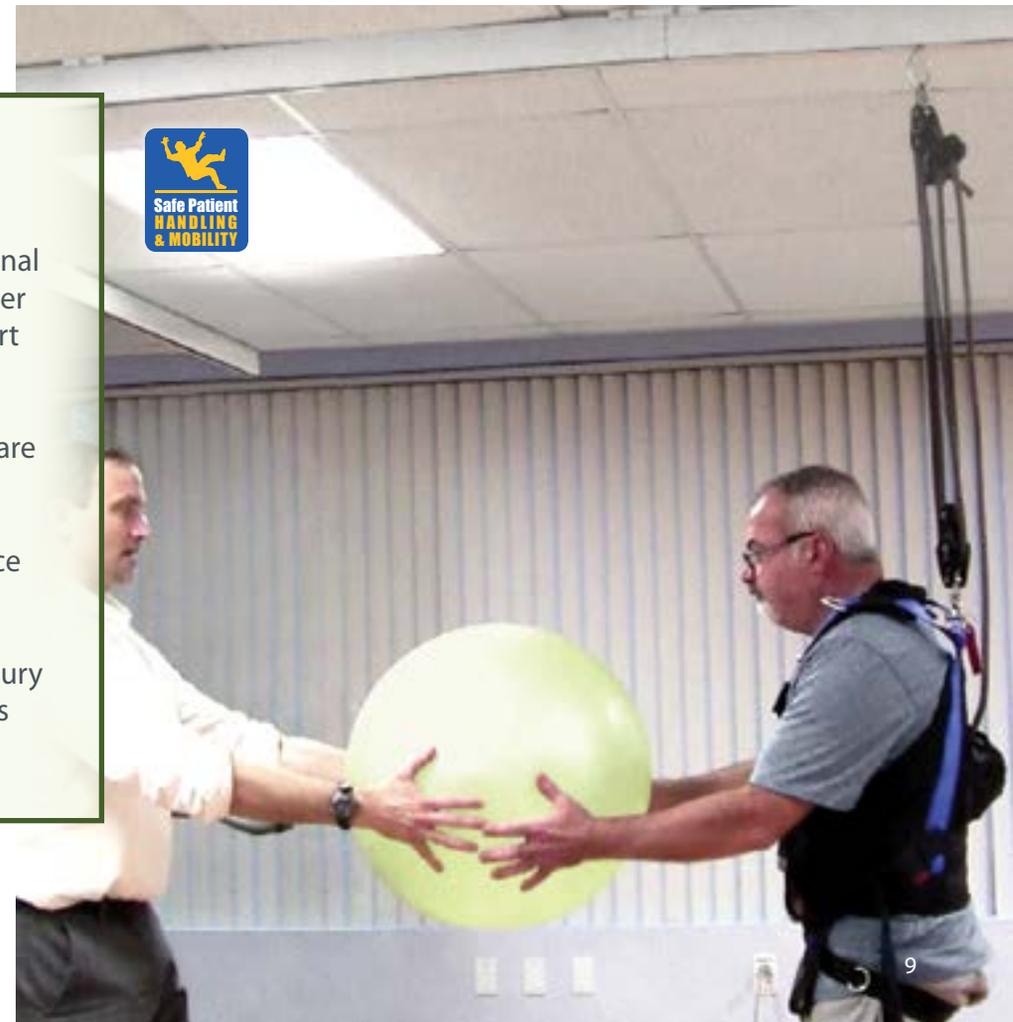
– *Cheri Prince, PT, Director of Rehabilitation Services, Life Care Center of Elkhorn*

To read Cheri's full testimonial, visit: www.biodex.com/testimonial/cheri-prince

The Biodex FreeStep Supported Ambulation System is an overhead track and harness system that provides a safe ambulation environment for both therapist and patient. Without the fear of falling, patients can focus more fully on their tasks of gait and balance. FreeStep SAS can be custom configured to your clinic, complementing the existing equipment floor plan. Install as a simple loop for continuous ambulation over stairs or through parallel bars, or add side branches for equipment-specific stations to include treadmill exercise or balance training.

Unique features of the Biodex FreeStep SAS

- Facilitates Enhanced Medical Rehabilitation (EMR) allowing for motivational techniques, greater interactivity between the patient and therapist, higher intensity sessions and increased feedback to the patient regarding effort and progress – all designed to improve functional abilities.
- Promotes Reactive Balance Training – patients can purposely fall to prepare for risks of real life and learn to fall the correct way to avoid injury.
- Designed to fit into current floor plan without using additional floor space or requiring new construction.
- Improves therapist safety – significantly mitigates the risk of therapist injury while assisting patients – allowing the therapists to focus on the patient's needs and progress, rather than support.



Active and Passive Motion for Upper and Lower Body

Designed for people with physical limitations, medBike® enables both upper and lower active-passive training in one compact device. Simple operation supports independent use by individuals in their home, or in clinical settings. The open design offers comfortable access when exercising from a chair or wheelchair, allowing for earlier movement training interventions.

Proven very effective for patients with Parkinson's disease, the movement training of medBike helps gently loosen and strengthen muscles and reduce spasticity. Research has shown that some people with Parkinson's disease can benefit by exercising in the Pedal Assisted Mode at the higher rpm levels that the medBike offers, up to 90 rpm.

The Continuous Control System avoids overstraining the lower- and upper-leg muscles, creating safe exercise conditions.

Download Clinical Guideline

Treatment of Patients with Parkinson's disease using Biodex Technology.

www.biodex.com/guideline/pd



Unique features of the medBike

- Three modes of operation – Active mode relies on user strength input, Passive mode provides motorized movement. Pedal Assisted mode combines user strength input and motorized output.
- In Pedal Assisted mode, the Continuous Control System measures the strength of the user's input and will assist with the rotational movement to meet the selected setting.
- Programmable personal exercise sessions with specific resistance and time values. Forward and reverse pedal movement can also be combined into one training session.

www.biodex.com/medbike



medBike is distributed exclusively by Biodex in the USA only.

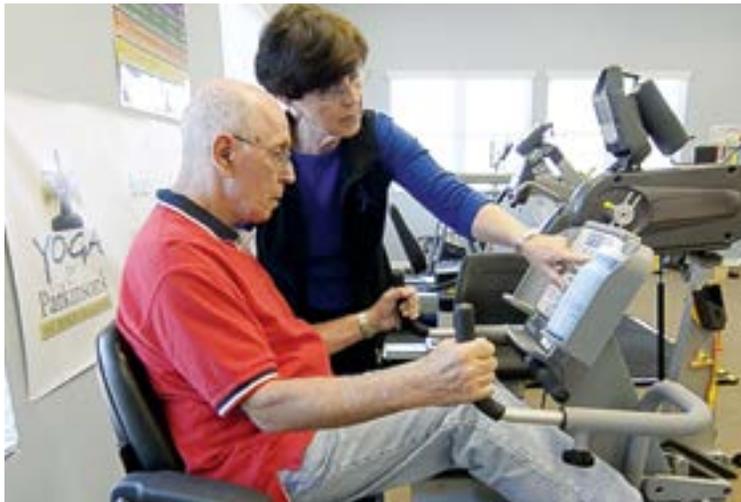
BioStep™ 2 Semi-Recumbent Elliptical

To provide patients with an alternative exercise option to treadmill walking, many clinics have selected the Biodex BioStep™ 2 Semi-Recumbent Elliptical. For those with lower extremity issues such as arthritis or claudication, the BioStep's fluid motion reduces joint impact because the user is not required to lift and strike their feet on the walking surface.

For patients with Parkinson's disease, therapists report non-gait exercise provides promising benefits

Arm swing is characteristically unbalanced and asynchronous, which negatively impacts gait. Stride length usually shortens to compensate for lack of shoulder and arm movement, as well as leg stiffness due to rigidity.

BioStep upper- and lower-extremity exercise loosens characteristically tight muscles. When patients with Parkinson's come off the BioStep, they are able to ambulate more easily and more freely, without tiring. Ideally, patients will exercise 3-4 times per week on the BioStep to maintain gains.



www.biodex.com/biostep



"Typically, I start a rehab session with several minutes on the Biodex BioStep Semi-Recumbent Elliptical," Ms. Hagan explains. "That helps them loosen up, and starts them extending their upper and lower extremities, readying them for work on the Biodex Gait Trainer."

Ms. Eleanor Hagan, Owner, Body in Balance Rehab & Fitness Center, Linwood NJ

[When I concentrate on my BioStep exercise]... "it feels like I don't have Parkinson's. The more I practice, the less I shake. Since I started exercising, I find that my shaking goes away much of the time, and I feel better about myself. Once I start my session, I feel physically fit, like there's nothing wrong with me."



Carmine, Patient with Parkinson's disease

Unique features of the Biodex BioStep 2 Semi-Recumbent Elliptical

- Increased amplitude of synchronized arm and leg motion helps reduce freezing and promotes reciprocal patterning.
- Elliptical motion provides smooth, continuous "zero-joint impact" exercise.
- Combines bi-directional, lower-extremity exercise with upper-body motion with natural rhythmic arm swing.
- Rotating seat and step-through design for easy and safe entry and exit.
- Strengthens muscles associated with walking, balance, and mobility for even the most deconditioned patients.

Improve Ambulation. Increase Function. Reduce Falls.

Be the Provider of Choice for this growing population... with Biodex.

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Balance System™ SD



Gait Trainer™ 3



NxStep™ Unweighing System



FreeStep SAS



BioStep™ 2



medBike®

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