

"The Clinical Advantage"™



Concussion Management

BIODEX Balance Assessment for Concussion Management

Consistent with NCAA and NATA Guidelines

*"At a minimum, the baseline assessment should consist of the use of a symptoms checklist and standardized cognitive and balance assessment."*¹

– 2013 -14 NCAA® Sports Medicine Handbook

*"Formal cognitive and postural-stability testing is recommended to assist in determining injury severity and readiness to return to play (RTP)."*²

– NATA® Position Statement on Sport-Related Concussion

BIODEX

Leader in objective Balance Assessment for Concussion Management

BIODEX

Balance Assessment for Concussion Management

“Objective balance assessment is recognized as part of ‘best practice’ for concussion assessment and management.”³

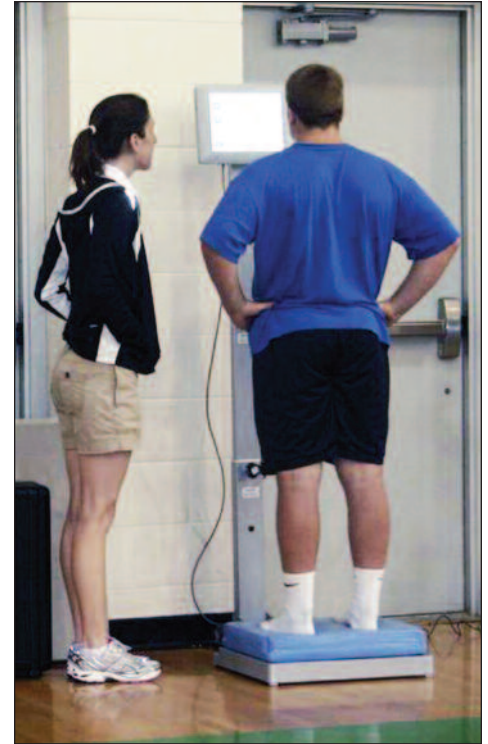
— *International Symposium on Concussion, Consensus Statement*

As research continues to demonstrate the potential long term impact of concussion in sports, the importance of objective assessment in the management of concussion has become vital.

Biodex Balance Assessment for Concussion Management adds the objective neurophysical component that gives clinicians the ability to quantify the elements of balance before and after an injury occurs. Using the Clinical Test of Sensory Integration of Balance (CTSIB), Biodex Balance Assessment can independently test all three sensory feedback systems (visual, vestibular and somatosensory).

The objective data provided by the Biodex Balance Assessment tool provides a performance baseline against which post-injury performance can be compared. In addition, a healthy population of student-athletes is stored on the system for general normative data comparison.

Detailed summary and progress reports track recovery and provide the medical team with quantitative data to help with the return-to-play decision.



“A decreased ability to maintain balance is one of the hallmark signs of concussion.”⁴

Baseline Testing



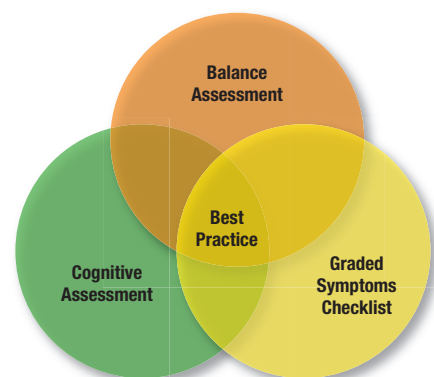
Baseline tests are performed on athletes preseason to establish an individual athlete’s pre-injury performance.

Today, the proper management of concussion should include baseline **Balance Assessment, Cognitive Assessment and Graded Symptoms Checklist.**

The NCAA® and NATA® have identified these as the three essential assessment pillars.

When combined, these preseason baseline tests can provide a comparison point for cognitive function and objectively quantified balance for athletes. In the case of a suspected concussion, it is these baseline tests which post-injury assessments are compared, providing the objective data necessary to track recovery.

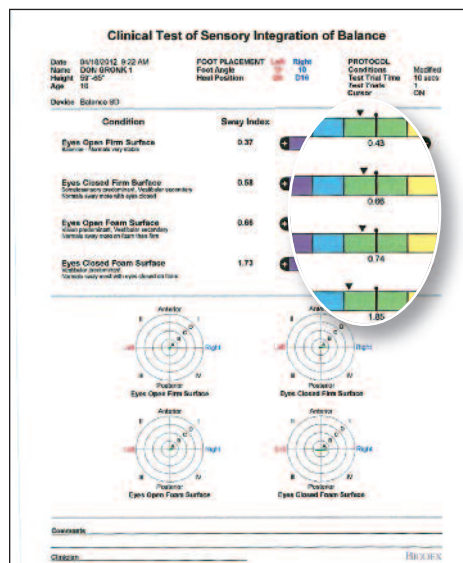
Best Practices in Concussion Management



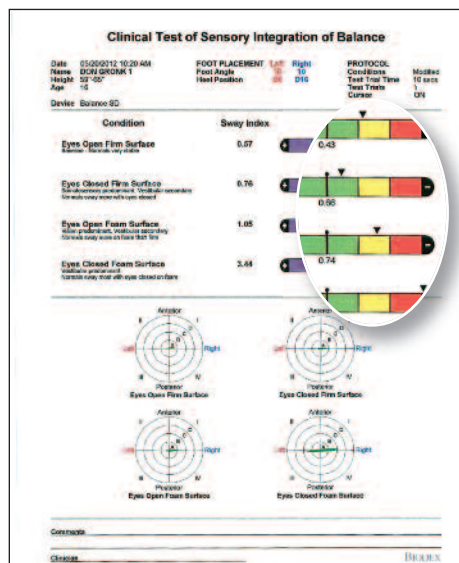
It is recommended that baseline tests include a Balance Assessment, Cognitive Assessment and Graded Symptoms Checklist.

Objective Documentation

CTSIB Summary Reports - Baseline and Post Injury



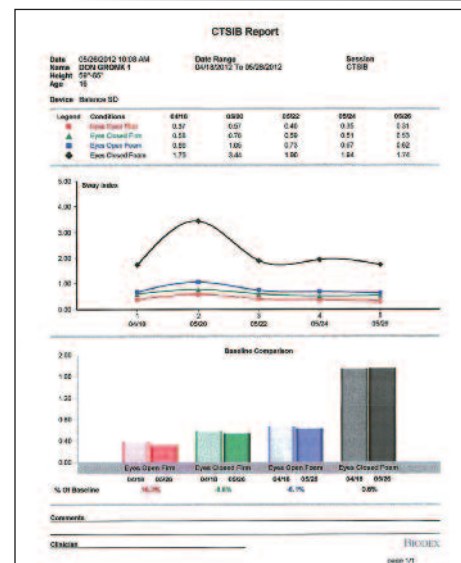
▲ Baseline Assessment



▲ Post-injury Assessment

NOTE: The position of the arrows in the enlarged view in relation to normative mean between the Baseline and Post-injury Assessment.

Progress Report



▲ Progress Report graphs results of the four sensory conditions over time.

Data from objective measures of postural stability is a critical component in determining severity of injury and post-injury recovery.

Both the Biodex Balance System SD and portable BioSway provide postural stability/balance testing with objective documentation including detailed baseline and post-injury summary reports and progress reports with comparison to normative data.

NEW normative databases are available targeting athletic population for a leading edge with balance assessment for concussion management.

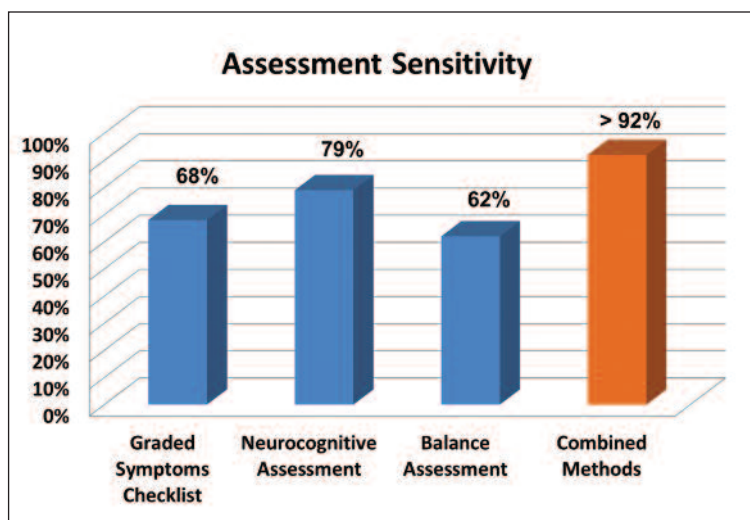
Updated Patient Data Collection Software Utility provides an easy way to export patient data as a .csv file for statistical analysis or Excel to create your own normative data.

The objective measure from postural stability/balance testing provides clinicians with an important additional piece of the concussion puzzle and assists them in determining readiness for return to play.⁵

Measuring Balance

Research shows that athletes often demonstrate decreased stability post-concussion.⁶ The postural stability deficit can best be explained by a sensory interaction problem that prevents concussed athletes from accurately using and exchanging sensory information from the visual, vestibular, and somatosensory systems.⁶ Difficulty in postural sway control can persist even after signs and symptoms of concussion subside.⁷ More simply stated, the athlete may appear asymptomatic and even pass a computerized cognitive test. However, the lingering effects of a balance disturbance from head trauma would go otherwise undetected without a balance assessment.

In fact, research has shown that balance assessment, in combination with cognitive testing and a graded symptoms checklist, increases overall sensitivity to greater than 90%.⁸



▲ Concussion should be approached through a multifaceted assessment, and each component of the assessment process should focus on distinct aspects of an athlete's function.⁸

Balance Technology

Biodex Balance Assessment is conducted using either the versatile Balance System™ SD or portable BioSway™. The Biodex Balance System SD is a sophisticated measuring and training device for static and dynamic balance testing and training. The BioSway is a portable balance device with a static-only platform.

The mCTSIB can be performed on either Biodex balance device, designed to systematically test the sensory selection process by compromising available somatosensory, visual and vestibular senses while measuring an athlete's ability to minimize postural sway.

The Sway Index is an objective quantification of postural sway and is measured during the mCTSIB. The test provides a generalized assessment of how well an athlete can integrate various senses with respect to balance, and compensate when one or more of those senses are compromised. A higher Sway Index indicates a reduction in the athlete's ability to remain steady during the test.

In addition to performing the mCTSIB test, the **NEW** version of the Balance System SD and BioSway software now includes the option of conducting a modified version of a Balance Error Scoring System (BESS) test of postural stability, popular for concussion management. Both systems now feature the ability to create custom sensory integration balance testing which allows for modification of existing or the creation of entirely new protocols with both the mCTSIB and BESS tests.⁹



CLINICAL TEST OF SENSORY INTEGRATION OF BALANCE (CTSIB)

The Biodex mCTSIB quantifies postural sway under these four sensory conditions:

Eyes Open, Firm Surface	Provides a baseline. Information available by all three sensory inputs: Somatosensory, visual and vestibular
Eyes Closed, Firm Surface	Visual not available; somatosensory and vestibular are available. If the athlete performs poorly, the vestibular or somatosensory may be compromised, with an increase in visual dependency.
Eyes Open, Unstable Surface	Somatosensory compromised; visual and vestibular are available. If the athlete performed poorly, visual or vestibular may be compromised, with an increase in somatosensory dependency.
Eyes Closed, Firm Surface	Visual not available; somatosensory compromised, only vestibular available. Concussed athletes are most likely to present problems in this condition. If performance is reduced beyond normal or baseline readings, the vestibular system may be disrupted.

The Clinical Test of Sensory Integration of Balance (CTSIB) is the accepted standardized assessment that identifies and tracks disturbances in balance and the three associated sensory systems.

Combined with today's technological advances, the CTSIB provides the sports medicine community with a more accurate and objective assessment tool for evaluating postural stability.

PEER PERSPECTIVE

Balance assessment gets thumbs up from High School Athletic Director



Scott Stein is the athletic director and head football coach at Sun Valley High School. "The baseline testing that we've done in the last couple of years has been excellent for us as athletic directors and coaches in understanding our kids. The new information that we're getting – from concussion screening to the equipment that they're wearing – allows us to get more involved in protecting the lives of the student-athletes that are playing sports for us," said Stein.

"The Balance testing for concussion is a big part of understanding when a student-athlete can come back to play safely. It's come all the way down from professional sports and is now at the high school level. In Union County, balance testing is going to be a big part of keeping our kids safe and healthy."

*Scott Stein, Athletic Director
Sun Valley High School, NC*



Whatever the Sport...

Balance Assessment for Concussion Management

BIODEX BALANCE ASSESSMENT PROGRAM FOR CONCUSSION MANAGEMENT

• Objective Balance Assessment

Both the Biodex Balance System SD and the portable BioSway deliver objective preseason baseline and post-injury balance assessment and provide extensive reporting capabilities for post-injury comparison.

These devices provide the Clinical Test of Sensory Integration of Balance (CTSIB) and the Balance Error Scoring System (BESS) test for postural stability, both suitable for concussion. The mCTSIB and BESS tests can be customized to suit your facility's needs.

Both products not only provide a balance assessment program for concussion management, but also offer multiple rehabilitation training protocols that can be used across a broad scope of athletic populations for general orthopedic and neuromuscular rehabilitation and athletic conditioning.

• NEW CTSIB Utility Software (complimentary download)

Allows you to store athlete baseline test results, compare to post-injury balance assessments and manage progress with documentation.

• NEW Extensive Normative Data

A healthy population of student-athlete data is stored on the system for general normative data comparison.

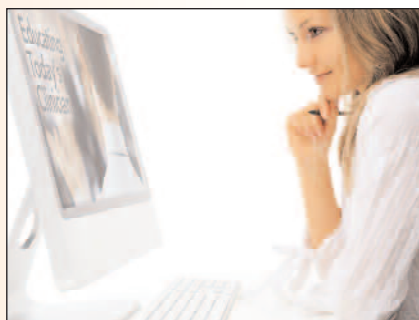
• Summary & Progress Reports

Show status, progress and outcomes of balance tests. These reports can be forwarded to doctors, coaches, parents or athletes to provide quantitative data that substantiates return-to-play decisions.

EDUCATION & TRAINING



Biodex combines science with practical application to present a series of interactive eLearning modules, hands-on workshops, evidence-based clinical protocols, and training



webinars all designed to help you better understand and utilize your Biodex Balance devices.

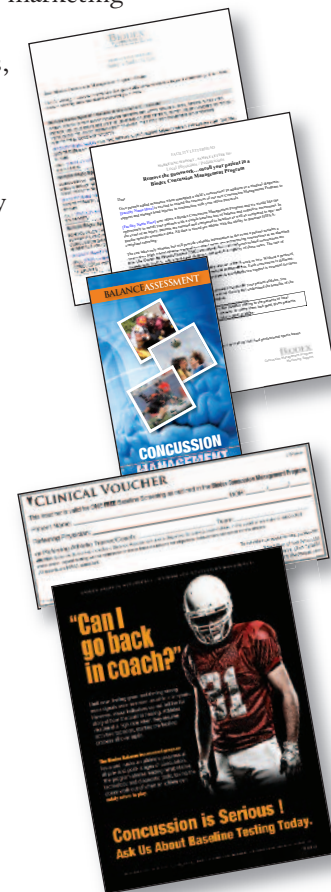
www.biodex.com/education

MARKETING SUPPORT

Available exclusively to our customers using Balance Assessment in support of a concussion management program, Biodex provides an assortment of marketing materials to attract athletes, parents, community sports teams, school coaches and athletic directors, as well as referring pediatricians. Materials can be customized to reflect your facility and used to broadcast the role of Balance Assessment in the management of concussion.

Materials Include:

- Sample letters
- Tri-fold brochure
- Sample press release
- Clinical voucher
- Concussion posters
- Physician education flyer
- Ads
- Scroll Sign
- Clinical brief



NEW Concussion Health

Biodex has partnered with Concussion Health, a leader in educating clinicians, on how to bridge the gap between concussion assessment and rehabilitation.

CONCUSSION HEALTH PURCHASE POINTS PROGRAM

Purchase a Biodex Balance System SD or portable BioSway and Biodex provides, at no additional cost, purchase points toward any Concussion Health product.

www.biodex.com/concussionhealth



Balance Assessment for Concussion Management

Balance System SD

Features static and dynamic balance testing and training. The Balance System SD not only serves your concussion management needs, but standardized athlete knee injury screening tests, plus six interactive training modes to provide valuable and effective proprioceptive and neuromuscular training.

950-440 Balance System SD

Includes Indexed CTSIB Pad, Printer and Printer Stand.

Concussion Utility Upgrade for existing Balance System SD* owners:

To upgrade your Balance System SD (software v1.3 or higher), you will need to download our CTSIB Utility Software and purchase the Indexed Foam Pad.

950-303 Pad, CTSIB Indexed



▲ Biodex Balance System SD™
Printer and Printer Stand included.

BioSway

The portable BioSway utilizes a static-only platform for balance testing and training. It features a lightweight, portable instrumented platform, easy-to-use 12" color, touch-screen display, standardized testing, interactive training, plus a hard shell travel case – perfect for when testing is brought to the athlete.

950-460 BioSway, 12.1" Display with Tabletop Stand and Case

950-461 BioSway, 12.1" Display with Tabletop Stand

Includes: Instrumented platform, CTSIB Indexed Pad, 12.1" color touch-screen LCD display with tabletop stand/wall mount bracket, AC adapter for 100-240 V input and two blindfolds.

Optional:

950-465 Adjustable Height Stand for 12.1" Display

950-464 HP Office Jet Printer (compact portable printer)

950-467 HP InkJet Printer

Concussion Utility Upgrade for existing BioSway* owners:

To upgrade your BioSway, you will need to download our CTSIB Utility Software and purchase Adjustable Height Display Stand and Printer.



▲ Biodex BioSway
Printer and Printer Stand sold separately.

Concussion Resources Include:

- **NEW eLearning Tutorials** for increased product utilization.
- **Marketing Support** for Balance Assessment for Concussion Management.
- **CTSIB Utility Software** for storing baseline test results, compare to post-injury balance assessments and manage progress with documentation.
- **Patient Data Collection Utility Software** easily converts test results to a .csv file or Excel to run statistical analysis and create normative data.

*** Software Upgrades Available.** Contact Biodex Customer Service or download at www.biodex.com/software.

1. 2011-12 NCAA® Sports Medicine Handbook, National Collegiate Athletic Association, July 2011
2. Guskiewicz, KM, et al (2004). National Athletic Trainers' Association Position Statement: Management of Sport-Related Concussion Journal of Athletic Training 2004;39(3):280-297
3. McCrory P, Meeuwisse W, Johnston K, Dvorak J, Aubry M, Molloy M, et al. Consensus statement on concussion in sport: the 3rd International Conference on concussion in sport, held in Zurich, November 2008. J Clin Neurosci. 2009;16:755-63.
4. Broglio SP, Guskiewicz KM. Concussion in Sport: The Sideline Assessment. Sports Health. 2009; 1:361
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8. Broglio SP, Macciocchi SN, Ferrara MS. Sensitivity of the concussion assessment battery. Neurosurgery. 2007;60:1050-1057; discussion 1057-1058.
9. Finnoff, JT, et al (2009). Intrarater and Interrater Reliability of the Balance Error Scoring System (BESS). PM&R, Volume 1, Issue 1, January 2009

DISCLAIMER: The information provided is not intended to be a substitute for professional medical advice but as a guideline to assessing athletes following a concussion. Always seek the care of a physician or other qualified healthcare provider with any questions or concerns you may have about a medical condition. If there is any question/concern about the athlete's status then recommend not returning to play.

www.biodex.com/concussion

BIODEX

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