THE IMPORTANCE OF MEASURING BALANCE

Research shows that athletes often demonstrate decreased stability post-concussion. 1 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. 1 Difficulty in postural sway control can persist even after signs and symptoms of concussion subside. 2 Or, 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 otherwise go undetected without a balance assessment.

Biodex Balance Assessment for Concussion Management adds an objective neurophysical component that gives clinicians the ability to quantify the elements of balance before and after an injury occurs. The program takes you through baseline testing, to sideline assessment, through post-injury evaluation and rehabilitation.

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.

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).

In addition to performing the CTSIB test, the Balance System SD and BioSway software 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 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 CTSIB and BESS tests. 3

The objective data generated by the Biodex Balance Assessment component provides a baseline against which post-injury performance can be compared. In addition, test results from 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 your medical team with quantitative data to help with the return-to-play decision.

Why a STATIC platform is important...

There are certain tests and training protocols that are meant to be done on a STATIC (firm) platform, including Limits of Stability (LOS), Percent of Weight Bearing and the Clinical Test of Sensory Interaction in Balance (CTSIB).

The CTSIB test was researched and presented by Shumway-Cook and Horak, originally published in the APTA Journal in 1986. It’s important to note that the CTSIB test calls for a static platform on which to achieve the test. While a foam pad is introduced for certain conditions, the test cannot be performed accurately on a dynamic-only surface, as this would significantly stray from the protocol.

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www.biodex.com/research/16245

Concussion Health Education Products

Biodex has partnered with Concussion Health, a leader in educating clinicians on how to bridge the gap between concussion assessment and rehabilitation. Concussion Health educates users on how to use data from an assessment and place it into a comprehensive care plan for recovery.

www.biodex.com/concussionhealth

Learn more
www.biodex.com/concussionhealth


When 19 year-old Brookdale Community College soccer player Devin Hope stepped into db Orthopedic Physical Therapy in Lincroft, NJ, little did she realize her visit would help prove a point David Bertone, PT, DPT, OCS had been trying to hammer home to his local sports communities.

Hope followed the doctor's advice, but her school also had a progressive concussion management program and referred her to Bertone, who had used the Biodex BioSway to complete a baseline balance study of the college's men's and women's soccer teams before the concussion occurred.

“I really think we need to educate the public more about the signs and symptoms of concussion,” stated Bertone. “And I think all sports leagues should have access to a practice using a comprehensive concussion program, which includes Biodex Balance Assessment with baseline balance testing using a device like the BioSway.

“Medical attention should be the rule, not the exception.”

“According to Bertone, after an injury occurs where there is no loss of consciousness, a sideline cognitive and functional assessment can be critical in a return-to-play decision. Kids often complain of concussion symptoms but coaches and parents aren’t aware of the signs, so injured athletes are rushed back too quickly. The most prudent point that parents and coaches need to understand is that kids must sit out if there is any doubt.”

BIODEX BRINGS IT ALL TOGETHER

Once a determination has been made to seek therapy for a concussion, Biodex Balance Assessment for Concussion Management, when used in conjunction with accepted neurocognitive testing programs, adds the vital vestibular and objective balance assessment now considered so important in concussion assessment.

Bertone has found his local sports leagues, high schools and colleges open to the idea of incorporating baseline balance testing and a concussion management program into their standards, and he would like to see more clinicians and physical therapists approach these groups to offer such services.

Continued on page 5.
Preventing injury implies the identification and understanding of the factors leading to that injury. Such an approach could allow the development of the most appropriate strategy for reducing the risk. In spite of a great number of possible causes postulated in the literature, only a few factors have been scientifically associated with injury, while others have been simply suggested as being implicated. In the context of hamstring strain, intrinsic factors related to individual features seem more predictive of injury than extrinsic ones, which are principally environment-related. Injury is a common occurrence through rapid, active extension of the knee, which solicits eccentric action to the hamstrings, decelerating the lower leg in the late swing phase. It has also been suggested that the hamstring muscles are vulnerable to injury during the rapid change from their eccentric to concentric action, when they become active hip extensors. At some exercise intensity, the player surpasses the mechanical limits tolerated by the muscle unit, justifying the analysis of strength imbalance as a factor leading to hamstring strain. In spite of abundant literature dedicated to the topic, today the relationship between muscle injury and strength disorders remains controversial.

Conclusion: Rehabilitation with an emphasis on eccentric strength training, with the hamstrings in a stretched position, resulted in zero recurrent injuries at an average of 1.7 years after return to play.


Read the full study www.biodex.com/research/hs151

Strength Imbalances and Prevention of Hamstring Injury in Professional Football Players

Preventing injury implies the identification and understanding of the factors leading to that injury. Such an approach could allow the development of the most appropriate strategy for reducing the risk. In spite of a great number of possible causes postulated in the literature, only a few factors have been scientifically associated with injury, while others have been simply suggested as being implicated. In the context of hamstring strain, intrinsic factors related to individual features seem more predictive of injury than extrinsic ones, which are principally environment-related. Injury is a common occurrence through rapid, active extension of the knee, which solicits eccentric action to the hamstrings, decelerating the lower leg in the late swing phase. It has also been suggested that the hamstring muscles are vulnerable to injury during the rapid change from their eccentric to concentric action, when they become active hip extensors. At some exercise intensity, the player surpasses the mechanical limits tolerated by the muscle unit, justifying the analysis of strength imbalance as a factor leading to hamstring strain. In spite of abundant literature dedicated to the topic, today the relationship between muscle injury and strength disorders remains controversial.

In a previous study, muscle strength performance disorders were isokinetically detected in about 70% of cases after hamstring strain, with lingering discomfort on return to the field.

This underlined a preferential eccentric peak torque deficit and a significant reduction of a mixed eccentric hamstring/concentric quadriceps (H/Q) ratio. It was suggested that recurrent injuries might be the consequence of inadequate rehabilitation. Nevertheless, it remained unclear whether strength imbalances were solely the consequence of the initial injury or a current causative factor for reinjury, or both. Subsequently, athletes with muscle imbalances and lingering complaints after hamstring strain followed a rehabilitative program individually adapted from their initial strength disorder profile. Normalization of isokinetic parameters, based on very strict cutoffs related to bilateral hamstring asymmetries and H/Q ratios, led to a significant reduction in the subjective intensity of discomfort and the avoidance of subsequent hamstring re-injury.

The current prospective study investigated the isokinetic intervention as a preseason screening tool in professional football players.

We aimed to determine:
(1) whether isokinetic strength variables collected through a preseason assessment could be predictors of subsequent hamstring muscle strain and
(2) whether normalization of strength performances and agonist/antagonist ratios in the preseason imbalanced player could significantly reduce the incidence of hamstring injury.


http://dx.doi.org/10.1177/036354650831764

Read the full study www.biodex.com/research/hs213
FOCUS ON: ACL SURGERY AND RTS CRITERIA

When is it safe to return to sport after ACL Surgery?

To which Mick Hughes, Physiotherapist and Exercise Physiologist at Melbourne Sports Medicine Centre replies “How long is a piece of string?”

While professional athletes have the incentive advantage and resources to Return to Sport (RTS) after ACLR quickly, usually 8-12 months, there is clear research emerging that demonstrates a safe and successful path for all.

THE DECISION TO RTS SHOULD BE BASED ON MEETING KEY PERFORMANCE STANDARDS

Two recent studies review ACL reinjury rates; both demonstrating the need to fulfill performance criteria before return to sport, with moderately similar results. While healing time plays an important factor*, measuring Quads strength within 10% of uninvolved leg and several other tests prove equally vital. Download the studies to learn more.

SYSTEM 4 PRO™
FULLY ACCOMMODATES A WIDE VARIETY OF POSITIONS AND EXERCISES.

Featuring a positioning chair with 360 degrees of rotation, motorized seat height adjustment and superior stabilization, the System 4 Pro™ only requires 64 square feet of operating space. Standard attachments: hamstring, back extension/flexion, linear closed-chain, upper extremity and an array of work simulation attachments.

SYSTEM 4 MVP™
A MID-POINT COMPROMISE, WITHOUT COMPROMISE.

Designed with fixed-height, single-chair positioning, fully assisted dynamometer height adjustment, with front-to-back chair adjustment and side to side dynamometer adjustment, the System 4 MVP™ only requires 64 square feet of operating space. Standard attachments: ankle, knee, shoulder, elbow and wrist. Optional attachments: hamstring, back extension/flexion, linear closed-chain, upper extremity, hip and array of work simulation attachments.

SYSTEM 4 QUICK-SET™
DESIGNED FOR KNEE, ANKLE, SHOULDER, ELBOW & WRIST.

If space and budget are primary concerns, the System 4 Quick-Set™ is what you need. This system requires only 32 square feet of operating space yet still ensures maximum patient stabilization. It features a fixed-height positioning chair with 360-degree rotation and front/back travel for easy patient setups. Standard attachments: ankle, knee, shoulder, elbow and wrist. Optional attachments: hamstring, back extension/flexion, linear closed-chain, upper extremity, hip and array of work simulation attachments.

More than 4,000 Biodex Dynamometers are in use worldwide. Below is an abbreviated list of the elite users.

US Pro Teams/Notables
- Boston Celtics
- Boston Red Sox
- Carolina Panthers
- Chicago Bears
- Dallas Cowboys
- Denver Broncos
- Green Bay Packers
- Houston Rockets
- Indianapolis Colts
- Kansas City Royals
- Los Angeles Dodgers
- Los Angeles Lakers
- New York Rangers
- New York Knicks
- Orlando Magic
- Pittsburgh Penguins
- Seattle Seahawks
- Tennessee Titans
- Texas Rangers
- Toronto Blue Jays

International Elite Football Users
- Arsenal F.C.
- Aston Villa F.C.
- Blackburn Rovers
- Benfica

Brazilian National Football Team
- Everton F.C.
- French National Football Team
- Glasgow Celtic F.C.
- Manchester City F.C.
- Napoli F.C.
- Palmeiras
- Santos F.C.
- United Arab Emirates Football Association, Dubai

Colleges/Universities
- Boston University
- California State University Fresno
- Georgia State University
- Indiana State University (KIN)
- Mississippi State University
- Ohio State (KIN)
- Penn State University
- NJ Rutgers University
- University of Alabama
- University of Arkansas
- University of Colorado
- University of Florida
- University of Texas
- University of Oklahoma

Simple decision rules can reduce reinjury risk by 84% after ACL reconstruction: the Delaware-Oslo ACL cohort study

Read the full study
www.biodex.com/research/acl202

Likelihood of ACL graft rupture: not meeting six clinical discharge criteria before return to a sport is associated with a four times greater risk of rupture

Read the full study
www.biodex.com/research/acl203

DYNAMOMETER PREMIER USER LIST

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- NJ Rutgers University
- University of Alabama
- University of Arkansas
- University of Colorado
- University of Florida
- University of Texas
- University of Oklahoma

Medical Centers/Clinics
- Andrews Institute
- Baylor Medical Center
- Brooke Army Medical Center
- Cincinnati Sports Medicine
- Cleveland Clinic
- HealthSouth Rehab Hospital
- Hospital for Special Surgery
- Hospital for Joint Diseases
- Kaiser Foundation
- Kessler Institute
- Mayo Clinic Health System
- Penn State Milton S. Hershey Medical Center
- Pinnacle Physical Therapy
- Rehab Institute of Chicago
- Rusk Institute
- Spaulding Rehabilitation Hospital
- Texas Children’s Hospital
- Walter Reed National Military Medical Center

…and many many more.

For more users
www.biodex.com/s4users
Bertone offers BioSway baseline testing free to local high schools, sports leagues and colleges. Then, since he has the data on file, athletes are logically referred to him when a concussion is diagnosed. At that point, he retests the athlete on the BioSway and uses Biodex Balance Assessment to help evaluate the patient’s condition. The results are passed along to the physician to help aid in determining an appropriate return-to-play date.

“The time invested in the baseline balance testing and marketing is really quite minimal,” points out Bertone. “The beauty of the BioSway is that it is so easily portable and it takes only three minutes to perform four tests on each athlete. By offering this as a free service, I’ve gained access to more physical therapy patients. The program introduces new patients to my practice, increases my brand in the community and helps improve the safety of everyone involved. It’s really a win/win scenario.”

Bertone markets to the parents of young athletes so they can have access to both cognitive and balance testing that is not being provided below the high school level. Participants pay for this service, adding another positive element to the program from a business standpoint.

“I’ve been marketing specifically to sports leagues for travel and peewees with good success,” confirms Bertone, who explains to parents and league administrators that their kids are not getting the baseline services now provided in some high schools and colleges - but they are getting the same number of concussions. He stresses the importance of knowing when the time is really right for return to play and that, without such baseline balance testing, anyone making the return-to-play decision is doing so without objective criteria.

If you are serious about concussion management, Biodex Balance Assessment for Concussion Management and Biodex BioSway are two tools that will help ensure you’ll do the most good.”
**CASE STUDY - CONCUSSION MANAGEMENT**

Aurora Sports Medicine Institute uses integrated approach in the management of concussion, including the Biodex Balance System SD for objective balance assessment

Aurora Sports Medicine Institute (ASMI) is the sports medicine branch of Aurora Sheboygan Memorial Medical Center, in Sheboygan, WI. As the premier sports medicine provider in southeastern Wisconsin, ASMI is the primary choice of physically active individuals for preventative and rehabilitative care of orthopedic and sports injuries.

Adam Brill is an Athletic Trainer at ASMI and plays a large role in program development at the institute. He is also the head Athletic Trainer at Plymouth High School in Plymouth, WI, where he is focused on performance enhancement and injury prevention for all their student athletes.

“We knew the general parameters in the management of concussion, but we wanted to develop a formal system and put some strong policies in place,” explains Brill. “We met as an athletic training team to review the Zurich Consensus Statement on Concussion in Sport that was published in 2009. That’s where we drew a lot of our information from. We also had a great team of pediatricians who provided their expertise and who we shared our ideas with.

Adam Brill
Athletic Trainer at ASMI

Read the full study [www.biodex.com/casestudy/aurora](http://www.biodex.com/casestudy/aurora)