

BIODEX

Elite Sport Clinical Justification



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BIODEX System 4 - Clinical Justification



PROTECT YOUR ATHLETES

Biodex technology helps manage specific sports injuries and determine safe return to play

Conventional testing – Screening – Rehabilitation

Prehabilitation – Training – Re-education – Supportive Evidence

“Working in professional sport on a daily basis, it is essential that clubs and governing bodies employ highly trained staff and provide them with the best equipment to keep their assets - the athletes, in peak condition. The Biodex System 4 Isokinetic and balance unit are essential pieces of kit in assessment, screening and rehabilitation of the whole playing squad and play a major part in our prevention and treatment of injury in my opinion.”

Dave Fevre MSc MCSP SRP, Freelance Clinician and Lecturer

Clinical Benefits of the Biodex System 4

- + **User Friendly and time efficient** – the intuitive software makes it easy to use, quick to set up, and personalised testing and exercise protocols can easily be saved on the system in any location.
- + **Objective Results** – Objective data allows informed, justified, and accurate clinical decisions to be made in tandem with other functional testing to comprehensively assess the athlete function and objectively inform rehabilitation progression and return to sport.
- + **Live Biofeedback Data** – Live numerical and graphic reports provide meaningful information to both the clinician and player.
- + **Testing and Rehabilitation Platform** – Testing to identify performance deficits allows bespoke and effective rehabilitation programmes to be put in place. Retesting during the rehabilitation programme provides numerical and graphical information of the effectiveness of any intervention, and then helps the clinician to adjust where necessary.
- + **Operational Modes** – A variety of testing and/or rehabilitation modes are available, allowing the equipment to be used throughout any treatment programme. These modes include passive, active assisted, sub-maximal, proprioceptive, isometric, isotonic, and isokinetic (concentric and eccentric) functions.
- + **Baseline Data** – The Biodex System 4 helps to provide baseline performance data for players at any stage of the season. This is particularly useful in screening the individual player and gives baseline data which will be extremely useful should related injury occur in season.
- + **Research** – The collection of data allows each institution, whether it be clinical, educational, or elite sport, an opportunity to gather population specific data in healthy and/or rehabilitating athletes.
- + **Clinician and Player Confidence** – Reliability, consistency, validity, and reproducibility are already proven in the System 4, allowing both parties to be confident in the results are a true reflection of performance.
- + **Medico Legal Information** – the results can assist in justifying clinical reasoning for return to play decisions and provide a good clinical basis on which to plan either progression of rehabilitation or return to play. The graphical and numerical data can easily be inserted into the medical records of the patient and referred to at later stages where necessary.

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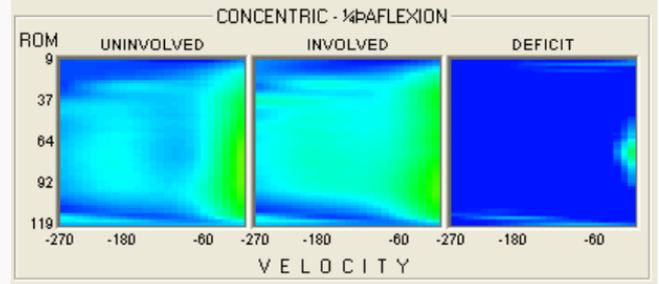
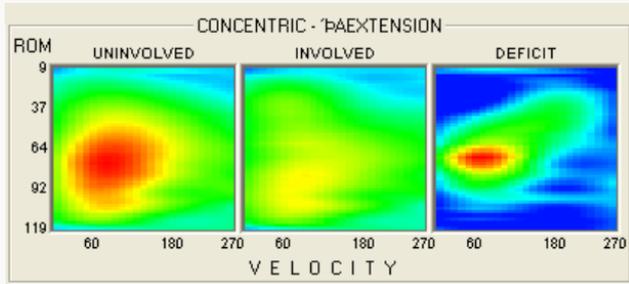
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Prevention & Rehabilitation

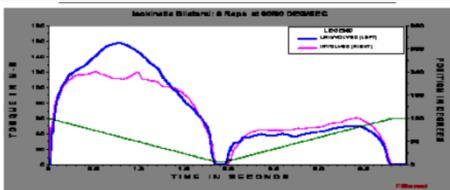
The goal of the clinical team is to maintain, and/or rehabilitate players to an appropriate level of competitive capability. Players not at this level need to be progressed in a quick and safe environment. Isokinetics provides this effectively and is an appropriate way of rehabilitating injured players. ^A



Isomap – a graphic representation of test results, identifying a deficit map. The deficit map highlights the rehabilitation target.

Predict Injury Risk

Using objective parameters to predict relative injury risk is a valuable tool within the sports environment. Identifying those at relative risk for particular injuries may allow bespoke and appropriate interventions to be implemented in the most effective manner. ^B

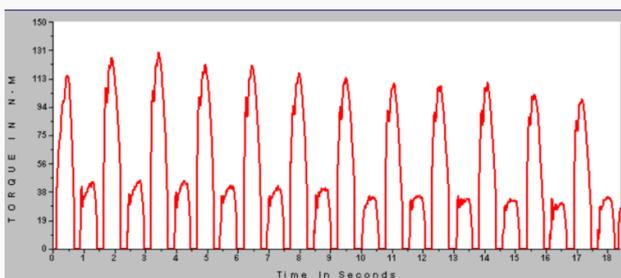


EXTENSION				FLEXION			
# OF REPS: RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT	RIGHT	LEFT
PEAK TORQUE	187.7	120.0	23.0	80.2	60.0	120.0	120.0
PEAK TORQUE %	281.7	82.3	36.2	96.6	96.6	180.0	180.0
TORQUE @ 90 DEG	190.0	80.0	147.0	140.0	140.0	140.0	140.0
TORQUE @ 90 DEG %	73.0	80.0	140.0	80.0	80.0	80.0	80.0
TORQUE @ 45 DEG	1.0	0.2	0.0	0.0	0.0	0.0	0.0
TORQUE @ 45 DEG %	100.0	100.0	1.0	20.0	20.0	10.0	10.0
AVG TORQUE	7.0	6.3	6.7	6.2	6.2	6.2	6.2
AVG TORQUE %	219.2	100.0	10.2	74.0	84.0	112.0	112.0
AVG TORQUE @ 90	3	3	3	3	3	3	3

Comprehensive data reports allow multiple parameters to be investigated

Performance Enhancement

Isokinetic training can provide a means of enhancing performance, both in the short term and longer-term periods. ^C



Graphical analysis of performance across time.

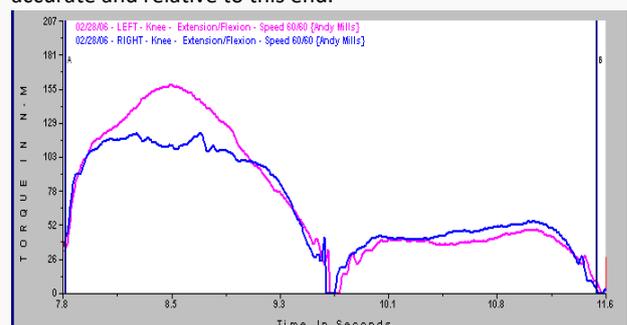
Functional Links

A criticism of isokinetic dynamometry is that it is not specific to athletic performance. Many question how can single joint slow constant angular velocities relate to multi directional, non-constant velocity multi joint sporting activity? This question is based on what is termed face validity as this reflects only whether a test appears to do what it is supposed to do. The strongest form of validity is criterion-related validity – relating isokinetic testing to athletic performance. In relation to soccer related activity – jumping, sprinting, and kicking – there are more than 50 studies that demonstrate a correlation between isokinetic testing and relative athletic performance. The numbers of studies that show no correlation are in single figures.

A further important point to note is that if a joint is unable to work normally in isolation, it is unable to work normally within a functional chain. The isolated assessment of a single joint therefore cannot be ignored when reviewing the overall functional capability.

Supportive Evidence

Whilst not truly diagnostic, isokinetic data analysis allows for objective performance deficits and/or deficiency trends to be observed. This information can be a valuable supportive tool when comparing functional tolerance of a player with their true performance capabilities. Underlying strength deficits can be compensated for within functional activities and subsequently mask deficiencies, which may become problematic over time. Appropriate isokinetic testing may provide a means of justifying player value and/or injury risk when considering transfers, contract renewals, and the likes. Interpretation of test data needs to be accurate and relative to this end.



The above graph illustrates a functionally competent individual, but an abnormal knee extension pattern.

Return to Training (RTT), Return to Play (RTP), and Return to Work (RTW)

Objectivity in Measuring Performance

There are various forms of tests available for measuring performance. Clinicians need to utilise a battery of tests which incorporate isolated strength measures, functional tests, and self-reported outcome measures to comprehensively assess the function of the athlete, determine the progression or regression of the rehabilitation schedule and eventually make the most important return to sport decision

Isokinetic testing is a **MAJOR** component of objectively measuring performance:

Value of Isokinetic Testing:

The use of Isokinetics has become a standard tool for evaluation and follow-up testing of specific muscular strength of the upper and lower extremities due to the benefits of range of motion control, accommodating resistance, varying movement velocity, and reliability.

- + Isokinetic evaluation allows for identification and quantification of the physical strength impairments that cause functional limitations. As already stated, this must be used in conjunction with functional testing in terms of multiple joint muscle action associated with general functional activities
- + Isokinetic testing allows for more accurate prognosis of predicted time required before return to sports training

Clinical Transparency

Rehabilitation must show objective progressive testing and the return to training and play is not a safe progression to make if this has been ignored.

This must be demonstrated in a graded and logical manner and with evidence-based clinical interventions. Isokinetic graphs and data, alongside accurate analysis of these two components provides solid clinical foundations on which to base the next stages of recovery. The Biodex System 4 provides objective outcome measures used in medico-legal objective progression and this is often used in combination with specific functional tests.

The following should be considered with this testing:

- + Auditable records which can be reviewed in future.
- + Auditable record of the rehabilitation pathway of the injured player
- + Transparent exit criteria to RTT, RTP and RTW

Conclusion

The player should be safe to return to elite sport with limited possibility of recurrence of the injury and with sound objective criteria to avoid any medico-legal implications.



A. Safe, effective & appropriate means of rehabilitating injured players

Hamstring Rehabilitation:

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B. Using objective parameters to predict

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