ADVANCING HAMSTRING ASSESSMENT & REHABILITATION WITH SPECIFICITY & PRECISION

‘WHERE BIOMECHANICS MEET PERFORMANCE”

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In February 2026 it is reported that there are about 18 Premier League players currently unavailable due to hamstring injury across 10 clubs (premierleague.com). In a squad of 25 players, 5 players will sustain at least 1 hamstring injury (Eskrand etal., 2022). Official RTP (Return to play) timelines are difficult to predict but the estimated time loss for some of these players are between 49-64 days which equates to an average of £490,000 and a total of £5.8 million in wages during this period. Recurrences are common. Maybe a Biomechanics centred approach is worth considering, particularly when 48%-81% of all hamstring injuries occur during sprinting (Roe et al., 2018; Wilson et al., 2007; Askling et al., 2013). These running related injuries occur in early stance or late swing phase in which the loads are the main contributing factor (3-10 times BW or 5.9-46 $N.Kg^{-1}$).

Biomechanics Meets Performance – “Specificity”

The HRIG is a novel device for the testing of isometric hamstring strength specific to the mechanism of injury in sprinting (Figure 1). It centres around an assessment and loading pattern specific to late swing and early stance. Critically it shows high inter-rater and intra-rater reliability of 0.93 ICC (CI 95%) of with the typical error of 21N (16-34N) is low.

Its key features are:

- Single leg, sprint relevant positioning increasing sensitivity to hamstring monitoring
- Objective BAMIC Classification, Injury risk screening and fatigue monitoring and readiness to train
- Controlled loading in a MTU/IMT/ fascicle lengthened position with live biofeedback to optimise tissue healing and RTP timelines, while preventing re-occurrences with objective force data.

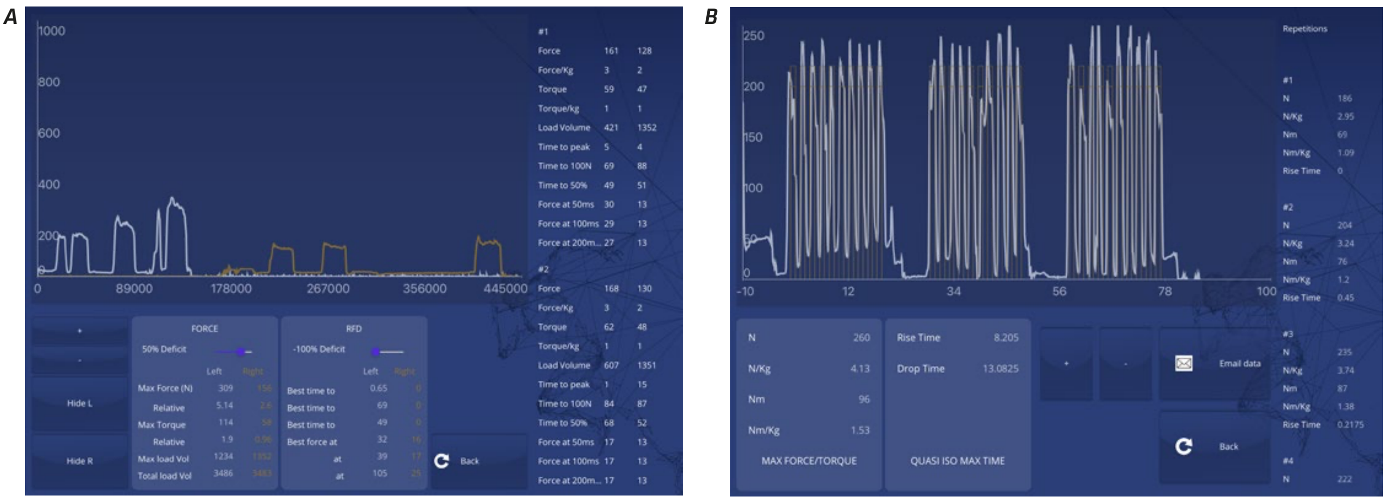

Figure 1: *THE HRIG – “Where Biomechanics Meets performance with live biofeedback”. Fig A - The HRIG provides indices of force, torque, rate of force development in which transmission is biased towards the Biceps Femoris (60%). Asymmetries are aligned with BAMIC Classification when assessing acute injuries with a 50% asymmetry in this case indicating a BAMIC 3C. Fig B – Ballistic muscle function with 1s contraction time and 1s recovery time 3 x 10 reps providing live biofeedback in preparation and clearance to Vmax.*

Figure 2: *THE HRIG – "Where Biomechanics Meets performance in Neural Drive" – This details two BAMIC 1A injuries with 13% and 9% asymmetries. In the case of the athlete with 13% asymmetry neural drive is medial biased (71% medial hamstring V 29% BF). In the case of the athlete with 9% asymmetry this is also the case however less so (55% Medial hamstring and 45% BF). Optimum levels for un-injured athletes indicate a BF bias of 60% in force production on the HRIG in this sprint position.*

Biomechanics Meets Performance – "Tendon Compliance"

"C" type muscle injures are extremely problematic and the degree of tendon stiffness and compliance to external and particularly internal muscle load is influenced by aponeurosis geometry and cross sectional area (CSA). Eccentric strength training promotes muscle hypertrophy, and fascicle lengthening however the geometry of the tendon and aponeurosis is relatively un-affected (Lazarczuk et al., 2024). The HRIG a) loads in a position specific to the mechanism of injury and provides a high strain stimulates (optimising tissue healing) for collagen synthesis to increase tendon CSA as tendons respond more to strain magnitude and duration than to movement velocity b) it provides time under tension favouring structural remodelling, low load for neural benefits and high load for structural tendon change and c) allows precision loading strategies with respect to regional hypertrophy. This tendon focused approach leads to reduced tendon stress, altered stiffness and compliance and improved force transmission and efficiency.

Biomechanics Meets Performance – "Neural Drive"

Supercompensation and inhibition, within muscle variations for neural drive are well documented with 1) reduced EMG amplitudes in the injured hamstring 2) delayed onset of activation 3) altered intra hamstring compartmentalisation, co-contraction with antagonists which reflect an inhibition because of alpha motor inhibition or a supercompensation effect which can lead to recurrent issues. Given the specificity of the mode of contraction (testing) the HRIG is used with KINEMOTION (EMG) to detail the bicep femoris as to whether it is a) the culprit or the victim and as to when this neural drive returns to optimum levels and b) provides targeted prescription for either the lateral or medial hamstring to optimise neural drive in RTP (Figure 2).

Conclusions

Be specific – The HRIG mimics the mechanism of injury when undertaking hamstring assessment and loading strategies to maximise sensitivity and optimise tissue healing.

Consider tendon compliance and loading strategies with objective data to optimise dosing and therefore tissue adaptations.

Neural drive is a considerable factor in clearance to return to sport and mitigating against recurrent injury.

Contact **martin@hrig.ie** for more information.

References

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