•Clinical Prognostic values in Hamstring Injuries.

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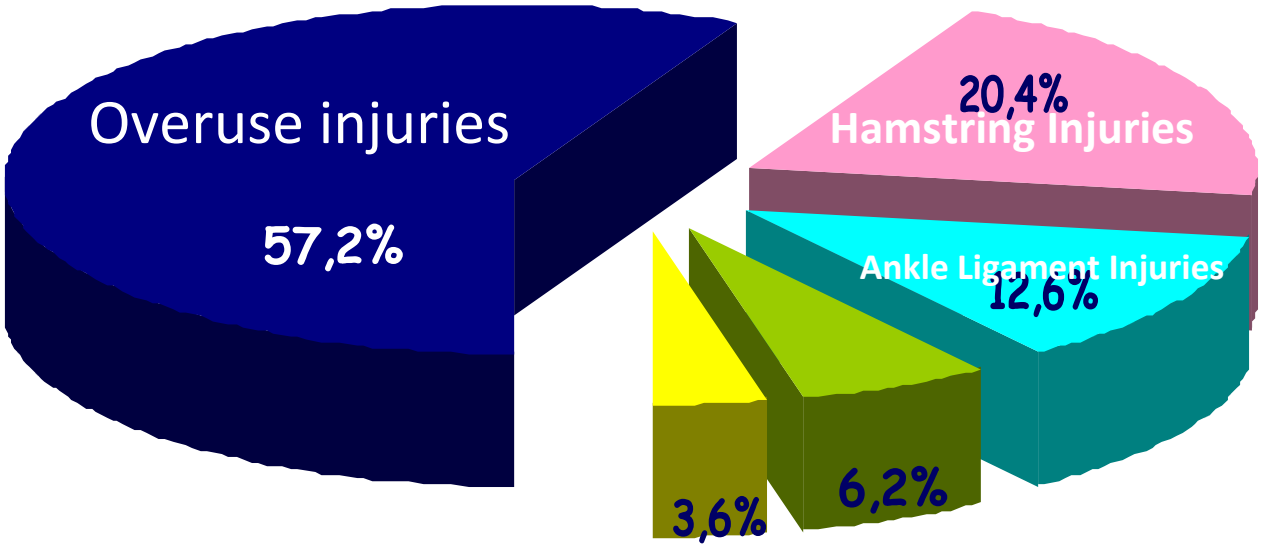
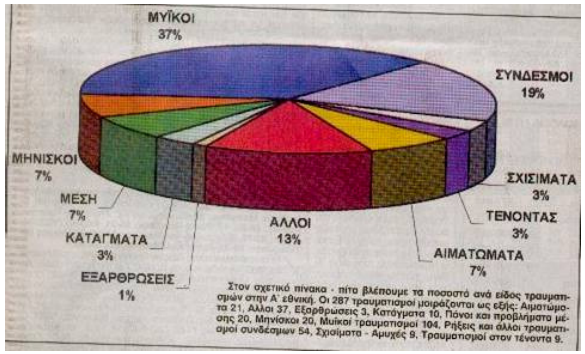
EJU Medical Committee Member.

Lower Limb Epidimiological Data Track&Field 1990-2010





PTM strains were the most common injury occurrence (16%), according with surveillance study of the 2007 International Association of Athletic Federations (IAAF) (2008)

Clinical - ANATOMICAL classification

1st	grade	mild	number of injured fibres partial
2nd	grade	moderate	incomplete
3rd	grade	severe	complete

Full rehabilitation time????

Schneider-Kolsky ME, Hoving JL, Warren P, Connell DA. A comparison between clinical assessment and magnetic resonance imaging of acute hamstring injuries. Am J Sports Med 2006;34:1008–1015.

Mason DL, Dickens V, Vail A. Rehabilitation for hamstring injuries. Cochrane database of systematic reviews (Online). 2007 CD004575.

The first MR study that described findings with poor prognosis of muscle injury evaluated **14 patients** and found that muscle rupture and retraction, haemorrhage, ganglion-like fluid collections, and **greater than 50% cross-sectional** involvement were associated with convalescent periods of **more than 6 weeks**

Follow up during rehabilitation time ????

Time to walk pain-free and previous hamstring injury are predictors of time to return to competition and recurrence.

Clinical predictors of time to return competition and of recurrence following hamstring strain in elite Australian footballers

Price Warren, Belinda J Gabbe, Michal Schneider-Kolsky, et al. ***Br J Sports Med*** **2010 44: 415-419**

•Clinical Prognostic values in Hamstring Injuries.

Classification based on:

1. a) within 6h detailed history & thorough clinical examination
   b) PRICE for 48 hours
   c) 48 hours post injury re evaluation
   &
2. Active range of motion (goniometry)

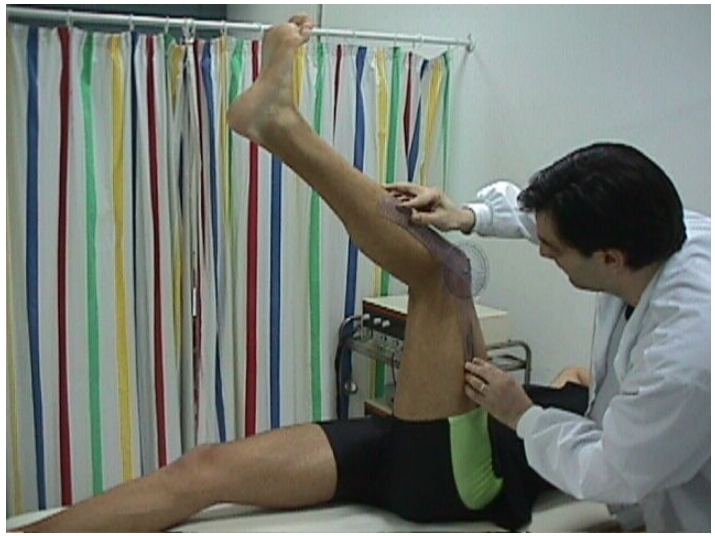
3. Ultrasonographically findings

4. Recorded time to full rehabilitation .

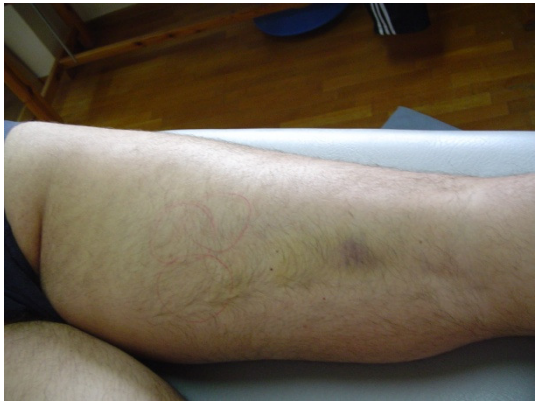
Hamstring injuries:
Malliaropoulos Thesis ,QMUL,MSc 1999.

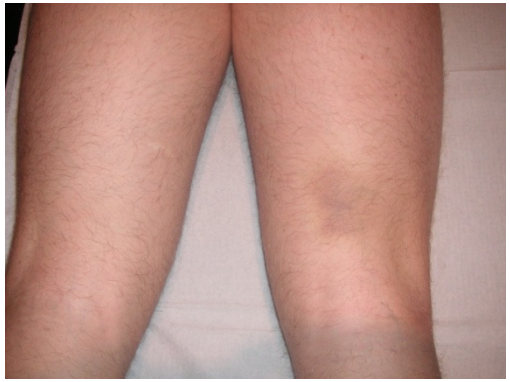
POSTERIOR THIGH MUSCLE INJURIES IN ELITE TRACK AND FIELDATHLETES: A NOVEL CLINICAL CLASSIFICATION
N Malliaropoulos , Nicola Maffulli ,et all AJSM 2010

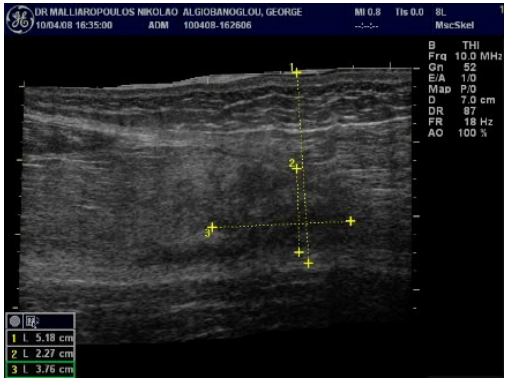
A-ROM both sides



POSTERIOR THIGH MUSCLE INJURIES IN ELITE TRACK AND FIELDATHLETES: A NOVEL CLINICAL CLASSIFICATION
N Malliaropoulos , Nicola Maffulli , *AJSM 2010*







grade 0	a normal US	a normal US
grade 1	subtle US findings	ill-defined hyperechoic or hypoechoic intramuscular areas or a swollen aponeurosis
grade 2	partial muscle tears	Haematoma formation
grade 3	complete muscle tears	Haematoma formation

•**Peetrons P. Ultrasound of muscles. Eur. Radiol. 2002;12(1):35-43.**

•Connell DA, Schneider-Kolsky ME, Hoving JL, et al. Longitudinal study comparing sonographic and MRI assessment of acute and healing hamstring injuries. AJR Am J Roentgenol. 2004;183:975-984.

POSTERIOR THIGH MUSCLE INJURIES IN ELITE TRACK AND FIELDATHLETES: A NOVEL CLINICAL CLASSIFICATION . N Malliaropoulos , Nicola Maffulli ,et all . AJSM 2010

Clinical Grade	AROM deficit	FRT	Athletes	Percentage (%)	Treatment
1ST	<10º degrees	6.9 (2.0)	75	**45.4**	Rehab
2ND	10º – 19º degrees	11.7 (2.4)	58	**35.2**	Rehab
3D	20º - 29º degrees	25.4 (6.2)	26	**15.8**	Immobilization Nsaids
4TH	>30º degrees	55.0 (13.5)	6	**3.6**	Operation??

- ✓ PROPER TREATMENT
- ✓ PROPER REHABILITATION PROGRAM
- ✓ ESTIMATION OF RETURN – TO – SPORTS TIME **Clinical Prognostic value**
- ✓ REDUCTION OF RECCURENCE

Malliaropoulos Thesis MSc ,QMUL ,1999.

High-speed running type or stretching-type of hamstring injuries makes a difference to treatment and prognosis

Carl M. Askling, Nikolaos Malliaropoulos and Jon Karlsson

Editorial BJSM (Under Publication)

There are at least **two** distinctly different types of acute hamstring strains

The most common injury type occurs during high-speed running and the other occurs during movements leading to extensive lengthening of the hamstrings, such as; high kicking, sliding tackle and sagittal split.

The ***high-speed running type*** is mainly located to the long head of biceps femoris and typically involves the proximal muscle-tendon junction.

The ***stretching-type*** is located close to the ischial tuberosity and typically involves tendon tissue of the semimembranosus.[7]

High-speed running generally cause a more marked acute functional impairment, but typically require a shorter rehabilitation period than the ***stretching-type*** of hamstring strains.[9]

A general rule of thumb is, “the closer to the ischial tuberosity, the longer rehabilitation period”.

Reinjury

Reinjury After Acute Posterior Thigh Muscle Injuries in Elite Track and Field Athletes

N.Malliaropoulos,T Isinkaye, K. Tsitas, N. Maffulli

Am J Sports Med February 2011 39 304-310

* National Track & Field Centre, Sports Injury Clinic, Sports Medicine Clinic of S.E.G.A.S., Thessaloniki, Greece
** Centre of Sports and Exercise Medicine, Barts and The London School of Medicine and Dentistry Mile End Hospital

At follow up, 23 of the 165 athletes (13.9%) had experienced a second hamstring muscle strain

Of the 75 athletes presenting with a grade I injury, (9.3%) had experienced a recurrence after 24 months.
Of the 58 athletes presenting a **grade II injury, (24.1%)** experienced a recurrence.
Of the 26 athletes presenting a grade III injury, (7.7%) experienced a recurrence
and of the 6 athletes presenting a grade IV injury, none had experienced a recurrence after 24 months.

Conclusions:
According to our classification,
athletes with acute grade II hamstring muscle strains experience a higher risk of re-injury than athletes with grade I, III & IV strains.

Low grade hamstring muscle INJURIES ,GRADE II can possibly lead to a higher risk of re-injury than high grade hamstring muscle sprains.

Objective clinical findings can provide an effective clinical tool to assess the risk of re-injury following acute hamstring muscle strains in elite track and field athletes

Clinical Prognostic value.

Active Knee Range of Motion Assessment in Elite Track and Field Athletes Normative Values

N.Malliaropoulos, K.Tsitas, P.Malliaras, Nicola Maffulli

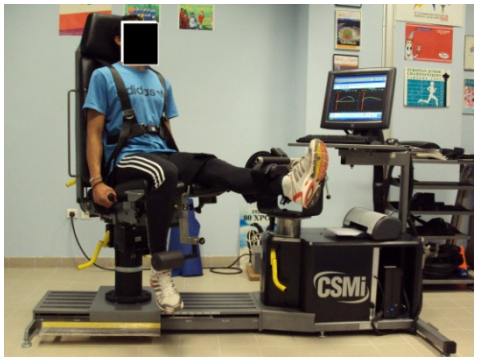
Athletes' physiological characteristics are fundamental both in terms of performance and injuries prevention.
One of those characteristics is flexibility.
Using an easy and cheap method, goniometry, estimating active knee Range of Motion could possibly establish normative reference values of Elite athletes' posterior thigh muscle flexibility.

Conclusion:Elite track and field athletes are mean posterior thigh muscle flexiblity is likely to be between 72.3º and 73.9º when tested with the AKE test.

Clinical Prognostic value

Figure 1. Start (A) and end (B) position of the AKE test

Preventing Hamstring Injuries in Sport

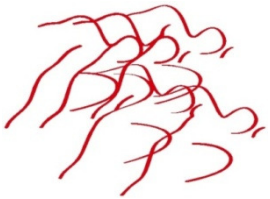


An injury prevention approach for PTM would consider the **interconnected, multidirectional and synergic interaction** between all the risk factors involved in this injury (e.g. core stability, ROM, architecture, strength, fatigue)

The high incidence of PTM injuries occurrence and reccurrence we were interested in developing an evidence based sport rehabilitation and injury prevention scheme of PTM.

Posterior thigh muscle exercises for track and field athletes: An injury prevention intervention.

NikosMalliaropoulos[1], JurdanMendigutxia[5], Hercules Pehlivanidis[1], Sofia Papadopoulou[1],Xavier Valle[2,3,4] , Peter Malliaras[6] Nicola Maffulli [6]



Exercise implementation rationale:
strength and conditioning guideline pescription

- Easy to implement
- Cost-effective
- Closed-chain
- Muscles operating at long lengths
- Multi-joint
- Bilateral exercises to avoid asymmetries
- High/moderate eccentric force activities

Then exercise progression progress more in relation to length parameter than to strength intensity and contraction velocity.

Eccentric loaded lunge drops

•unloaded lunge should perform to ensure proper biomechanical execution

•limit this exercise to 5 repetitions per side

• 1-3 sets /2wk

1-3 sets/8-10 steps /2wk

Non-uniform changes in MRI measurements of the thigh muscles following two hamstring strengthening exercises. Jurdan Mendiguchia[1], Mirian Aranzazu Garrues[2], John Barry Cronin[3,4], Bret Contreras[3], Asier Los Arcos[5], Nikos Malliaropoulos[6], Nicola Maffulli[7], Fernando Idoate[8].

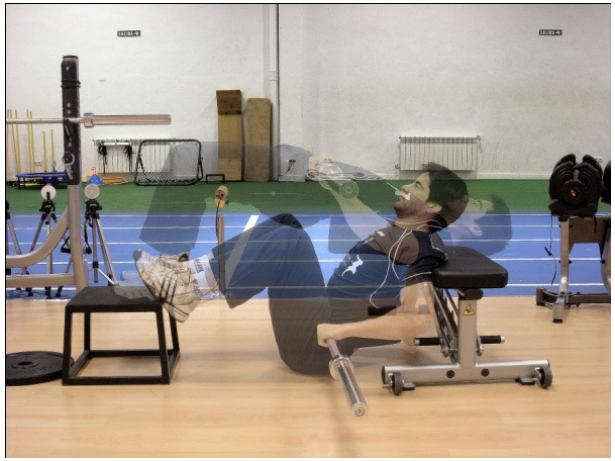
Eccentric backward steps:

• This exercise should be performed with cleats or a surface that has a lot of friction.

• Co athlete, coach or Sofia pushes forward while the athlete of interested is applying resistance but still allow himself or herself to be pushed backward while eccentrically contracting the muscles.

1-3 sets/8-10 steps /2wk

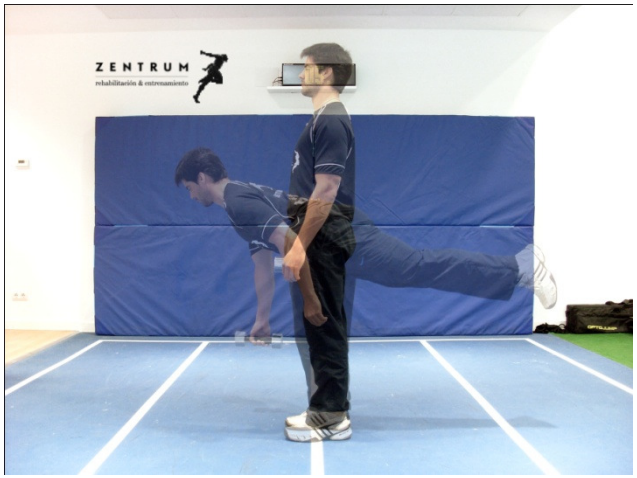
Bench Bridge



- **Unloaded bridge should perform to ensure proper biomechanical execution**
- **1-3 sets/10 reps /2wk**

Single leg deadlift

Unloaded -Loaded
1-3 sets/8reps /2wk

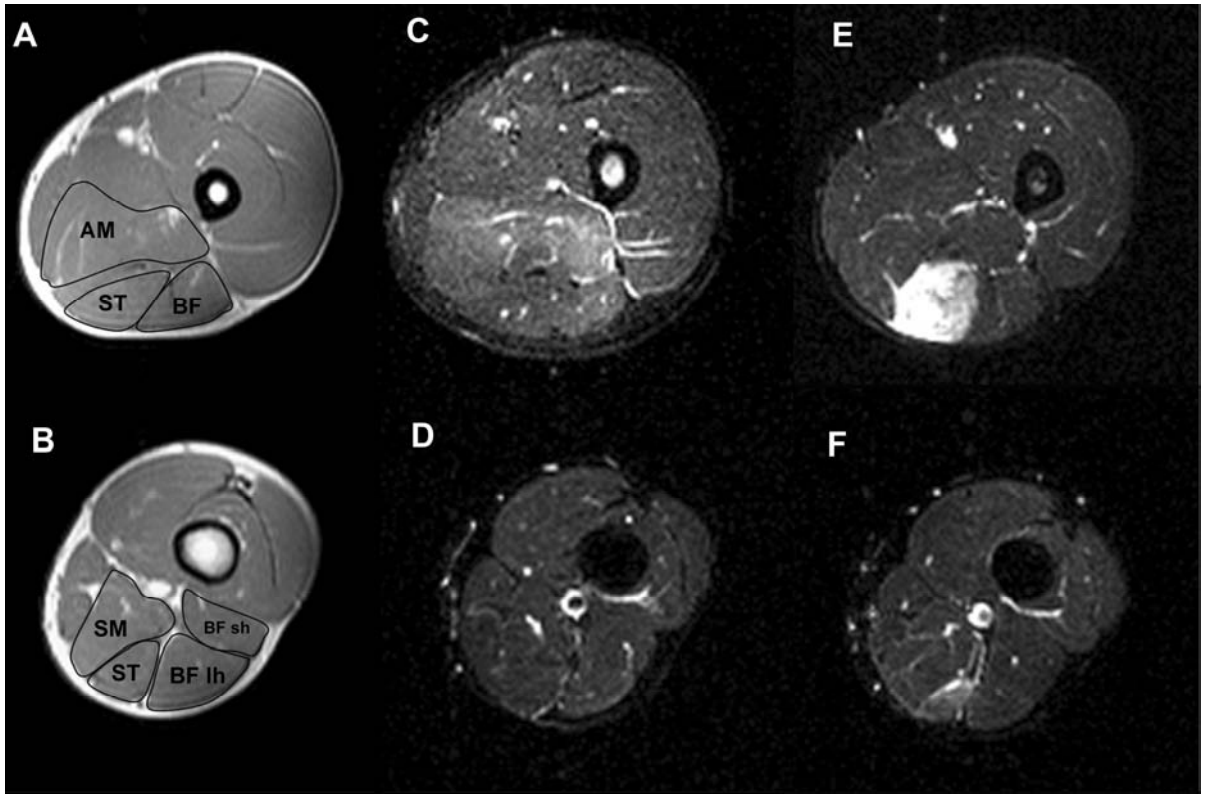


Future

Targeting different parts of the hamstring with different exercises

Hip or knee dominant:
Location: proximal o distal
Muscle targeted

Targeting different parts of the hamstring with different exercises



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Non-uniform changes in MRI measurements of the thigh muscles following two hamstring strengthening exercises

Jurdan Mendiguchia[1], Mirian Aranzazu Garrues[2], John Barry Cronin[3,4], Bret Contreras[3], Asier Los Arcos[5], Nikos Malliaropoulos[6], Nicola Maffulli[7], Fernando Idoate[8].

ELC exercise was better suited for loading all regions of the ST muscle while the **L exercise** was more effective for loading the proximal regions of biceps femoris and adductor magnus.

- **Clinical Prognostic values in Hamstring Injuries.**

Q&A

Barts and The London School of Medicine and Dentistry

Queen Mary University of London

E.C.O.S.E.P.

13TH ANNUAL SCIENTIFIC MEETING IN SPORT & EXERCISE MEDICINE
&
30TH ANNIVERSARY OF CENTRE FOR SPORT & EXERCISE MEDICINE
In association with
EUROPEAN COLLEGE OF SPORT & EXERCISE PHYSICIANS-ECOSEP

ECOSEP AFTERNOON SESSION

CHAIR: Prof John King

14.00 Hagland's disease – new anatomic and functional considerations. **Prof H Lohrer**

14.20 Injuries in Gaelic football. **Dr A Henry**

14.40 Hamstring injuries in young athletes. **Prof X Valle**

15.00 Hamstring injuries – prevention intervention. **Dr N Malliaropoulos**

15.20 **ECOSEP travelling fellowship 2011. Dr F Oliva**

Injury reoccurrence is suggested to occur from 12 up to 31% .
More importantly, from the 58 athletes that presented with a grade II injury the 14 (24.1%) experienced a recurrence. Thus suggesting that grade II to be in higher risk to experience an PTM injury reoccurrence[13].
Nevertheless the prolonged rehabilitation and side effects of recovery time[2] in combination of detraining[14] may cause a frustration of the sport rehabilitation medical team regarding the treatment and performance enhancement.

In respect to the TF and the high incidence of PTM injuries occurrence and reoccurrence we come across in our clinic.
We took interested in developing an evidence based sport rehabilitation & injury prevention scheme of PTM.
Applicable to the TF muscular demands in respect to the prevalent eccentric injury mechanism.

Re-injury following acute posterior thigh muscle injuries in elite track and field athletes Malliaropoulos N,Maffulli N et al..AJSM 2011.2.304-10

ST

Kettlebell Swing and Romanian Deadlift targeted specifically ST over BF (17-22%, P<0.05) at very high levels of normalized EMG (73-115% of MVC).

ST

semitendinosus: eccentric leg curl.

ST

SM: single leg deadlift.

BF

Supine Leg Curl and Hip Extension specifically targeted the BF over the ST (_ 20-23%, P<0.05) at very high levels of normalized EMG (75-87% of MVC).

BF

lunge exercise activate proximal aductor and biceps femoris .

Distal B F

Nordic hamstring exercises that activates distal biceps femoris.

Proximal BF

TRX

Therefore even that during the last decade there has been a major movement towards the use of eccentric training to treat tendon pathology ,

There is insufficient evidence yet to state that the protocols of eccentric training have the capacity to reduce hamstring injuries.

Goldman EF, Jones DE. Interventions for preventing hamstring injuries. *Cochrane Database Syst Rev*. 2010;(1). Review.

Eccentric exercise may prevent injury to the muscletendon unit by improving the muscle's ability to absorb more energy and increased force before failing. **[28,29]**

LaStayo PC, Woolf JM, Lewek MD, et al. Eccentric muscle contractions: their contribution to injury, prevention, rehabilitation, and sport. J Orthop Sports Phys Ther. 2003 ;33(10):557-71. Review.

Preventing Hamstring Injuries in Sport

1. The risk of hamstring muscle injury increases with a decrease in conventional H : Q180.

Further analysis revealed that a conventional H : Q180 ratio of less than 0.6 was found to increase the risk of hamstring injury by 17 times (p=0.03, HR 17.4, 95% CI 1.31 to 231.4).

A prospective cohort study of hamstring injuries in competitive sprinters: preseason muscle imbalance as a possible risk factor S S Yeung, A M Y Suen, E W Yeung *Br J Sports Med* 2009 43: 589-594