יום עיון בנושא פציעות

HAMSTRING

דורון שליסל
BPT
f- דורון שליסל – הדור הבא בפיזיותרפיה

קצת עליי...

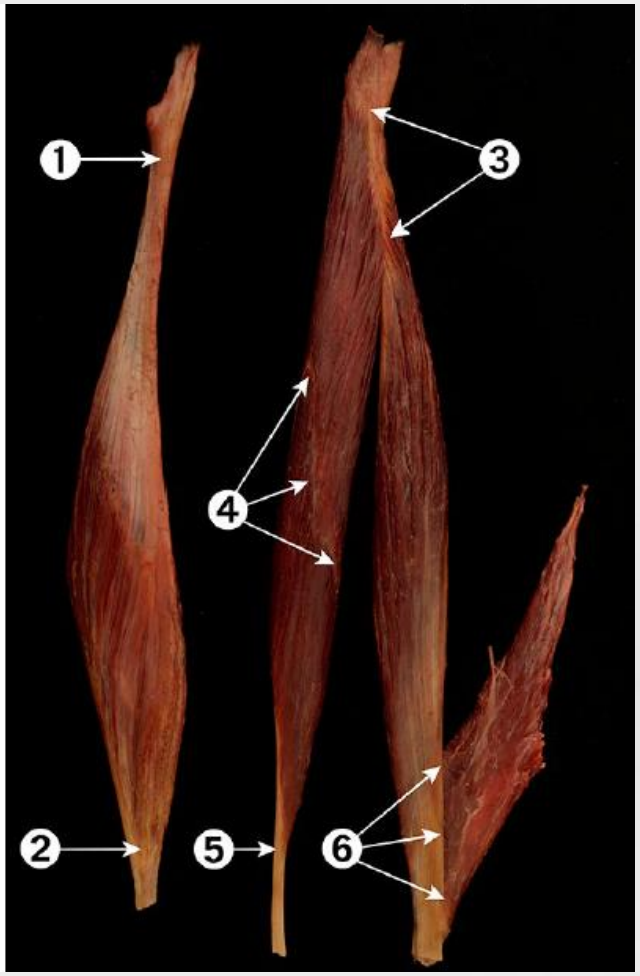

HES
HEALTH EDUCATION SEMINARS
CERTIFICATE OF ATTENDANCE
This is to certify that
Doron Schlissel
Attended a course
Hamstring Injuries
World Class Research & Rehabilitation
June 7th 2018 (6hrs CPD)
GoPerform UK, Reading
Course Tutors:
Dr David Opar, Dr Ryan Timmins, Dr Nicol van Dyk & Dr Phil

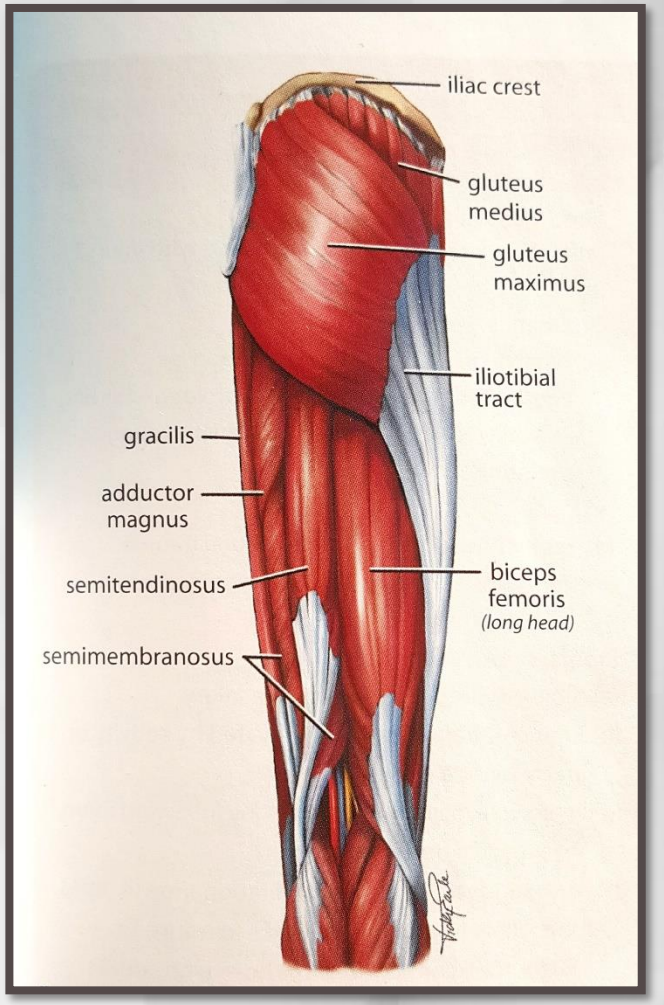

GoPerform


המכללה האקדמית צפת

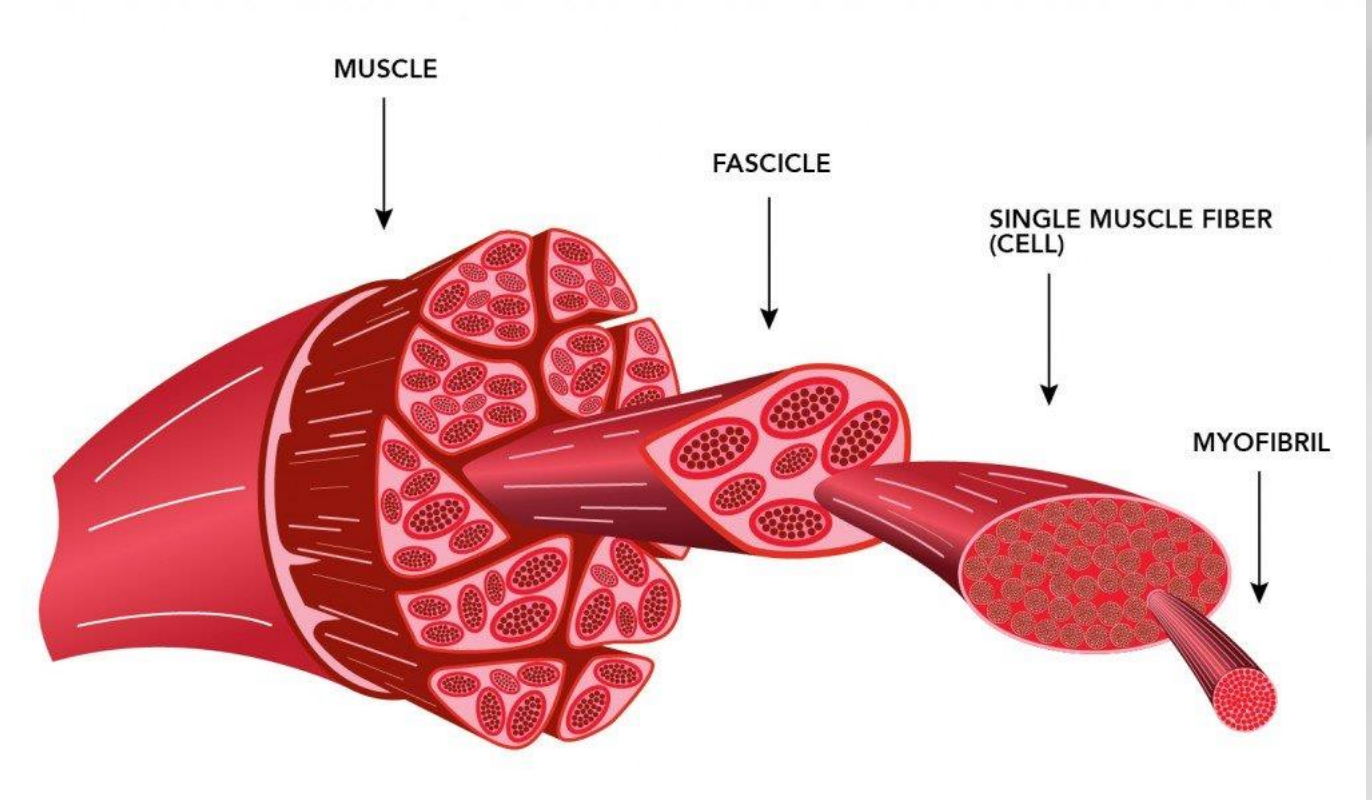

NY 1
NE 0
21:36

קבוצת שרירי HAMSTRING

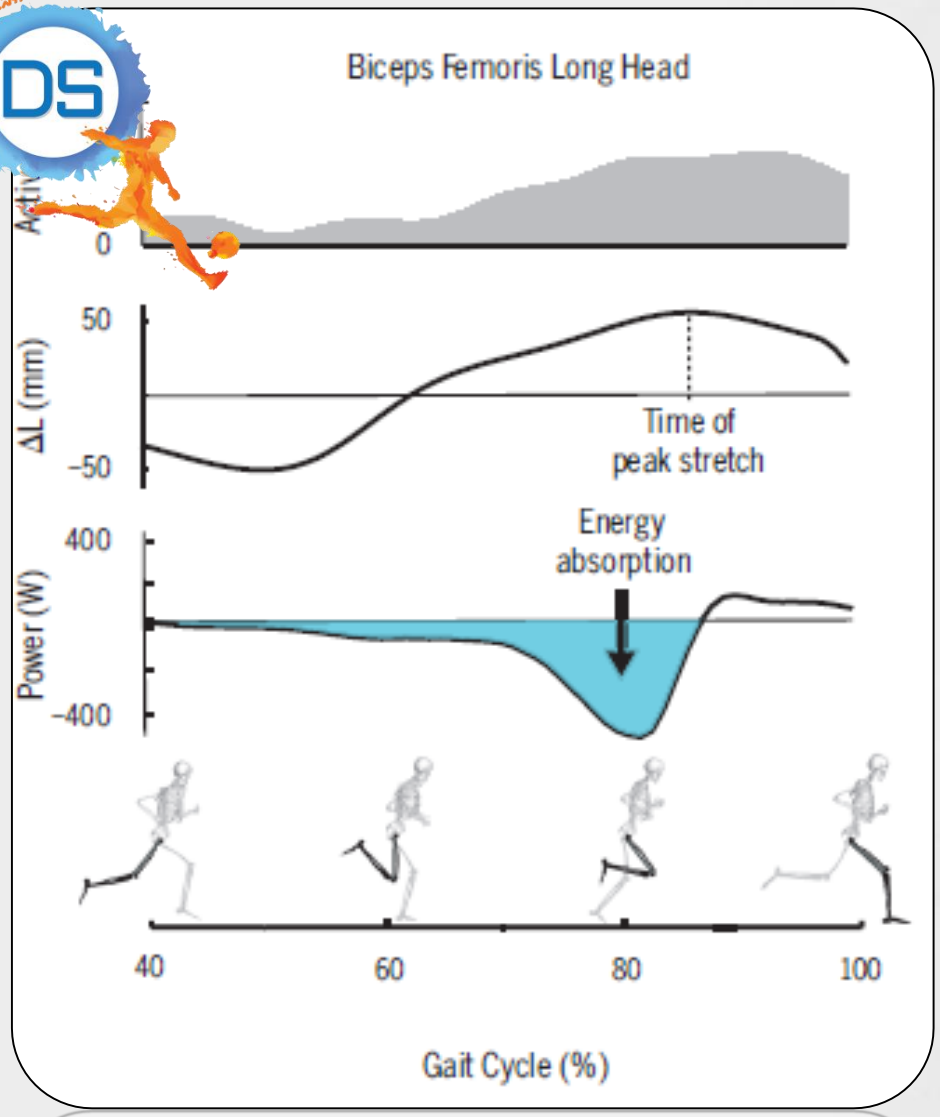


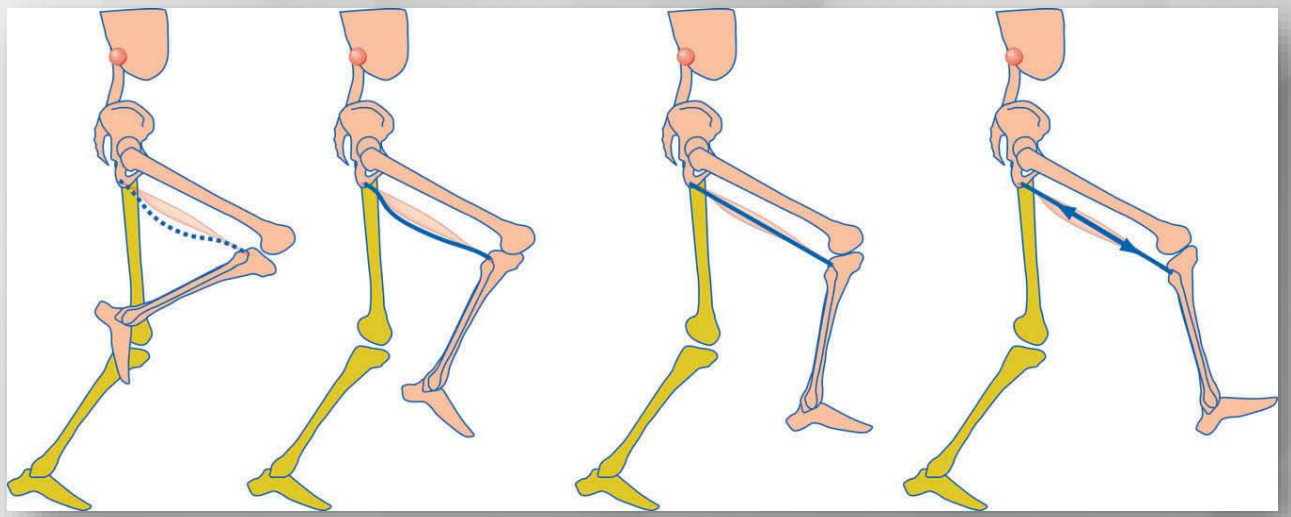


מבנה שריר ברמת ה- FASCICLES



תפקוד וביומכניקה





סיווג קרעים

- פציעה במסגרתה נגרמים קרעים בסיבי השריר כתוצאה ממתיחת יתר
- שרירים אופיניים
- דרגות

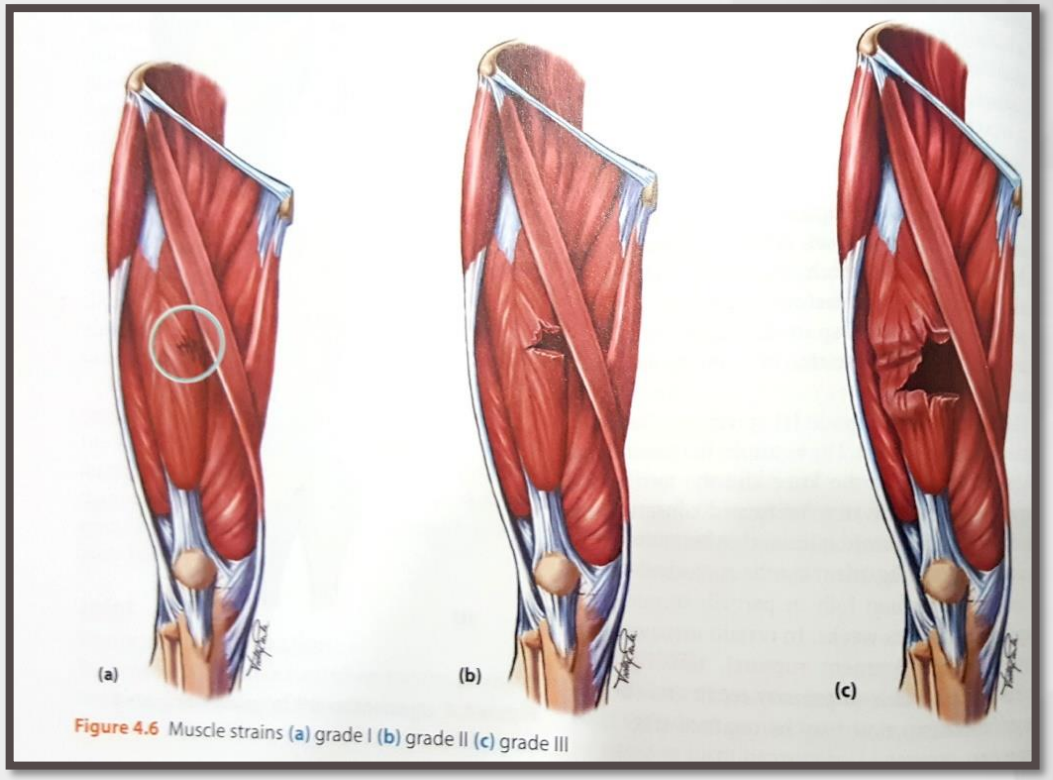
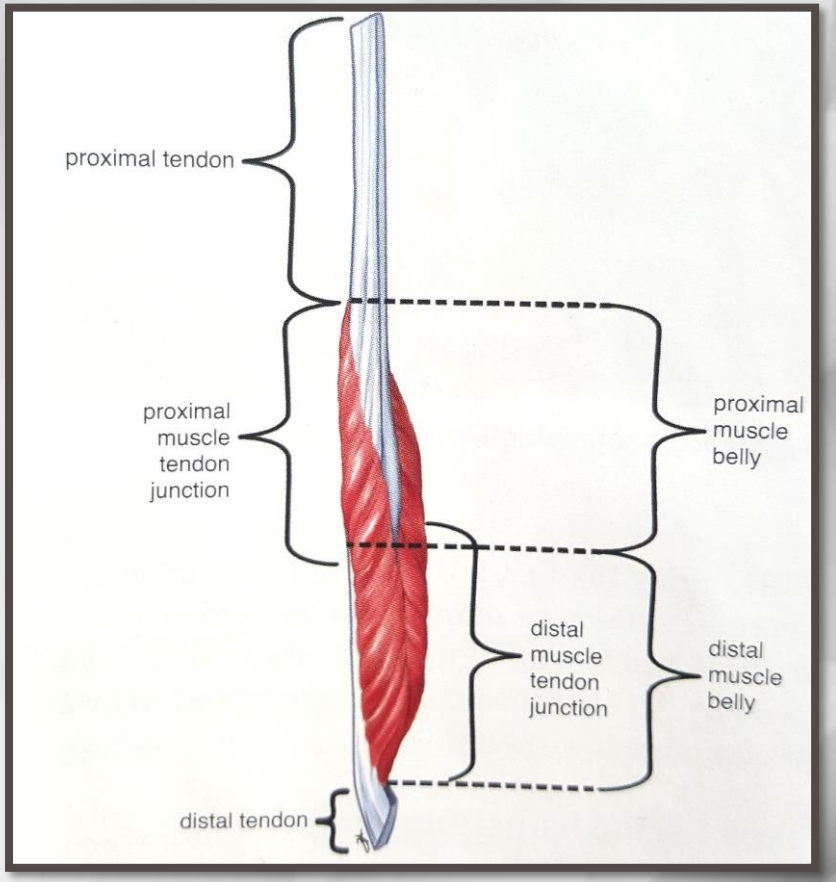
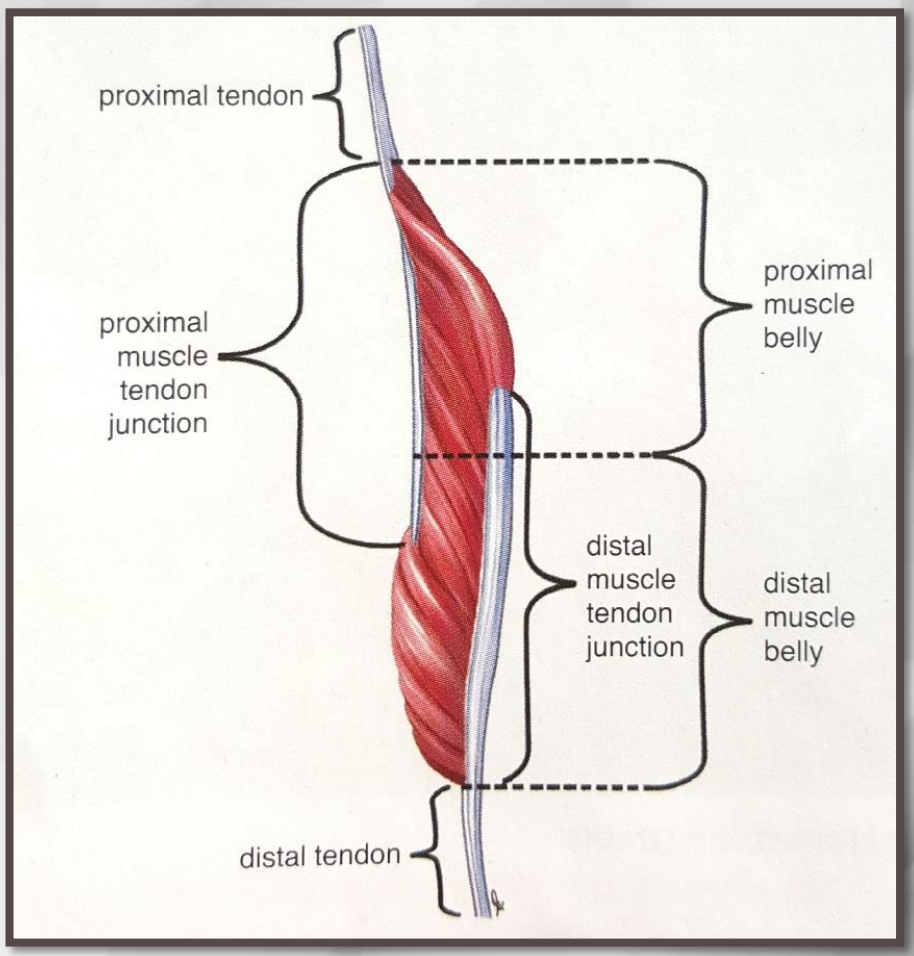


Figure 4.6 Muscle strains (a) grade I (b) grade II (c) grade III

סוגי פציעות - TYPE 2



סוגי פציעות - TYPE 1



אפידימיולוגיה

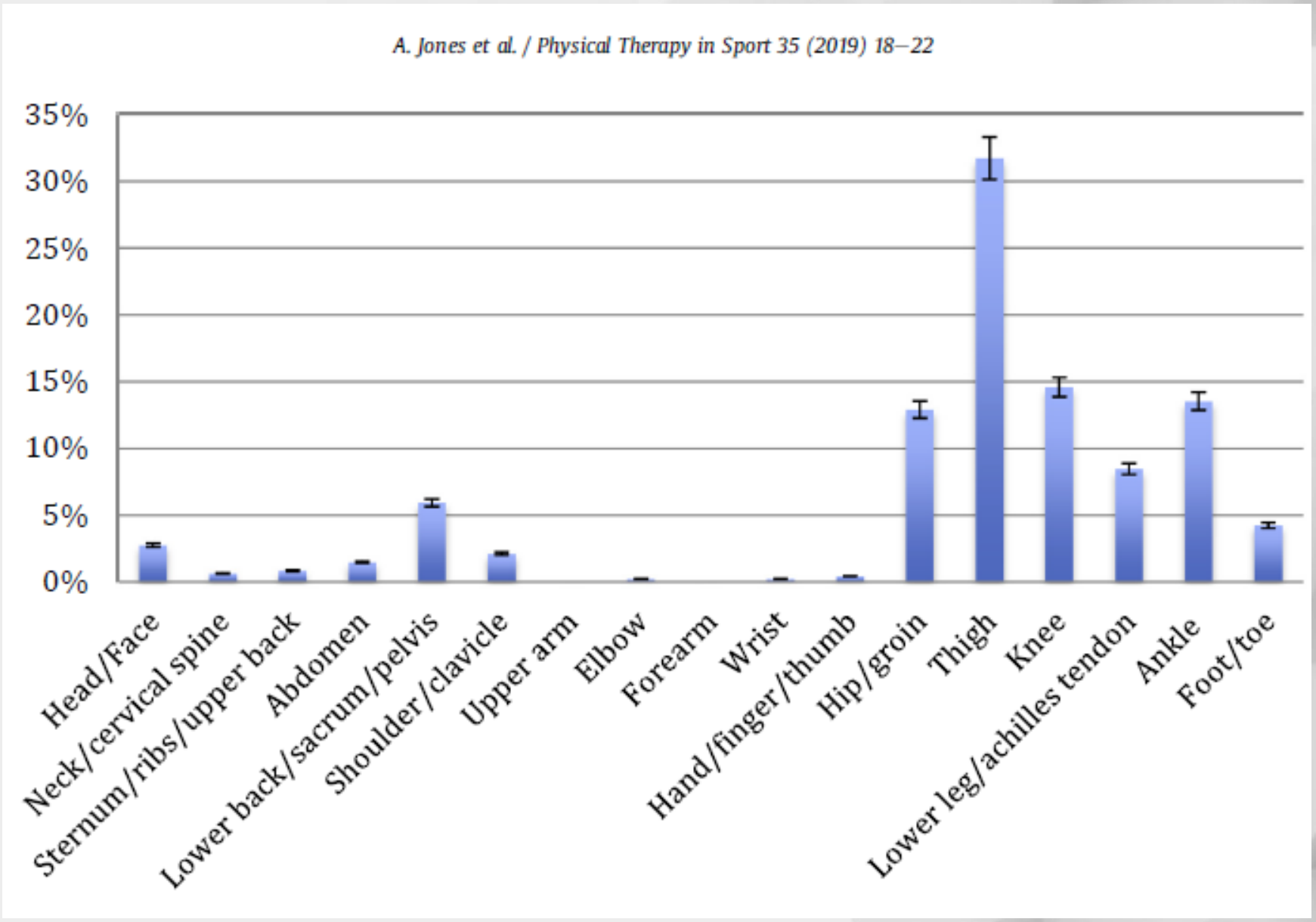
- הפציעה השכיחה ביותר בספורט המקצועני
- מבין כלל הפציעות בעלת אחוז הפציעות החוזרות הגבוה ביותר

  - 32% – פוטבול אמריקאי
  - 21% – רוגבי
  - 16% – כדורגל

אפידמיולוגיה

- מיקום הפציעה השכיח ביותר: **ירך>ברך>קרסול**
- סוג הפציעה השכיח ביותר: מתיחת שריר- 41.2% מכלל הפציעות
- בין מתיחות השריר, הירך האחורי הייתה הנפוצה ביותר- **39% מכלל מתיחות השריר וכ- 16.3% מכלל הפציעות!**

Jones et al, 2019



Jones et al, 2019

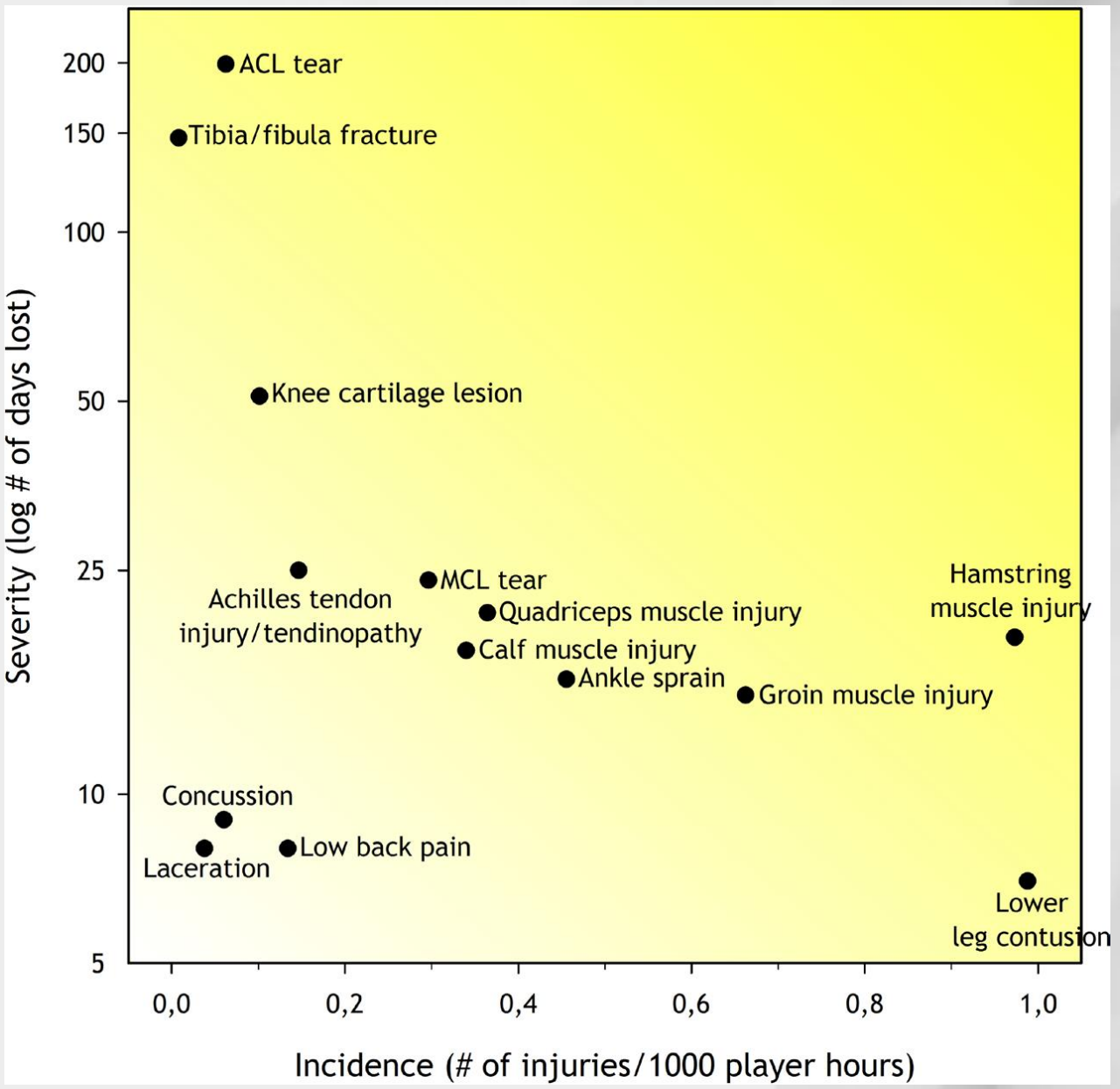
Quadriceps
19%

Hamstring
37%

Calf
13%

Groin-adductor
23%

Ekstrand et al, 2011



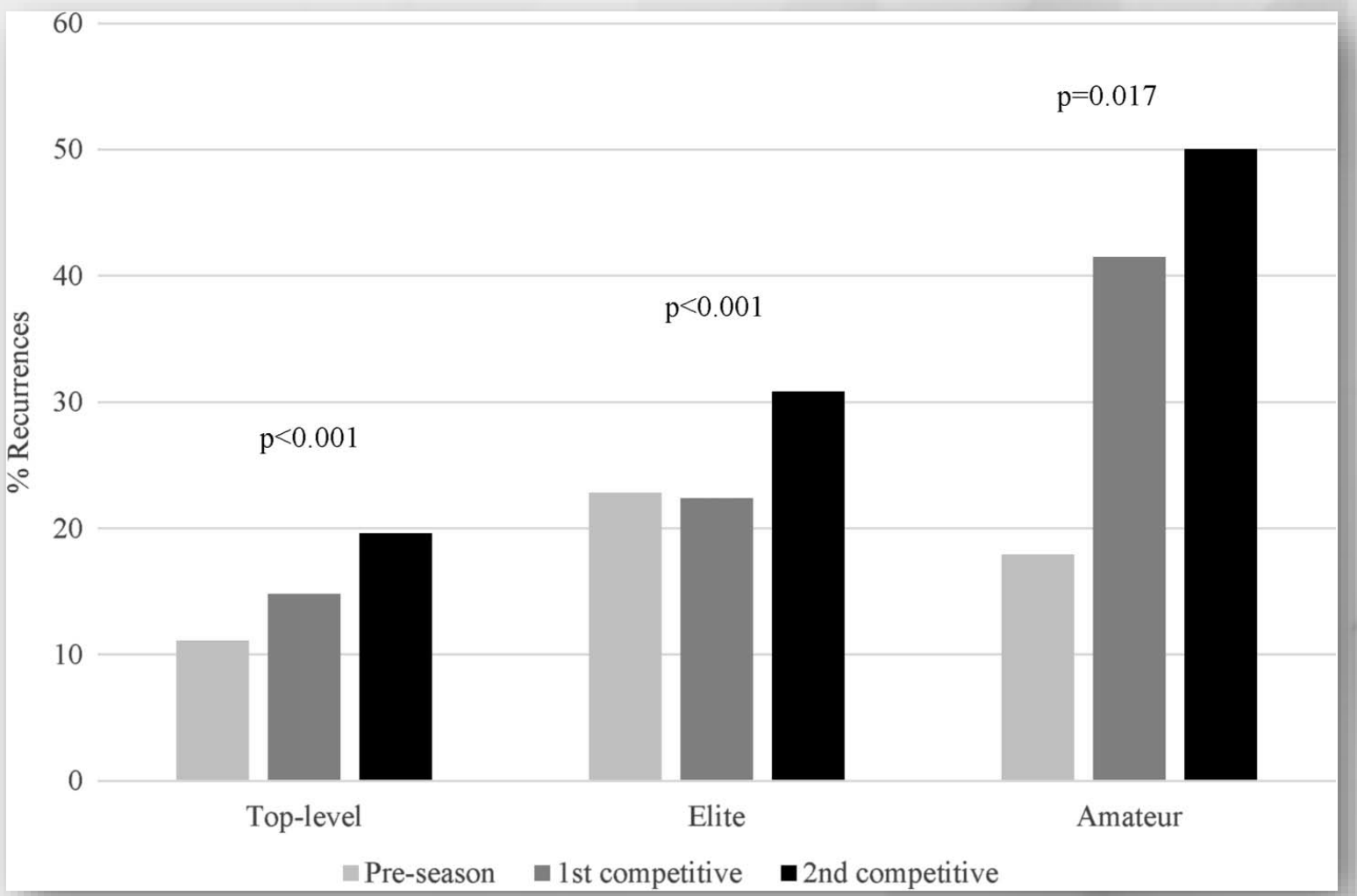
Bahr et al, 2018

Fewer ligament injuries but no preventive effect on muscle injuries and severe injuries: an 11-year follow-up of the UEFA Champions League injury study

Jan Ekstrand,[1,2,3] Martin Hägglund,[2,4] Karolina Kristenson,[1,2] Henrik Magnusson,[2,4] Markus Waldén[1,2]

Ekstrand J, *et al*. *Br J Sports Med* 2013;**47**:732–737. doi:10.1136/bjsports-2013-092394

שיקום שווה לכולם!



Hagglund et al 2016

משמעות מקצועית

- **5 פציעות** בעונה בקבוצה עם סגל של 25 שחקנים
- הפסד ממוצע של **80 ימי משחק**
- היעדרות של 3-4 משחקים בממוצע לאחר כל פציעה
- היעדרות כוללת מ- **21 משחקים בעונה**

FC Barcelona Squad 2018

כבר בדקה ה-30: נתניה ביצעה 3 חילופים כפויים

אירוע נדיר במשחק בין היהלומים לב"ש - לאחר חצי שעה סיים דראפיץ' את כל החילופים בעקבות פציעות של ורגוץ', אברהם ובצ'יראי. כל השלושה עם חשש לקרע (6 תגובות)

Injuries affect team performance negatively in professional football: an 11-year follow-up of the UEFA Champions League injury study

Martin Hägglund,[1,2] Markus Waldén,[2,3] Henrik Magnusson,[1,2] Karolina Kristenson,[2,3] Håkan Bengtsson,[2] Jan Ekstrand[2,3]

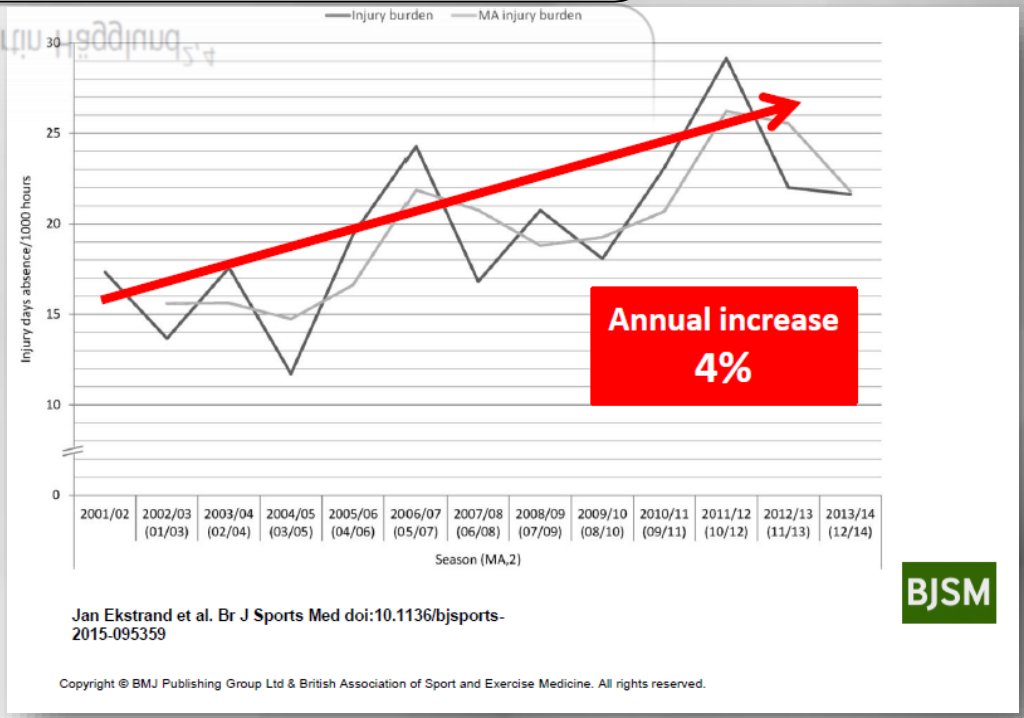
האם אנחנו בכיוון הנכון?

Original article

Editor's choice
Scan to access more free content

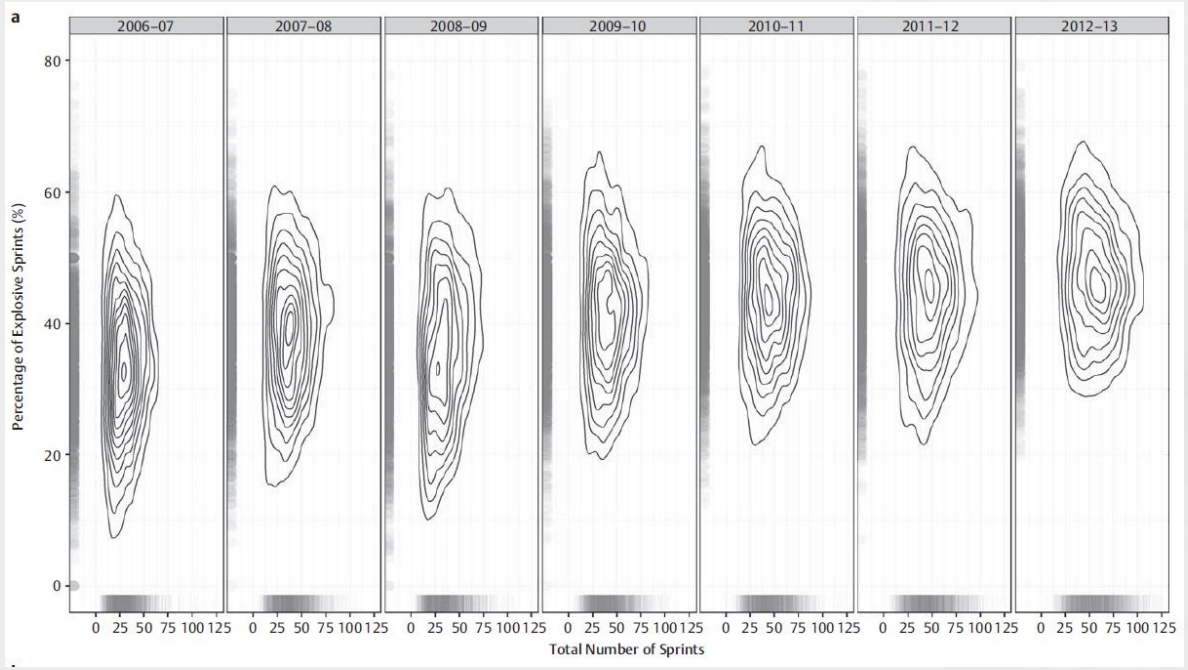
Hamstring injuries have increased by 4% annually in men's professional football, since 2001: a 13-year longitudinal analysis of the UEFA Elite Club injury study

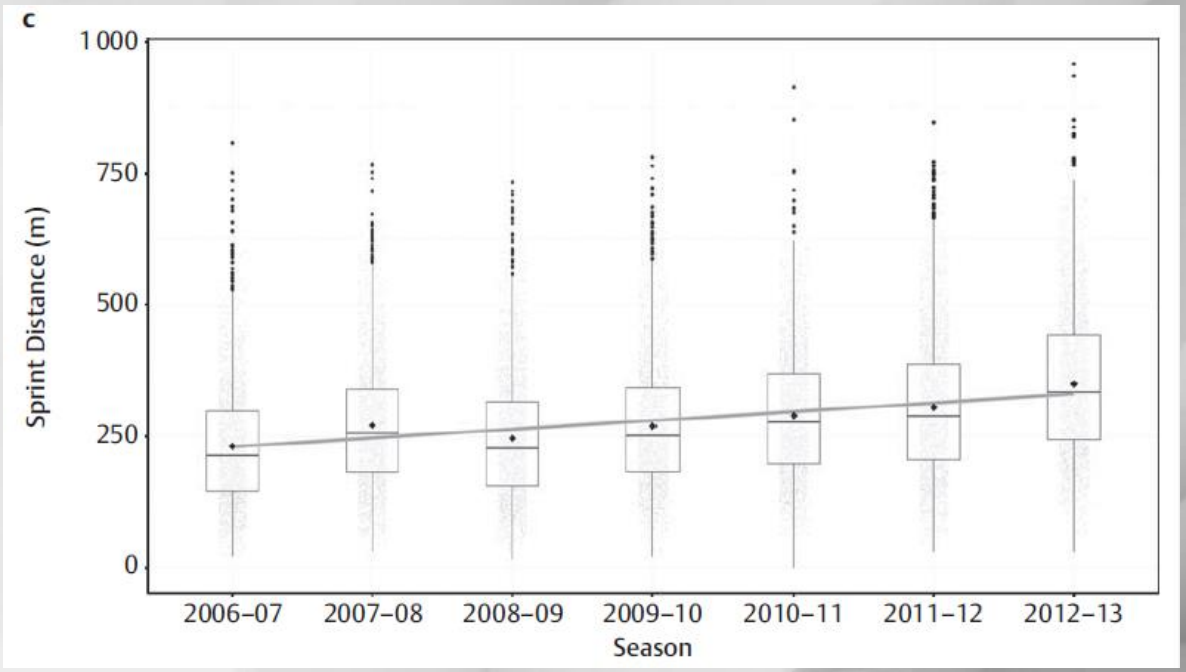
Jan Ekstrand,[1,2,3] Markus Waldén,[1,2] Martin Hägglund[2,4]



The Evolution of Physical and Technical Performance Parameters in the English Premier League

מרחק ריצה של שחקנים עלה ב 2% מעונת 2006 עד 2013
מרחק הריצות המהירות (לא ספרינט) עלה ב 30%
מספר הריצות המהירות עלה ב 35%
מספר הספרינטים עלה ב 85%!!!





סיבות לכך?

Evidence-based hamstring injury prevention is not adopted by the majority of Champions League or Norwegian Premier League football teams: the Nordic Hamstring survey

Roald Bahr,[1,2] Kristian Thorborg,[3,4] Jan Ekstrand[5]

גורמי סיכון לפציעה ומניעתה

Previous injury	Increase age	Flexibility	Ethnicity	H:Q Ratio
Weight/BMI	Height	Functional measures	Qudariceps isokinetic strength	Hamstring eccentric strength
Player position	Fatigue	Strength	Fascicle length	Strength imbalances
		running		

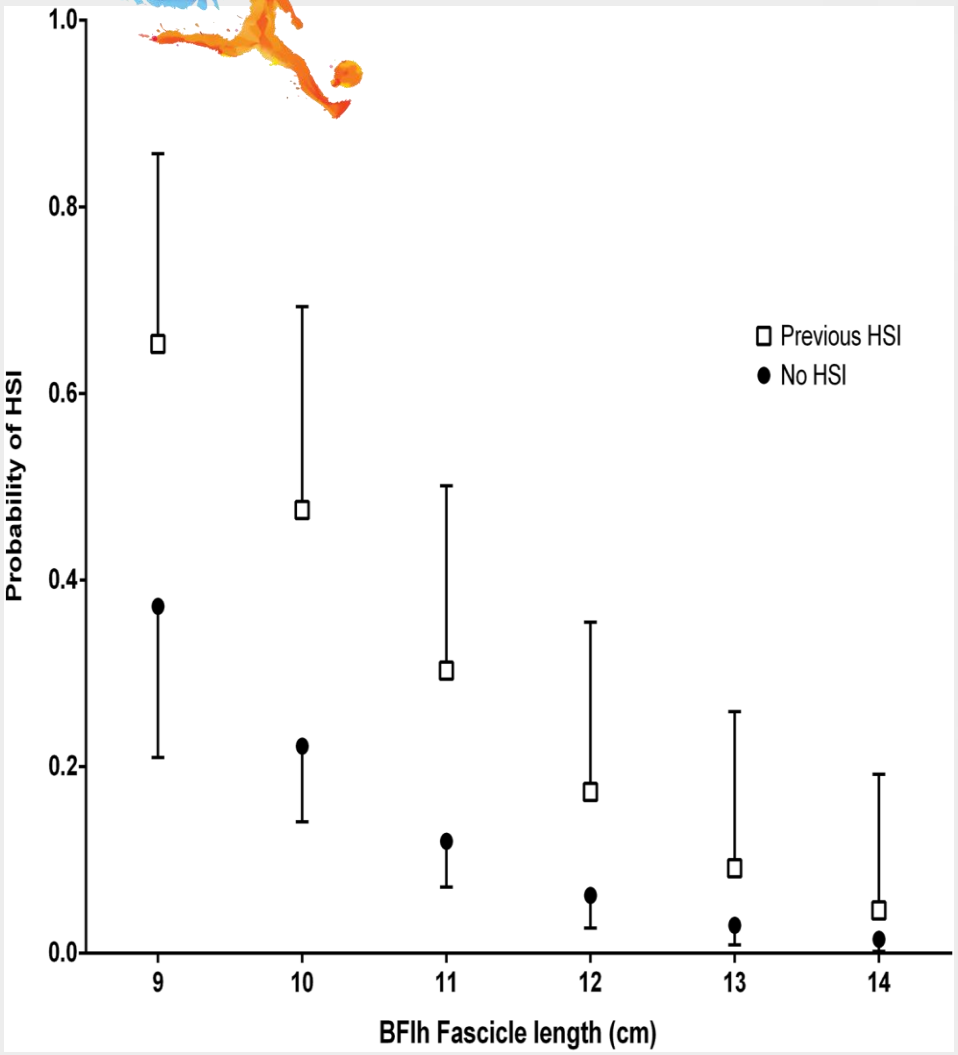
גורמי סיכון לפציעה ומניעתה

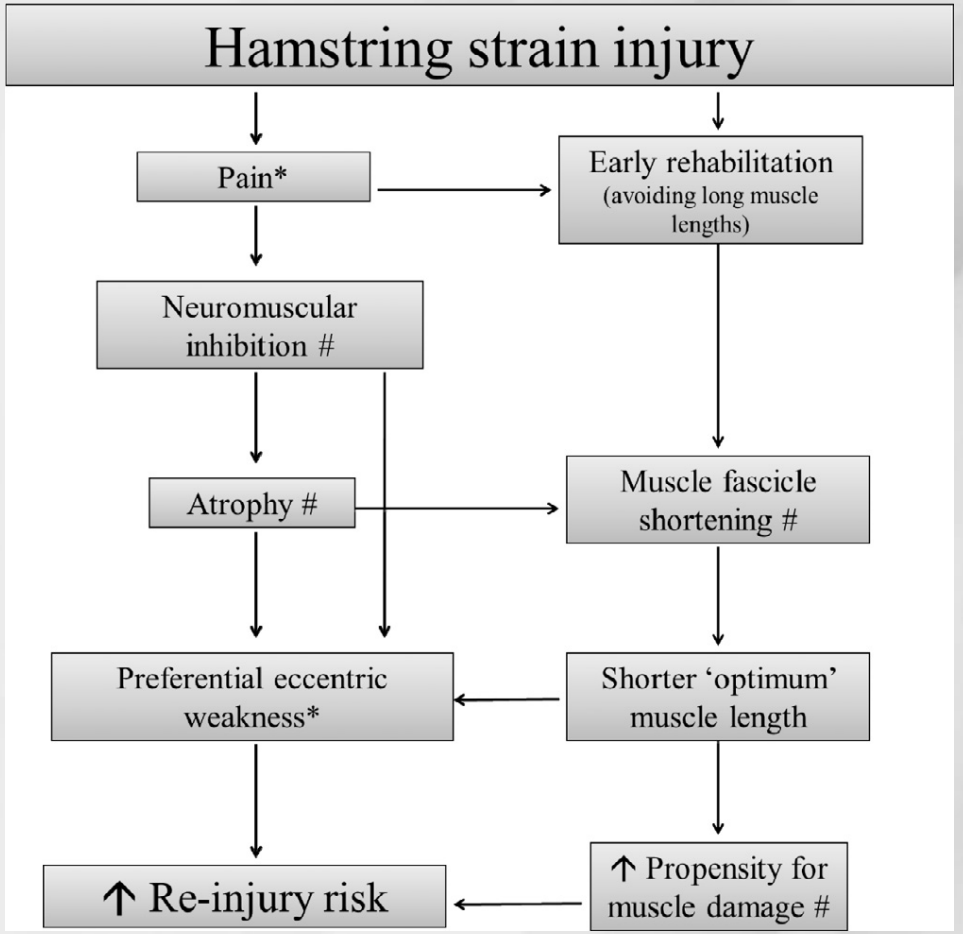
Risk factors for hamstring muscle strain injury in sport: a systematic review and meta-analysis

Grant Freckleton, Tania Pizzari

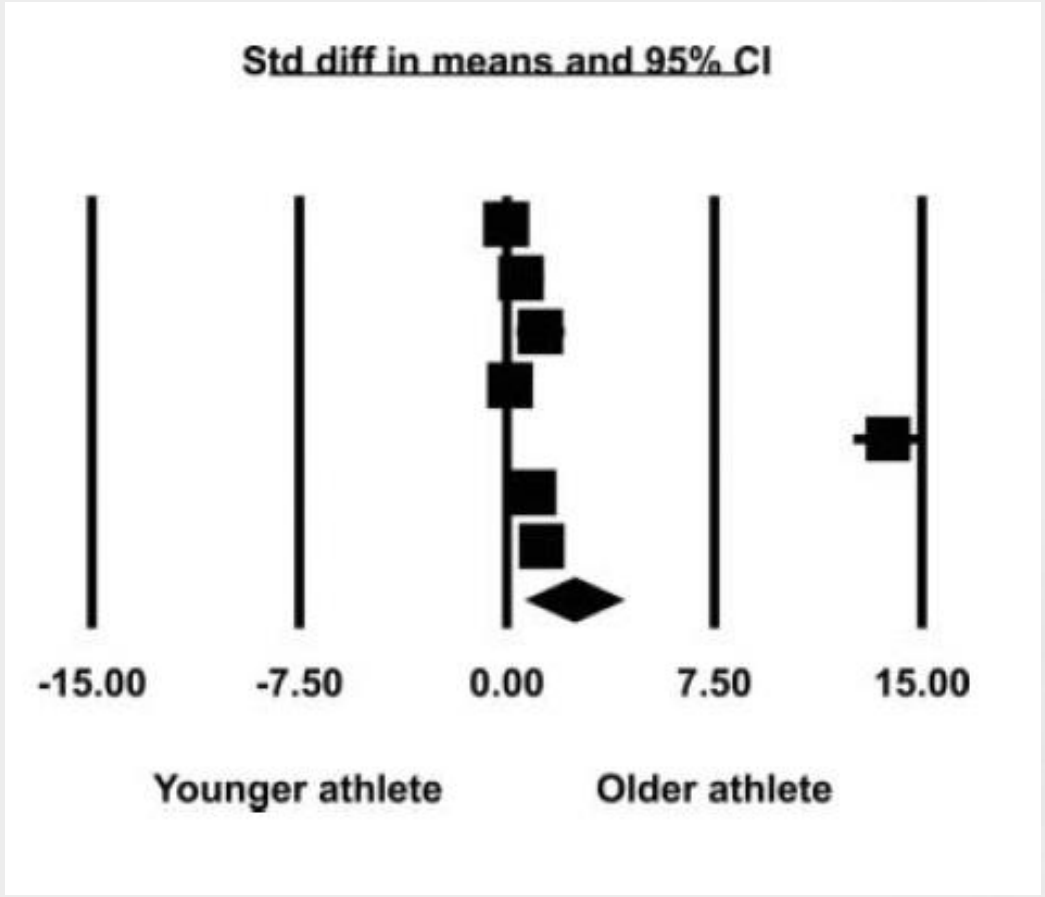
- Previous injury
- Increase age
- Qudariceps isokinetic strength
- Hamstring eccentric strength

פציעות קודמות





גורמי סיכון- גיל ופציעות קודמות



גורמי סיכון לפציעה ומניעתה

Hamstring and Quadriceps Isokinetic Strength Deficits Are Weak Risk Factors for Hamstring Strain Injuries

A 4-Year Cohort Study

Nicol van Dyk,*† PT, MSc, Roald Bahr,†‡ MD, PhD, Rodney Whiteley,† PT, PhD, Johannes L. Tol,†§|| MD, PhD, Bhavesh D. Kumar,¶ MD, Bruce Hamilton,†# MBCHB, Abdulaziz Farooq,† MPH, MSc, and Erik Witvrouw,†** PhD
Investigation performed at Aspetar Orthopaedic and Sports Medicine Hospital, Doha, Qatar

Review

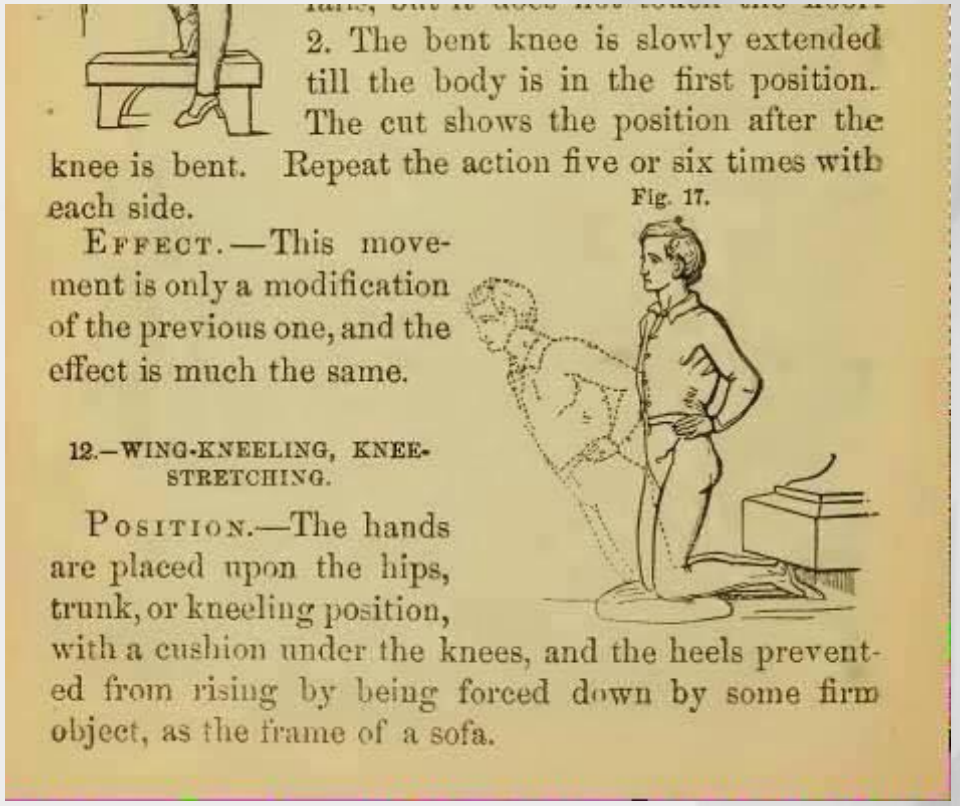
Isokinetic strength assessment offers limited predictive validity for detecting risk of future hamstring strain in sport: a systematic review and meta-analysis

Brady Green, Matthew N Bourne, Tania Pizzari

האם יש לנו מושג איך למנוע את הפציעה?

Wing-kneeling, knee stretching ...1880 כבר מ

G.Taylor



2. The bent knee is slowly extended till the body is in the first position. The cut shows the position after the knee is bent. Repeat the action five or six times with each side.

Fig. 17.

EFFECT.—This movement is only a modification of the previous one, and the effect is much the same.

12.—WING-KNEELING, KNEE-STRETCHING.

POSITION.—The hands are placed upon the hips, trunk, or kneeling position, with a cushion under the knees, and the heels prevented from rising by being forced down by some firm object, as the frame of a sofa.

The Nordic Exercise

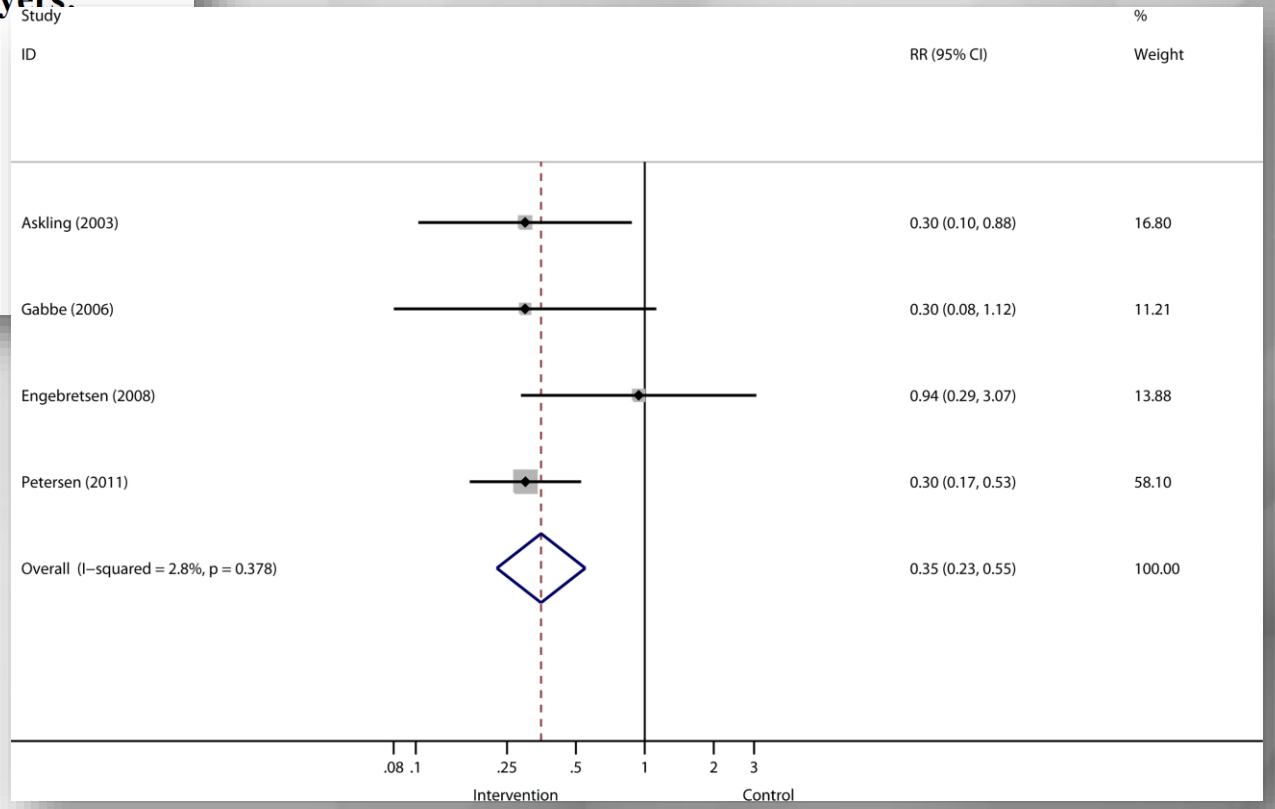
Sports Med (2017) 47:907–916
DOI 10.1007/s40279-016-0638-2

SYSTEMATIC REVIEW

Effect of Injury Prevention Programs that Include the Nordic Hamstring Exercise on Hamstring Injury Rates in Soccer Players: A Systematic Review and Meta-Analysis

Wesam Saleh A. Al Attar[1,2,3] · Najeebullah Soomro[1,4] · Peter J. Sinclair[1] · Evangelos Pappas[2] · Ross H. Sanders[1]

Published online: 17 October 2016
© Springer International Publishing Switzerland 2016



The Nordic Exercise

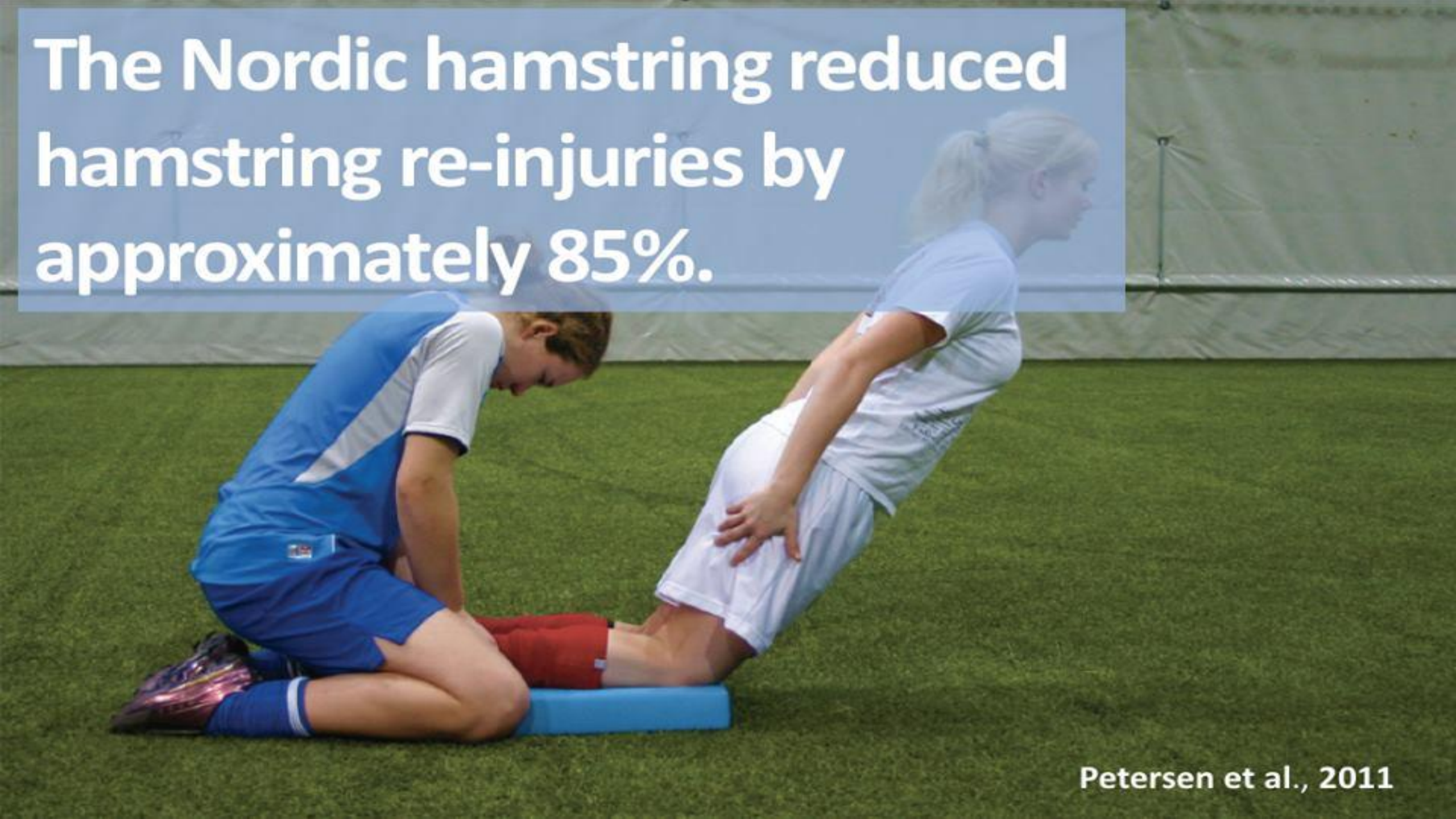
- מחקרי RCT's אשר בחנו את תרגיל ה- Nordic
- Petrson et al 2011 & van der host et al 2015

תוצאות משותפות הראו כי:

– קבוצת ה-Nordic: מתוך 753 שחקנים – **25 פציעות**

– קבוצת קונטרול: מתוך 768 שחקנים – **77 פציעות!**

ירידה של 67.5% בפציעות hamstring


The Nordic hamstring reduced hamstring re-injuries by approximately 85%.
Petersen et al., 2011

למה לא מבצעים את זה ?

- התרגיל לא מדמה את מנגנון הפציעה
- פציעה בריצה מהירה >> תרגול מבוצע בצורה איטית
- ביומכניקה של הפציעה= ירך בכיפוף ברך ביישור
- ביומכניקה של התרגיל = ירך יישור ברך בכיפוף
- השריר הדומיננטי שעובד- Medial Hamstring, פציעה היא בLHbf
- פחד מהתרגיל
- DOMS

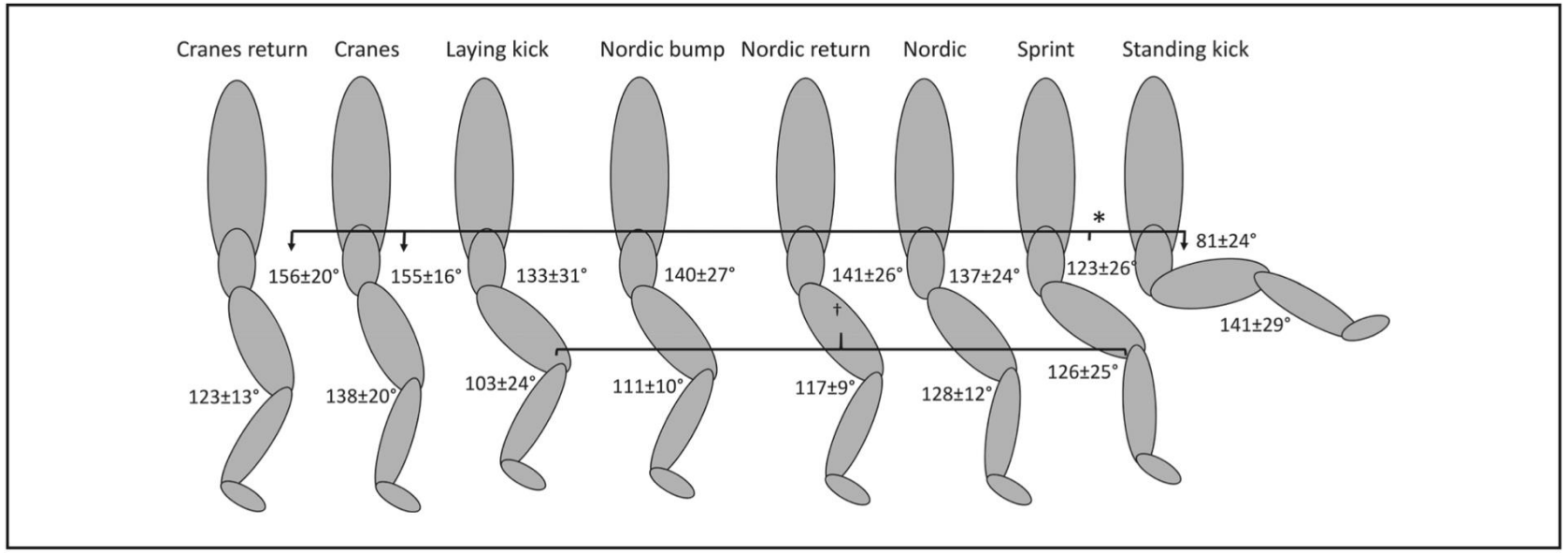


Figure 3. *The angles (+/-SD) at maximal EMG activity for the hip and knee joints, averaged over all three muscles for each hamstring exercise and sprint.*
**Indicates a significant difference for hip joint angle for this exercise with the sprints ($p < 0.05$)*
†Indicates a significant difference for knee joint angle between this exercise and the sprints on a ($p < 0.05$)

Van den tillar et al, 2017

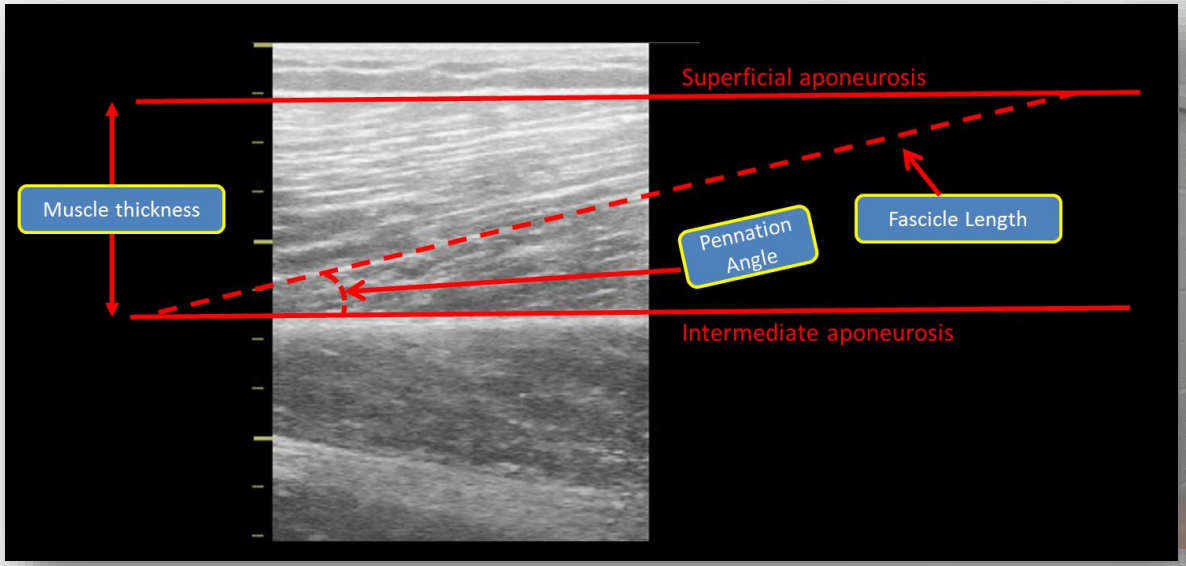
כח- סוג כיווץ מבנה השריר

Original article

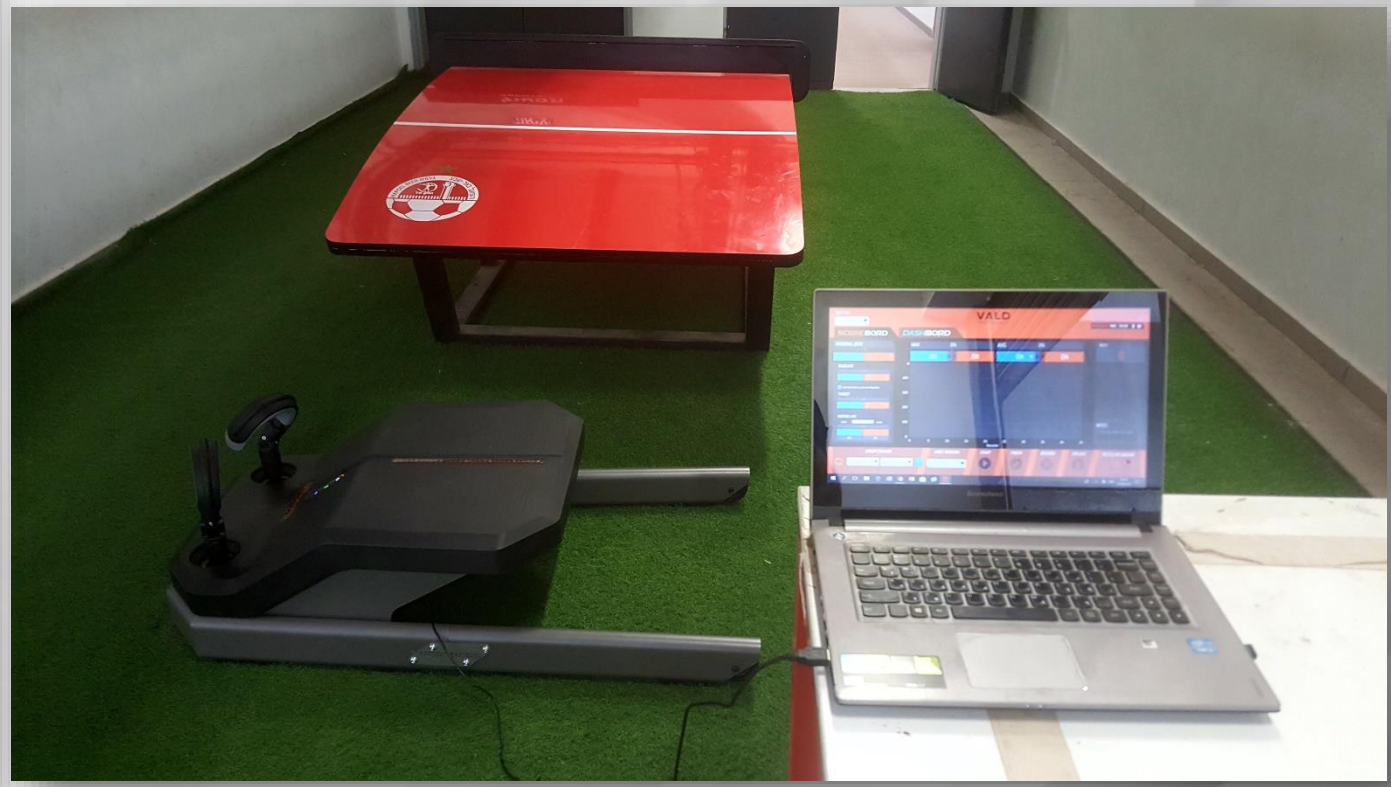
Short biceps femoris fascicles and eccentric knee flexor weakness increase the risk of hamstring injury in elite football (soccer): a prospective cohort study

Ryan G Timmins,[1] Matthew N Bourne,[2] Anthony J Shield,[2] Morgan D Williams,[3] Christian Lorenzen,[1] David A Opar[1]

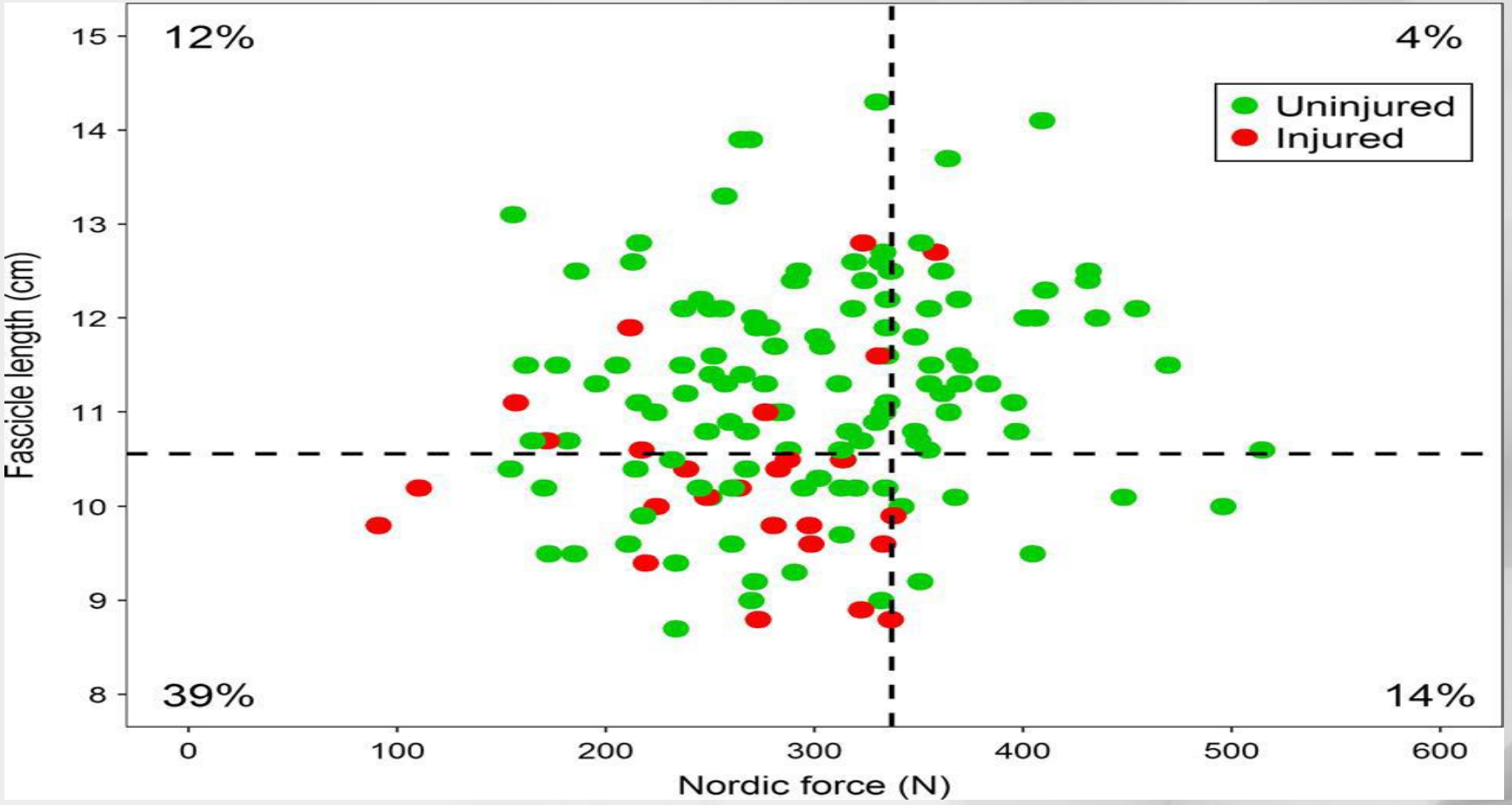
כח- סוג כיווץ מבנה השריר



כח- סוג כיווץ מבנה השריר



כח- סוג כיווץ מבנה השריר

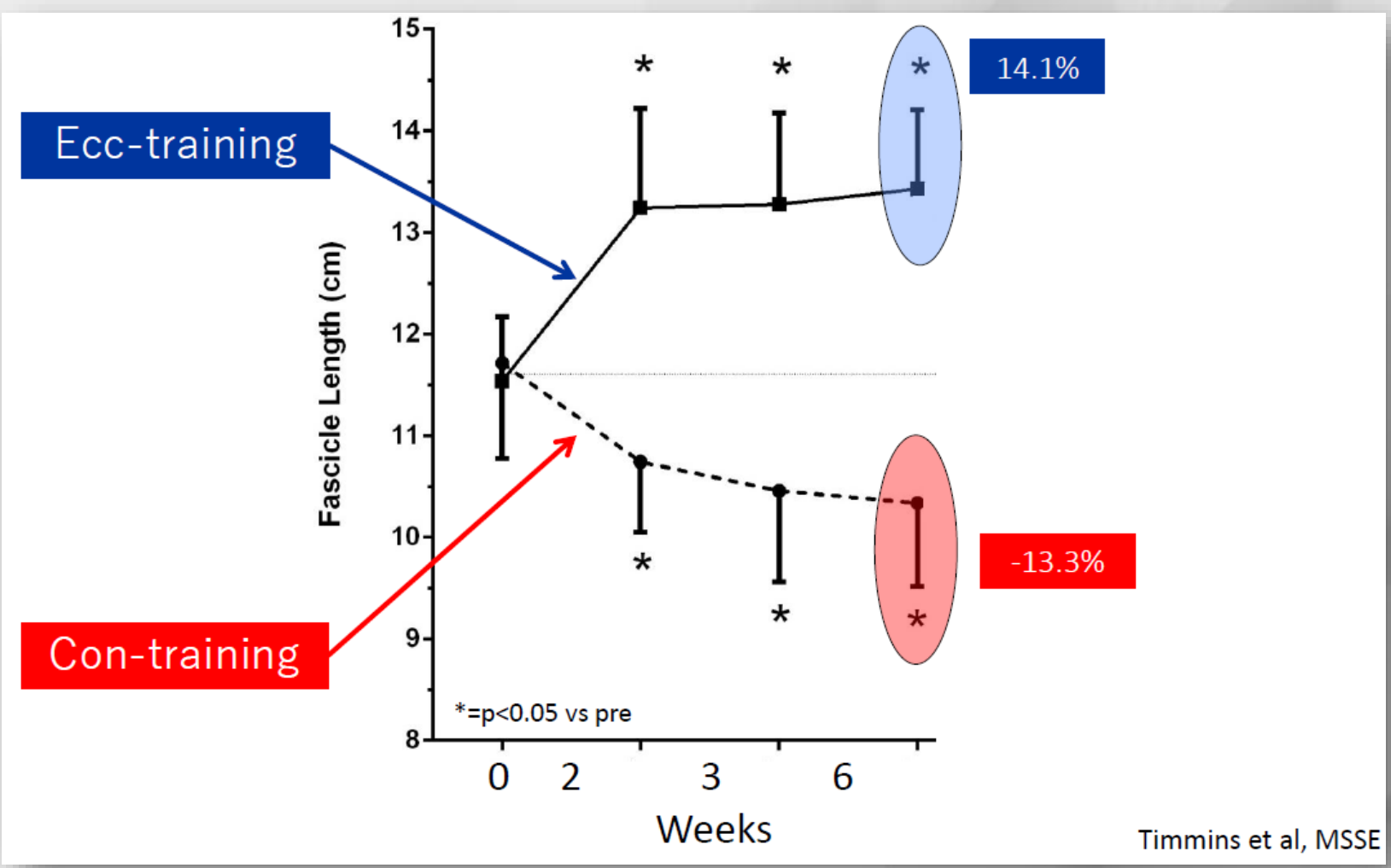


Timmins et a, 2016

The effects of eccentric training on lower limb flexibility: a systematic review

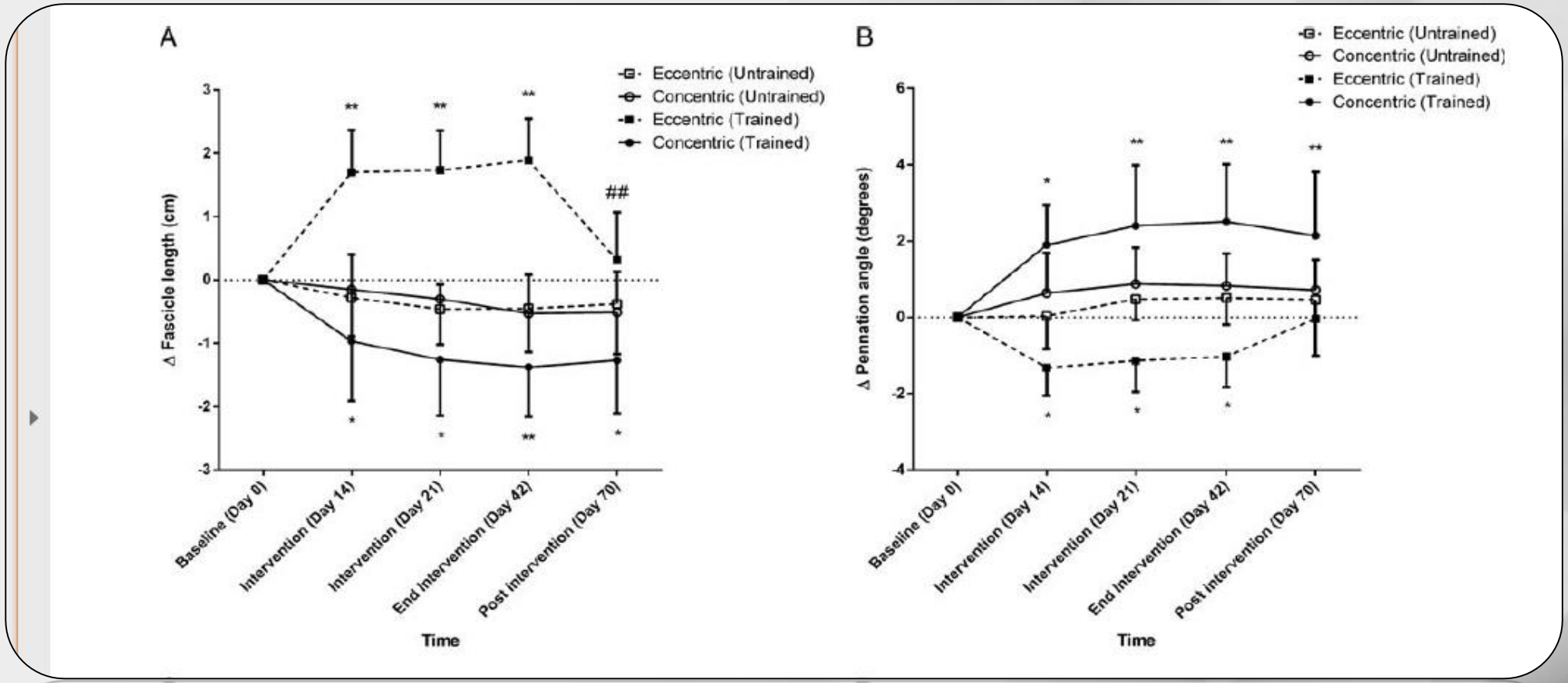
Kieran O'Sullivan, Sean McAuliffe, Neasa DeBurca

כח- סוג כיווץ מבנה השריר



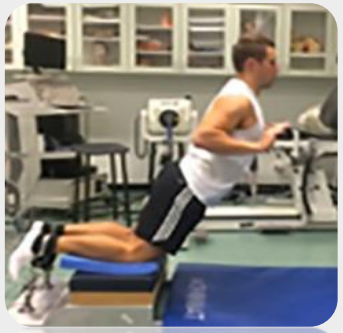
Timmins et a, 2016

בחירת תרגילים

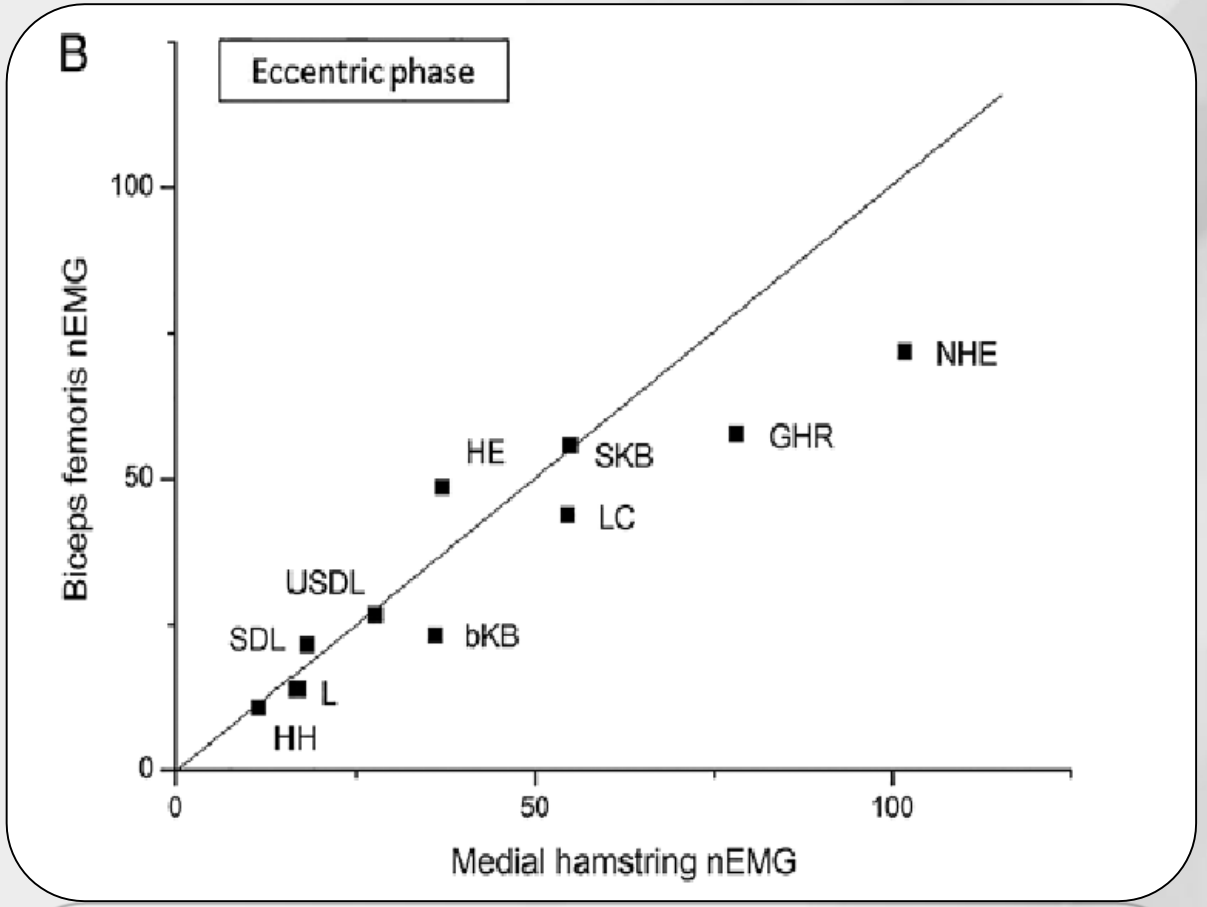


Timmins et a, 2016

בחירת תרגילים

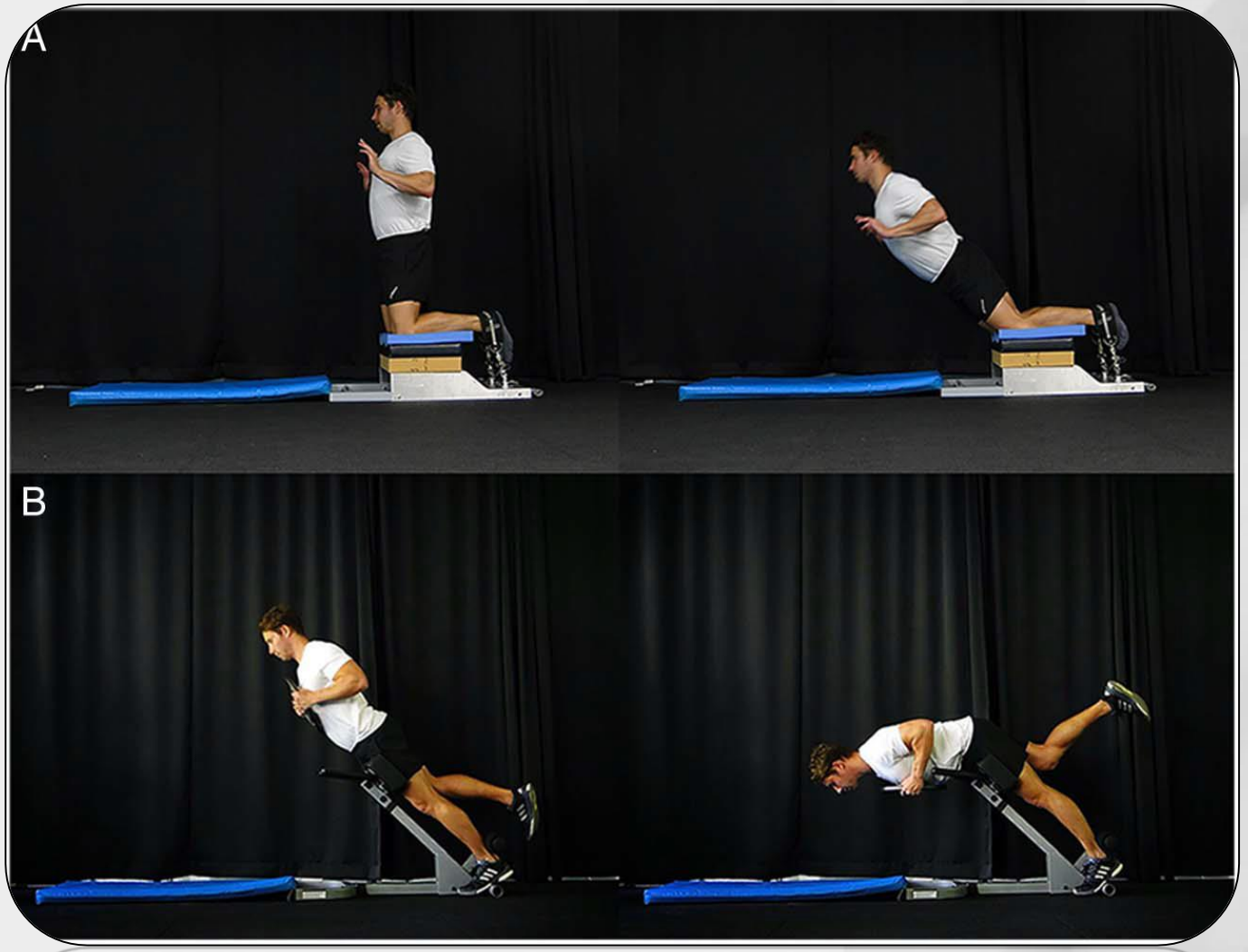


בחירת תרגילים

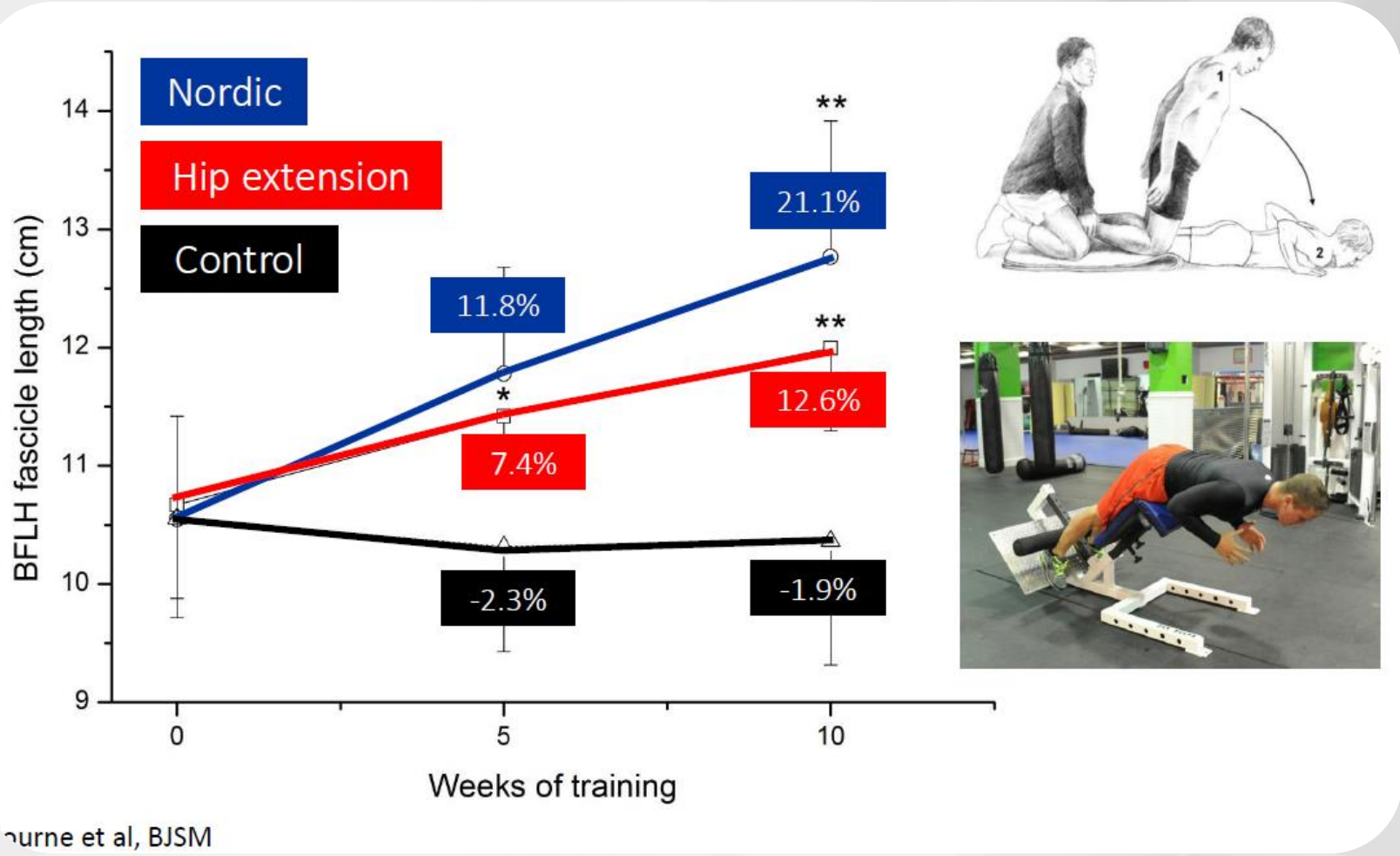


Bourne et al, 2016

בחירת תרגילים



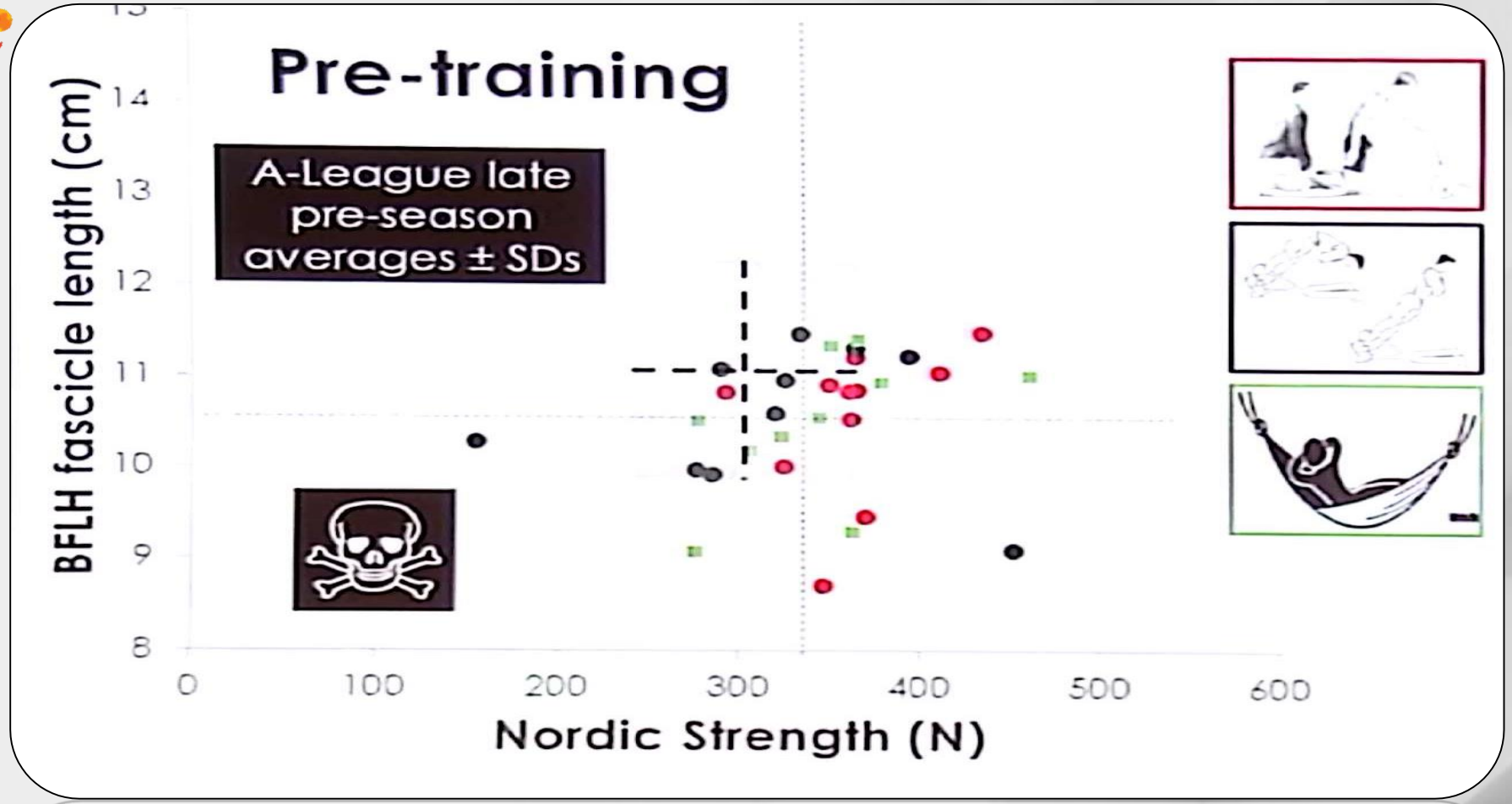
בחירת תרגילים



urne et al, BJSM

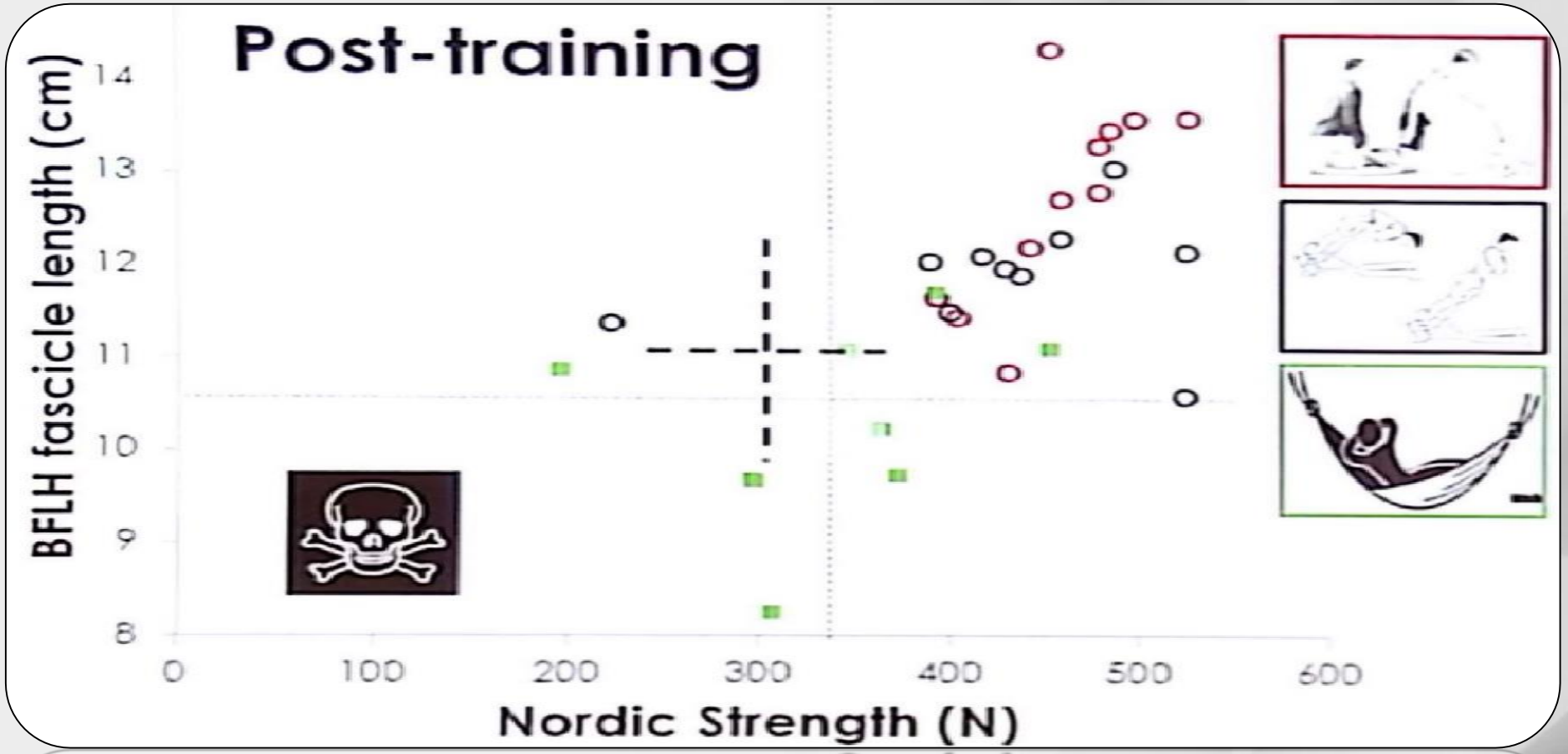
Bourne et al, 2016

בחירת תרגילים



Bourne et al, 2016

בחירת תרגילים



Bourne et al, 2016

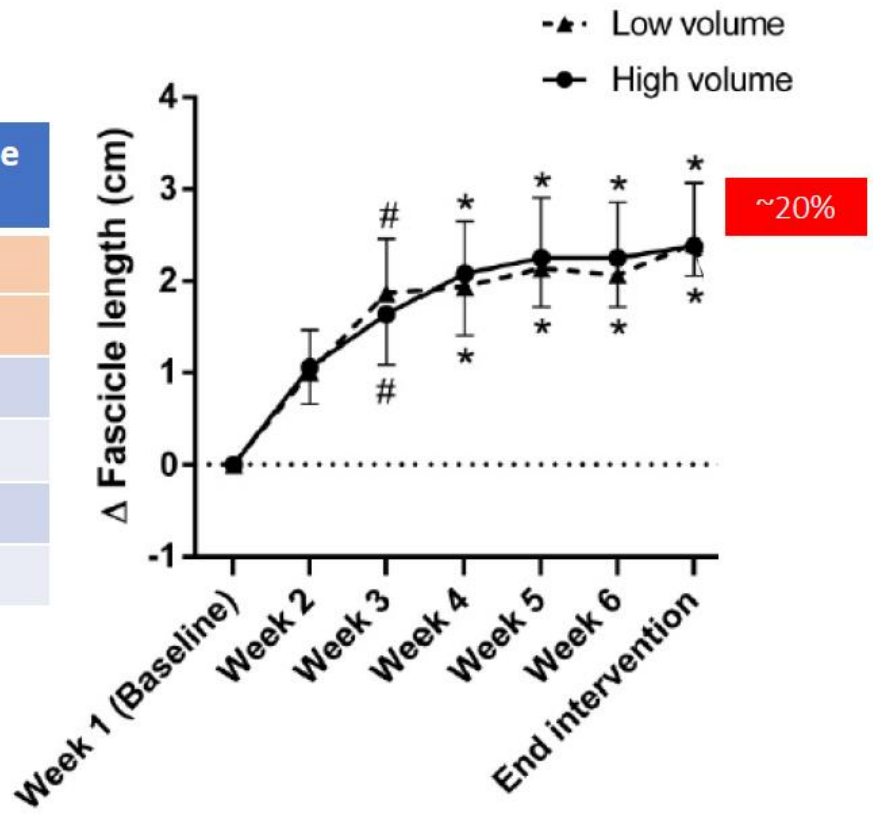
אבל במהלך עונה עצימות גבוהה...

יש הרבה משחקים...

לו"ז צפוף

VOLUME

Week	High volume (reps)	Low volume (reps)
1	48	48
2	48	48
3	64	8
4	80	8
5	100	8
6	100	8



Presland et al, SJMSS 2018.

Applying Science To Practice

Leicester City: The science behind their Premier League title

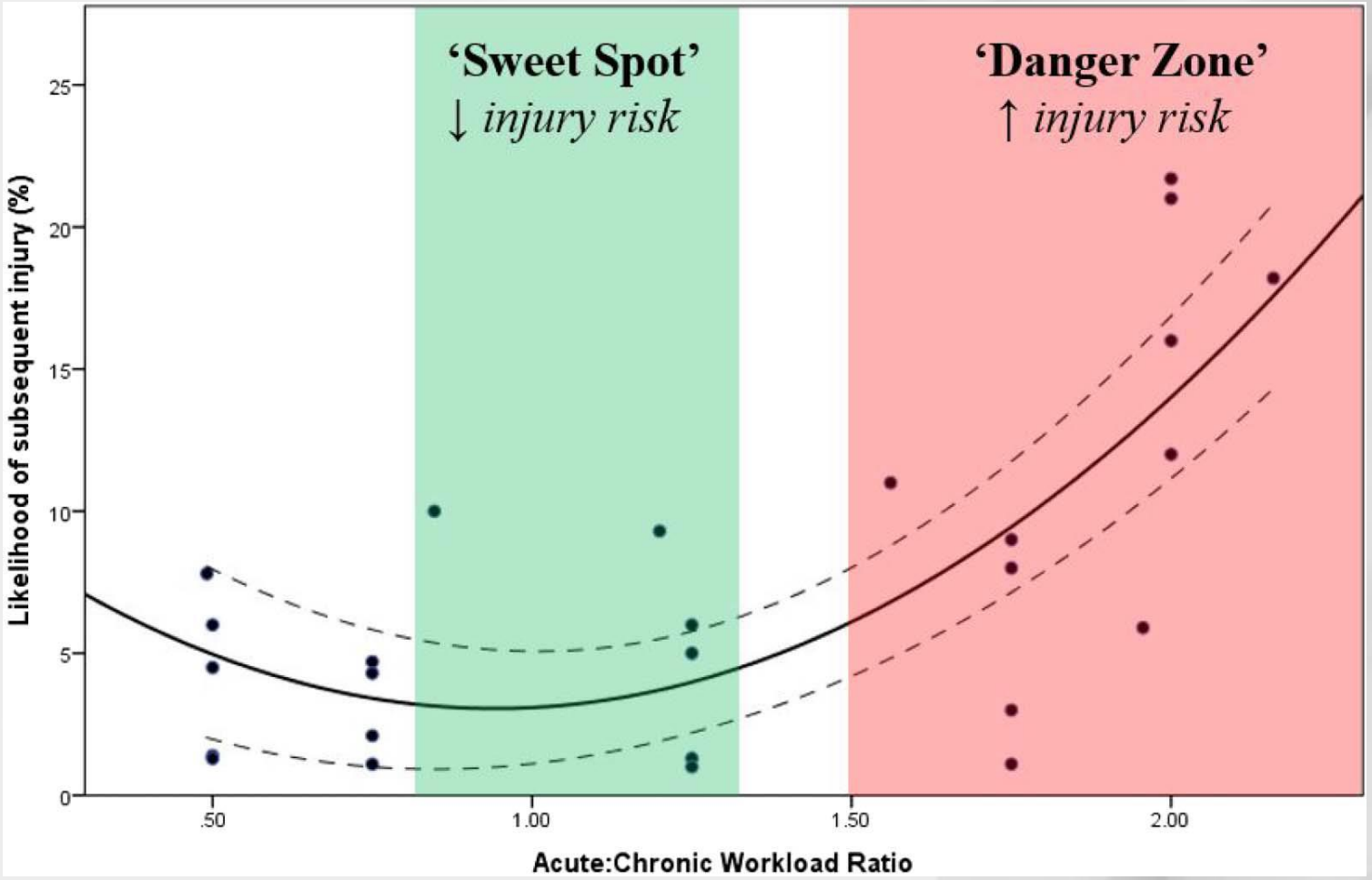
By Alistair Magowan
BBC Sport

4 May 2016 | Leicester

Share

Leicester players wear GPS vests in training to record their every movement

< 0.80 (Under training and higher relative injury risk)
80 – 1.30 (Optimal workload and lowest relative injury risk – "The Sweet Spot") [7].
> 1.50 (The "danger zone" and highest relative injury risk)

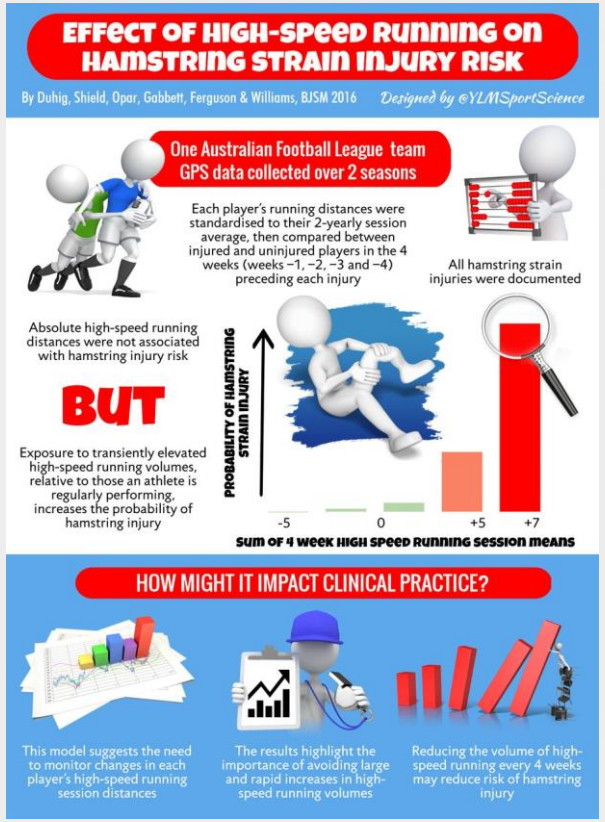


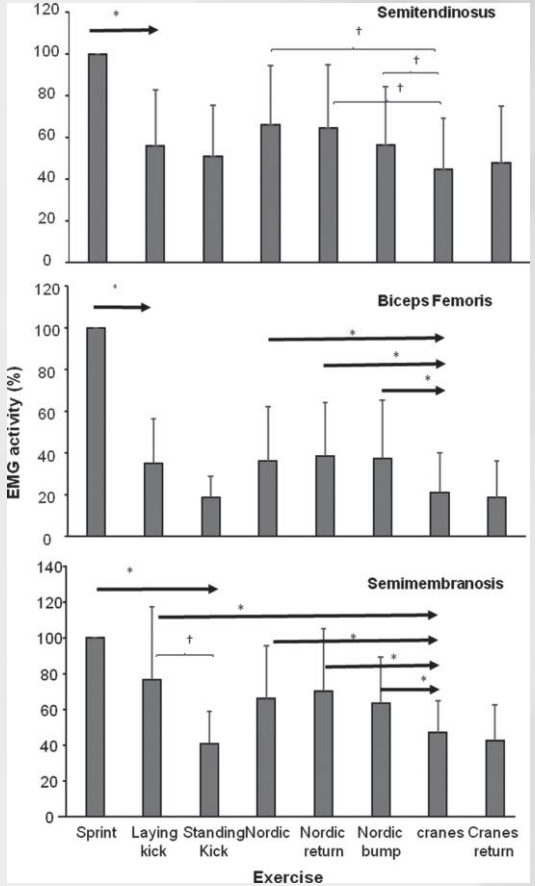
Gabbett, 2015

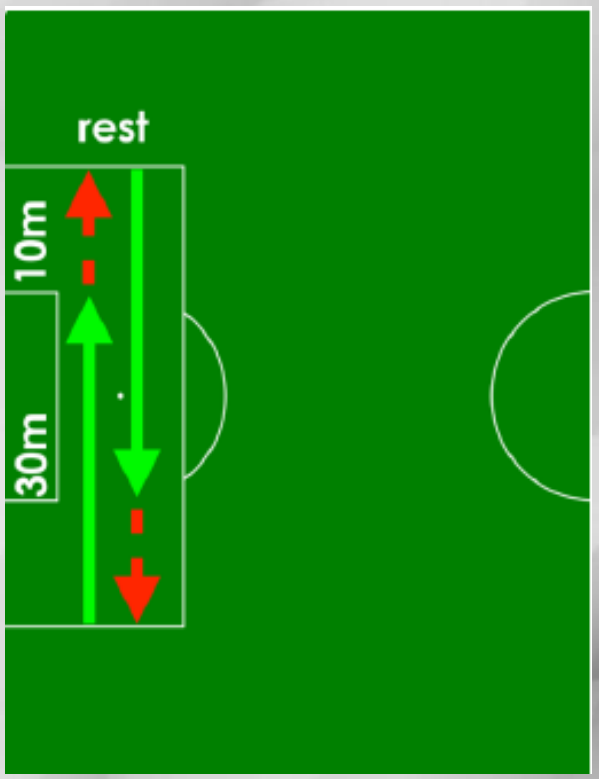
Applying Science To Practice

חשיפה לספרינטים

פעילות שרירית ב- Hamstring בזמן ספרינט הייתה הגבוהה ביותר מבין כל תרגילי הכח







Van den Tillarr et al, IJSPT, 2017

Applying Science To Practice

Example 1

MD+1	MD+2	MD+3	MD-3	MD-2	MD-1
+24	+48	+72	-72	-48	-24
Sun	Mon	Tues	Wed	Thurs	Fri
REST	RECOVERY	SSG; 6v6	REST	BTB; 11v11	SSG; 11v11

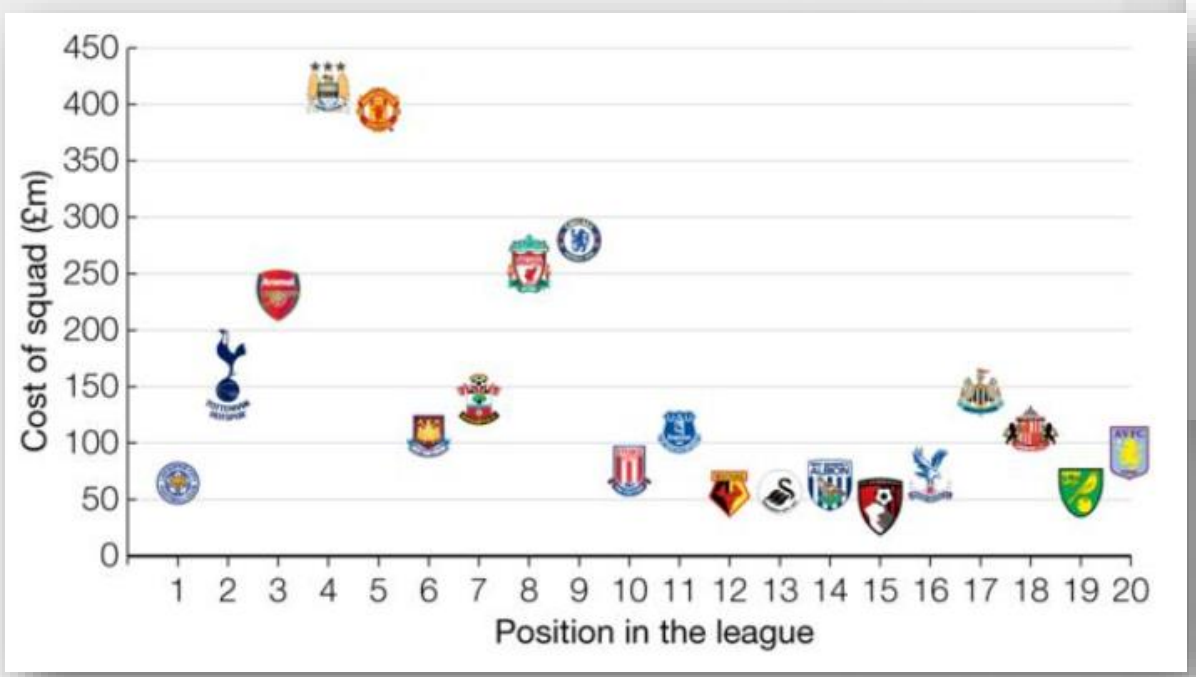
Example 2

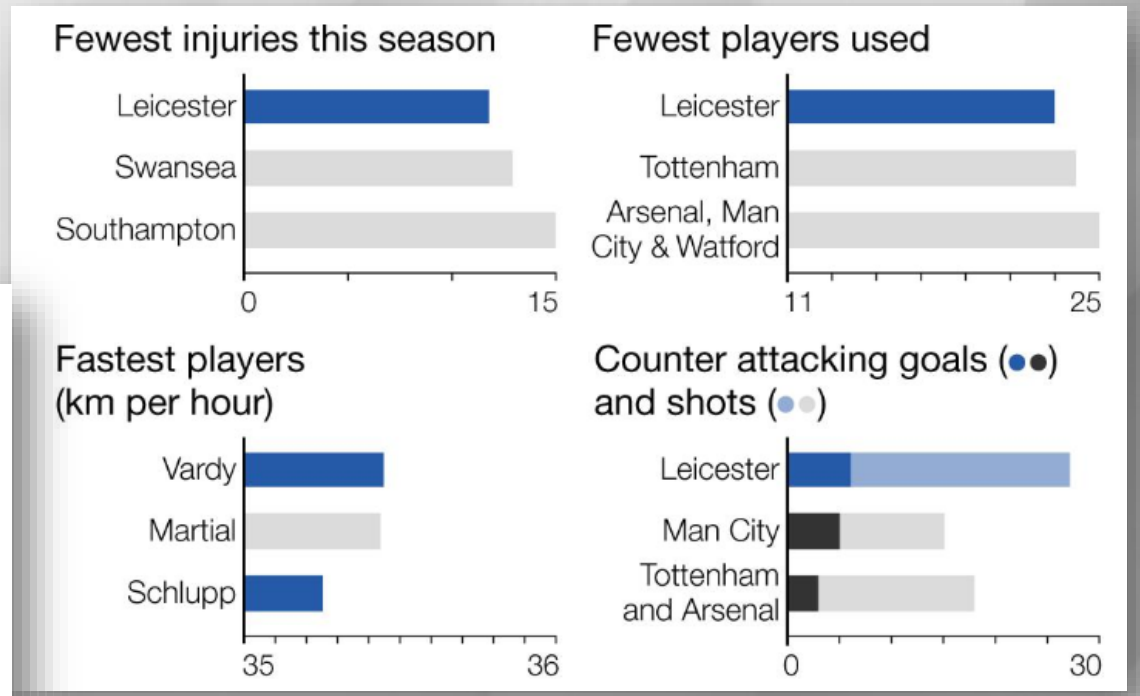
MD+1	MD+2	MD+3	MD-3	MD-2	MD-1
+24	+48	+72	-72	-48	-24
Sun	Mon	Tues	Wed	Thurs	Fri
REST	RECOVERY	SSG; 6v6	Tactics; 11v11	Technical; specific	SSG; 11v11

Example 3- x2 MD

MD+1/-2	MD+2/-1	MD	MD+1/-3	MD-2	MD-1
+24	+48		-72	-48	-24
Sun	Mon		Wed	Thurs	Fri
RECOVERY	SSG; 11v11	None starters	RECOVERY	Tactical; 11v11	SSG; 11v11

Applying Science To Practice



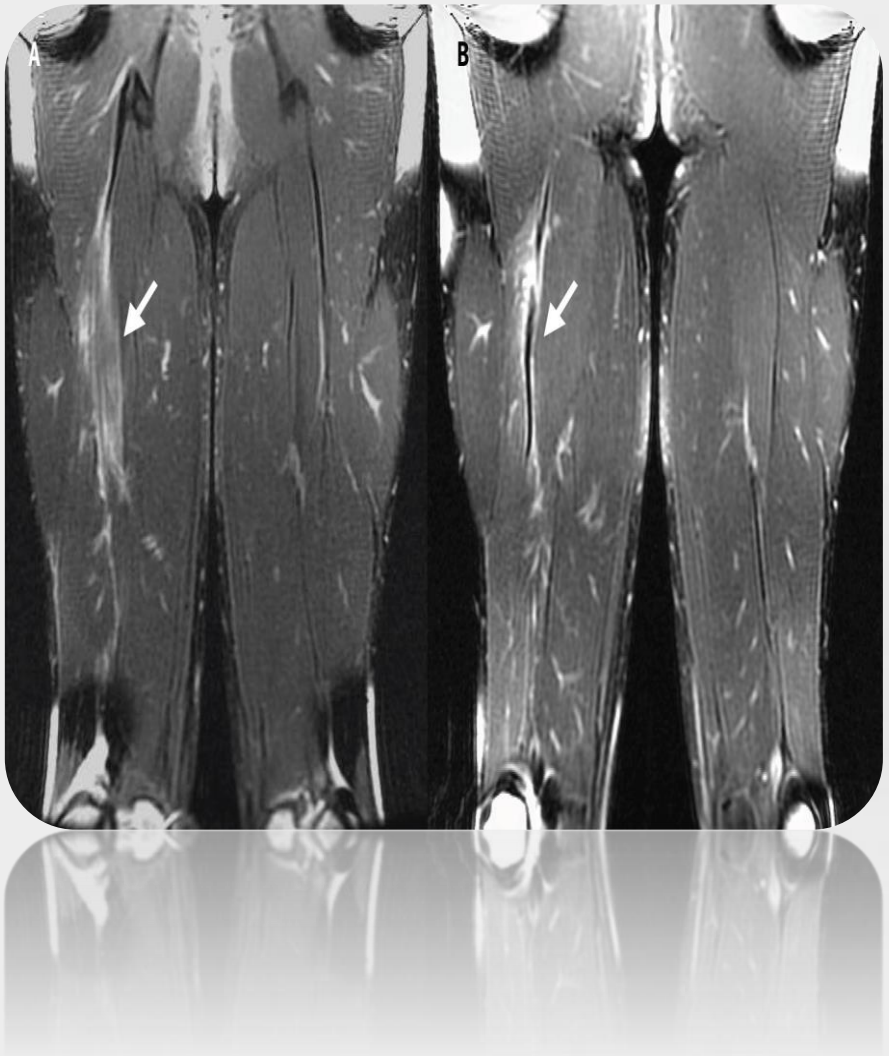


אבחון ושיקום

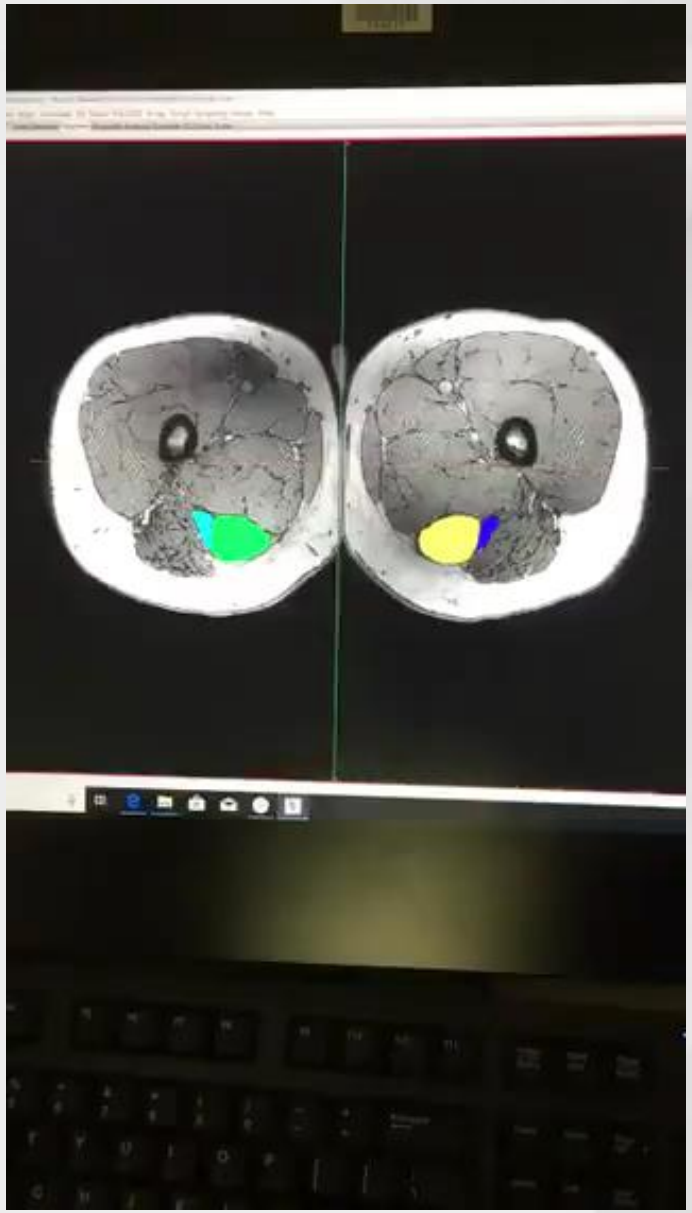
אבחון

מתחלק ל:

- **אבחנה קלינית** – כוח, גמישות, נקודת כאב מקסימלי, מרחק מ-Ischial tuberosity
- **MRI**

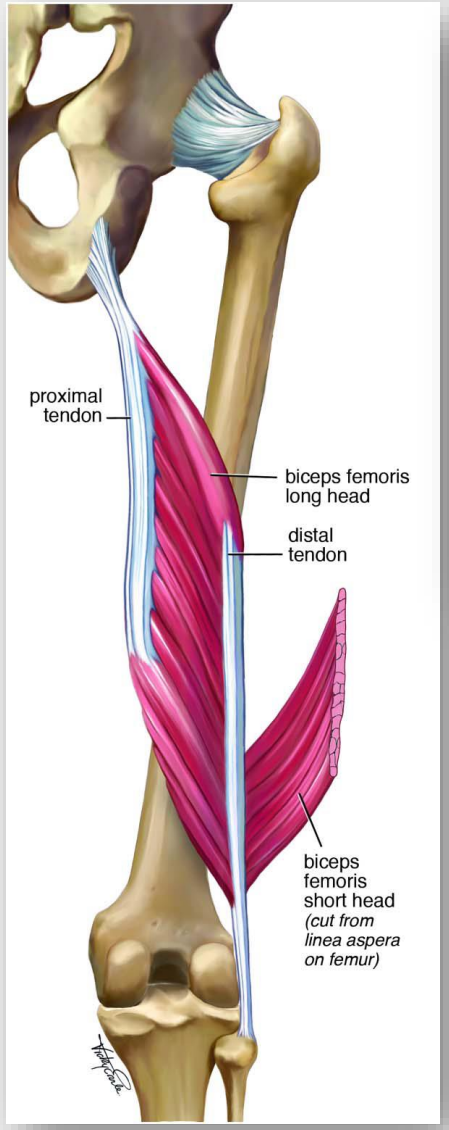


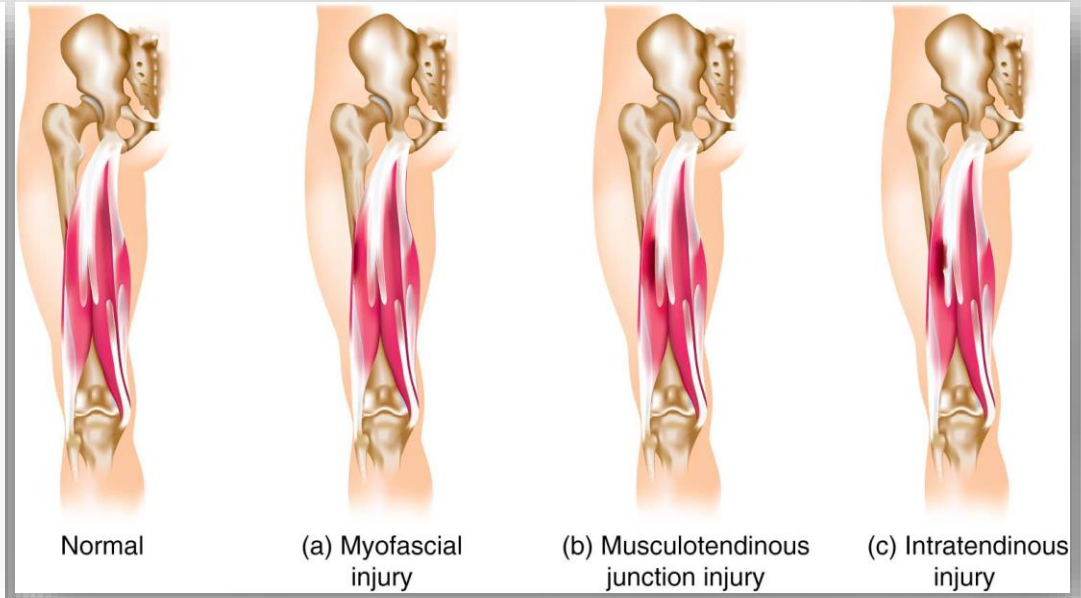
אבחון

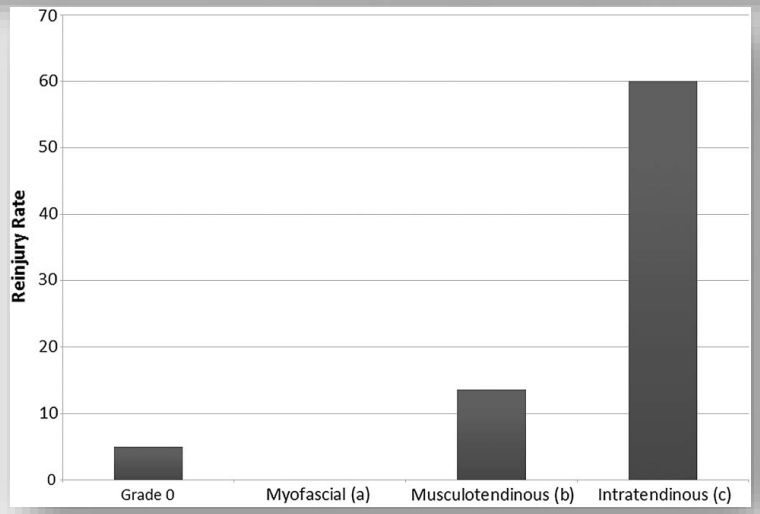


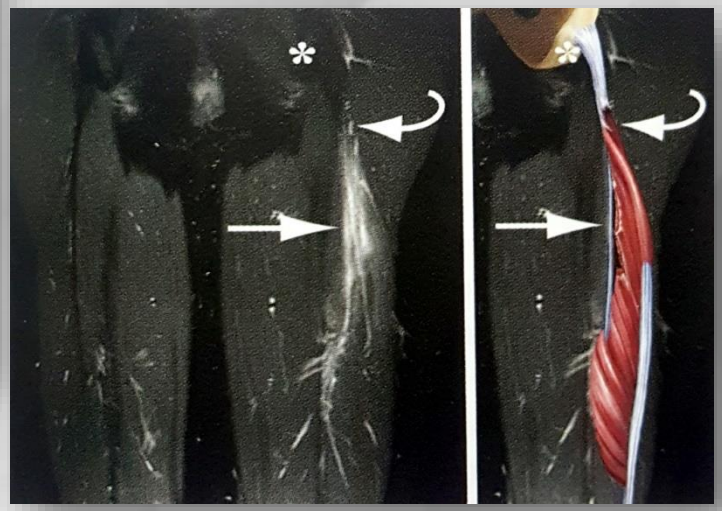
@messerd008

סיווג נוסף בפציעת hamstring



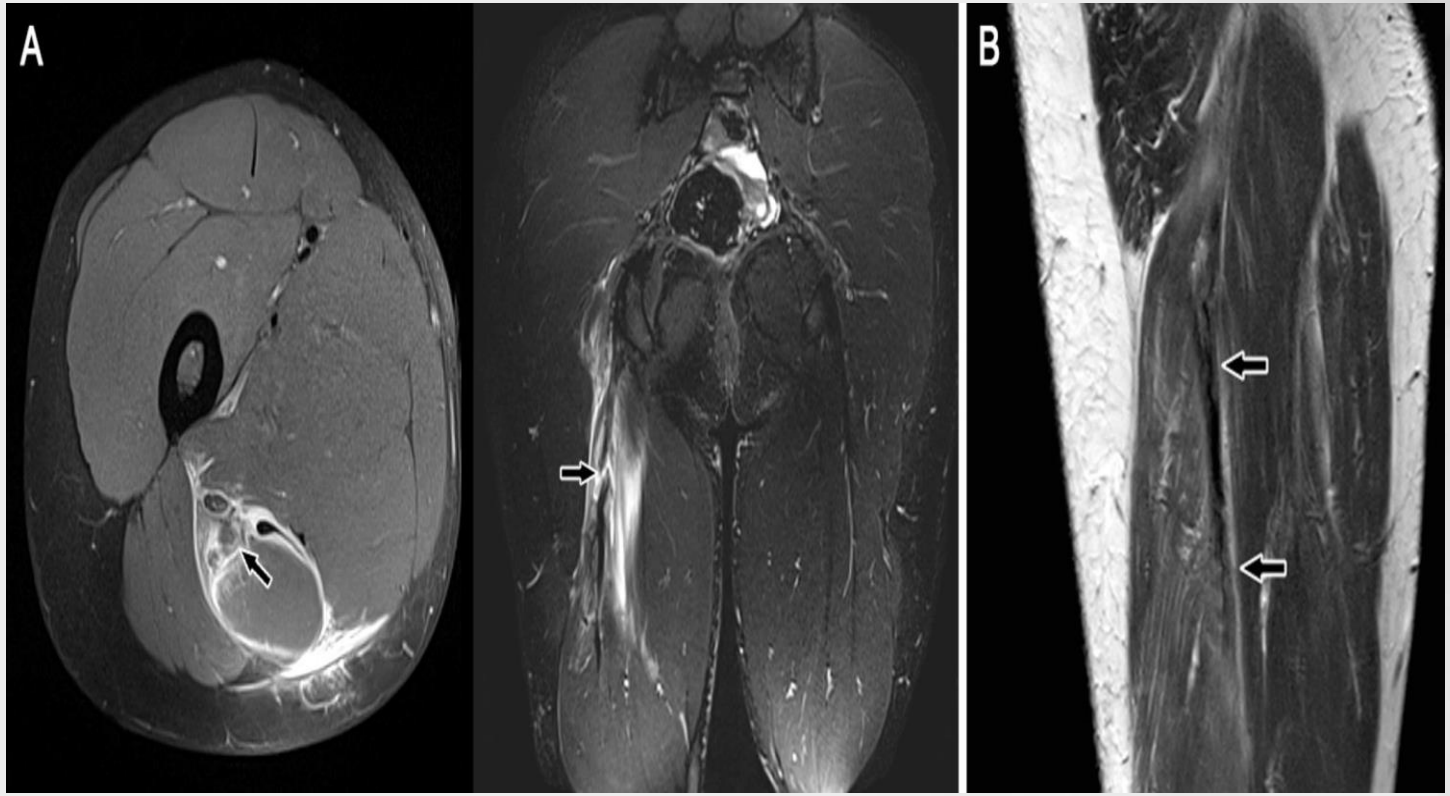






Brukner & Connell, 2016

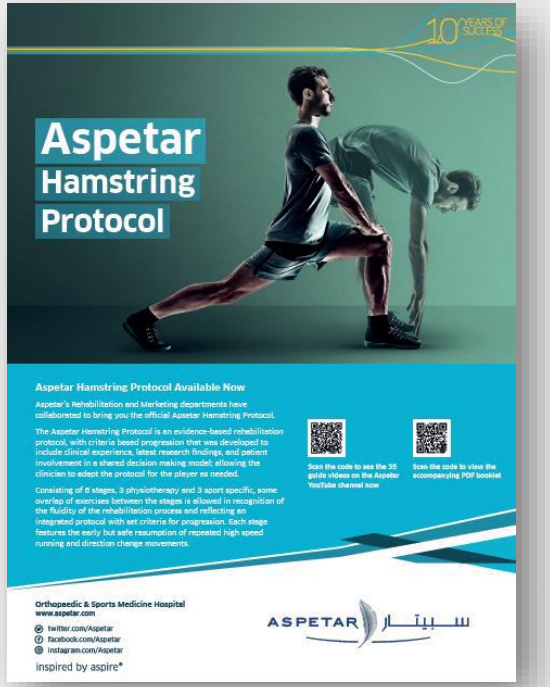
סיווג נוסף בפציעת hamstring



- 165 שחקנים
- 64 (40%) מאובחנים עם פגיעה אינטרמסולרית
- ללא הבדל בזמן חזרה לספורט ואחוז פציעות חוזרות

Van der made, 2018

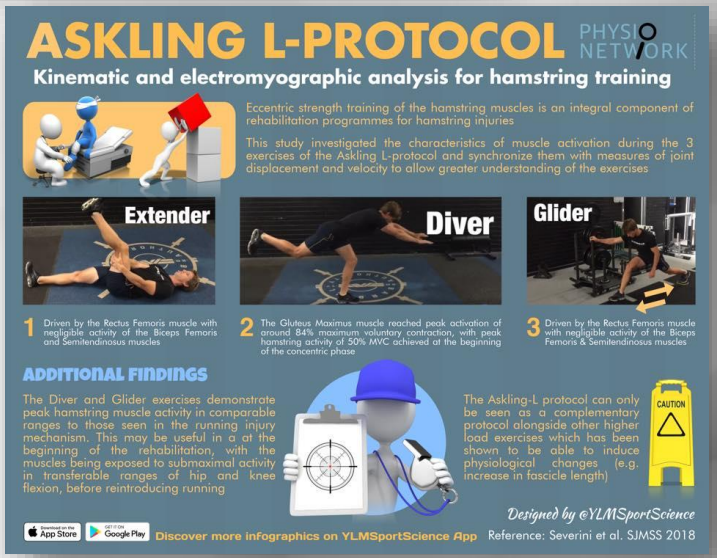
פרוטוקולי שיקום



Pain-free vs pain-threshold rehabilitation for acute hamstring strain injury: A randomised controlled trial

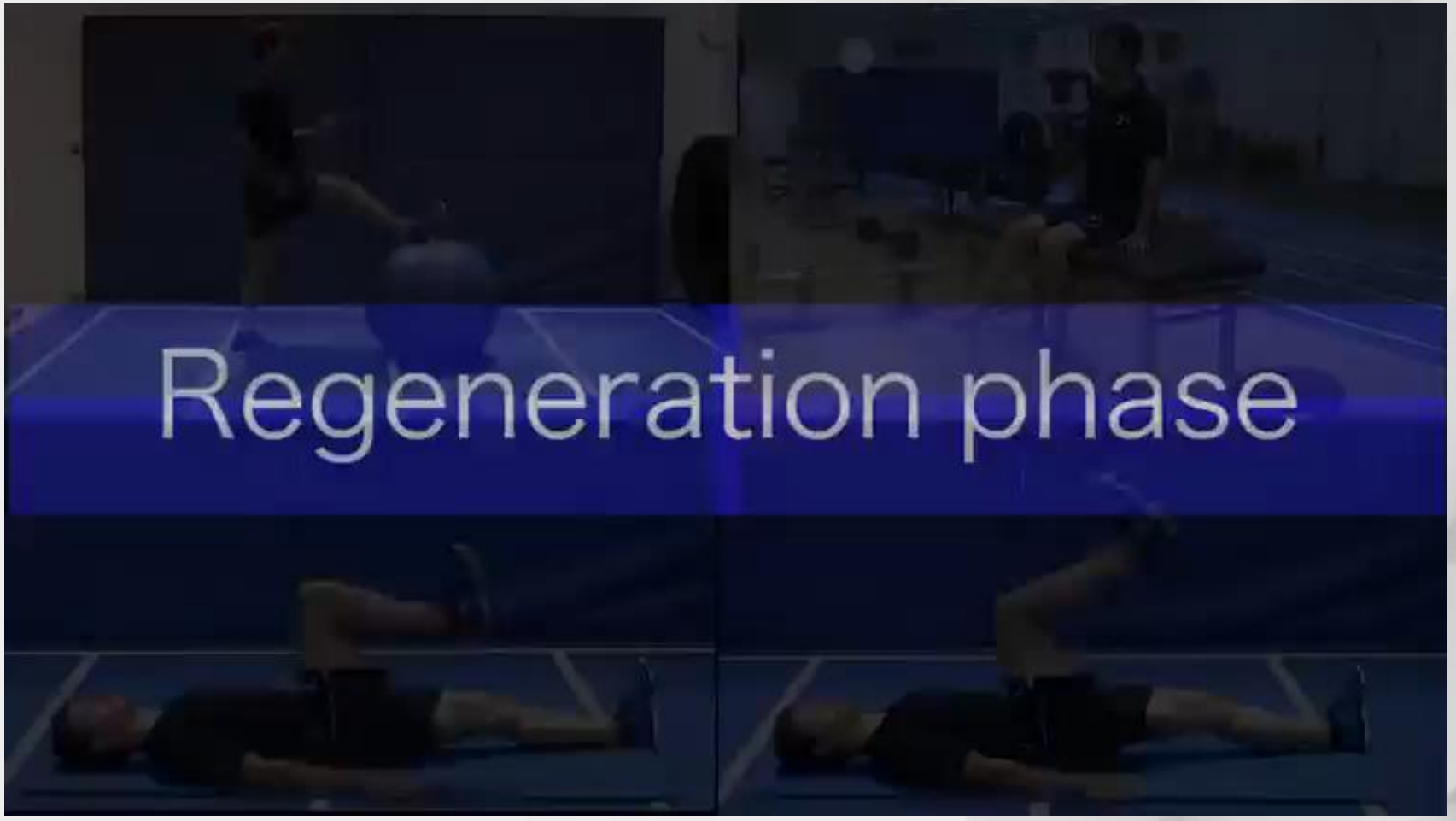
J. Hickey [1,*], R. Timmins [1], N. Maniar [1], E. Rio [2], G. Naughton [1], M. Williams [3], D. Opar [1]

[1] *School of Exercise Science, Australian Catholic University, Australia*
[2] *La Trobe Centre for Sports and Exercise Medicine Research, Australia*
[3] *School of Health, Sport and Professional Practice, University of South Wales, Wales, United Kingdom*



פרוטוקולי שיקום-Askeling L Protocol

פרוטוקולי שיקום- Multifactorial

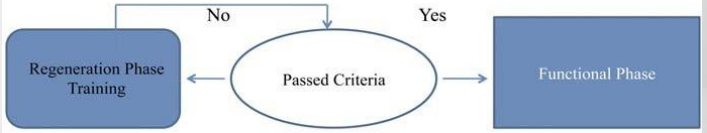


Multifactorial -פרוטוקולי שיקום

A

Regeneration Phase

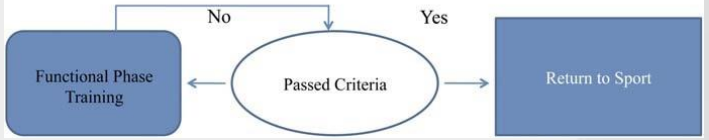
Variable	Test	Criteria for Progression
Pain after injury	Prone with knee flexed to 15° (10)	No pain
Isolated strength at long muscle lengths	Prone with knee flexed to 15° (21)	< 10% asymmetry
Neural deficiencies	Slump test (6)	No pain
Hamstring flexibility	Active knee extension (AKE) test (31)	< 10% asymmetry
Hip flexor flexibility	Modified Thomas test (MTT) (17)	+5 symmetry below horizontal



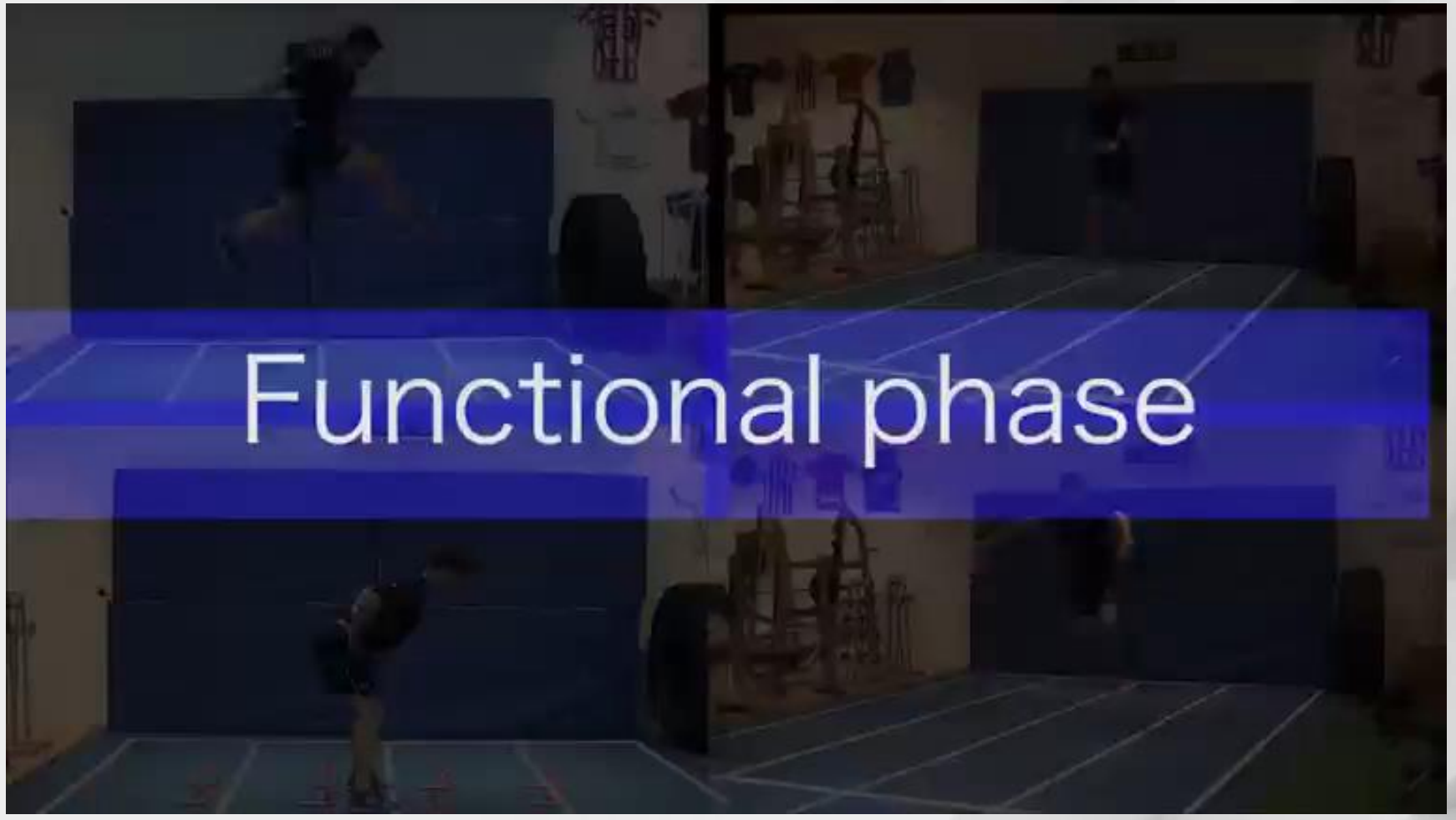
B

Functional Phase

Variable	Test	Criteria for Progression
Pain	Palpation (10)	No pain
Peak torque (H/H) and conventional ratio (H/Q)	Isokinetic knee flexion/extension at $60°\cdot s^{-1}$ (8)	< 10% H/H and H/Q > 0.45 (Biodex) or > 0.47 (Cybex)
Hip extension strength	Prone hip extension (37)	< 10% asymmetry between legs
Distance	Triple hop test (16)	< 10% asymmetry between legs
Endurance (Repetition number)	Single leg bridge test (13)	> 25 and < 10% asymmetry between legs
Torsion capabilities	ASLR test (22)	No compensations
Insecurity and Pain	Askling H-test (2, 3)	No pain and insecurity



פרוטוקולי שיקום- Multifactorial



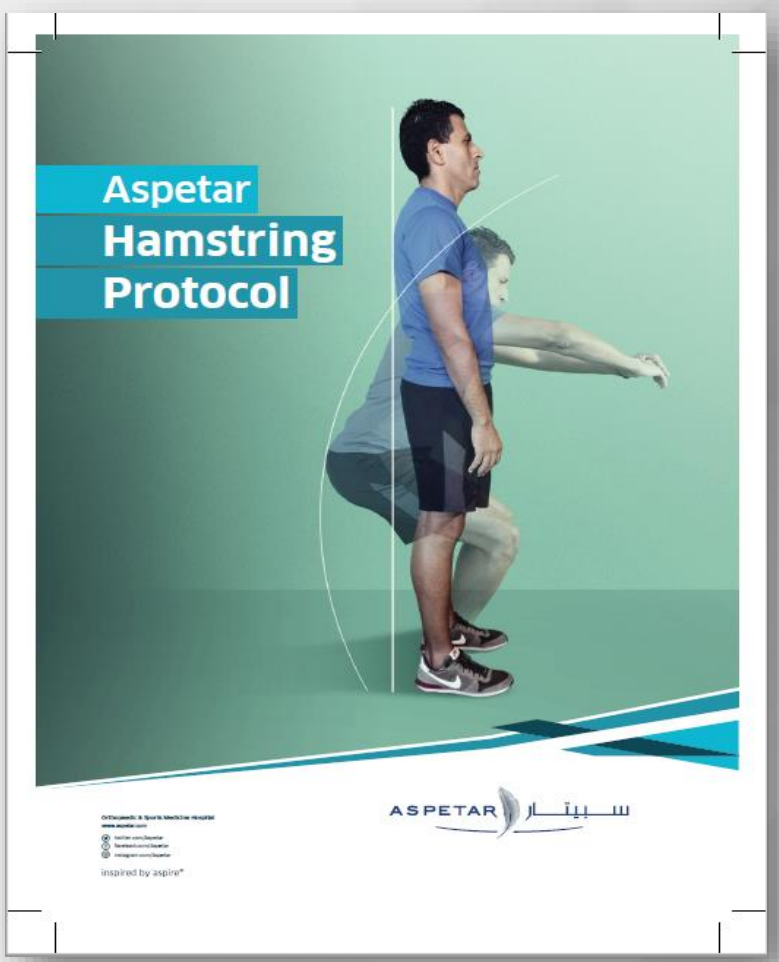
Multifactorial -פרוטוקולי שיקום

Running technique	**Frontal plane** running drills Low- to moderate-intensity sidestepping (10 m x 5 reps) Low- to moderate-intensity grapevine stepping (10 m x 5 reps) Low- to moderate-intensity steps forward and backward over a tape line while moving sideways (10 m x 5 reps) **Sagittal plane** running drills (vertical emphasized execution specially first days or painful subjects) - 8 running exercise drills (statics in place dynamics over 8m) Running 5 m + 5 m deceleration (4 reps) Running 10 m + 5 m deceleration (3 reps) Running 15 m + 5 m deceleration (2 reps)	**Warm Up:** Hamstring Ballistic stretching (2 x 6 reps) Static "B" drill with resisted band (2 x 5 reps) Hurdle drills (1 set walking lower intensity, 1 set bounding higher intensity) Hurdle drill 1 (2 reps) Hurdle drill 2 (2 reps) Hurdle drill 3 (2 reps) Hurdle drill 4 (2 reps) Military march (15 m x 2 reps) Lunge + deadlift (4 reps for each leg) Lunge + "B" drill (4 reps for each leg) From Skipping to running (20 m x 4 reps) Sprint bounding (15 m x 3 reps) Running with hurdle jumps (15 m x 1 rep) Sprinting 5 m (3 reps), 10 m (3 reps), 15 m (4 reps), 20 m (3 reps), 30 m (2 reps) and 40 m (1 rep) (15 sec of rest per each 1 sec sprinting) Sled push resisted accelerations (30% BW) 5 m (3 reps) and 10 m (2 reps)	1

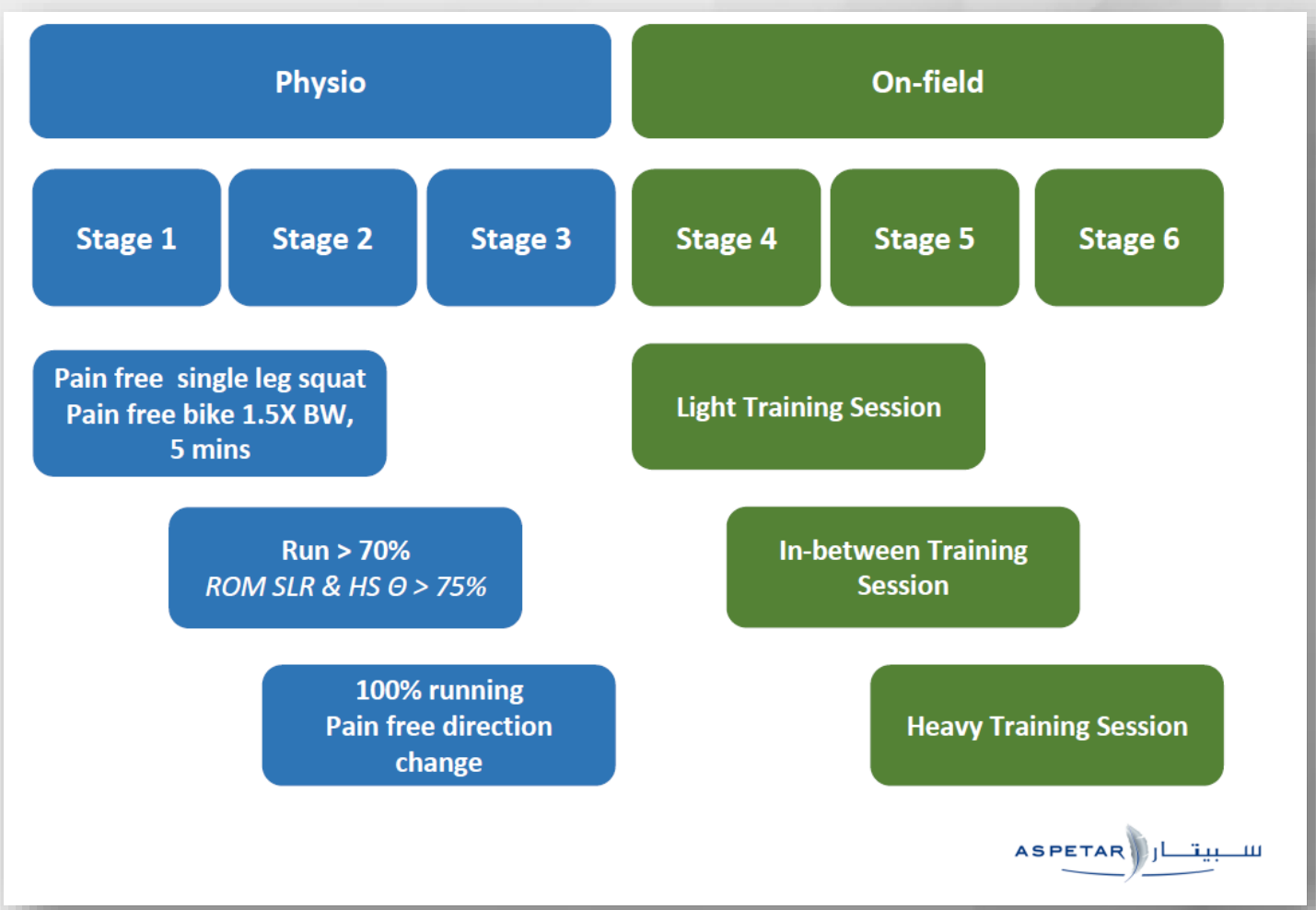
1, contents corresponding to the training day 1; 2, contents corresponding to the training day 2; 3, contents corresponding to the training day 3. Minimum of three blocks 1-2-3 in the functional phase before RTS.
Reps, repetitions; BW, body weight; NMES, neuromuscular electrical stimulation.
[a]Mild discomfort allowed during exercises execution.

	REGENERATION PHASE	FUNCTIONAL PHASE	
Manual Therapy	Manual therapy: - Plantar fascia, gastrocnemius and hamstring (avoiding injury site) massage - Lumbar Z-joint mobilization - Sliding Neural Mobilization (3 x 12 reps) NMES	Manual therapy: - Plantar fascia, gastrocnemius and hamstring (injury site included) massage - Lumbar Z-joint mobilization	1. 2. 3
Flexibility	Psoas static flexibility with pelvic retroversion (4 x 15 sec) Quadriceps dynamic mobility (2 x 8 reps) Hamstring dynamic mobility with fitball (2 x 8 reps) Hamstring dynamic mobility supine (2 patterns) (2 x 8 reps)	Hamstring dynamic mobility + contralateral psoas flexibility (2 x 5 reps) Hamstring wall flexibility (Push/Pull) (3 x 3 reps)	2. 3
Gluteus	**Gluteus Maximus** (Choose an option daily as pain tolerated): **Option A** Prone hip extension (2 x 10 reps x 3 sec) Single leg bridge + contralateral kick (as tolerated) (2 x 5 reps x 3 sec) Double leg bridge (50% BW; 3 x 6 reps x 3 sec) **Option B** Hip thrust (40% BW; 3 x 6 reps x 3 sec) Single leg bridge + contralateral kick (as tolerated) (10% BW; 2 x 4 reps x 3 sec) Single leg hip thrust + contralateral kick (as tolerated) (3 x 6 reps x 3 sec) **Gluteus Medius:** Clamshell with band (3 x 6 reps x 3 sec) Side lying hip abduction with band (3 x 6 reps x 3 sec)	**Gluteus Maximus** (Choose an option): **Option A** Single leg hip thrust (10% BW; 3 x 4 reps x 3 sec) Double leg hip thrust (60% BW; 3 x 8 reps x 3 sec) Walking sled push (75% BW; 15 m x 2 reps) **Option B** Single-leg foot and shoulder elevated hip thrust + contralateral kick (2 x 4 reps x 3 sec) Single leg back extension + perturbations (2 x 4 reps) Swing leg hip extension + contralateral hip flexion (2 x 3 changes) **Gluteus Medius:** Side step running with band (5 m x 5 go and back) Monster running with band (5 m x 5 go and back)	2
Hamstring strength	Prone isometrics (mid and long length) (2 x 5 reps x 5 sec) Standing long length isometrics (2 x 5 reps x 5 sec) Supine isometrics (tolerated degrees) (2 x 5 reps x 3 sec) Submaximal eccentric manual resistance in prone (intensity as tolerated) (2 x 8 reps)	(4 Hamstring strength exercises per session selecting 2 hip dominant and 2 knee dominant) **HIP dominant** Double leg deadlift with 4 kg medicine Ball (2 x 8 reps) Lunge (15% BW; 2 x 6 reps) Single leg deadlift with 15kg + step up (2 x 6 reps) **KNEE dominant** Double leg slide curl (2 x 6 reps) Nordic hamstring (2 x 4 reps) Sprinter eccentric leg curl (2 x 6 reps)	2
Plyometrics		Double leg hurdle hop with trunk flexion (2 x 4 reps) Double broad jump with 5 kg (2 x 4 reps) 2 consecutive explosive scissor jumps (3 times) Single leg horizontal jump (2 x 3 reps)	2
Ankle stabilizers	Double leg hamstring / gastrocnemius disassociation drill (3 x 6 reps) Single leg hamstring / gastrocnemius disassociation drill (2 x 6 reps) Step bounding side to side (25% BW; 2 x 10 reps)	Ankle drill 1 (20% BW; 10 m x 4 reps) Ankle drill 2 (20% BW; 10 m x 4 reps)	2
Lumbopelvic control	Side bridge feet in bench + perturbation (2 x 5 reps x 5 sec) Birdog (2 x 5 reps x 5 sec) Long lever posterior pelvic plank (2 x 4 reps x 5 sec) Leg scissors arms on the floor (2 x 5 reps x 5 sec)	Stir the pot with fitball (3 x 2 reps) Leg Scissors arms on the chest (2 x 5 reps x 5 sec) Single-leg stand rotating reaches 4 kg (2 x 6 reps) TRX helicopter (2 x 4 reps) Sprinter push/pull with pulleys (2 x 6 reps)	2. 3

פרוטוקולי שיקום- Aspetar



פרוטוקולי שיקום - Aspetar

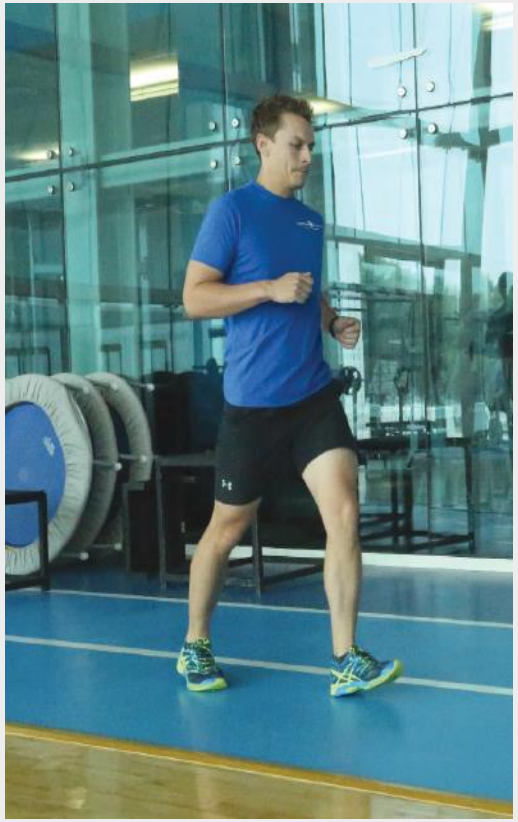


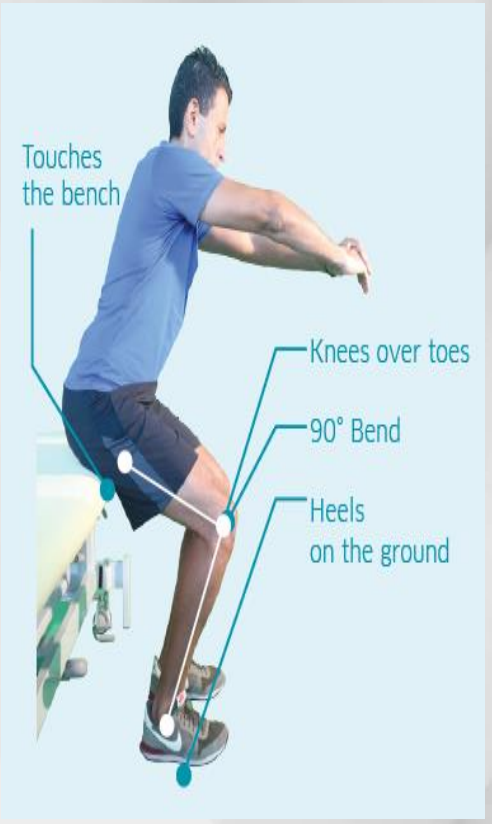
פרוטוקולי שיקום -Aspetar

	/ / 201_ Days Post: **Sign:**	
	INJURED	*UNINJURED*
Average pain today	*VAS* /10	
Walking	No P NA	
Jogging	No P NA	
2 leg squat x 3	No P NA	
1 leg squat x 3	No P NA	
Trunk flexion	No P NA	
Total palp. length:	*cm P*	
Mid range	*kg* ***P*** **|** *no*	*kg*
Outer range	*kg* ***P*** **|** *no*	*kg*
SLR	° ***P*** **|** *no*	°
MHFAKE	° ***P*** **|** *no*	°
Bent leg bridge 3x	No P NA	
Straight leg bridge 3x	No P NA	
Comments:		

פרוטוקולי שיקום- Aspetar

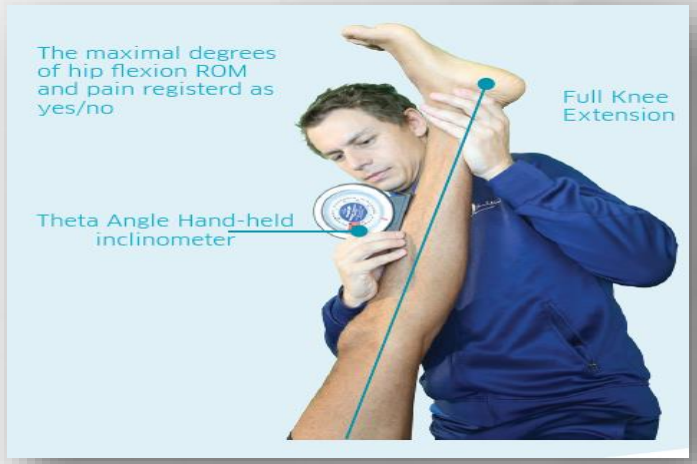
Assessment





פרוטוקולי שיקום- Aspetar

Assessment



פרוטוקולי שיקום- Aspetar

Assesment

שלב ראשון – לאפשר ריפוי לרקמה הפגועה

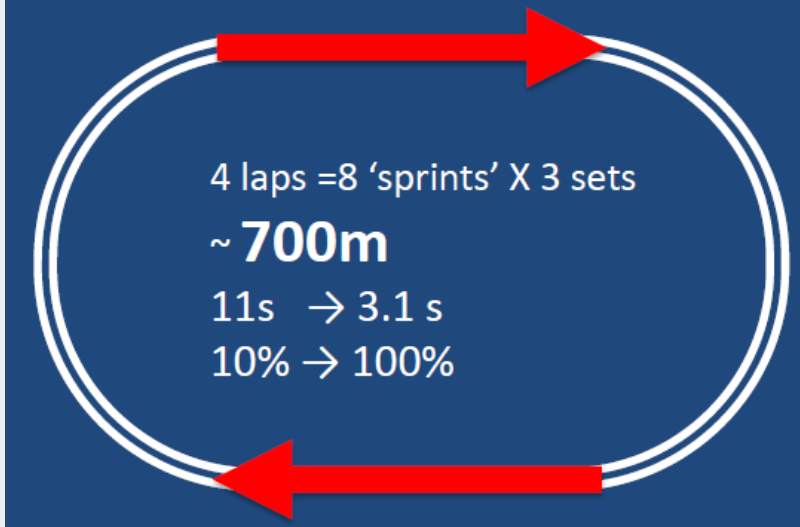
WEEK:		
STAGE	TREATMENT	*SETS/ REPS*
1	2 LEG SQUAT *Prog: with weights*	3 x 15 3 X 8
1	EXERCISE BIKE *(Watt: 2x BW) 5min + 5 min*	5 mins
1 2	SUPINE BRIDGE 2 LEGS	3 X 12
1 2	SUPINE ISOMETRIC HEEL DIGS	3 X 12
1 2	SINGLE LEG SQUAT → 45° *Prog: with weights*	3 X 8 3 x 15
1 2	MANUAL RESISTED HAMSTRINGS	3 X 12
1 2	SOFT TISSUE	5 mins
1 2	ACTIVE ROM	3 x 8
1 2 3	"THE EXTENDER" *Daily*	(3 x 12) x 2
1 2 3	"ARABESQUE/DIVER" *Every 2nd day*	3 x 6
1 2 3	"THE GLIDER" *Every 3rd day*	3 x 6
2 3	SUPINE BRIDGE 1 LEG *2 sec up/2 sec down* *2sec up/1 sec down* *On step* *On exercise ball*	4 x 15
2 3	STRETCHING (SLR and PKET)	3 X 30 s
2 3	RESISTED HAMSTRINGS 1. Prone leg curl 2. Prone leg curl eccentric	 4 x 15 4 x 8
3	ECCENTRIC STRENGTHENING Nordic hamstring	 2 x 5/3 x 6

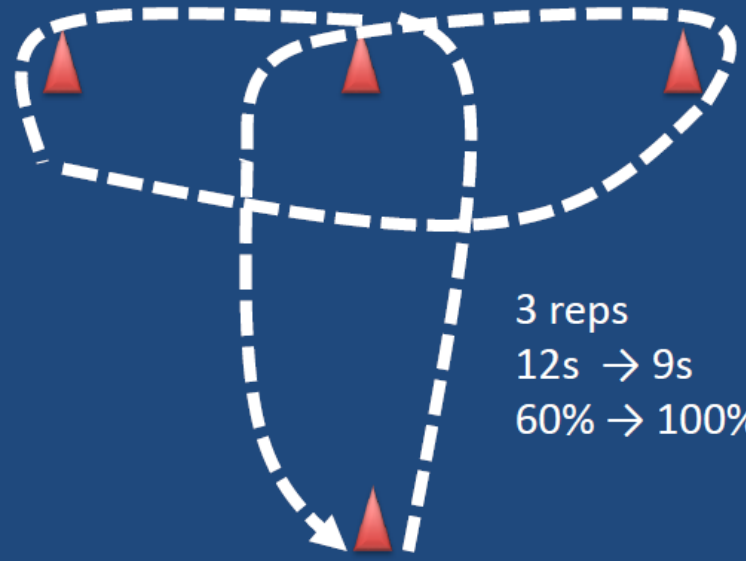
- להגן על התפתחות צלקת ולתרגל שליטה נוירומסקולרית בטווח ROM מוגן
- צמצום אטרופיה שרירית
- הורדת כאב

שלב 2-3 – שמירה על תפקוד שריר מלא ושליטה נוירומסקולרית

- החזרת שליטה נוירומסקולרית מלאה בשריר הפגוע
- החזרת הכח בטווח ללא כאב, מה- Mid range להתקדם למצבים מאורכים יותר
- השגת שליטה על גוו ואגן תוך כדי ביצוע תנועות מהירות
- ריצה ללא כאב במהירות המקסימלית עם שינוי כיוון

Running - The problem is the solution

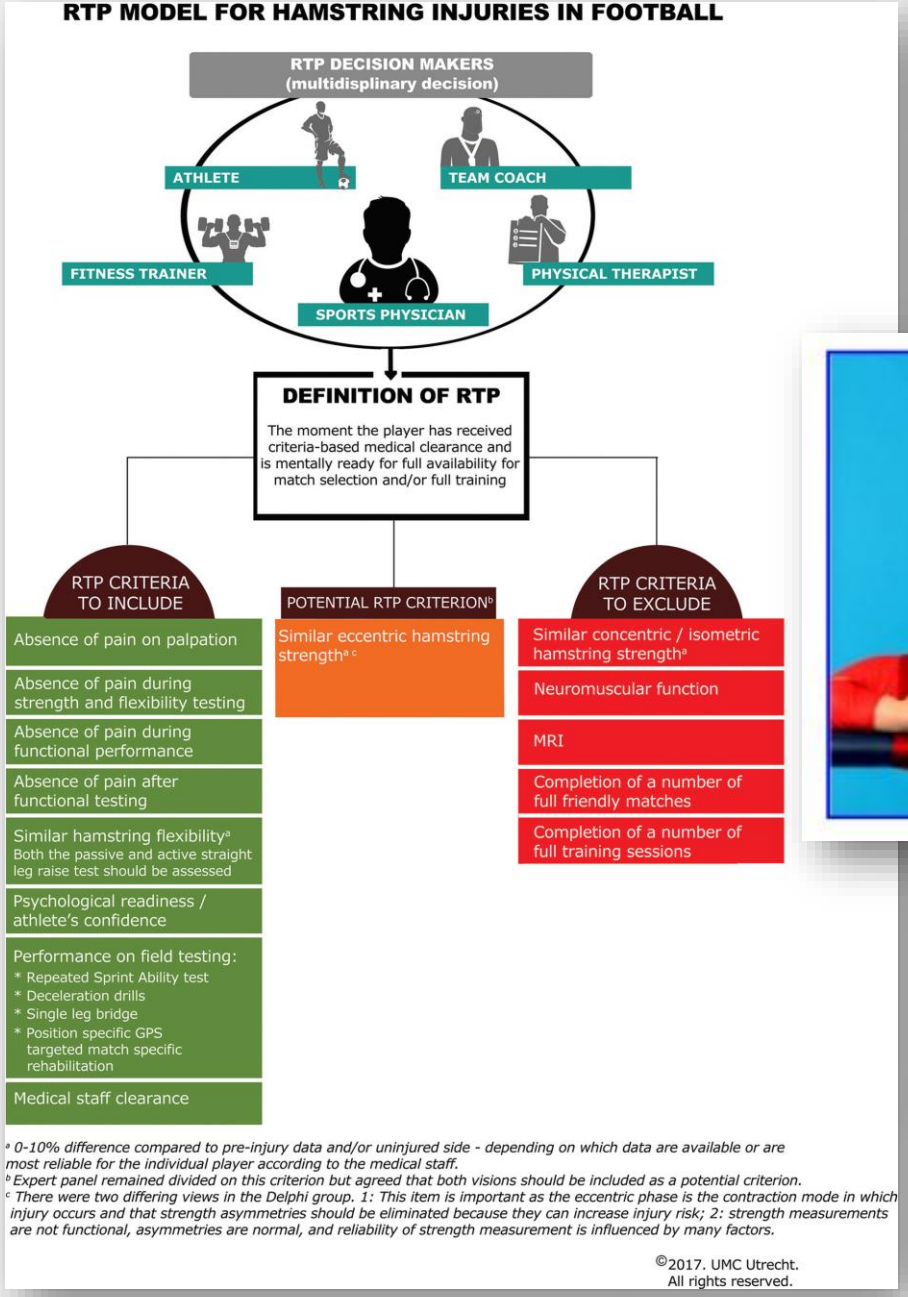


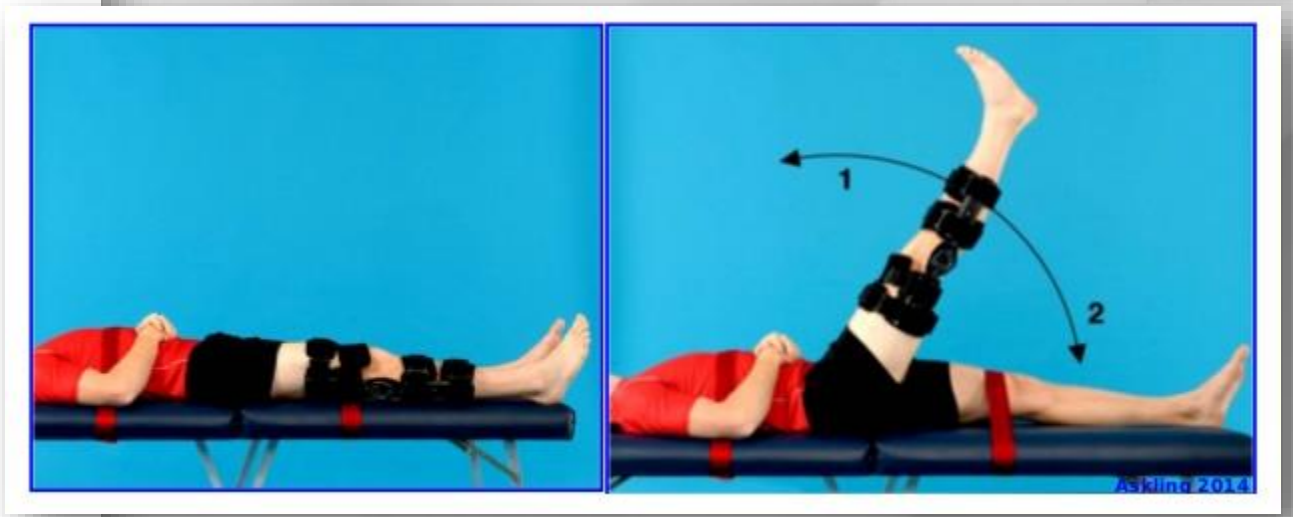


שלב 4-6 אינטגרציה של דרישות ספציפיות על פי הספורט

- ללא סימפטומים במהלך כל הפעילויות
- השלמת 3 אימונים ללא כאב
- Sport specific participation - המטרה שהספורטאי יהיה ללא כאב במהלך כלל הפעילויות וישלים 3 אימונים ללא כאב בזמן ביצוע האימון או אחריו

חזרה לספורט





Van der horst et al, 2017 and Askling et al, 2010

יש לכם את הכלים... תעשו את הצעד הנכון

תודה רבה על ההקשה


Barcelona'92