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INJURY PREVENTION

for Basketball Players

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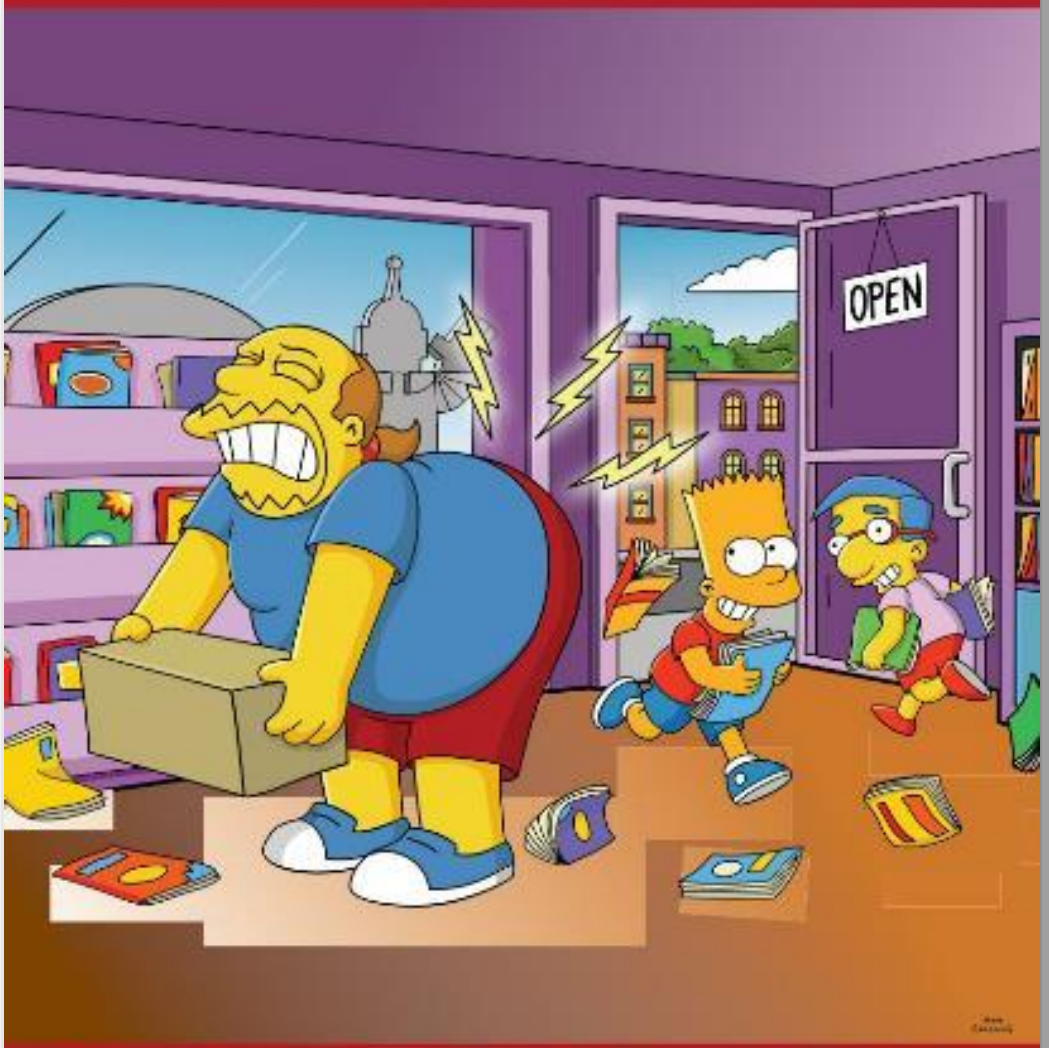
USE YOUR MUSCLES



NOT YOUR BACK

Body Check +

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- Sports injury data -

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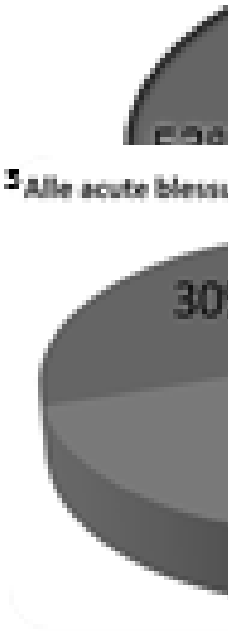
Sporttakken in Vlaanderen	Aantal blessures/100 deelnemers
Rugby	13,1
Handbal	9,3
Baseball/softball	8,8
Korfbal	7,8
Basketbal	7,5
Voetbal	6,7
Zaalvoetbal	6,1
Volleybal	5,9
Judo	5,5
Ju-jitsu	4,4



ry Prevention
12
17
1990

Tabel 1: Blessurepercentages in Vlaanderen (per sporttak)

(cijfers van het Steunpunt Sport, Beweging en Gezondheid, 2002-2006)

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Injury in the National Basketball Association: A 17-Year Overview

Mark C. Drakos, MD,*† Benjamin Domb, MD,‡ Chad Starkey, PhD, ATC,§ Lisa Callahan, MD,† and Answorth A. Allen, MD†

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Shoulder/Arm
Men: 2,8%

Table 1. Injury rate by body area.

	All Injuries (n, 12 594)		Game-Related Injuries (n, 6287)		
	Total	Games Missed	Total	Game Related	

Definition of Injury

There is a notable variability in used injury definitions among researchers. One of the broad injury definitions define injury as any muscular-skeletal complaint newly incurred due to competition and/or training that received medical attention regardless of absence from competition or training. [7] The advantage of this definition is possibility to assess full spectrum of injuries from mild contusions to fractures and not only those which result in time lost from participation, bearing in mind that athletes sometimes compete despite an injury. [6] Although in practice researchers more often apply the „time loss" definition.

[a]CI, confidence interval.

Borowski, 2008

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Table 2. Injury rate by structure.

Structure	All Injuries (n, 12 594)				Game-Related Injuries (n, 6287)				95% CI[a]
	Total		Games Missed		Total		Game Related		
	n	%	n	%	n	%	%	Rate	
Ankle	1850	14.7	6838	11.6	1123	17.9	60.7	3.4	3.2-3.6
Lumbar spine	1279	10.2	6729	11.4	481				
Patella	1266	10.1	8076	13.6	309				
Knee	1135	9.0	10 737	18.1	501				
Foot	962	7.6	5992	10.1	374				
Tibia	954	7.6	5597	9.5	431				
Femur	905	7.2	3044	5.1	482				
Hip	781	6.2	2518	4.3	416				
Hand	571	4.5	2702	4.6	383				
Face	493	3.9	255	0.4	342				
Shoulder	466	3.7	1932	3.3	265				
Eye	351	2.8	359	0.6	237				
Fingers	298	2.4	696	1.2	195				
Thumb	276	2.2	1212	2.0	172				
Elbow	255	2.0	433	0.7	152				
Thorax	241	1.9	419	0.7	131				
Cervical spine	198	1.6	590	1.0	116				
Skull	107	0.8	254	0.4	79				
Abdomen	80	0.6	499	0.8	40				
Humerus	79	0.6	237	0.4	46				
Systemic	38	0.3	32	0.1	7				
Genitals	9	0.1	28	0.0	5				

[a]CI, confidence interval.

Table 3. Injury rate by specific pathology.[a]

Pathology	All Injuries				Game-Related Injuries				95% CI[b]
	Total		Games Missed		Total		Game Related		
	n	%	n	%	n	%	%	Rate	
Lateral ankle sprain	1658	13.2	5223	8.8	1066	17.0	64.3	3.2	3.0-3.4
Patellofemoral inflammation	1493	11.9	10 370	17.5	245	3.9	16.4	0.7	0.7-0.8
Lumbar sprain/strain	999	7.9	3933	6.6	361	5.7	36.1	1.1	1.0-1.2
Hamstring strain	413	3.3	1826	3.1	189	3.0	45.8	0.6	0.5-0.7
Adductor strain	394	3.1	1416	2.4	185	2.9	47.0	0.6	0.5-0.6
Knee sprain	392	3.1	4369	7.4	268	4.3	68.4	0.8	0.7-0.9
Foot inflammation	362	2.9	2043	3.5	94	1.5	26.0	0.3	0.2-0.3
Quadriceps contusion	338	2.7	478	0.8	232	3.7	68.6	0.7	0.6-0.8
Knee/patella contusion	321	2.5	690	1.2	213	3.4	66.4	0.6	0.6-0.7
Finger sprain	308	2.4	336	0.6	205	3.3	66.6	0.6	0.5-0.7
Triceps surae strain	259	2.1	2078	3.5	138	2.2	53.3	0.4	0.3-0.5
Leg contusion	227	1.8	316	0.5	157	2.5	69.2	0.5	0.4-0.6
Hip contusion	218	1.7	249	0.4	159	2.5	72.9	0.5	0.4-0.6
Foot sprain	207	1.6	866	1.5	120	1.9	58.0	0.4	0.3-0.4
Achilles tendinopathy	204	1.6	1038	1.8	45	0.7	22.1	0.1	0.1-0.2
Thumb sprain	196	1.6	811	1.4	127	2.0	64.8	0.4	0.3-0.5
Wrist sprain	181	1.4	851	1.4	125	2.0	69.1	0.4	0.3-0.4
Periorbital laceration	172	1.4	52	0.1	114	1.8	66.3	0.3	0.3-0.4
Ankle inflammation	150	1.2	1026	1.7	37	0.6	24.7	0.1	0.1-0.1

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Demographic data of all players undergoing ACL reconstruction:

- Right = left knee *(Harris et al., 2013)*
- Injury timing (not significant) *(Harris et al., 2013)*:
  - In-season game (65%)
  - 2th half (62%)
  - 4th quarter (40%)

  → fatigue
- Field position: guard = forward > center (not significant) *(Moira et al., 2013)*

Table 1. Demographic data of NBA players

	n
Number of players Number of ACL tears*	64 69
Mean age, y	25.7 ± 3.5
Mean body mass index, kg/m²	25.0 ± 2.1
Right knee	35
Left knee	34
Mean years of experience in NBA prior to ACL tear	4.1 ± 3.0
Position Guard Forward Center	 29 23 12
Number of All-Stars	13 (20%)
Mean salary prior to ACL tear, US$ millions	1.73
ACL tear timing In-season game First quarter Second quarter Third quarter Fourth quarter In-season practice Preseason basketball Off-season basketball Non–basketball related	 45 11 (24%) 6 (13%) 10 (22%) 18 (40%) 4 10 8 2

*Sixty players had a primary ACL tear; 2 players had bilateral nonsimultaneous ACL tears; 1 player had a primary and retear in the same knee; 1 player had a primary and 2 retears in the same knee.

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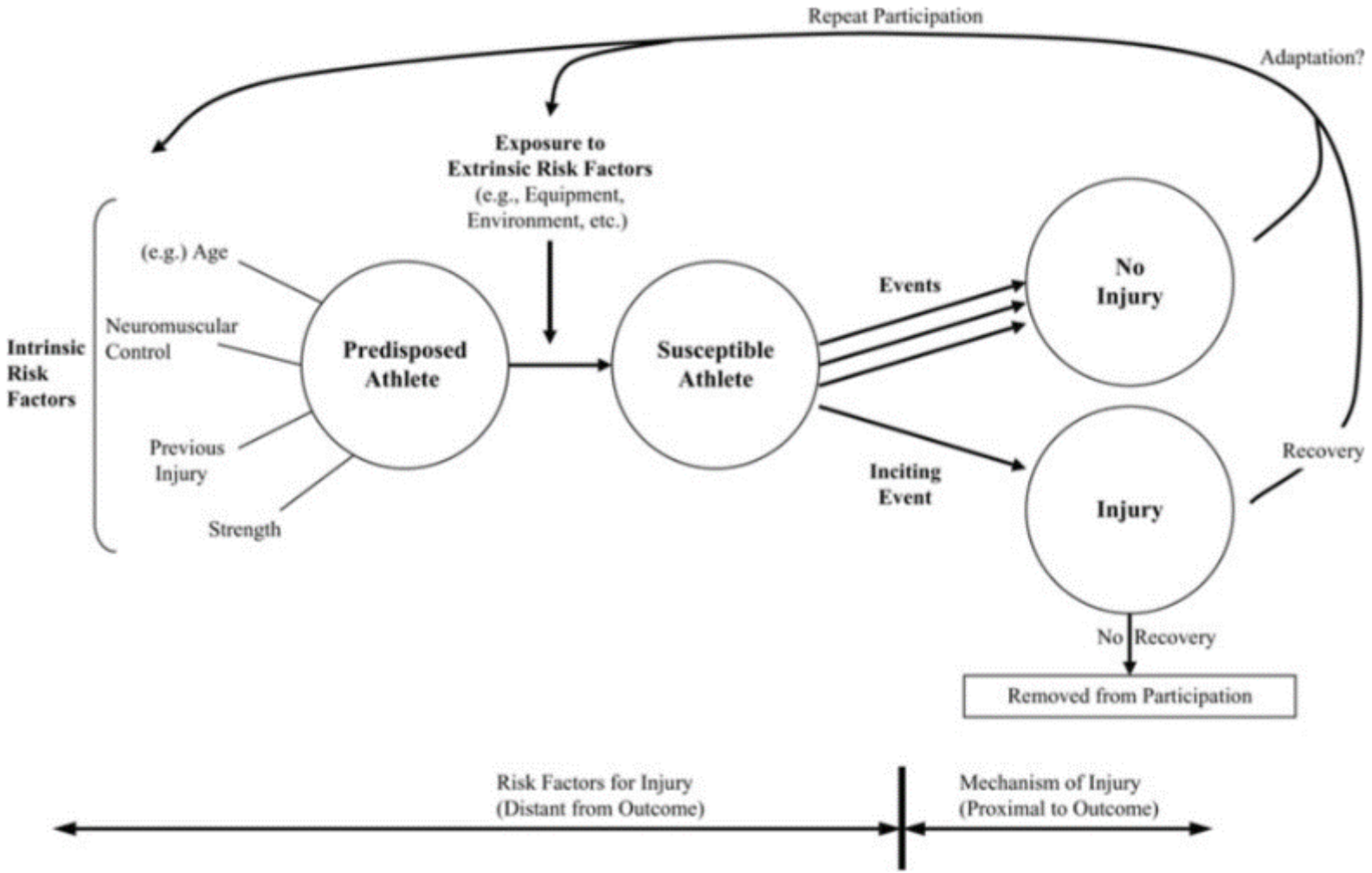

Meeuwisse et al., 2007

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INTRINSIC RISK FACTORS
PHYSICAL
Age Sex Somatype Injury history Physical fitness Joint mobility Ligament instability Anatomic abnormality Motor control Sportspecific abilities
PSYCHOLOGICAL/MENTAL
Motivation Risico behaviour Coping strategies (stress)

EXTRINSIC RISK FACTORS
EXPOSURE
Type sport Total time sport activity Position in the team Competition level
TRAINING
Fitt principe
ENVIRONMENT
Ground Out vs indoor Weather
MATERIAL

Parkkari, 2001

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- Sports Injury Prevention -

“Injury prevention is an effort to prevent or reduce the severity of bodily **injuries** caused by external mechanisms, such as accidents, before they occur.”

Definition Wikipedia

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The Levels of Prevention

	PRIMARY Prevention	**SECONDARY** Prevention	**TERTIARY** Prevention
Definition	An intervention implemented before there is evidence of a disease or injury	An intervention implemented after a disease has begun, but before it is symptomatic.	An intervention implemented after a disease or injury is established
Intent	Reduce or eliminate causative risk factors (risk reduction)	Early identification (through screening) and treatment	Prevent sequelae (stop bad things from getting worse)
NAS Example	Prevent addiction from occurring Prevent pregnancy	Screen pregnant women for substance use during prenatal visits and refer for treatment	Treat addicted women Treat babies with NAS

Adapted from: Centers for Disease Control and Prevention. A Framework for Assessing the Effectiveness of Disease and Injury Prevention. MMWR. 1992; 41(RR-3);001. Available at: http://www.cdc.gov/mmwr/preview/mmwrhtml/00016403.htm

TENNESSEE DEPARTMENT OF HEALTH

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Generic injury prevention

Individual injury prevention

Collective with adaptation FITT

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Importance of warming-up *(Malliou e.a., 2007)*, cooling-down *(Malliou e.a., 2007)*, balance training *(Cumps e.a., 2007)*, functional strength training *(Arnason e.a., 2008)*, stretching *(Amako e.a., 2003)*, correction technique *(Scase e.a., 2006)*

Effective **multifactoral "intrinsic"** prevention programs *(Emery e.a. 2007, 2010; Olsen e.a. 2005; Soligard e.a. 2008)*

→ with in account core stability *(Emery e.a., 2010)*

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- Body Check + -

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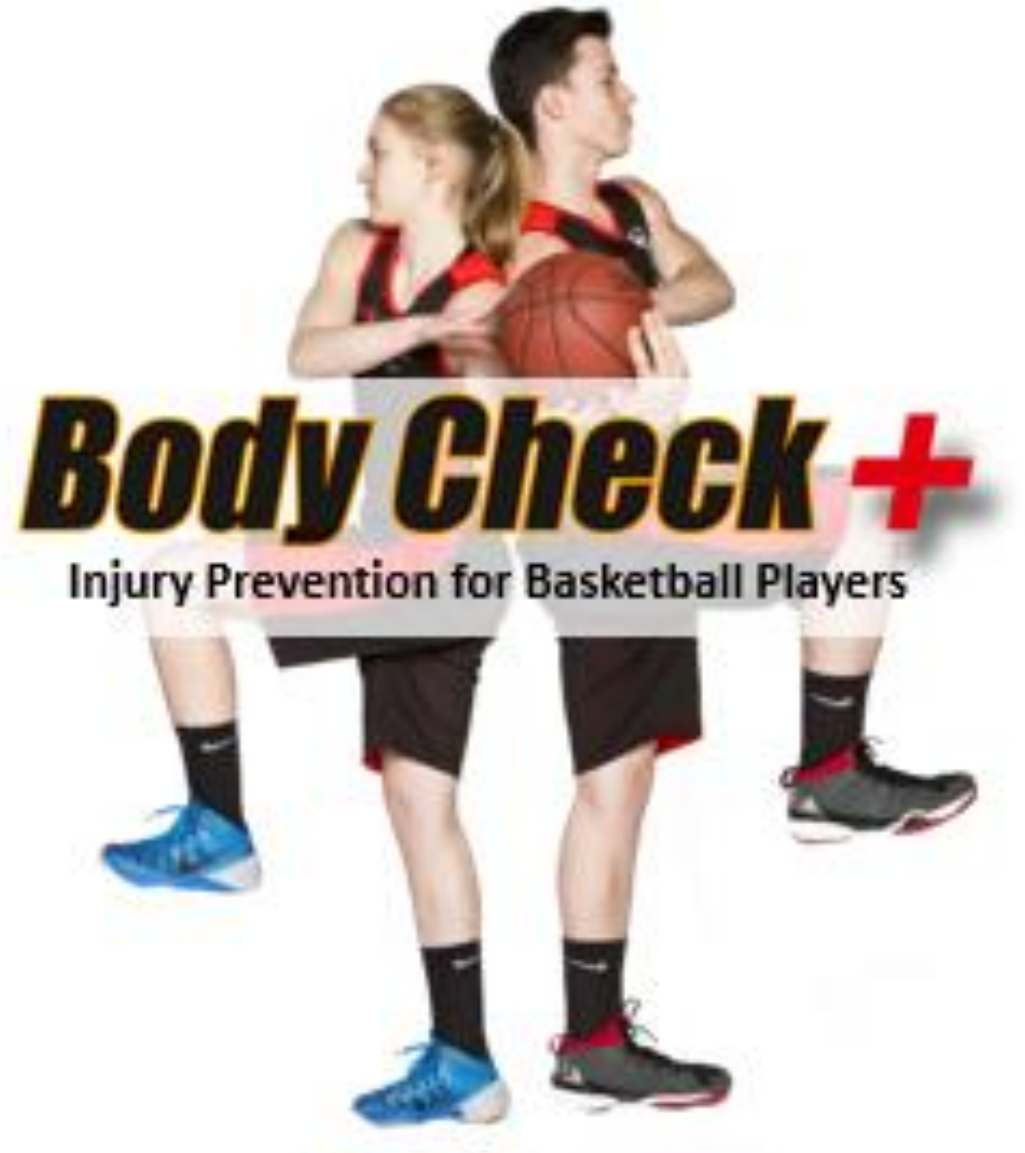
UNIVERSITEIT GENT

SPORT. VLAANDEREN

basketbal .vlaanderen

Vlaamse overheid



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THE GOAL

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THE GOAL

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HOW

Educating players, coaches and clubs about injury prevention by creating interesting, beautiful, easy-to-use products

For **EVERY TEAM** (high/low level) & useable in warming up

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HOW

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POSTERS

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1 MATRIX / REGION

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POSTERS

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VIDEO'S ON WEBSITE

CLINIC VIDEO WITH ALL EXERCISES

DETAILED EXECUTION OF ALL EXERCISES

INTEGRATION IN BASKETBALL TRAINING

YouTube

WWW

basketbal.vlaanderen.be
> Bodycheckplus

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BROCHURE

DETAILED DESCRIPTION OF ALL EXERCISES

DO'S & DON'TS

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PUSH UP PLUS

- ***Position***
  - *4 point position with straight back*
  - *Elbow straight – tuck in chin*
- ***Execution***
  - *push out shoulders*
- ***Remarks***
  - *no shoulder hitching – keep back in starting position*
- ***Modalities***
  - *2 sets off 10 reps*

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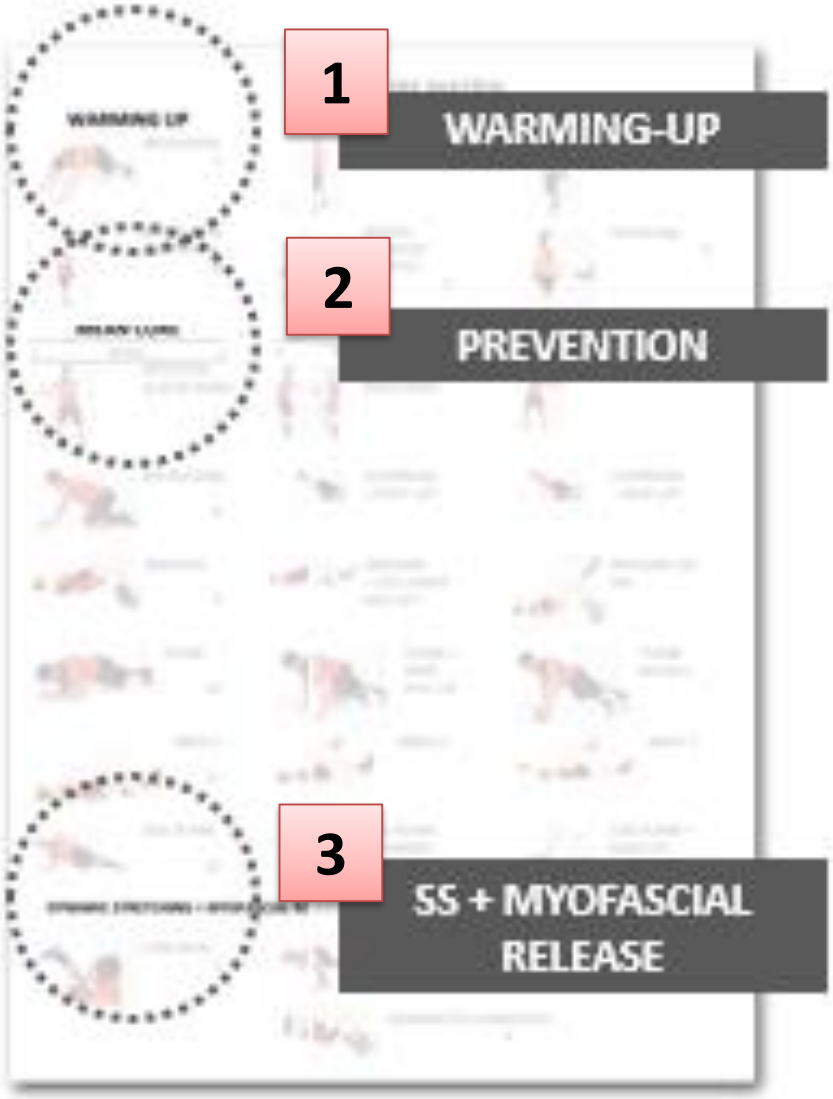
INJURY PREVENTION STRATEGIES



- Core stability
- Stability LL and UL
- Jump and landing technique
- Strength

Body Check +

1 WARM-UP

	Warming-up
Content	✓Sportspecific movements ✓Dynamic stretches (mobilisers) ✓Keep warm ✓Gradual bigger movements ✓No negative effect on performance
Duration	✓10 - 20min
Intensity	✓Light sweat ✓Build up intensity

Static Stretching Can Impair Explosive Performance for At Least 24 Hours

Haddad, Monoem[1,2]; Dridi, Amir[1]; Chtara, Moktar[1,3]; Chaouachi, Anis[1]; Wong, Del P.[4]; Behm, David[5]; Chamari, Karim[6]

Journal of Strength and Conditioning Research: January 2014 - Volume 28 - Issue 1 - p 140–146
doi: 10.1519/JSC.0b013e3182964836
Original Research

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Schouder - Opwarming

1 Krab voetbal

2 Lopen met schouder stabilisatie

3 Zijwaarts lopen met schouder stabilisatie

4 Kruiwagen

Enkel - Opwarming

1 Skipping met richtingsverandering

2 Toe Tapping

3 Run and challenge

6 Heel to toe walk

Knie - Opwarming

1 Skip en hielaanslag

2 Zijwaartse bijtrekpassen

3 Run and balance

4 Helikopter

5 Quadriceps

6 Cradle

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2 PREVENTION EXERCISES

- Core Stability
- Stability UB and LB
- Jump and landing technique
- Strength training

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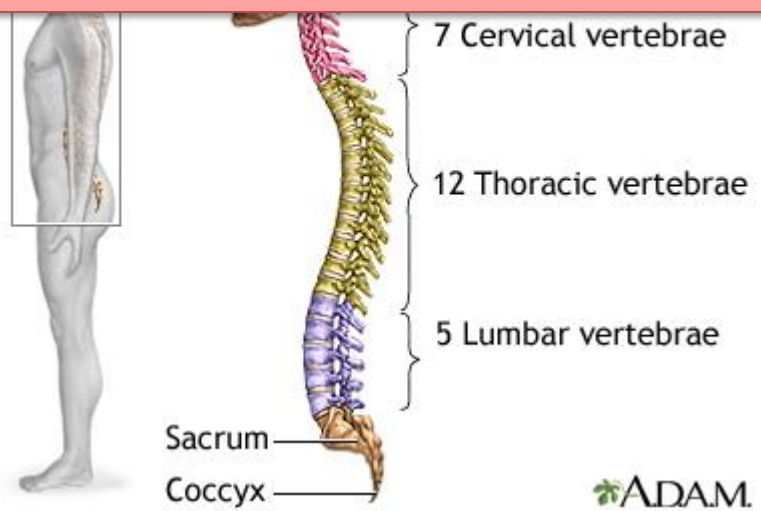
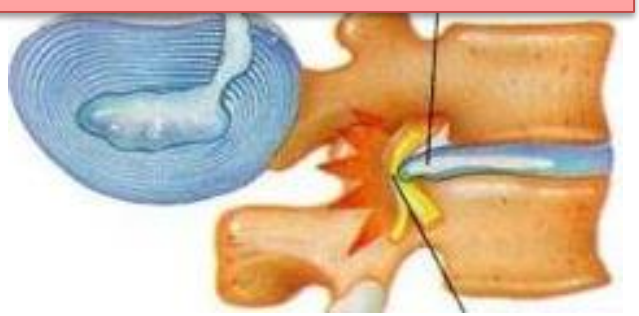
2.1 Core stability

Guidelines core stability training

- Keep normal curvature!
  - ➢ Use lumbal bracing =
    contract deep abdominal- AND back muscles
- Static -> dynamic. Easy -> difficult
- Gradual build-up intensity, duration, repetitions, sets!





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2.1 Core stability

Romp - Preventie

7 Rotatie stabilisatie met rekker

7 Statische rotatie stabilisatie

8 Backward rocking

8 Superman

9 Bruggen

9 Bruggen en been op/neer bewegen

10 Voorwaartse plank

10 Voorwaartse plank met kniebeweging

10 Voorwaartse plank met kniebewegingen vanop bal

11 ABDO1

11 ABDO2

11 ABDO3

12 Zijwaartse plank

12 Zijwaartse plank met armbeweging

12 Zijwaartse plank met armbeweging en knielift

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2.1 Core stability

BodyCheck+- Bruggen op bal en been uitstrekken (pro)

2.2 Stability LB-UB

Guidelines balance training

- Gradual build-up intensity, duration, repetitions, reps!
  - Static
  - With movements/jumps
  - External factors
- Upper and lower body
- Left and Right

Body Check +

2.2 Stability LB-UB

BodyCheck+- Statische rotatie stabilisatie (advanced)

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2.2 Stability LB-UB

BodyCheck+- Uitvalpas met rotatie (advanced)

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2.3 Correct jump and landing technique

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anding technique

Hudl Technique 4+
Slow Motion Video Analysis
UberSense Inc

#70 in Sports
★★★★★ 268 Ratings
Free • Offers In-App Purchases

ideo images

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Body Check +

2.3 Correct jump and landing technique

Most common faults:

- Frontal plane: knee valgus, trunk asym, shoulder asym, foot asym, ground basis …
- Sagittal plane: knee in front of foot, lack of knee and hip flexion, asym …

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2.3 Correct jump and landing technique

Guidelines jump-landing technique

- Deep knee flexion (100°)
  - Knees not further then toes
  - No valgus
- Deep hip flexion (sit on chair)
  - Shoulders not further then knees
  - Neutral back
- Feet on hip width
  - Feet forward directed
- Shock absorption with front foot

2.3 Correct jump and landing technique

BodyCheck+- Drop jump (basic)

Body Check +

2.3 Correct jump and landing technique

BodyCheck+- Drop squat naar Counter Movement Jump (advanced)

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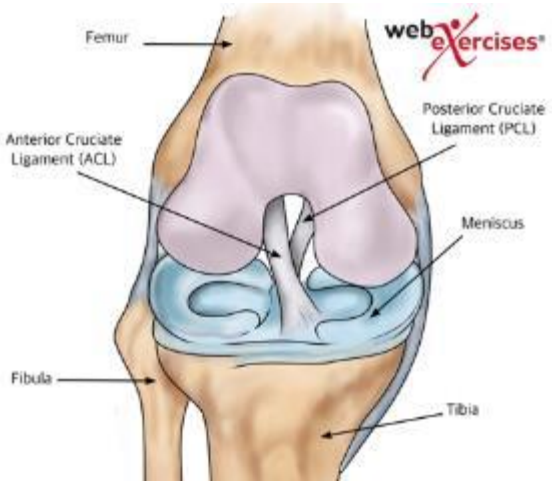
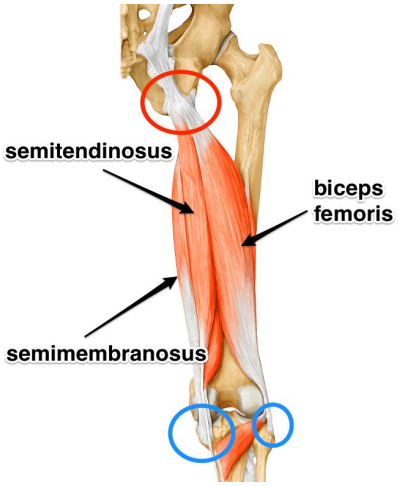
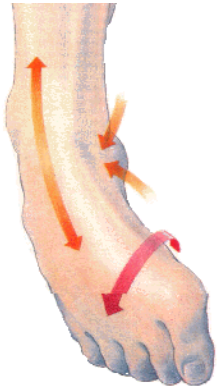
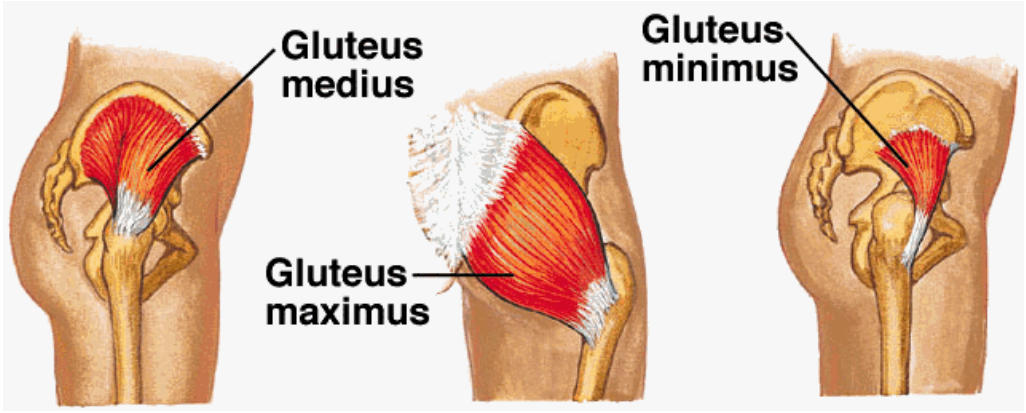
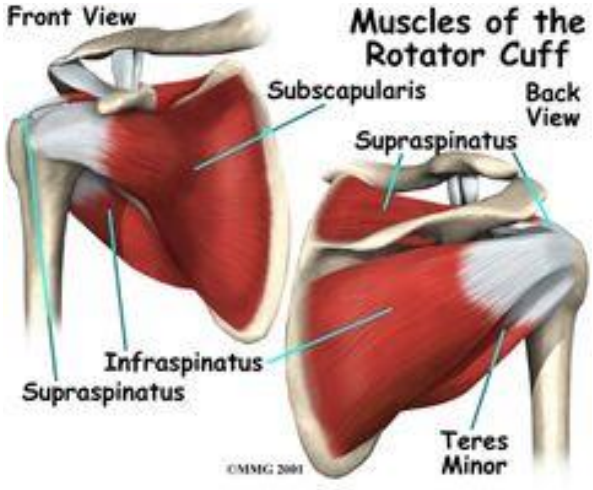
2.4 Strength training











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2.4 Strength training

Guidelines strength training

- Gradual build-up of intensity, duration, reps, sets!
- Keep neutral curve.
- Focus on weaker muscles:
  - Hamstrings
  - Glutes
  - Tibialis anterior en peronei
  - Rotator cuff muscles shoulder
- Attention for excentric force
- Build up to jumps and plyometry!

2.4 Strength training

BodyCheck+- Achterwaartse uitvalpas met roeibeweging met exorotatie en elleboogstrekking (pro)

2.4 Strength training

BodyCheck+- Bijtrekpassen met miniband (pro)

3 SS AND SMFR - STRETCHING

Guidelines stretching

1 Before: DS → **2 After:** SS

- ✓ Stay warm
- ✓ Sportspecific
- ✓ Gradual bigger amplitude movement (mobilisers)
- ✓ Deel van de opwarming

Attention!!
Depends on individual

- ✓ safer
- ✓ Bring muscle to rest length
- ✓ Part of cooling-down

~~Sportactiviteit~~ → **3 Regular SS of not-flexible structures → 2 X 60"**

EXTRA: SMFR

APPLICATION OF SMR			
Frequency	Sets	Duration	
Daily	1-2	- Hold Roller on TrP until the tenderness is decreased by 75% - Depending on experience and current tissue quality - Hold 30-90” depending on:	
	(Hou, Tsai and Chung, 2002)	30” with max pain tolerance	90” with minimal pain tolerance

ry tool

Body Check +

Romp - Myofasciale release

13 Low back

14 Low back

15 Low back – Foamroller

10 Thoracale E
Foamr

16 Quadratus lumb

Enkel - Myofasciale release

13 Kuitspier (onderste deel) – Foamroller

14 Kuitspier (bovenste deel) – Foamroller

15 Tibialis anterior* (shin) – Foamroller

Knie - Myofasciale release

13 ITB-band

14 Quadriceps

15 Hamstrings

16 Adductoren

17 Bilspieren

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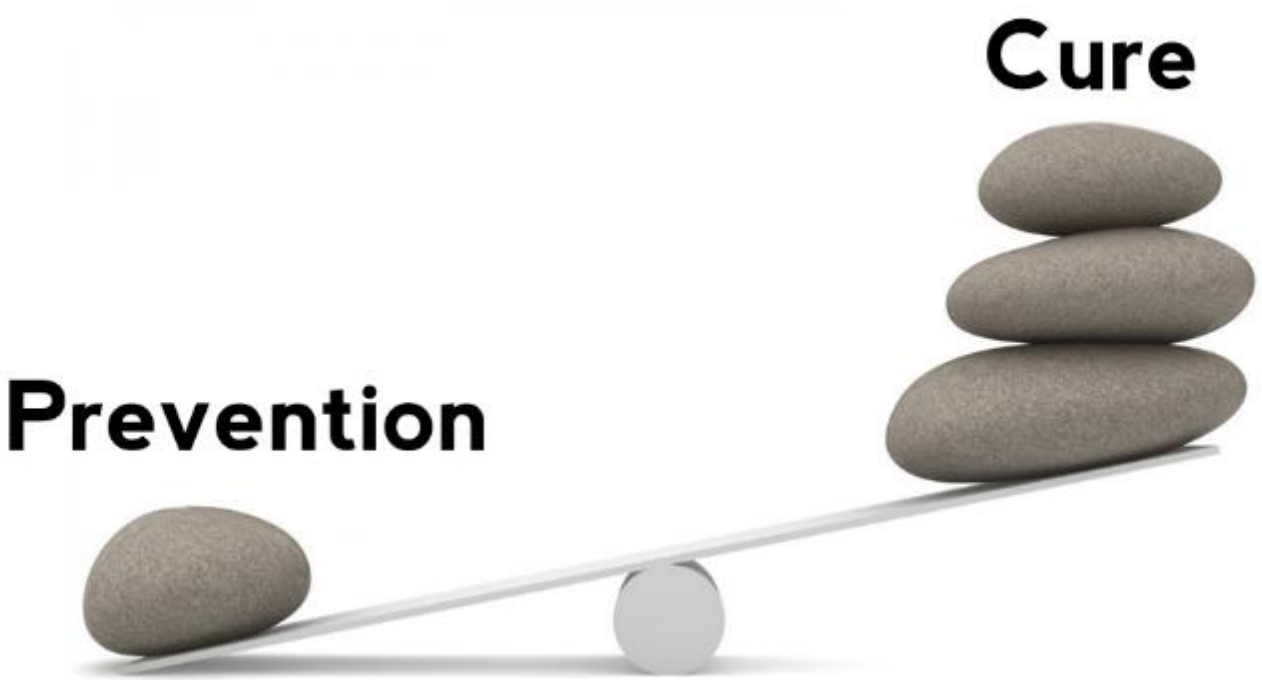

An ounce of prevention is worth a pound of cure.

- Benjamin Franklin -

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