Return to sport after ACL reconstruction: What to know? What to do?

dr. Bart Dingenen & dr. Alli Gokeler
@BartDingenen @AlliGokeler
Table of content

- Return to sport after ACL reconstruction: what is the problem?
  - Bart Dingenen, 5 minutes

- Traditional ACL return to sport criteria: time for an update?!
  - Alli Gokeler, 10 minutes

- Future optimizations for a return to sport clinical decision-making process
  - Bart Dingenen, 10 minutes

- How to perform a return to sport decision-making process in a clinical setting?
  - Alli Gokeler, 10 minutes

- How to perform secondary ACL injury prevention training in a clinical setting?
  - Bart Dingenen, 5 minutes

- Questions & Answers
  - Bart Dingenen & Alli Gokeler, 5 minutes
What is the problem?
ACL injury

ACL reconstruction

RETURN TO SPORT
Fifty-five per cent return to competitive sport following anterior cruciate ligament reconstruction surgery: an updated systematic review and meta-analysis including aspects of physical functioning and contextual factors

Clare L Ardern, Nicholas F Taylor, Julian A Feller, Kate E Webster

N=7556

- Return to Sport: 81%
- Return to Preinjury level: 65%
- Return to Competition: 55%
ACL injury

ACL reconstruction

RETURN TO SPORT
We should do better!!
What is (successful) return to sport?
Success can mean different things to different people!
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  - Bart Dingenen, 5 minutes
- Questions & Answers
  - Bart Dingenen & Alli Gokeler, 5 minutes
Traditional ACL RTS criteria: time for an update?
LOOK LEFT

Bart Dingenen¹,² · Alli Gokeler³

Bart Dingenen¹,² · Alli Gokeler³

- ACL injury
- ACL reconstruction
- Gradual periodized return to sport
- Follow-up

Preoperative rehabilitation
Criterion-based postoperative rehabilitation
Return to sport testing
Shared decision-making
Does Extended Preoperative Rehabilitation Influence Outcomes 2 Years After ACL Reconstruction?

A Comparative Effectiveness Study Between the MOON and Delaware-Oslo ACL Cohorts

Mathew J. Failla, PT, MSPT, SCS, David S. Logerstedt, PT, PhD, SCS, Hege Grindem, PT, PhD, Michael J. Axe, MD, May Arna Risberg, PT, PhD, Lars Engebretsen, MD, PhD, Laura J. Huston, MS, Kurt P. Spindler, MD, and Lynn Snyder-Mackler, PT, ScD, SCS, FAPTA

**Conclusion:** The cohort treated with additional preoperative rehabilitation consisting of progressive strengthening and neuromuscular training, followed by a criterion-based postoperative rehabilitation program, had greater functional outcomes and RTS rates 2 years after ACLR. Preoperative rehabilitation should be considered as an addition to the standard of care to maximize functional outcomes after ACLR.
(1) Time-based
(2) Knee-focused

(3) A yes or no RTS decision only at the hypothetical “end” of the rehabilitation

(4) Narrow vision on RTS readiness after ACL reconstruction

Traditional return to sport approach
Factors Used to Determine Return to Unrestricted Sports Activities After Anterior Cruciate Ligament Reconstruction

Sue D. Barber-Westin, B.S., and Frank R. Noyes, M.D.

- 40% provided no criteria for RTS after ACLR
- 60% used time postoperatively at least as one of the RTS criteria
- 32% used time as the only criterion
- Only 13% used objective criteria
**Table 4.** Objective Criteria Provided for Release to Sports Activities

<table>
<thead>
<tr>
<th>Criteria Categories</th>
<th>No. of Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time postoperatively, muscle strength</td>
<td>16</td>
</tr>
<tr>
<td>Time postoperatively, muscle strength, ROM/effusion</td>
<td>3</td>
</tr>
<tr>
<td>Time postoperatively, thigh circumference, single-leg hop test</td>
<td>3</td>
</tr>
<tr>
<td>Time postoperatively, ROM/effusion</td>
<td>4</td>
</tr>
<tr>
<td>Time postoperatively, muscle strength, single-leg hop test</td>
<td>2</td>
</tr>
<tr>
<td>Time postoperatively, muscle strength, ROM</td>
<td>2</td>
</tr>
<tr>
<td>Time postoperatively, Lachman rating, effusion</td>
<td>1</td>
</tr>
<tr>
<td>Time postoperatively, muscle strength/thigh circumference, single-leg hop test</td>
<td>1</td>
</tr>
<tr>
<td>Time postoperatively, muscle strength, single-leg hop test, ROM/effusion</td>
<td>1</td>
</tr>
<tr>
<td>Time postoperatively, muscle strength, 4 single-leg hop tests, ROM/effusion, validated questionnaires</td>
<td>1</td>
</tr>
<tr>
<td>Single-leg hop test</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE.** Data are presented for 35 studies that provided objective criteria for return to sports.

Barber-Westin & Noyes 2011
Return to play following ACL reconstruction: survey among experienced arthroscopic surgeons (AGA instructors)

Wolf Petersen · Thore Zantop

Criteria for return to play

<table>
<thead>
<tr>
<th>%</th>
<th>Lachman test</th>
<th>Pivot shift</th>
<th>anterior drawer</th>
<th>RON</th>
<th>KT 1000</th>
<th>one leg jump test</th>
<th>strengthening analysis</th>
<th>proprioception test</th>
<th>MRI</th>
<th>other</th>
</tr>
</thead>
</table>
Simple decision rules can reduce reinjury risk by 84% after ACL reconstruction: the Delaware-Oslo ACL cohort study

Hege Grindem, Lynn Snyder-Mackler, Håvard Moksnæs, Lars Engebretsen, May Arna Risberg

What are the findings?

► In the first 2 years after ACL reconstruction, 30% of people who returned to level 1 sports sustained a reinjury compared with 8% of those who participated in lower level sports.
► For every month that return to sport was delayed, until 9 months after ACL reconstruction, the rate of knee reinjury was reduced by 51%.
► More symmetrical quadriceps strength prior to return to sport significantly reduced the knee reinjury rate.
Likelihood of ACL graft rupture: not meeting six clinical discharge criteria before return to sport is associated with a four times greater risk of rupture

Polyvios Kyritsis,¹ Roald Bahr,¹,² Philippe Landreau,¹ Riadh Miladi,¹ Erik Witvrouw¹,³

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Discharge tests and criteria used during the study period</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Six-part return to sport tests</strong></td>
<td><strong>Discharge permitted when each of these criteria was met</strong></td>
</tr>
<tr>
<td>Isokinetic test at 60, 180 and 300°/s</td>
<td>Quadriceps deficit &lt;10% at 60°/s</td>
</tr>
<tr>
<td>Single hop</td>
<td>Limb symmetry index &gt;90%</td>
</tr>
<tr>
<td>Triple hop</td>
<td>Limb symmetry index &gt;90%</td>
</tr>
<tr>
<td>Triple crossover hop</td>
<td>Limb symmetry index &gt;90%</td>
</tr>
<tr>
<td>On-field sports-specific rehabilitation</td>
<td>Fully completed</td>
</tr>
<tr>
<td>Running t test</td>
<td>&lt;11 s</td>
</tr>
</tbody>
</table>

Criteria were set according to the literature at the start of the study.
Likelihood of ACL graft rupture: not meeting six clinical discharge criteria before return to sport is associated with a four times greater risk of rupture.

Polyvios Kyritsis, Roald Bahr, Philippe Landreau, Riadh Miladi, Erik Witvrouw

<table>
<thead>
<tr>
<th></th>
<th>ACL injury</th>
<th>No ACL injury</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed RTS criteria</td>
<td>14</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td>Passed RTS criteria</td>
<td>12</td>
<td>104</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>132</td>
<td>158</td>
</tr>
</tbody>
</table>

Sensitivity: $\frac{14}{26} = 53\%$

Specificity: $\frac{104}{132} = 79\%$
What can or should we assess?
Psychological factors are important to return to pre-injury sport activity after anterior cruciate ligament reconstruction: expect and motivate to satisfy

Sofi Sonesson¹ · Joanna Kvist¹ · Clare Arden²,3 · Annika Österberg¹,4 · Karin Grövare Silbernagel⁵

Table 4 Motivation to return to pre-injury activity level and satisfaction with current activity level and knee function. Data (median (range)) displayed for all participants (all) and separately for those who at the 52-week follow-up had returned to their pre-injury sport activity (returned), and for those who had not returned to their pre-injury sport activity.

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre-operative</th>
<th>16 weeks</th>
<th>52 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>Returned</td>
<td>Not returned</td>
</tr>
<tr>
<td>How important is it for you to return to your pre-injury activity level?</td>
<td>10 (3–10)</td>
<td>10 (8–10)</td>
<td>10 (3–10)</td>
</tr>
<tr>
<td>Do you think it is possible to return to your pre-injury activity level?</td>
<td>9 (4–10)</td>
<td>10 (7–10)</td>
<td>9 (4–10)</td>
</tr>
<tr>
<td>How much are you willing to make the effort to return to your pre-injury activity level?</td>
<td>10 (4–10)</td>
<td>10 (8–10)</td>
<td>10 (4–10)</td>
</tr>
<tr>
<td>Are you satisfied with your current knee function?</td>
<td>2 (1–8)</td>
<td>2 (1–8)</td>
<td>n.s.</td>
</tr>
<tr>
<td>If you were to spend the rest of your life with your knee function just the way it has been in the last week, would you feel...?</td>
<td>6 (2–7)</td>
<td>5 (4–7)</td>
<td>n.s.</td>
</tr>
</tbody>
</table>
Development and preliminary validation of a scale to measure the psychological impact of returning to sport following anterior cruciate ligament reconstruction surgery

Kate E. Webster*, Julian A. Feller, Christina Lambros

Psychological Responses Matter in Returning to Preinjury Level of Sport After Anterior Cruciate Ligament Reconstruction Surgery

Clare L. Ardern,*† PT, Nicholas F. Taylor,† PT, PhD, Julian A. Feller,‡§ MD, FRACS, Timothy S. Whitehead,‡ MD, FRACS, and Kate E. Webster,§ PhD
The ACL-RSI (Anterior Cruciate Ligament Return to Sports after Injury) scale was developed and validated by Dr. Kate E. Webster and colleagues at La Trobe University, Melbourne, Australia. It measures athletes' emotions, confidence in performance, and risk appraisal in relation to returning to sport after an ACL injury.

Instr. Questions 1-4 Next Four>

1. Are you confident that you can perform at your previous level of sport participation?
Not at all confident ———— Fully confident

2. Do you think you are likely to re-injure your knee by participating in your sport?
Extremely likely ———— Not likely at all

3. Are you nervous about playing your sport?
Extremely nervous ———— Not nervous at all

4. Are you confident that your knee will not give way by playing your sport?
Not at all confident ———— Fully confident

Questions 9-12

9. Are you afraid of accidentally injuring your knee by playing your sport?
Extremely afraid ———— Not at all afraid

10. Do thoughts of having to go through surgery and rehabilitation again prevent you from playing your sport?
All of the time ———— None of the time

11. Are you confident about your ability to perform well at your sport?
Not at all confident ———— Fully confident

12. Do you feel relaxed about playing your sport?
Not at all relaxed ———— Fully relaxed
Development of a test battery to enhance safe return to sports after anterior cruciate ligament reconstruction

Alli Gokeler\textsuperscript{1} \textsuperscript{1}\textsuperscript{1} · Wouter Welling\textsuperscript{1,2} · Stefano Zaffagnini\textsuperscript{3} · Romain Seil\textsuperscript{4} · Darin Padua\textsuperscript{5}
Increased risk ACL
10!
LSI Quadriceps

Mean 85.9 ± 12.3
Success rate 39.3%
A Critical Analysis of Limb Symmetry Indices of Hop Tests in Athletes After Anterior Cruciate Ligament Reconstruction

Alli Gokeler¹
Wouter Welling¹,²
Anne Benjaminsen¹,³
Koen Lemmink¹
Romain Seil⁴
Stefano Zaffagnini⁵

<table>
<thead>
<tr>
<th>TLH (cm)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference involved limb compared to normative data</td>
<td>125.7 ± 71.4</td>
</tr>
<tr>
<td></td>
<td>43.5 ± 49.2</td>
</tr>
<tr>
<td>p value</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Difference uninvolved limb compared to normative data</td>
<td>104.1 ± 65.6</td>
</tr>
<tr>
<td></td>
<td>30.8 ± 49.8</td>
</tr>
</tbody>
</table>
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  - Bart Dingenen, 5 minutes

- Questions & Answers
  - Bart Dingenen & Alli Gokeler, 5 minutes

Bart Dingenen¹,² · Alli Gokeler³
Should Return to Sport be Delayed Until 2 Years After Anterior Cruciate Ligament Reconstruction? Biological and Functional Considerations

Christopher V. Nagelli¹,²,⁴,⁵ · Timothy E. Hewett¹,²,³,⁴,⁵
### Table 5. Muscle Strength Criteria for Return to Sports According to Graft Type

<table>
<thead>
<tr>
<th>Muscle Strength Criteria (Compared With Opposite Side)</th>
<th>BPTB Autograft</th>
<th>STG Autograft</th>
<th>Double-Bundle Grafts</th>
<th>Other Grafts*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;90% isokinetic strength</td>
<td>9</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>≥85% isokinetic strength</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>&gt;80% isokinetic strength</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>≥90% quadriceps index</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>≥90% weighted leg extension</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 6. Single-Leg Hop Test Criteria for Return to Sports According to Graft Type

<table>
<thead>
<tr>
<th>Single-Leg Hop Test Criteria (Compared With Opposite Side)</th>
<th>BPTB Autograft</th>
<th>STG Autograft</th>
<th>Double-Bundle Grafts</th>
<th>Other Grafts*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;90% single hop</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>≥90% on 4 tests: single hop, triple hop, crossover hop, and timed hop</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>≥85% single hop</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>&gt;90% “hop/jump testing”</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 1. Recommended criteria for strength and hop performance prior to a return to sport after ACL reconstruction

<table>
<thead>
<tr>
<th>Type of sport</th>
<th>LSI strength</th>
<th>LSI hop performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pivoting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td>100% on knee extensor as well as knee flexor strength</td>
<td>90% on two maximum&lt;sup&gt;a&lt;/sup&gt; as well as one endurable&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Competitive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-pivoting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-contact</td>
<td>90% on knee extensor as well as knee flexor strength</td>
<td>90% on one maximum&lt;sup&gt;a&lt;/sup&gt; or one endurable&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Recreational</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> For example, a vertical jump and a hop for distance [30, 62, 69, 78]

<sup>b</sup> For example, the triple jump [78], stair hop [78] or side hop test [30]
The validity and reliability of an iPhone app for measuring vertical jump performance

Carlos Balsalobre-Fernández, Mark Glaister & Richard Anthony Lockey

Figure 3. Concurrent validity between the force platform and My Jump app.
CMJ  SJ  DJ  CMJ free arms

28.53  29.30  31.86  31.68  31.29  33.26  34.34  37.15  37.15  37.66

Jump height (cm) - Tap to change variable
Thorborg 2011, Luedke 2015
Likelihood of ACL graft rupture: not meeting six clinical discharge criteria before return to sport is associated with a four times greater risk of rupture

Polyvios Kyritsis, Roald Bahr, Philippe Landreau, Riadh Miladi, Erik Witvrouw

What are the findings?

- Meeting six specific objective discharge criteria before return to sport after ACL reconstruction rehabilitation was associated with approximately one-quarter the risk of ACL graft rupture.
- For every 10% decrease in the hamstring to quadriceps strength ratio there was a 10.6 times higher risk of sustaining an ACL graft rupture.
Biomechanical Measures During Landing and Postural Stability Predict Second Anterior Cruciate Ligament Injury After Anterior Cruciate Ligament Reconstruction and Return to Sport

Mark V. Paterno,†‡§|| PT, MS, SCS, ATC, Laura C. Schmitt,†‡§# PT, PhD, Kevin R. Ford,†‡|| PhD, FACSM, Mitchell J. Rauh,‡ PT, PhD, MPH, FACSM, Gregory D. Myer,†‡a MS, CSCS, Bin Huang,†‡b PhD, and Timothy E. Hewett,†‡||c PhD, FACSM
Can two-dimensional video analysis during single-leg drop vertical jumps help identify non-contact knee injury risk? A one-year prospective study

Bart Dingenen a,*, Bart Malfait a, Stefaan Nijs b, Koen H.E. Peers c, Styn Vereecken c, Sabine M.P. Verschueren a, Filip F. Staes a
Can two-dimensional measured peak sagittal plane excursions during drop vertical jumps help identify three-dimensional measured joint moments?

Bart Dingenen a,* , Bart Malfait a,1 , Jos Vanreunterghem b,2 , Mark A. Robinson a,3 , Sabine M.P. Verschueren a,4 , Filip F. Staes a,5
BUT...
Neuroplasticity Following Anterior Cruciate Ligament Injury: A Framework for Visual-Motor Training Approaches in Rehabilitation
Postural stability deficits during the transition from double-leg stance to single-leg stance in anterior cruciate ligament reconstructed subjects

Bart Dingenen暖, Luc Janssens暖, Steven Claes暖, Johan Bellemans暖, Filip F. Staes暖
Postural Stability During Single-Leg Stance: A Preliminary Evaluation of Noncontact Lower Extremity Injury Risk
Pre-injury

Injury

Articular deafferentiation

CNS re-organization

Maladaptive CNS response
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✓ How to perform secondary ACL injury prevention training in a clinical setting?
  ✓ Bart Dingenen, 5 minutes

✓ Questions & Answers
  ✓ Bart Dingenen & Alli Gokeler, 5 minutes
How to organize the decision-making process?
Return-to-Play in Sport: A Decision-based Model

David W. Creighton, MS,* Ian Shrier, MD, PhD,† Rebecca Shultz, PhD,* Willem H. Meeuwisse, MD, PhD,‡ and Gordon O. Matheson, MD, PhD*

Decision-Based RTP Model

Step 1
Evaluation of Health Status

Medical Factors
- Patient Demographics (e.g., age, sex)
- Symptoms (e.g., pain, giving way)
- Personal Medical History (e.g., recurrent injury)
- Signs (Physical Exam) (e.g., swelling, weakness)
- Lab Tests (e.g., x-ray, MRI)
- Functional Tests (e.g., diagonal hop test)
- Psychological State (e.g., depressed)
- Potential Seriousness (e.g., concussion, tennis elbow)

Step 2
Evaluation of Participation Risk

Sport Risk Modifiers
- Type of Sport (e.g., collision, non-contact)
- Position Played (e.g., goalie, forward)
- Limb Dominance (e.g., MSK alignment)
- Competitive Level (e.g., recreational, professional)
- Ability to Protect (e.g., padding)

Step 3
Decision Modification

Decision Modifiers
- Timing & Season (e.g., playoffs)
- Pressure from Athlete (e.g., desire to compete)
- External Pressure (e.g., coach, athlete family)
- Masking the Injury (e.g., effective analgesia)
- Conflict of Interest (e.g., financial)
- Fear of Litigation (e.g., if restricted or permitted)

Return-to-Play Decision
Gradual periodized return to sport
On Field Rehabilitation
Training for the average demands will likely result in athletes being under-prepared for the most demanding passages of play.

Reference: by Gabbett et al. BJSM 2016

Designed by @YLMSportScience
Has the athlete trained enough to return to play safely? The acute:chronic workload ratio permits clinicians to quantify a player’s risk of subsequent injury

Peter Blanch,¹,² Tim J Gabbett³,⁴

<table>
<thead>
<tr>
<th>Chronic workload ( % of normal average )</th>
<th>110</th>
<th>100</th>
<th>90</th>
<th>80</th>
<th>70</th>
<th>60</th>
<th>50</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>4.7</td>
<td>4.1</td>
<td>3.6</td>
<td>3.4</td>
<td>3.2</td>
<td>3.3</td>
<td>3.3</td>
<td>3.5</td>
</tr>
<tr>
<td>100</td>
<td>4.3</td>
<td>3.7</td>
<td>3.4</td>
<td>3.3</td>
<td>3.3</td>
<td>3.6</td>
<td>3.6</td>
<td>4.0</td>
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<tr>
<td>90</td>
<td>3.9</td>
<td>3.5</td>
<td>3.3</td>
<td>3.3</td>
<td>3.3</td>
<td>3.6</td>
<td>4.2</td>
<td>4.9</td>
</tr>
<tr>
<td>80</td>
<td>3.5</td>
<td>3.3</td>
<td>3.3</td>
<td>3.7</td>
<td>4.3</td>
<td>5.3</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>3.3</td>
<td>3.3</td>
<td>3.7</td>
<td>4.6</td>
<td>5.8</td>
<td>7.5</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>3.3</td>
<td>3.8</td>
<td>4.9</td>
<td>6.6</td>
<td>8.8</td>
<td>11.6</td>
<td>14.9</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>4.0</td>
<td>5.1</td>
<td>5.8</td>
<td>7.5</td>
<td>10.1</td>
<td>14.9</td>
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Gradual periodized return to sport
ACL injury

ACL reconstruction

Gradual periodized return to sport

Follow-up

Preoperative rehabilitation

Criterion-based postoperative rehabilitation

Return to sport testing

Shared decision-making

Dingenen & Gokeler 2017 Sports Medicine
(1) Time-based

(2) Knee-focused

(3) A yes or no RTS decision only at the hypothetical "end" of the rehabilitation

(4) Narrow vision on RTS readiness after ACL reconstruction

(5) Criterion-based

(6) Multifactorial

(7) Sensorimotor spectrum

(8) Multi-segmental

(9) Interaction individual - task - environment

(10) RTS continuum

(11) Shared decision

(12) Big picture view

Traditional return to sport approach

Optimized return to sport approach

Let’s turn the page!!

Dingenen & Gokeler 2017 Sports Medicine
Table of content

- Return to sport after ACL reconstruction: what is the problem?
  × Bart Dingenen, 5 minutes

- Traditional ACL return to sport criteria: time for an update?!
  × Alli Gokeler, 10 minutes

- Future optimizations for a return to sport clinical decision-making process
  × Bart Dingenen, 10 minutes

- How to perform a return to sport decision-making process in a clinical setting?
  × Alli Gokeler, 10 minutes

- How to perform secondary ACL injury prevention training in a clinical setting?
  × Bart Dingenen, 5 minutes

- Questions & Answers
  × Bart Dingenen & Alli Gokeler, 5 minutes
ACL injury prevention in my training?
Yes, we can reduce ACL injury risk!

Around 50% decreased PRIMARY ACL injury risk with injury prevention programs.
MULTI-COMPONENT INTERVENTIONS:

- Strengthening
- Proximal control exercises
- Movement education - feedback
- Jump training - plyometrics
- Balance training
- Agility exercises

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<th>Upper limit</th>
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Favour to Training  Favour to Control

Random Effect Model
Optimization of the Anterior Cruciate Ligament Injury Prevention Paradigm: Novel Feedback Techniques to Enhance Motor Learning and Reduce Injury Risk
We should do better!!

We CAN do better!!
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