6th Congress of ECOSEP
European College of Sports & Exercise Physicians

From Labs to the Pitch
Return-to-play criteria after ACL reconstruction

François Delvaux, Jean-Louis Croisier

University of Liege & SPORTS²/CHU Liege, Belgium
Successful RTP =

1. No re-injury

2. Level of performance identical to pre-injury
Introduction

(1) Time-based
(2) Knee-focused

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

(4) Narrow view of RTS readiness after ACL reconstruction

Traditional return to sport approach

Optimized return to sport approach

Biopsychosocial framework

(1) Criterion-based
(2) Multifactorial
(3) Sensorimotor spectrum
(4) Multi-segmental
(5) Interaction individual - task - environment
(6) RTS continuum
(7) Shared decision
(8) Big picture view

Bart Dingenen, Alli Gokeler
How can we facilitate RTP decision after ACLR?

RTP decision is easier if previous assessments are regularly realized during rehab.

ACL injury
Surgery
Return-to-play decision
Return to competition
Regular assessment is key: What about Return To Running?

Criteria for return to running after anterior cruciate ligament reconstruction: a scoping review

Alexandre J M Rambaud,1,2 Clare L Ardern,3,4 Patricia Thoreux,5,6 Jean-Philippe Regnaux,7,8 Pascal Edouard1,9

201 studies with time-based criterion
36 studies with other criterion or criteria

- Questionnaire
- Flexion ROM >95% other knee, >100°, >120°
- Full extension ROM
- Pain
- Effusion
- Graft evaluation
- Other clinical exam

Clinical criteria
- n=1
- n=9
- n=8
- n=2

Strength criteria
- Isokinetic
- Isometric
- Isotonic
- Subjective

Performance-based criteria
- Balance
- Gait pattern
- Functional tests: hop, Single-leg squat, ...

Cut-off values?
↓
No consensus
What is the evidence of Return-to-sport testing?

The Association Between Passing Return-to-Sport Criteria and Second Anterior Cruciate Ligament Injury Risk: A Systematic Review With Meta-analysis

JUSTIN M. LOSCIALE, DPT, CSCS1 • RACHAEL M. ZDEB, DPT, CSCS, USAW-LISP2 • LEILA LEDBETTER, MLIS3
MICHAEL P. REIMAN, PT, PhD, ATC4 • TIMOTHY C. SELL, PT, PhD4,5

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What is the Evidence for and Validity of Return-to-Sport Testing after Anterior Cruciate Ligament Reconstruction Surgery? A Systematic Review and Meta-Analysis

Kate E. Webster1,2 • Timothy E. Hewett2,3,4,5

CONCLUSION: Passing RTS criteria did not show a statistically significant association with risk of a second ACL injury. The quality-of-evidence rating prevents a definitive conclusion on this question and indicates an opportunity for future research.
CONCLUSION

Our reanalysis omits two studies\(^1\)\(^2\) with designs that addressed a different research construct than the remaining three and/or have a high risk of bias. We found that compared with patients who fail RTS tests prior to return to sport, athletes who pass RTS test batteries have: (1) a lower risk of (any) knee reinjury, (2) a lower risk of any second ACL injury and (3) a lower risk of ACL graft rupture; (4) no conclusions regarding contralateral ACL injury risk can be drawn due to insufficient data.
Which criteria can we use for RTP testing after ACLR?

Which criteria are used to clear patients to return to sport after primary ACL reconstruction? A scoping review


6 categories of criteria:
1. Time
2. Strength
3. Hop testing
4. Clinical examination
5. PRO’S
6. Functional performance
Return to Official Italian First Division Soccer Games Within 90 Days After Anterior Cruciate Ligament Reconstruction: A Case Report

J Orthop Sports Phys Ther • Volume 35 • Number 2 • February 2005

Differing ligamentization time frames in human grafts compared with a recent review of animal reports.

The American Journal of Sports Medicine, Vol. 39, No. 11 2011
1. Time

Should we wait for 2 years after ACLR before RTP??

RTP decision is a risk management approach

Answer this question: « What is the minimal time before RTP? »

➔ And then consider other RTP criteria

Time for a Different Approach to Anterior Cruciate Ligament Injuries: Educate and Create Realistic Expectations

Joshua Robert Zadro¹² - Evangelos Pappas³


Rehabilitation must target strength and functional performance, avoid rapid increases in training load, and be guided by a return to sport (RTS) timeframe that is no shorter than 9 months (postoperative rehabilitation only)
2. Strength

Gold standard = Isokinetic dynamometry

- **CON Q & H**: 3 reps at 60°/s & 5 reps at 240°/s
- **ECC H**: 3 reps at 30°/s

**Bilateral comparison:**

- <10%

**H/Q ratios (Cybex):**
- **CON**: >0.50-0.55
- **Mixed**: >0.90

**Future? Maybe add**
- Functional strength
- Hip ABDuctors strength

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.

3. Hop testing

Limb Symmetry Index > (85)-90%

3. Hop testing – Future?

Medial Side Triple Hop for distance

90° Medial Rotation Hop for distance

when retesting athletes. Medial and rotational hop tests are more likely to show limb asymmetries in ACL-reconstructed participants compared to forward hop tests.
4. Clinical examination

• No swelling

• **No abnormal laxity** (<3mm Lachman test or bilateral comparison)

• Full ROM
5. PRO’s – Patient Reported Outcomes

1. Symptoms, function, activity, participation:
   - No pain
   - KOS-ADL > 90% (Burgi 2019, BJSM)
   - IKDC 2000 (Logerstedt 2014, JOSPT)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Females</th>
<th>Males</th>
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<tbody>
<tr>
<td>18-24 years old</td>
<td>84</td>
<td>90</td>
</tr>
<tr>
<td>25-34 y.o.</td>
<td>83</td>
<td>86</td>
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<tr>
<td>35-50 y.o.</td>
<td>85</td>
<td>78.5</td>
</tr>
<tr>
<td>51-65 y.o.</td>
<td>69</td>
<td>75</td>
</tr>
</tbody>
</table>

2. Psychological factors:
   - ACL-RSI:
     - > 65 (Delvaux, submitted)
6. Functional performance

- Agility
  Ex: T-test

- Proprioception
  Ex: Y Balance test

- Aerobic endurance
  Ex: threshold test

- Quality of movement
  Ex: LESS

Cut-off values?
→ To be individualised
Individualise the RTP decision

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Modifiers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>Age, sex, personal history</td>
</tr>
<tr>
<td>Strength</td>
<td>Type and level of sport</td>
</tr>
<tr>
<td>Hop testing</td>
<td>Timing of the season</td>
</tr>
<tr>
<td>Clinical examination</td>
<td>External pressure</td>
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<tr>
<td>PRO’S</td>
<td>Individual goals</td>
</tr>
<tr>
<td>Functional performance</td>
<td>...</td>
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</tbody>
</table>

• RTP decisions after ACLR are easier if regular evaluations are realised previously according to a **criterion-based approach**

• **Return to running** is one of the first steps and should be considered regarding clinical, strength and performance-based criteria

• Define a **minimal time before RTP** and then consider other criteria

• The **main categories of criteria** for RTP clearance are: **strength, hop testing, clinical exam, PRO’s** and **functional performance**

• For some parameters, cut-off values are available but further research are needed

• **Individualise the RTP decision** according to specific modifiers: age, sex, personal history, type / level of sport, individual goals,...
Thank you for your attention!