

The average time to return to sport after an ACL reconstruction (with or without meniscus surgery) is 9-12 months.

As per Dr. Cole's physical therapy protocol, if you are an athlete returning to sport you will complete a preliminary functional test to assess progress at around 3.5 months, and a full functional test at around 6 months (examples below). These help provide information regarding therapy, recovery, and reinjury risk.

If appropriate parameters are met, you will be allowed to progress slowly back into sport specific activities. This may be anywhere from 6-9 months. A return to play protocol directed to your specific sport may be provided.

No full return to play will be allowed until <u>at least</u> 9 months post operatively.

Test		Dynamic Valgus * (Y/N)	R	L	%
Hand-Held Dynamometer	Quadriceps	N/A			
	Hamstrings	N/A			
	Hip Abduction	N/A			
Y-Balance (Anterior only)					
Leg Length (ASIS to medial malleolus):	cm				
Leg Press	Body weight:				
Percentage of Body Weight:	Seat setting:				
🗆 50% 🗆 75%					

Preliminary Functional Test Week 12 (Prior to 12-week follow-up appointment)

Return to Sport Test Weeks 20-24 (Prior to 6-month follow-up appointment)

Test		Dynamic Valgus * (Y/N)	R	L	%
Hand-Held Dynamometer	Quadriceps	N/A			
	Hamstrings	N/A			
	Hip Abduction	N/A			
Y-Balance	Anterior:				
	Posterolateral:				
Leg Length (ASIS to medial malleolus): cm	Posteromedial:				
	Composite:	N/A			N/A
Single Leg Vertical					
Single Leg Hop with Fatigue Protocol					
Single Leg Backwards Hop					
Cross-Over Hop					
Figure 8 Hop					
Drop Landing Knee Excursion**					
Leg Press	Body weight:				
Percentage of Body Weight:	Seat setting:				
other %					
Additional comments:					

* Dynamic Valgus is defined as the kneecap being medial to the great toe during the test

** Only perform Drop Landing if patient passes ALL hops tests – SL Hop, SL Backwards Hop, Cross-Over Hop, and Figure 8 Hop.



Austin Cole, MD

Why We Suggest Return to Sport 9 Months After ACL Repair

(Originally published by the Mobility Fit Team)

To understand this, let's dig into a simplified explanation about what happens at the cellular level after an ACL reconstruction.

But First – Acronyms you may not be familiar with

- ACL = Anterior cruciate ligament
- ACLR = Anterior cruciate ligament reconstruction

Day 0: Surgery

Weeks 1-4 Inflammatory stage: Following surgery the joint and its components are irritated from the controlled damage that occurs during surgery. The new ACL is flooded with inflammatory cells that drive the healing process. At this point the new ACL has not vascularized meaning there is no blood flow to the graft.

Weeks 4-12 Proliferative stage: The graft re-vascularizes, gaining a supply of blood, and type III collagen is formed from its components into a disorganized matrix (think a knitted blanket with larger openings – i.e. relatively weak)

Weeks 12+ Ligamentization: The disorganized matrix of type III collagen continues to strengthen, forming type I collagen (think of a tightly stitched blanket that is resistant to stretch). This gradually strengthens to become MUCH stronger than during the proliferative stage.

Reading the above stages makes it clear that return to sport is not appropriate in the first 3 months. Not only are people usually still dealing with swelling, reduced strength, and decreased control, but the ACL graft is in a stage prior ligamentization, meaning that the strength of the ACL itself is significantly reduced. Since we can rule out the first 3 months, then we should look at what happens from months 4-9.

Typically, jogging is initiated at 12 weeks or after following therapy (depending on progress). It is typically very awkward and takes time (and strength) to improve mechanics to the point of increasing speed. After jogging would come jumping and cutting. Not only do we need the ligamentization process to be underway by this point, but we also need to see clients demonstrating sufficient strength and control to initiate jumping and cutting. I am sure we can agree that someone must be able to squat and significantly flex their knees with good control before they undergo the rapid knee flexion and high forces associated with initiating a change of direction.

For these reasons, nobody attempts to return from an ACL repair until at least 6 months post-operative. Now the question becomes, when is the right time to return from an ACL repair?

Typically we look for several benchmarks:

- 1. Full and pain-free active range of motion of the knee
- 2. Strength of the surgical side greater or equal to 90% of the non-surgical side
- 3. Even weight distribution during activities on 2 legs (such as a squat)
- 4. Passing score on return to sport testing (there are many of these, but we typically use single leg hop for distance, triple hop, and crossover triple hop)
- 5. Good dynamic control of the knee during running and jumping activities

So, how long should it take to achieve these?

That varies greatly from person to person, so it does not provide us with a timeline, but based on much research and personal experience, it is *extremely rare* that someone achieves all of these by 6 months. Now, why do we make the jump from *6ish* months to 9 months?

THE RESEARCH

- "Returning to knee-strenuous sport before 9 months after ACL reconstruction was associated with an approximately <u>7 fold increased</u> rate of sustaining a second ACL injury."
 - Beischer, Susanne, et al. "Young Athletes Who Return to Sport Before 9 Months After Anterior Cruciate Ligament Reconstruction Have a Rate of New Injury 7 Times That of Those Who Delay Return." *journal of orthopaedic & sports physical therapy* 50.2 (2020): 83-90.
- "The reinjury rate was significantly <u>reduced by 51 % for each month</u> RTS (Return To Sport) was delayed until 9 months after surgery, after which no further risk reduction was observed."
 - Grindem, H., L. Snyder-Mackler, and H. Moksnes. "Simple decision rules reduce reinjury risk after anterior cruciate ligament reconstruction: the Delaware–Oslo cohort study." *Br J Sports Med Published Online First* 9 (2016).
- Athletes who returned to competition within the first 7 months were nearly <u>three times more likely</u> to sustain a second ACL injury than those who returned after 7 months, with the majority of the injuries occurring within the first month of returning to sport.
 - Capin, Jacob J., et al. "Gait mechanics and second ACL rupture: Implications for delaying returnto-sport." *Journal of Orthopaedic Research* 35.9 (2017): 1894-1901.
- Six to 9 months following ACLR (ACL Reconstruction), patients continue to demonstrate functional hop and isokinetic knee extension deficits, as well as kinematic differences, during the propulsion and landing phases of the hop tests.
 - Xergia, Sofia A., et al. "Asymmetries in functional hop tests, lower extremity kinematics, and isokinetic strength persist 6 to 9 months following anterior cruciate ligament reconstruction." *Journal of Orthopaedic & Sports Physical Therapy* 43.3 (2013): 154-162.

- Relatively large unloading of the ACLR limb (but not differences in contact times) are seen during
 running for athletes <9 months post-ACLR despite having completed functional criteria required to
 permit RTS training. These asymmetries appear to slightly increase with increasing speed, and the
 reverse is true for healthy controls and <u>those ≥9 months</u> after ACLR surgery.
 - Thomson, Athol, et al. "Marked asymmetry in vertical force (but not contact times) during running in ACL reconstructed athletes< 9 months post-surgery despite meeting functional criteria for return to sport." *Journal of science and medicine in sport* 21.9 (2018): 890-893.
- At 6 months, two patients (3.2%) passed all criteria. At 9 months, seven patients (11.3%) passed all criteria.
 - Welling, Wouter, et al. "Low rates of patients meeting return to sport criteria 9 months after anterior cruciate ligament reconstruction: a prospective longitudinal study." *Knee Surgery, Sports Traumatology, Arthroscopy* 26.12 (2018): 3636-3644.
- Athletes passed return to sport criteria 232 ± 99 days after ACLR. One year after ACL reconstruction 95% had returned to sport, 78% at their preinjury level. Two years after ACL reconstruction all athletes had returned to sport, 95% at their preinjury level and only one athlete had a second ACL injury.
 - Arundale, Amelia JH, et al. "Two year ACL reinjury rate of 2.5%: outcomes report of the men in a secondary ACL injury prevention program (ACL-SPORTS)." *International journal of sports physical therapy* 13.3 (2018): 422.

Even in a relatively small sample size of the research is clear – reinjury risk is dramatically higher in the 6-9 month range than it is after 9 months. We now have enough data to make an educated decision.

Final verdict: Return to sport after ACL reconstruction should occur after passing all return to sport testing AND greater than 9 months following surgery. For some, this means return is delayed well beyond 9 months as they work to meet objective criteria for return to sport.