

# ACL Reconstruction

## Criterion-Based Physical Therapy Protocol · 9–12 Month Timeline

Modeled on current best evidence: criterion-based recovery-stage framework (Arthroscopy 2025), NEJM clinical practice review, and return-to-sport consensus criteria.



### AT A GLANCE

|                 |                                                                            |
|-----------------|----------------------------------------------------------------------------|
| TIMELINE        | 9–12 months, criterion-based progression (time windows are approximate)    |
| WEIGHT BEARING  | As tolerated with crutches from day 1; brace per surgeon preference        |
| KEY METRICS     | Quadriceps limb-symmetry index (LSI), hop testing, effusion grade, ACL-RSI |
| RETURN TO SPORT | Not before 9 months; quad + hop LSI ≥90% and psychological readiness       |

KEY PRECAUTIONS

- Open kinetic chain knee extension only with surgeon clearance (typically limited arc 90°–40°).
- Do not progress phases on time alone — each advancement requires the listed criteria.
- Earlier return to sport is associated with significantly higher reinjury rates.

## PHASED REHABILITATION

| PHASE 1 — EARLY: PROTECTION & ROM RECOVERY         |                                                                                                                                                                                                                                                                                                                                                                                                                                          | Weeks 0–6   |
|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| GOALS                                              | <ul style="list-style-type: none"> <li>Pain and effusion control</li> <li>ROM 0° extension to 115° flexion by end of phase</li> <li>Normalized gait</li> </ul>                                                                                                                                                                                                                                                                           |             |
| INTERVENTIONS                                      | <ul style="list-style-type: none"> <li>Weight bearing as tolerated with crutches; brace per surgeon preference</li> <li>Cryotherapy and compression for pain/swelling control</li> <li>Quad sets, straight leg raises (SLR), heel slides, patellar mobilization, ankle pumps</li> <li>Neuromuscular electrical stimulation (NMES) to quadriceps</li> <li>OKC knee extension only with surgeon clearance (limited arc 90°–40°)</li> </ul> |             |
| CRITERIA TO ADVANCE                                | <ul style="list-style-type: none"> <li>ROM 0°–115°</li> <li>Effusion ≤1+</li> <li>Normalized gait</li> <li>Quad LSI ≥60%</li> </ul>                                                                                                                                                                                                                                                                                                      |             |
| PHASE 2 — INTERMEDIATE: NEUROMUSCULAR RE-EDUCATION |                                                                                                                                                                                                                                                                                                                                                                                                                                          | Weeks 7–9   |
| GOALS                                              | <ul style="list-style-type: none"> <li>Restore balance and proprioception</li> <li>Initiate closed-chain strengthening</li> </ul>                                                                                                                                                                                                                                                                                                        |             |
| INTERVENTIONS                                      | <ul style="list-style-type: none"> <li>Balance and proprioception training (single-leg stance, perturbation training)</li> <li>CKC progression: leg press, squats, step-ups</li> <li>Stationary bike, pool walking for aerobic conditioning</li> </ul>                                                                                                                                                                                   |             |
| CRITERIA TO ADVANCE                                | <ul style="list-style-type: none"> <li>Full symmetrical ROM</li> <li>Quad LSI ≥70%</li> </ul>                                                                                                                                                                                                                                                                                                                                            |             |
| PHASE 3 — LATE: STRENGTHENING & RUNNING INITIATION |                                                                                                                                                                                                                                                                                                                                                                                                                                          | Weeks 10–16 |
| GOALS                                              | <ul style="list-style-type: none"> <li>Initiate running</li> <li>Progressive resistance training</li> <li>Sound landing mechanics</li> </ul>                                                                                                                                                                                                                                                                                             |             |
| INTERVENTIONS                                      | <ul style="list-style-type: none"> <li>Running initiated when quad LSI ≥80%</li> <li>Progressive resistance training: lunges, single-leg squats, deadlifts</li> <li>Landing mechanics training</li> </ul>                                                                                                                                                                                                                                |             |
| CRITERIA TO ADVANCE                                | <ul style="list-style-type: none"> <li>Quad LSI 75–80%</li> <li>Proper landing mechanics</li> </ul>                                                                                                                                                                                                                                                                                                                                      |             |

| PHASE 4 — TRANSITIONAL: AGILITY & POWER |                                                                                                                                                                         | Months 4–6 |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| GOALS                                   | <ul style="list-style-type: none"> <li>Restore power, agility, and change of direction</li> </ul>                                                                       |            |
| INTERVENTIONS                           | <ul style="list-style-type: none"> <li>Jumping, sprinting, deceleration, and change-of-direction drills</li> <li>Sport-specific movement patterns introduced</li> </ul> |            |
| CRITERIA TO ADVANCE                     | <ul style="list-style-type: none"> <li>Quad LSI and hop testing <math>\geq 85\%</math></li> </ul>                                                                       |            |

  

| PHASE 5 — RETURN TO SPORT |                                                                                                                                                                                                                                                                                 | Months 6–12 |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| GOALS                     | <ul style="list-style-type: none"> <li>Safe return to full competition</li> </ul>                                                                                                                                                                                               |             |
| INTERVENTIONS             | <ul style="list-style-type: none"> <li>Sport-specific conditioning and competition simulation</li> </ul>                                                                                                                                                                        |             |
| CRITERIA TO ADVANCE       | <ul style="list-style-type: none"> <li>No pain or effusion</li> <li>Quad LSI <math>\geq 90\%</math></li> <li>Hop test LSI <math>\geq 90\%</math></li> <li>Psychological readiness (ACL-RSI scale)</li> <li>Minimum 9 months from surgery before full return to sport</li> </ul> |             |

## GUIDING PRINCIPLES

This protocol follows criterion-based progression over rigid time-based advancement; phased rehabilitation balancing tissue healing with controlled stress application; objective milestones (ROM, strength LSI, functional testing) to guide phase transitions; individualization based on surgical findings, tissue quality, and patient factors; and ongoing surgeon–therapist communication throughout recovery.

## REFERENCES

- Petterson SC, Buckmire MC, Giordano AO. Recovery Stages After Anterior Cruciate Ligament Reconstruction. *Arthroscopy*. 2025;41(11):4393-4395.
- Musahl V, Karlsson J. Anterior Cruciate Ligament Tear. *N Engl J Med*. 2019;380(24):2341-2348.
- Turk R, Shah S, Chilton M, et al. Return to Sport After ACL Reconstruction Requires Evaluation of >2 Functional Tests, Psychological Readiness, Quadriceps/Hamstring Strength, and Time After Surgery of 8 Months. *Arthroscopy*. 2023;39(3):790-801.e6.
- Weaver B, Gavia A, Wellsandt M, et al. Factors Impacting Time to Reach Return-to-Sport Benchmarks Following ACL Reconstruction. *Knee*. 2026;62:104494.

*For clinical use by licensed physical therapists treating patients of Robert Pettit, MD. This document is a rehabilitation guideline, not a substitute for clinical judgment. Progression must be individualized based on intraoperative findings, tissue quality, and patient response. Scan the QR code for the current version of this protocol.*