

Anterior Cruciate Ligament Reconstruction (ACLR) Rehabilitation Guideline

Graft Choice: ☐ Bone-Patellar Tendon-Bone (BTB) ☐ Hamstring ☐ Quad ☐ Allograft

Precautions

☐ ACLR +/- Meniscetomy	Weightbearing Status: 50% foot flat weight bearing (FFWB) during 1 st week (Avoid weigh bearing (WB) – Caution WB until nerve block wears off Crutches: Used immediately post-op; weaned based on quad control and heel to toe pattern; Goal to discharge (D/C) 4-6 weeks Brace: Locked in extension during 1 st week then unlocked as range of motion (ROM) dictates with good quad control (Goal to D/C 4-6 weeks) ROM: As tolerated focusing on knee extension ☐ Other: _____	
☐ ACLR + Meniscus Repair	Weightbearing Status: ☐ Weight Bearing As Tolerated (WBAT) ☐ 50% WB x 4 Weeks ☐ Non-Weight Bearing (NWB) x 4 weeks Crutches: Until WB restriction lifted and heel to toe pattern (Goal to D/C crutches by 6 weeks) Brace: Locked in extension x 2 weeks then unlocked as ROM dictates (Goal to D/C 4-6 weeks) ROM: Limit 0-90° X 4 weeks then as tolerated No OC HS Strengthening x 8 weeks ☐ Meniscus Root Repair: No closed chain knee flexion > 90 for 6 months Passive knee flexion only for 6 weeks	Crutch D/C Criteria - Able to perform straight leg raise (SLR) with < 3° of lag - ROM 0-90° - Able to complete 5 reps of step-up to a 7" step - Able to ambulate in brace with minimal to no antalgia or asymmetry
☐ ACL Repair	Weightbearing Status: 50% FFWB x 3 days, then transition to WBAT Crutches: Used immediately post-op; weaned based on quad control and heel to toe pattern (Goal to D/C by 4 weeks) Brace: Locked in extension during 1 st week then unlocked (as ROM dictates) with good quad control (Goal to D/C 4-6 weeks) – Locked in extension x 10days w/ BEAR (Dr. Gilmore) ROM: As tolerated focusing on knee extension	Criteria to Unlock Brace - Rom 0-60° - Able to perform SLR with < 5° of lag - Able to demonstrate single leg stance (SLS)" for 5-10 sec
☐ ACLR + Multi- Ligament Reconstruction	Weightbearing Status: ☐ _____ Crutches: ☐ _____ ROM: ☐ _____	Brace D/C Criteria - ROM 0-120° - Normal gait pattern - No quad lag w/ SLR - Reciprocal stair negotiation - Able to complete 5 reps of step-up and step-down exercise to a 7" step
☐ ACLR + PLC Repair	Weightbearing Status: ☐ WBAT ☐ 50% WB x 4 Weeks ☐ NWB x 4 weeks Crutches: Until WB restriction lifted and heel to toe pattern (goal to D/C crutches by 6 weeks) Brace: Locked in extension x 4 weeks Open as motion allows (Goal to DC at 8 weeks) ROM: Limit 0-90° x 4 weeks	
☐ OTHER: _____	Weightbearing Status: _____ Crutches: _____ ROM: _____	

PHASE I (0-14 days)

Goals:

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Reduce inflammation, swelling and pain (Stroke Test 2+ or less) 2. Achieve full passive knee extension – Equal to contralateral lower extremity (LE) - hyperextension possible 3. Restore patellar mobility | <ol style="list-style-type: none"> 4. Gradually improve knee flexion mobility 5. Establish/improve quadriceps control 6. Restore independent ambulation |
|--|--|

Interventions

Range of Motion	Passive ROM (PROM) / Active ROM (AROM) / Active-Assistive ROM (AAROM) as tolerated; <u>emphasize full passive extension</u> (✓precautions for ROM limitations) Heel prop Bike: Rocking for ROM (<i>If Knee flexion (FLX) $\geq 115^\circ$, then full rotations</i>)		
Exercises	Hamstring (HS)/Calf stretching Ankle Pumps Quad Sets/Glute Sets*+ Quad Iso (90 and 60)*+ Knee Extensions*+ SLR (multi-plane)*+	TKE (standing and prone) Leg Press (0-80)+ Mini Squats+ Step up+ Clam Shell Hamstring Curls (✓precautions)	<i>Exercise list is not exhaustive</i> * = exercise can be combined with Neuromuscular Electrical Stimulation (NMES) + = exercise can be combined with blood flow restriction (BFR)
Manual	Patella Mobilizations Extension with Overpressure Soft Tissue Mobilization (STM)/ Instrument-Assisted Soft Tissue Mobilization (IASTM)	PROM/AAROM Incision mobilization (once healed/sutured removed)	
Modalities	BFR + Functional Electrical Stimulation*	Ice, Elevation and Compression Electromyographic (EMG) Biofeedback	

Criteria to Progress to Phase 2

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Minimal Effusion 2. Good Quad Control (Ability to perform SLR without quad lag) 3. Full passive knee extension | <ol style="list-style-type: none"> 4. PROM 0-90° 5. Good patella mobility 6. Independent ambulation with crutches |
|---|--|

PHASE II (Weeks 2-6)

Goals:

1. Progress towards full symmetrical ROM
2. Normalize patella mobility
3. Minimal effusion (Stroke Test 1+ or less)
4. Normal gait pattern

Interventions

Range of Motion	PROM/AAROM/AROM as tolerated; emphasize full passive extension (✓precautions) Heel prop, prone hangs Bike: Rocking for ROM (<i>If Knee FLX $\geq 115^\circ$, then full rotations</i>)		
Exercises	HS/Calf stretching Quad Iso (90, 60, 40)*+ Knee extensions*+ Squats+ Leg Press (0-80)+ Step up/down (forward, lateral)+	Lunges+ Proprioceptive/neuro control Hamstring Curls (✓precautions) Band walks Calf raises Bike (cardio) Integrated dual task activities	<i>Exercise list is not exhaustive</i> * = exercise can be combined with NMES + = exercise can be combined with BFR
Manual	Patella Mobilizations Extension with Overpressure STM/IASTM	PROM/AAROM Incision mobilization (once healed/sutured removed)	
Modalities	BFR + Functional Electrical Stimulation*	Ice, Elevation and Compression Electromyographic (EMG) Biofeedback	

Criteria to Progress to Phase 3

*Criteria supersedes time for progression to next phase

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. AROM 0-125° 2. Minimal Effusion (Stroke Test 1+ or less) 3. Normal Gait without assistive device (AD) 4. Demonstrate ability to ascend 8" stairs w/ good knee translation | <ol style="list-style-type: none"> 5. Single limb stand for 30 seconds (involved LE) 6. Perform 10 SLR without lag 7. Lateral step down 1-4" stair (without LE valgus) 8. Quad strength 60% or > compared to contralateral side |
|---|--|

PHASE III (Weeks 6-10)			
Goals: 1. Improve quadriceps strength / eccentric control 2. Reciprocal stair negotiation 3. Improve ADL endurance 4. Protect patella-femoral joint 5. Improve lower extremity flexibility 6. Continue to improve ROM if not equal to contralateral (priority!)			
Interventions			
Exercises	Bike/Elliptical for cardio Knee extensions Squats Deadlift Lunges Leg Press Step up/down (forward, lateral)	Band walks Single Leg Strengthening - Leg Press - Squats - Deadlifts Core strengthening Integrated dual task activities	<i>Exercise list is not exhaustive</i> May continue to incorporate BFR
Criteria to Progress to Phase 4			
*Criteria supersedes time for progression to next phase			
1. ROM is within normal limits (WNL) of contralateral limb 2. Ability to descend 8" stairs with good leg control and without pain 3. Lateral step down from 6-8" stair with good control 4. Box Drop Test from 6" stair 5. Single limb stand with 60 degree knee flexion for 30 seconds 6. Pain-free exercise 7. Trace effusion			

PHASE IV (Weeks 10-16)			
Goals: 1. Continue to improve quadriceps strength / eccentric control 2. Normalize flexibility and ROM 3. No reactive swelling > 12 hours after increased activity 4. Prepare for return to run program (Goal to introduce running at 12-16 weeks)			
Interventions			
Exercises	Bike/Elliptical for cardio Knee extensions Squats Deadlift	<i>Continue all exercises from Phase 3</i> <i>Initiate Low Level Plyometrics when appropriate</i> Leg Press Step up/down (forward, lateral) Single Leg Strengthening	Lunges Core strengthening Integrated dual task activities Proprioceptive/neuro control
Criteria to Progress to Phase 5			
*Criteria supersedes time for progression to next phase			
1. ROM is WNL of contralateral limb 2. Ability to descend 8" stairs with good leg control and without pain 3. Lateral step down from 6-8" stair with good control 4. Box Drop Test from 6" stair 5. Quad strength 70-80% compared to contralateral side *Must complete isokinetic or HH dynamometer at 3 months*			

Running Initiation Criteria	
☐ Met Criteria to Progress to Phase 4	
Alter-G Initiation Criteria	☐ %LE Strength Symmetry (Limb Symmetry Index - LSI) $\geq 60\%$ ☐ Walk: normal gait, 15 min at self-selected speed (See Appendix A Phased Alter-G Progression)
Linear Jogging Criteria	☐ Met above Alter-G Initiation Criteria ☐ %LE LSI $\geq 70\%$ Q:Q HS:HS ☐ 30 split jumps w/o LOB ☐ Metronome Step Down: 80BPM, w/ knee flexion to 50 deg for 30 sec (See Appendix B Phased Running Progression)
#Strength Testing Options in order of preference: 1. Isokinetic dynamometer (Must complete @ 6&9 mos.) 2. Handheld dynamometer 3. OKC Knee Extension (EXT)/FLX machine (EXT 90-45° and full ROM)	

Low Level Plyometrics			
Exercise	Sets	Foot contacts per set	Total foot contacts
Two-leg hops: in place	3	30	90
Two-leg hops: forward/backward	3	30	90
Two-leg hops: side to side	3	30	90
One-leg hops: in place	3	20	60
One-leg hops: forward/backward	3	20	60
One-leg hops: side to side	3	20	60
One-leg broad hop	4	5	20
Total	22		470
Rest Intervals: Between sets: 90 seconds Between exercises: 3 minutes Criteria to Complete Low-Level Plyometric Routine: - Patient able to perform 3 sessions within 7-day time without any increase in baseline pain, swelling or soreness			

Sprinting Initiation Criteria	
☐ Completed Phased Running Progression	
☐ %LE LSI $\geq 70\%$ Q:Q HS:HS	
☐ Hop Testing LSI $\geq 70\%$	
(See Appendix C Return to Sprinting)	

Phase V (Weeks 16-24)

Goals:

- | | |
|--|--|
| <ol style="list-style-type: none"> 1. Symptom-free running 2. No swelling with increased activity level 3. Maximize strength and flexibility to meet functional demands | <ol style="list-style-type: none"> 4. Normalize jumping/landing mechanics |
|--|--|

Exercises	Interventions	
Continue running protocol Low velocity and low impact drills - Prepare for high-level plyometrics Change of direction exercises and agility drills Continue integrated dual task activities	Cont. aggressive strengthening - Squats - Deadlifts - Lunges - Leg Press	Low-level sport-specific drills

Criteria to Progress to Phase 6

*Criteria supersedes time for progression to next phase

1. Symptom-free running
2. Hop test > 75% limb symmetry
3. Completion of Return to Sport (RTS) testing battery
4. Quad strength 85%+ compared to contralateral side

Must complete isokinetic dynamometer at 6 months

*Perform Return to Sport Testing if progressing to Phase 6

Phase VI (Months 6+)

Goals:

1. Lack apprehension with sports specific movements
2. Return to prior level function
3. Pass return to play testing / MD clearance

Exercises	Interventions	
Advance cardio training (specific to sport) Reactive motor control drills Low- to high-level plyometrics (see criteria) Low- to high-level sport-specific drills	Cont. aggressive strengthening - Squats - Deadlifts - Lunges - Leg Press	

Criteria for Discharge

1. Pass return to sport testing (see specifics below)
2. Flexibility to accepted levels of sport performance
3. Independent with strength and conditioning program
4. No Kinesiophobia
5. Able to complete sport-specific tasks with good motor control/movement patterns (consider high speed and dual)

Must complete isokinetic dynamometer at 9 months

*Perform Return to Sport Testing at 9 months

High-Level Plyometric Initiation Criteria

- ☐ Pass ALL running 'Linear Jogging Criteria'
- ☐ Quad strength 85%+ compared to contralateral side
- ☐ Squat 60% Body Weight 5 reps / 5 seconds
- ☐ No Kinesiophobia
- ☐ No swelling or issues with low-level plyometrics

Return to Practice Criteria

Non-contact individual drills

- ☐ Quad strength 80%+ compared to contralateral side
- ☐ No pain, swelling, or issues with running
- ☐ No pain, swelling, or issues with plyometrics and agility drills in clinic

Non-contact team drills

- ☐ Quad strength 85%+ compared to contralateral side
- ☐ Hop Test 80%+ limb symmetry
- ☐ No Kinesiophobia

Return to Sport/Activity Criteria

Clinical Assessment	☐ 0/10 pain with all activity ☐ No active effusion ☐ Knee ROM: FLX & EXT $\pm 2^\circ$ of contralateral limb
Subjective Assessment	☐ International Knee Documentation Committee (IKDC) $\geq$ Gender Predicted Norm ☐ ACL—RSI Questionnaire $\geq 65\%$
Functional Performance Testing	☐ $\pm$ LE Strength Symmetry (LSI) $>90\%$ ☐ $\pm$ LE Strength HS:Q $>75\%$ Female $>65\%$ Male ☐ Passed ACL RTS Testing - Composite score $>90\%$ LSI (See Appendix D – ACL RTS testing Form) <i>Recommend combination testing of strength, agility and power according to available resources/clinic set</i>
<i>$\pm$Strength Testing Options in order of preference:</i> 1. Isokinetic dynamometer (must be completed at 6 and 9 months) 2. Handheld Dynamometer 3. Open kinetic chain (OKC) Knee EXT/FLX machine	

Appendix A Phased Alter G Progression

Name: _____

**if post-op, patient has met specific Alter-G initiation criteria:* ☐

Week	BW	Walk Pace	Time	Jog Pace	Time	Total Time	Goal
1a	60%	Walk 3.0-3.3mph	1 min	Jog 5.0–7.0mph	1 min	5 bouts or 1 mile	Find comfortable jog pace
1b	60 – 65%	Walk 3.0-3.5mph	1 min	Jog 5.0–7.0mph	1-2 mins	5 bouts or 1 mile	Increase jog time
2a	70%	Walk 3.0- 3.5mph	1 min	Jog 5.0–7.0mph	1-2 mins	5 bouts or 1 mile	Increase body weight
2b	70 - 75%	Walk 3.0-3.5mph	1 min	Jog 5.0–7.0mph	1-3 mins	5-8 bouts or 1.5 miles	Progress distance
3a	80%	Walk 3.0-3.5mph	1 min	Jog 5.0–7.0mph	1-2 mins	5 bouts or 1 mile	Increase body weight
3b	80 - 85%	Walk 3.0-3.5mph	1 min	Jog 5.0–8.0mph	1-3 mins	5-8 bouts or 1.5 miles	Increase jog speed
4a	90%	Walk 3.0-3.5mph	1 min	Jog 5.0–8.0mph	1-3 mins	1-2 miles	Normal running gait pattern
4b	90%	Walk 3.0-3.5mph	1 min	Jog 5.0-8.0mph	2-5 mins	1-2 miles	Increase jog time during bouts

**** Running not to be done on back-to-back days ****

** A treadmill incline of 3-5 degrees is recommended if it improved running mechanics in the athlete **

Alter G Protocol Soreness Rules:

- If MAJOR pain/soreness/edema after the prior run, or during warm-up, DO NOT run that day and drop down 1 level at the next therapy session.
- If pain/soreness during workout, drop down 1 level for the run that day.
- If minor pain/soreness after the prior workout, stay at the same level for the run that session.
- If NO pain/soreness/edema during or after the prior run, progress per protocol

Appendix B

Phased Running Progression

Name: _____

**If post-op, patient has met specific criteria to begin running program:* ☐

Dynamic Warm up

- 1) Double Leg Squats x 10 reps
- 2) Single Leg Squats x 5-10 reps
- 3) Single Leg RDL x 5-10 reps
- 4) Single Leg Heel Rise x 10 reps (each side)
- 5) Lateral Band Walks x 10 reps (each side)
- 6) Plank x 30 seconds (each side)

Option 1

A) Treadmill ☐

Level 1	Alternate 0.1 mile walk / 0.1 mile jog – 2 miles
Level 2	Alternate 0.1 mile walk / 0.2 mile jog – 2 miles
Level 3	Alternate 0.1 mile walk / 0.3 mile jog – 2 miles
Level 4	Alternate 0.1 mile walk / 0.4 mile jog – 2 miles
Level 5	Jog 2 miles
Level 6	Increase workout to 2.5 miles
Level 7	Increase workout to 3 miles
Level 8	Alternate between running / jogging every 0.25 miles

B) Track ☐

Jog straights / walk curves – 2 miles
Jog straights / jog 1 curve every other lap – 2 miles
Jog straights / jog 1 curve every lap – 2 miles
Fast walk 1.75 laps / walk curve – 2 miles
Jog 2 miles
Increase workout to 2.5 miles
Increase workout to 3 miles
Increase speed on straights / jog curves

Instructions

- Mandatory 2 days rest between workouts for first 2 weeks
- Do not advance more than 2 levels per week
- Two days rest mandatory between levels 1, 2 and 3
- One day rest mandatory between levels 4-8

Soreness Rules

- If sore during warm-up, take 2 days off and drop down 1 level
- If sore during workout, take 1 day off and drop down 1 level
- If sore after workout, stay at same level

Option 2

Time Based ☐

	Walk	Run	Repetitions	Days
Phase 1	4 minutes	1 minute	3-6	2-3
Phase 2	3 minutes	2 minutes	3-6	2-3
Phase 3	2 minutes	3 minutes	3-6	2-3
Phase 4	1 minute	4 minutes	3-6	2-3
Phase 5	0	30 minutes	1	3

Instructions

- The runner is to take at least one day off in between running days
- The runner can progress to next phase once they are able to complete 6 reps of the run time without increased pain or swelling
- Do not progress phases if one of the following occurs:
 - Sharp pain during run, pain that worsens as patient continues running, pain is so severe that it causes patient to alter gait
- After completion of phase 5, increase weekly mileage by 10-30%

This Clinical Guideline may need to be modified to meet the needs of a specific patient.

The model should not replace clinical judgement

Information taken from:

University of Delaware Interval Running Protocol: https://cpb-us-w2.wpmucdn.com/sites.udel.edu/dist/c/3448/files/2016/10/running_progression_2015-orf1zr.pdf

Ohio State Basic Return to Running Guideline: <https://wexnermedical.osu.edu/-/media/files/wexnermedical/patient-care/healthcare-services/sports-medicine/education/medical-professionals/other/basic-return-to-running-guideline.pdf?la=en&hash=BA8D440B70C5063C529CCE2EB13C4EF8D7B20CD>

Appendix C

Return to Sprinting

Name: _____

**If post-op, patient has met specific criteria to begin Sprinting Program:* ☐

The below program should be performed on alternating days. Progression/regression should be based on soreness and effusion as well as the athlete's ability to complete specified work/rest ratios.

Stage 1

Initiation Criteria: Completion of Phased Running Progression, Strength Testing LSI $\geq 70\%$ Q:Q | HS:HS, Hop Testing LSI $\geq 70\%$, no effusion

50% Intensity (1:3 work to rest ratio)			
Objective: Build work capacity for anaerobic conditioning/endurance			
Step 1	Step 2	Step 3	Step 4
20 yd x 3 untimed	20 yd x 4 untimed	20 yd x 3	20 yd x 3
40 yd x 2 untimed	40 yd x 3 untimed	40 yd x 4	40 yd x 4
60 yd x 2 untimed	60 yd x 2 untimed	60 yd x 2	60 yd x 2
80 yd x 2 untimed	80 yd x 2 untimed	80 yd x 2	80 yd x 2
100 yd x 1 untimed	100 yd x 1 untimed	100 yd x 1	100 yd x 2
80 yd x 2 untimed	80 yd x 2 untimed	80 yd x 2	80 yd x 1
60 yd x 2 untimed	60 yd x 2 untimed	60 yd x 2	60 yd x 2
40 yd x 2 untimed	40 yd x 3 untimed	40 yd x 4	40 yd x 4
20 yd x 3 untimed	20 yd x 4 untimed	20 yd x 3	20 yd x 3
19 runs @ 940 yds	19 runs @ 1060 yds	23 runs @ 1100 yds	23 runs @ 1120 yds

Stage 2

Initiation Criteria: Completion of Stage 1, Strength Testing LSI $\geq 80\%$ Q:Q | HS:HS, Hop Testing LSI $\geq 80\%$, full passive flexion restored

75% Intensity (1:5 work to rest ratio)			
Objective: Speed Development, improve technique and build repeated sprint ability			
Step 1	Step 2	Step 3	Step 4
20 yd x 3	20 yd x 3	20 yd x 2	20 yd x 2
40 yd x 2	40 yd x 2	40 yd x 2	40 yd x 2
60 yd x 2	60 yd x 1	60 yd x 1	60 yd x 2
80 yd x 1	80 yd x 1	80 yd x 1	80 yd x 1
100 yd x 1	100 yd x 1	100 yd x 1	60 yd x 2
80 yd x 1	80 yd x 1	80 yd x 1	40 yd x 2
60 yd x 2	60 yd x 1	60 yd x 1	20 yd x 2
40 yd x 2	40 yd x 2	40 yd x 2	
20 yd x 3	20 yd x 3	20 yd x 2	
17 runs @ 780 yds	15 runs @ 660 yds	13 runs @ 620 yds	13 runs @ 560 yds

Stage 3

Initiation Criteria: Completion of Stage 2, Strength Testing LSI $\geq 90\%$ Q:Q | HS:HS, Hop Testing LSI $\geq 90\%$, no effusion or pain

90-100% Intensity (1:7 work to rest ratio)			
Objective: Achieve maximum effort. Work:Rest ratio should replicate sports demands in step 3 and 4			
Step 1	Step 2	Step 3	Step 4
20 yd x 6	10 yd x 3	10 yd x 3	10 yd x 2
40 yd x 2	20 yd x 4	20 yd x 3	20 yd x 3
60 yd x 1	40 yd x 2	30 yd x 2	30 yd x 2
40 yd x 2	60 yd x 1	40 yd x 2	40 yd x 1
20 yd x 6	40 yd x 2	60 yd x 1	60 yd x 1
10 yd x 3	30 yd x 1	30 yd x 2	40 yd x 1
	20 yd x 4	20 yd x 3	30 yd x 2
	10 yd x 2	10 yd x 3	20 yd x 3
**Full subjective recovery	**Full subjective recovery		10 yd x 2
20 runs @ 490 yds	19 runs @ 460 yds	19 runs @ 440 yds	17 runs @ 420 yds

This Clinical Guideline may need to be modified to meet the needs of a specific patient.

The model should not replace clinical judgement

Information taken from:

Criteria-Based Return to Springing Progression Following Lower Extremity Injury: <https://pmc.ncbi.nlm.nih.gov/articles/PMC7134353/>

Name: _____

Date of Test: _____

Weeks Post-op: _____

MR#: _____

Procedure: _____

Satisfactory Clinical Examination

- 1) Appropriate time from injury/surgery for healing
- 2) Completed rehabilitation program – Understands Home Exercise Program (HEP)
- 3) Knee ROM: Flexion & extension $\pm 2^\circ$ of contralateral limb
- 4) Pain $< 2/10$ with all activity for testing; 0/10 for RTS
- 5) No kinesiophobia of testing; TSK-11 score of < 19 for RTS

IKDC Score: _____

* ≥ 70 for Practice, ≥ 90 for RTS

ACL-RSI Questionnaire: _____

* ≥ 65 for RTS

LE Y-Balance Test

Pass: YES NO

	Left			Right			Difference*	Limb Length: (ASIS to med mal)	
Anterior	/	/	/	/	/	/		Left	Right
Posteromedial	/	/	/	/	/	/			
Posterolateral	/	/	/	/	/	/			
Composite Score^									

3 trials, record maximal reach in each direction

*Difference should be less than 4cm for return to sport; < 4 cm = pass

^Composite Score= (Medial + posteromedial + posterolateral)/(3x limb length) X 100

Functional Hop Testing

Pass: YES NO

	Uninvolved Side				Involved Side				LSI
Single Limb Hop (cm)	1	2	3	Avg	1	2	3	Avg	
Triple Hop (cm)	1	2	3	Avg	1	2	3	Avg	
Crossover Hop (cm)	1	2	3	Avg	1	2	3	Avg	

*LSI difference $< 10\%$ to pass

Side Hop Test Right: _____ Left: _____ LSI: _____

Pass: YES NO

LSI $\geq 90\%$ to pass

T Agility Drill

Pass: YES NO

Trial 1/2/3	Best
/ /	

* < 11 seconds to pass

Landing Error Scoring System:

Score: _____

Pass: YES NO

* ≤ 4 to pass

Strength Testing (Isokinetic or HHD)

Considerations:

LSI $\geq 90\%$ to pass

HS:Q $> 75\%$ ♀ $> 65\%$ ♂

Isokinetic must be completed for full clearance!

Able to complete sport-specific drills in clinic with good motor control/movement patterns (full speed): ☐

Assessment: _____

Cleared for Return to Sport? YES NO

Name: _____

Date: _____

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References:

1. Ardern CL, Ekås GR, Grindem H, et al. 2018 International Olympic Committee consensus statement on prevention, diagnosis and management of paediatric anterior cruciate ligament (ACL) injuries. *Br J Sports Med*. 2018;52(7):422-438. doi:10.1136/bjsports-2018-099060
2. Baghdadi S, Ganley TJ, Wells L, Lawrence JTR. Early Identification of Arthrofibrosis in Adolescents Following Anterior Cruciate Ligament Reconstruction Is Associated With the Need for Subsequent Surgery: A Matched Case-Control Study. *Arthroscopy*. 2022;38(7):2278-2286. doi:10.1016/j.arthro.2022.01.043
3. Beischer S, Gustavsson L, Senorski EH, 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 [published correction appears in J Orthop Sports Phys Ther. 2020 Jul;50(7):411. doi: 10.2519/jospt.2020.50.7.411.]. *J Orthop Sports Phys Ther*. 2020;50(2):83-90. doi:10.2519/jospt.2020.9071
4. Brinlee AW, Dickenson SB, Hunter-Giordano A, Snyder-Mackler L. ACL Reconstruction Rehabilitation: Clinical Data, Biologic Healing, and Criterion-Based Milestones to Inform a Return-to-Sport Guideline. *Sports Health*. 2022;14(5):770-779. doi:10.1177/19417381211056873
5. Colapietro M, Portnoff B, Miller SJ, Sebastianelli W, Vairo GL. Effects of Blood Flow Restriction Training on Clinical Outcomes for Patients With ACL Reconstruction: A Systematic Review. *Sports Health*. 2023;15(2):260-273. doi:10.1177/19417381211070834
6. Cruz AI Jr, Beck JJ, Ellington MD, et al. Failure Rates of Autograft and Allograft ACL Reconstruction in Patients 19 Years of Age and Younger: A Systematic Review and Meta-Analysis. *JB JS Open Access*. 2020;5(4):e20.00106. Published 2020 Dec 30. doi:10.2106/JBJS.OA.20.00106
7. Dai W, Leng X, Wang J, Cheng J, Hu X, Ao Y. Quadriceps Tendon Autograft Versus Bone-Patellar Tendon-Bone and Hamstring Tendon Autografts for Anterior Cruciate Ligament Reconstruction: A Systematic Review and Meta-analysis. *Am J Sports Med*. 2022;50(12):3425-3439. doi:10.1177/03635465211030259
8. Filbay SR, Grindem H. Evidence-based recommendations for the management of anterior cruciate ligament (ACL) rupture. *Best Pract Res Clin Rheumatol*. 2019;33(1):33-47. doi:10.1016/j.berh.2019.01.018
9. Gifstad T, Foss OA, Engebretsen L, et al. Lower risk of revision with patellar tendon autografts compared with hamstring autografts: a registry study based on 45,998 primary ACL reconstructions in Scandinavia. *Am J Sports Med*. 2014;42(10):2319-2328. doi:10.1177/0363546514548164
10. Kyritsis P, Bahr R, Landreau P, Miladi R, Witvrouw E. 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. *Br J Sports Med*. 2016;50(15):946-951. doi:10.1136/bjsports-2015-095908
11. Lorenz D, Domzalski S. CRITERIA-BASED RETURN TO SPRINTING PROGRESSION FOLLOWING LOWER EXTREMITY INJURY. *Int J Sports Phys Ther*. 2020;15(2):326-332.
12. MOON Knee Group, Spindler KP, Huston LJ, et al. Anterior Cruciate Ligament Reconstruction in High School and College-Aged Athletes: Does Autograft Choice Influence Anterior Cruciate Ligament Revision Rates?. *Am J Sports Med*. 2020;48(2):298-309. doi:10.1177/0363546519892991
13. Perriman A, Leahy E, Semciw AI. The Effect of Open- Versus Closed-Kinetic-Chain Exercises on Anterior Tibial Laxity, Strength, and Function Following Anterior Cruciate Ligament Reconstruction: A Systematic Review and Meta-analysis. *J Orthop Sports Phys Ther*. 2018;48(7):552-566. doi:10.2519/jospt.2018.7656
14. Randsborg PH, Cepeda N, Adamec D, Rodeo SA, Ranawat A, Pearle AD. Patient-Reported Outcome, Return to Sport, and Revision Rates 7-9 Years After Anterior Cruciate Ligament Reconstruction: Results From a Cohort of 2042 Patients. *Am J Sports Med*. 2022;50(2):423-432. doi:10.1177/03635465211060333

15. Sinacore JA, Evans AM, Lynch BN, Joreitz RE, Irrgang JJ, Lynch AD. Diagnostic Accuracy of Handheld Dynamometry and 1-Repetition-Maximum Tests for Identifying Meaningful Quadriceps Strength Asymmetries. *J Orthop Sports Phys Ther.* 2017;47(2):97-107. doi:10.2519/jospt.2017.6651
16. van Melick N, van Cingel RE, Brooijmans F, et al. Evidence-based clinical practice update: practice guidelines for anterior cruciate ligament rehabilitation based on a systematic review and multidisciplinary consensus. *Br J Sports Med.* 2016;50(24):1506-1515. doi:10.1136/bjsports-2015-095898
17. Wellsandt E, Failla MJ, Snyder-Mackler L. Limb Symmetry Indexes Can Overestimate Knee Function After Anterior Cruciate Ligament Injury. *J Orthop Sports Phys Ther.* 2017;47(5):334-338. doi:10.2519/jospt.2017.7285
18. Wengle L, Migliorini F, Leroux T, Chahal J, Theodoropoulos J, Betsch M. The Effects of Blood Flow Restriction in Patients Undergoing Knee Surgery: A Systematic Review and Meta-analysis. *Am J Sports Med.* 2022;50(10):2824-2833. doi:10.1177/03635465211027296