NOTE: When feasible prior to surgery, it is recommended that patients have at least 0-120° ROM, no effusion and ≥ 80% of quad and hamstring strength as compared to the unaffected limb.

Anterior Cruciate Ligament Reconstruction (ACLR) – concurrent injuries and graft type considerations	**Rehab Protocol** **Aaron Vandenbos, MD** 
PHASE 1: Generally 0-2 Weeks Post-Op	
GOALS:	1) Protect surgical graft 2) Normal gait and stair ambulation 3) ROM: full knee extension and ≥ 110° knee flexion 4) Good quadriceps control (achieve ≥ 20 SLRs with no lag) 5) Minimize pain and swelling
PRECAUTIONS:	- Wear brace **AT ALL TIMES** (even while sleeping) - **NO OPEN KINETIC CHAIN** strengthening exercises - **NO RUNNING** **Additional Considerations:** With concurrent injuries, follow the more conservative protocol with regards to precautions (WB, ROM), and rehab progression (i.e. meniscus repair, PLC) **Meniscus Repair**: WBAT with brace locked in extension Avoid OKC HS strengthening for 6 weeks, with limited isotonic hamstring strengthening for 8 to 10 weeks. Weeks 0-4: No WB activities with knee flexed >45° for 4 weeks Weeks 4-12: limit WB activities to <90° Weeks 12-16: no squats with twisting for 16 weeks **HS Autograft**: No resisted HS strengthening for 12 weeks, expect return to sport will be delayed **AND** delayed return to running and plyometrics (Wilk). No HS strengthening for 8 weeks.
CRUTCH:	- WBAT - D/C when sufficient quad control and normal gait are both achieved
BRACE:	- Remains locked at 0° for WB activity only until patient is able to do 20 SLRs without an extension lag • If able to, then open brace to current ROM NOTE: Knee ROM would be limited the first 6 weeks post-op for an ACLR with meniscal repair
WOUND:	- Post-op dressing remains intact until post-op day #2 (~48 hours after surgery) - Shower after post-op day #2 (no need to cover the incision site) - DO NOT SUBMERGE knee in water until 4 weeks post-op and incisions have fully healed - Suture/staple removal @ 10-14 days post-op per Ortho
CRYOTHERAPY:	- Cold with compression/elevation as needed (ice with compression wrap)
REHABILITATION:	- Begin scar massage after incision has healed and scar is formed - Perform the following rehabilitation exercises; progress as tolerated

˜ Days 1-7	- Calf pumps with theraband - Heel slides (assisted as needed) - Quad sets (use e-stim until patient is able to do 10 SLRs w/o extension lag) - Supine passive extension with towel under heel - Prone hangs as needed - Gentle HS stretching - UBE
˜ Days 8-14	- Patellar mobilizations after suture/staple removal - THEREX for restoration of quad function and hip/core strengthening - Stationary bike for ROM; progress to biking for conditioning - Ankle ROM and proprioceptive training - Progressive ankle strengthening - Mini squats 0-45° or as tolerated - Multi-angle hip and thigh isometrics until able to perform isotonics - Gait training as needed until normalized gait
FOLLOW-UP:	Supervised rehabilitation: 2-3x per week PT re-evaluation: monthly Orthopedic re-evaluation: 2-4 weeks post-operatively

PHASE 2: Generally 2-6 Weeks Post-Op	
GOALS:	1) Full knee ROM 2) Minimal or no effusion 3) > 80% quadriceps compared to the uninvolved limb 4) Functional strength and control in daily activities
PRECAUTIONS:	- **DO NOT SUBMERGE** knee in water until 4 weeks post-op and incisions have fully healed - **NO RUNNING**
BRACE:	- Wear brace at Ortho's discretion - May be removed during rehab at therapist's discretion
REHABILITATION:	- Continue Phase 1 exercises as needed - Progress to the following exercises and increase intensity gradually when patient is ready (i.e. no increase in knee pain or effusion since the previous exercise session) - Recommend exercises begin with lighter intensity and higher reps with progression to higher intensity and lower reps
˜ Weeks 2-6	- Stationary biking for conditioning; may add elliptical and/or rower gradually - Beginner level pool exercises primarily in the sagittal plane (i.e. no breaststroke or whip kick motion) - General LE stretching (i.e. calf, HS, quads, hip flexors, and hip abductors/adductors) - Progressive strengthening* • Thigh musculature with emphasis on knee extension; progress with loading and ROM • Hip extension, abduction, and adduction • Plantarflexion • Core musculature • DO NOT neglect the patient's overall fitness condition • *no resisted HS strengthening until 12 weeks post-op
NEUROMUSCLUAR TRAINING:	THEREX on an unstable surface (i.e. foam pad), SL exercises, and exercises with reduced visual input

FOLLOW-UP:	Supervised rehabilitation: 2-3x per week PT re-evaluation: monthly Orthopedic re-evaluation: 12 weeks post-operatively

PHASE 3: Generally 6-12 Weeks Post-Op	
GOALS:	1) Maintain full knee ROM 2) Minimal or no effusion 3) Progress strengthening and neuromuscular retraining 4) DL hop in place without pain using good form
PRECAUTIONS:	**NO RUNNING**
REHABILITATION:	- Continue Phase 2 exercises as needed - Progress to the following exercises and increase intensity gradually when patient is ready (i.e. no increase in knee pain or effusion since the previous exercise session) - Continue bike, elliptical, rower, and/or stair machine for conditioning purposes
˜ Weeks 6-9	- Continue beginner level pool exercises primarily in the sagittal plane (i.e. no breaststroke or whip kick motion) - General LE stretching (i.e. calf, HS, quads, hip flexors, and hip abductors/adductors) - Progressive strengthening - Progressive neuromuscular training and balance exercises
˜ Weeks 9-12	- Progressive pool program as tolerated - Progressive functional training • 2-legged plyometrics (i.e. shuttle jumps and jump roping) • Progress DL to SL - Progressive LE and core strengthening - Progressive neuromuscular training and balance exercises
TESTING:	SL squat to ≥ 60° for max reps and ≥ 80% of non-surgical limb
FOLLOW-UP:	Supervised rehabilitation: 2-3 per week PT re-evaluation: monthly Orthopedic re-evaluation: 12 weeks post-operatively

PHASE 4: Generally 3-6 months Post-Op	
GOALS:	1) Jog at own pace and distance without pain 2) ~90% strength return for quadriceps and HS compared to uninvolved limb 3) Hop test and Y-balance limb symmetry > 90% 4) Isokinetic testing limb symmetry > 85% 5) Meet occupation requirements at 6-9 months
PRECAUTIONS:	- **NO PARTICIPATION** in sports or physically demanding military schools; at the discretion of the rehabilitation team
REHABILITATION:	- Continue Phase 3 exercises as needed - Progress in duration and intensity of exercises (i.e. no increase in knee pain or effusion since the previous exercise session)
˜ Months 3-4	- Progressive balance training as needed - Progressive LE and core strengthening - Progressive jogging program • Begin on Alter-G if available • Criteria for run progression: pain-free hopping and ability to perform ≥ 90% of uninvolved limb max reps SL squats to ≥ 60° knee flexion

	• Increase time and/or distance no more than 10% - 20% per week - Progressive functional, neuromuscular, plyometric, and agility training: • Jumping, hopping, directional jogging, cariocas, shuffles, etc. • SL anterior and lateral jumps • Shuttle jumps progressing to box jumps
˜ Months 5-6	- Biodex isokinetic testing: until > 90% symmetry - Hop test battery: until > 90% symmetry in hop for distance, triple hop for distance, crossover hop, and 6-meter timed hop - Y-balance test: until > 90% symmetry - Movement quality assessments: Landing Error Scoring System (LESS), Functional Movement Screen (FMS), etc.
FOLLOW-UP:	Supervised rehabilitation: 1-2x per week PT re-evaluation: monthly Orthopedic re-evaluation: 6 months post-operatively
MISCELLANEOUS:	- After 6 months post-op, Phase 4 exercises are continued and gradually increased in intensity and duration as tolerated - Pass Service fitness test at 9-12 months

PHASE 5 (RETURN TO SPORT): Generally 9 Months Post-Op	
GOALS:	1) Sport-specific training without pain or swelling 2) Mitigate future injury risk 3) Hop test and Y-balance limb symmetry > 90% 4) Isokinetic testing limb symmetry > 90% 5) Full return to sports/athletics and military training without limitations
PRECAUTIONS:	- **NO PARTICIPATION** in sports or physically demanding military schools until cleared for return to sport by the rehabilitation team
REHABILITATION:	- Continue Phase 4 exercises as needed - Progress in duration and intensity of exercise (i.e. no increase in knee pain or effusion since the previous exercise session)
	- Warm-up: 5-10 minutes on bike, elliptical, or stairmaster - General LE stretching (i.e. calf, HS, quads, hip flexors, and hip abductors/adductors) - Progressive LE and core strengthening - Progressive balance training as needed - Progressive jogging program • Increase time and/or distance no more than 10% - 20% per week - Progressive agility and plyometric training - Incorporate drills/activities specific to patient's sport
RETURN TO SPORT (RTS) EVALUATION:	- Hop test battery: single hop, triple hop for distance, crossover hop, and 6-meter timed hop - Isokinetic strength (60o/sec) - Vertical jump - Deceleration shuttle test
RTS CRITERIA:	- No functional complaints - Confidence when running, cutting, and jumping at speed required for specific sport - Demonstration of sport-specific drills/activities - 90% contralateral values on hop tests
FOLLOW-UP:	Supervised rehabilitation: 1-2x per week PT re-evaluation: monthly Orthopedic re-evaluation: 9-12 months post-operatively

MISCELLANEOUS:	- Progress activities for return to sport/collision sports or aggressive military training (i.e. airborne school) based on the patient's functional performance and endurance. This time period will be directed by the Ortho Surgeon and the Physical Therapist. This may require between 9-12 months before cleared without restrictions

These guidelines were created as a framework for the post-operative rehabilitation program. They DO NOT substitute for any specific restrictions or requirements that are determined through the necessary shared decision-making and collaboration between the operating surgeon and treating rehabilitation team.