Running, Agility and Landings

Phase 3 of this ACL rehabilitation protocol sees a return to running, agility, jumping and hopping, as well as the continuation of a gym based strength and neuromuscular program.

Change of direction training and modified game play can also commence and progress during this phase, although supervision by the clinician is recommended.

The knee should be swelling and pain free during this phase, and an emphasis is placed on correct technique particularly for deceleration tasks such as landing from a jump. It's important to perfect landing and pivoting biomechanics before progressing fully back to sport (Phase 4).

Exercises and activities in Phase 3 typically include agility drills such as slalom running, shuttle runs, and ladder drills. Jumping and hopping exercises usually start with drills such as scissor jumps and single hops and progress to box jumps and single leg landings with perturbations.

It's important that there is some rest and recovery time during this phase as many of the exercises and activities require eccentric muscle activity. Clinicians should watch for signs of overload of the patellofemoral complex in particular.

The three most important goals of Phase 3 are:

- Attain excellent hopping performance (technique, distances, & endurance)
- Progress successfully through an agility program and modified game play
- Regain full strength and balance

Phase 3

Running, Agility and Landings

Most important goals

Attain excellent hopping performance

Complete agility program

Regain full strength and balance

Phase 3

Running, Agility and Landings

Phase 3: Outcome Measures and Goals

The following hurdle criteria must be met before Phase 3 testing is conducted (see Phase 1 & 2 for test descriptions):

- Full range of motion (prone hang test and knee flexion)
- No effusion/swelling (stroke test)
- A "good" rating on the Single Leg Squat Test (Crossley et al, 2011)
- No side to side difference for the Single Leg Bridge Test, Single Leg Calf Raises, and Side Bridge Endurance Test

Outcome Measure	Test Description & Reference	Goal	√
Single Hop Test	Single leg hop test (Noyes et al, 1991) Subjects stand on one leg and hop as far forward as possible and land on the same leg. The average (mean) distance of 2 valid hops is recorded with a tape measure which is fixed to the ground. Measure from toe at take-off to heel at landing. Arms are free to swing. A limb symmetry index is calculated by dividing the mean distance (in cms) of the involved limb by the mean distance of the noninvolved limb then multiplying by 100.	**1.** >95% compared with other side **2.** Equal to or greater than pre-operative data (best result – affected or non-affected)	○
Triple Hop	Triple Hop Test (Noyes et al., 1991) Subjects are required to hop forwards three consecutive times on one foot. The total distance is measured, and the average (mean) of 2 valid tests is recorded. Measure from toe at take off to heel at landing. Arms are free to swing. A limb symmetry index is calculated by dividing the mean distance (in cms) of the involved limb by the mean distance of the noninvolved limb then multiplying by 100.	>95% compared with other side	○
Triple Cross Over Hop Test	Triple Cross Over Hop Test (Noyes et al, 1991) This test is performed on a course consisting of a 15cm marking strip on the floor which is 6m long. Subjects are required to hop three consecutive times on one foot going in a medial to lateral to medial direction, crossing the strip on each hop. The total distance is measured, and the average (mean) of 2 valid hop tests is recorded. Measure from toe at take-off to heel at landing. Arms are free to swing. A limb symmetry index is calculated by dividing the mean distance (in cms) of the involved limb by the mean distance of the noninvolved limb then multiplying by 100.	>95% compared with other side	○

Running, Agility and Landings

Phase 3: Outcome Measures and Goals

Outcome Measure	Test Description & Reference	Goal	√
Side Hop Test	Side Hop Test (Gustavsson et al., 2006) Subjects stands on test leg with hands behind the back and jumps from side to side between two parallel strips of tape, placed 40 cm apart on the floor. Subject jumps as many times as possible during 30sec. The number of successful jumps performed, without touching the tape is recorded.	>95% compared with other side	○
Single Leg Squat	Single Leg Rise Test (Culvenor et al., 2016 & Thorstensson et al., 2004) Subjects sit on a chair (or a plinth) with test leg bent to 90°, and 10cm from edge of chair. With hands behind the back, the subject aims to stand up from the sitting position, and sit down as many times as possible.	Hurdle requirement = >22 repetitions both limbs	○
Balance (Dynamic)	Star Excursion Balance Test (Gribble et al, 2012) The star excursion balance test (SEBT) is performed in the anterior, posterolateral, and posteromedial directions. A composite score for all 3 directions is obtained for each leg. A limb symmetry index is then calculated by dividing the mean distance (in cms) of the involved limb by the mean distance of the noninvolved limb then multiplying by 100.	>95% compared with other side	○
Balance (Dynamic)	Cooper & Hughes Sports Vestibular Balance Test Subjects stand on one leg with a small amount of flexion in the hip, knee and ankle, and place their hands on their waist. In this position, two assessments are performed; **1. Side to side** At a rate of 60 beats per minute, subjects repeatedly turn their head from side to side (70-90 degree turn) for a period of 15 seconds. Vision needs to be inline with head position (no visual fixing). **2. Up and down** At a rate of 60 beats per minute, subjects repeatedly tilt their head up and down (looking floor to ceiling) for a period of 15 seconds. Vision needs to be inline with head position (no visual fixing). The test is passed if subjects can maintain single leg stance and do not take their hands off their waist for both assessments	Pass both limbs	○

Running, Agility and Landings

Phase 3: Outcome Measures and Goals - Supplementary Goals

Supplementary goals are considered a bonus for each phase of the ACL rehab protocol and should be strongly encouraged when the patient is returning back to high level jumping, cutting and pivoting sports.

NB: The absence of not performing supplementary tests however, is not considered a "road-block" to the next phase.

Outcome Measure	Test Description & Reference	Goal	√
Single Leg Press	1RM Single Leg Press (Campanholi Neto, José, et al, 2015) This test can be performed in most commercial gymnasiums that have a 45 degree incline leg press. Please ensure an appropriate warm up. Seat position is at 90 degrees to the slide, and the foot should be placed so that the hip is flexed to 90 degrees. A valid repetition is where the weight is lowered to a depth of 90 degrees knee flexion and then extended back to full knee extension.	1.8 x Body Weight (sled + weight)	○
Squat	1RM Squat This test can be performed in most commercial gymnasiums that have a squat rack. Please ensure an appropriate warm up and supervision/spotter whilst performing this test. There are many ways to perform the squat exercise ie. Front Squat, Back Squat, Trap Bar Squat; whichever way you choose to do it, we advise that the person attempts to squat down to 90 degrees knee flexion, and rises up into full knee and hip extension	1.8 x Body Weight	○