

ACL exercises after 4-month post-op isokinetic tests

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1 Introduction

Warm up

In order to prepare your body for your workout, it is important to begin with a good warm up. It is up to you to choose which activity you would like to do. There are several options: 5-10' bike – jog – skipping rope and/or 3x15 two-legged squats.

Modes of muscular contraction

In order to produce force, a muscle can contract in different ways: isometric, concentric and eccentric. During the various exercises you will find in this document, you will mainly use concentric and eccentric contractions. For each exercises, your physio will specify which mode you should train.

Concentric: the muscle produces force while being shortened

Eccentric: the muscle produces force while being elongated. Eccentric contraction is observed while slowly resisting a movement.

Isometric: the muscle produces force without variation in muscle length. Isometric contraction is observed while maintaining the joint in a fixed position.

Strength training modalities

According to your personal and specific needs (determined by your isokinetic test), you will be asked to train your muscles in different modalities. Each modality implies a specific number of series and repetitions as well as precise rest duration. For best results, it is important that you follow these instructions.

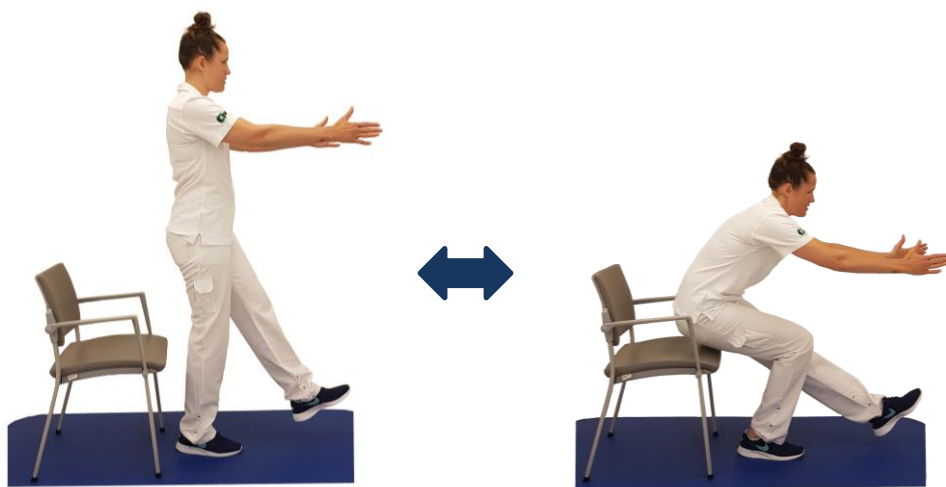
Note: in order to be efficient, muscle failure must be achieved at the end of every series. This means that no additional repetition is doable. If the maximal number of required repetitions is achieved with ease, the load is too low and must be raised. In contrast, if the minimal number of repetitions of a series is not achieved, the load is too high and must be lowered. Consequently, the load you are working with must continuously be adapted to your capacities and progress.

	Endurance strength (concentric)	Max strength (concentric)	Eccentric	Isometric
Series	3-4	3-4	4	3
Repetitions	20 - 25	2 - 5	6 - 8	30"
Rest	1'	3'	3'	1'

2 Strength training with functional exercises

2.1 Quadriceps

Single Leg Squat



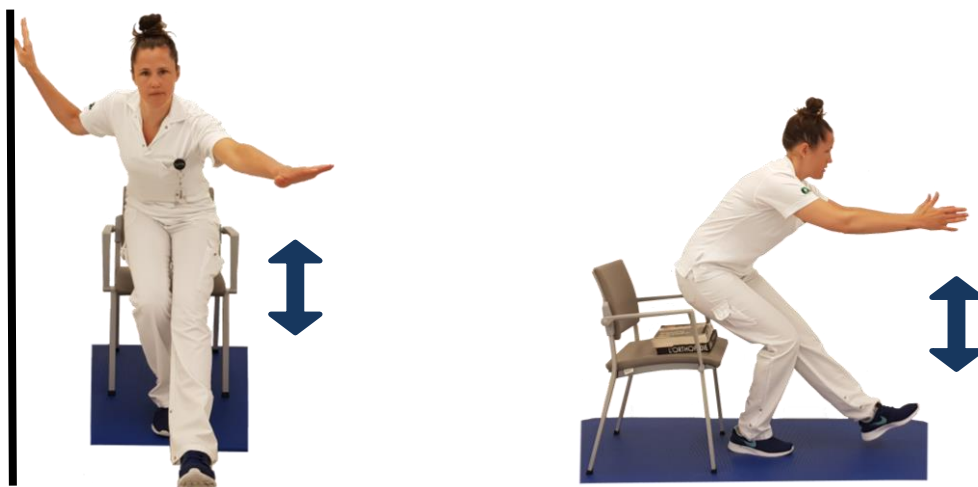
Instructions: Stand on operated leg, bend knee until you briefly touch a target with your buttocks (without sitting) and return to standing position.

Modalities: endurance strength (concentric) / max strength (concentric) / eccentric / isometric

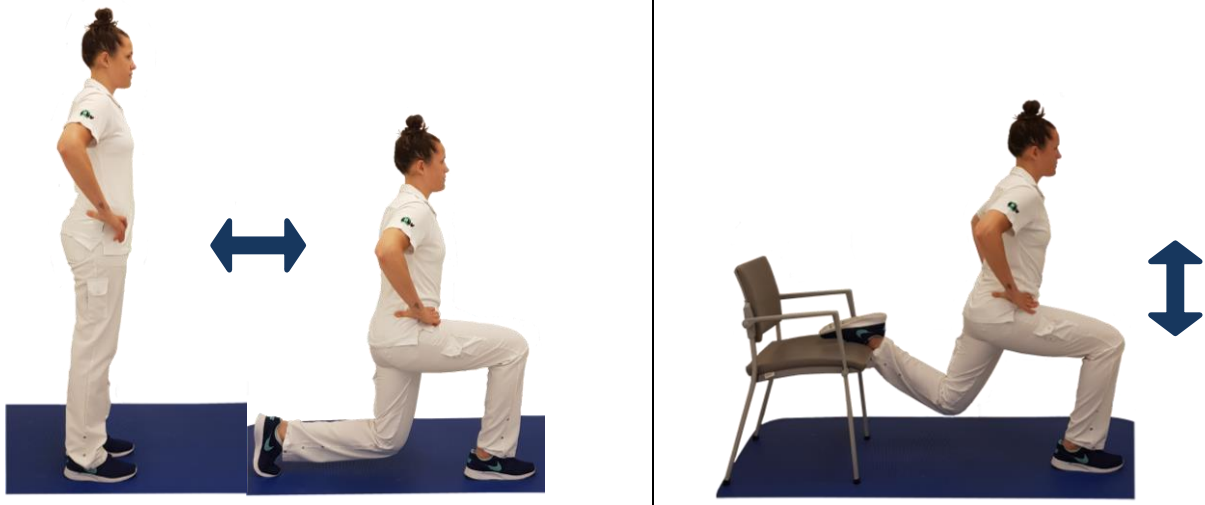
Increase difficulty: lower the target / add weight

Decrease difficulty: place hand on wall / elevate the target (add a cushion/books on the seat/bench)

Caution: knee is stable and in line with toes, back is straight



Dynamic forward lunges



Instructions: Take a long step forward with operated leg, bend both knees until the back knee touches the ground, return to initial standing position.

Modalities: endurance strength (concentric) / max strength (concentric) / eccentric

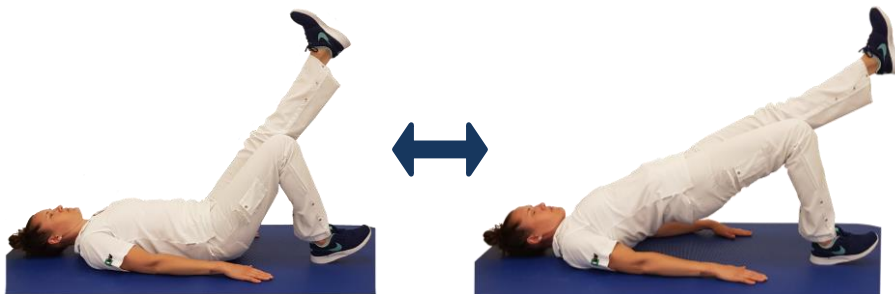
Increase difficulty: add weight / Bulgarian split squat with or without added weight (image below)

Decrease difficulty: place hand on wall

Caution: knee in line with toes, weight on the front foot

2.2 Hamstrings

Single Leg Bridge



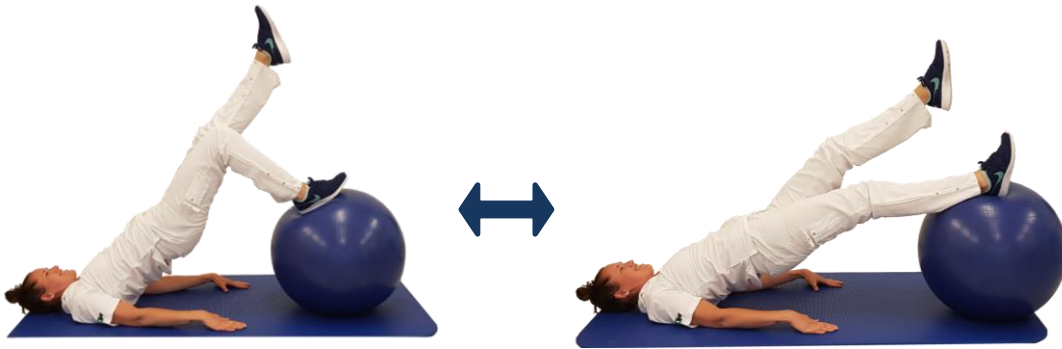
Instructions: Lay on back, bend operated knee to 90° and place heel on the ground. Extend opposite leg and keep it in the air with thighs parallel at all times. Lift pelvis by pushing on your heel. Return to initial position. Briefly touch the floor and repeat.

Modalities: endurance strength (concentric) / max strength (concentric)

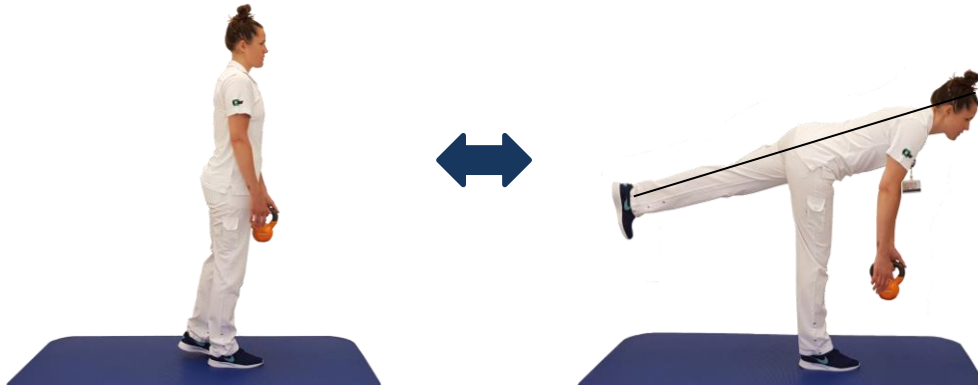
Increase difficulty: increase knee extension / add weight on pelvis / place heel on an elevated surface (step/chair) (see image) / place heel on Swissball (or towel) and bend/extend your knee (see image)

Decrease difficulty: lift pelvis and maintain the position (isometric contraction) / lift pelvis with both feet on ground then lower on operated limb only (eccentric contraction)





Single Leg Romanian Dead Lift



Instructions: Stand on operated leg, lean forward while keeping knee slightly bent and back straight. Pelvis and shoulders do not rotate.

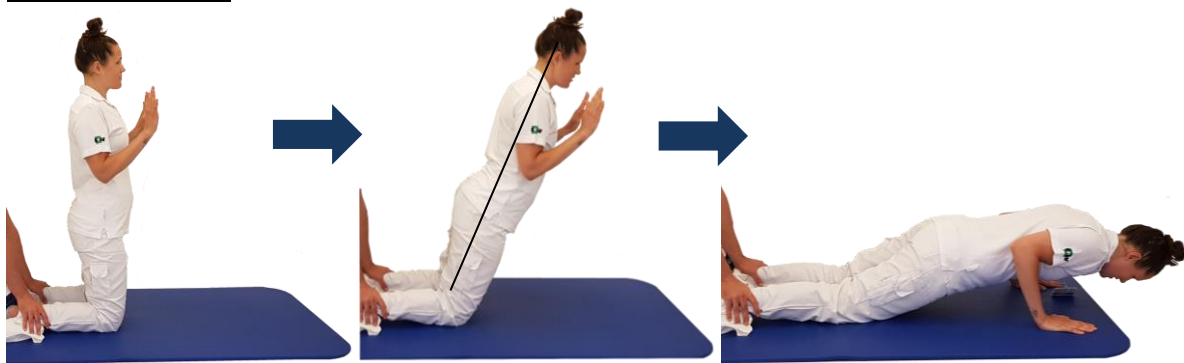
Caution: knee flexion in operated leg is identical throughout the movement

Modalities: eccentric

Increase difficulty: add weight

Decrease difficulty: place hand on wall

Nordic Hamstring



Instructions: Kneel with hips extended and torso upright, fix feet (under heavy furniture or with someone's help), slowly lower yourself until body is parallel to floor with hands ready to be placed on ground at the end of the movement. Return to initial position by pushing on hands.

Caution: vertical line from head to knees at all times (back is straight, pelvis does not tilt)

Modalities: eccentric

Increase difficulty: add weight (hold in hands)

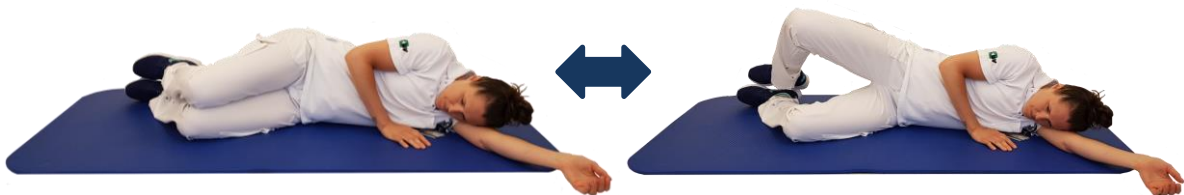
Decrease difficulty: use a Swissball to help decelerate the downward movement while keeping tension in hamstrings



3 Global strength training

3.1 Glutes

Clamshell

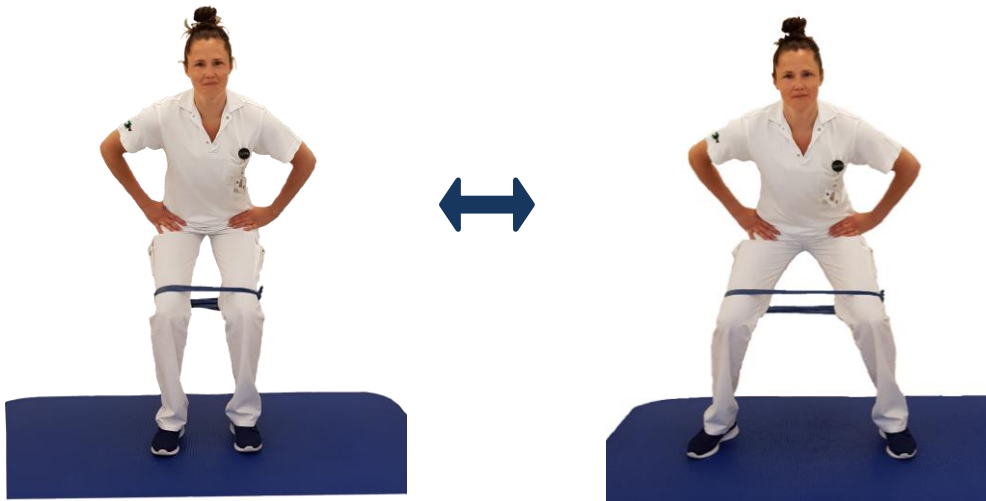


Instructions: Lie on your side with operated limb on top, knees slightly bent and feet together. Lift top knee while keeping feet together. Return to initial position.

Modalities: endurance strength (concentric)

Increase difficulty: place elastic band around thighs (just above knees)

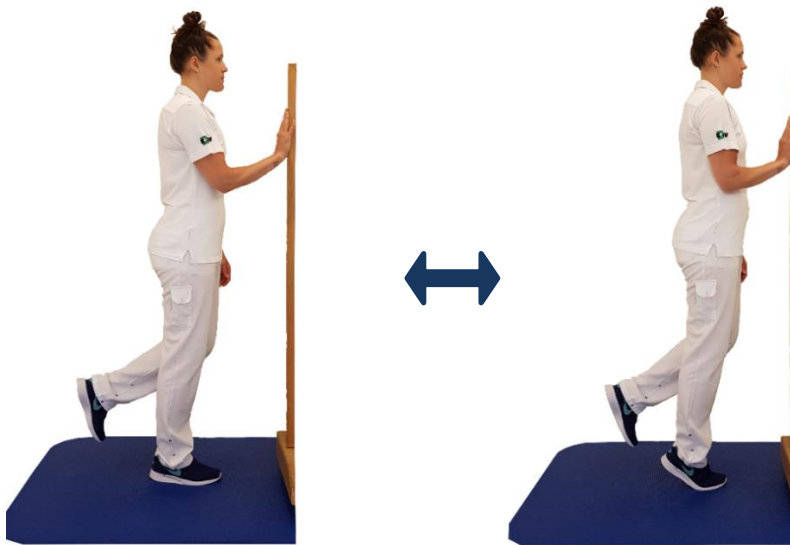
Side steps



Instructions: make side steps while keeping knees bent at all times

Increase difficulty: place elastic band around thighs (just above knees/ankles/feet)

3.2 Triceps Surae



Instructions: Stand on operated leg, keep knee extended, elevate heel, return to initial position.

Modalities: endurance strength (concentric)

Increase difficulty: add weight

Decrease difficulty: do the exercise on both legs and gradually transfer bodyweight onto operated leg.

3.1 Trunk strength - Plank

Front plank



Instructions: Place forearms and feet on the ground, hold the adapted push up position while maintaining alignment from head to toes

Modalities: isometric

Increase difficulty:

- Lift one leg /one hand /one foot and opposite hand off the ground
- Bring elbow towards opposite knee (see image)

Decrease difficulty: place knees on the ground



Side Plank

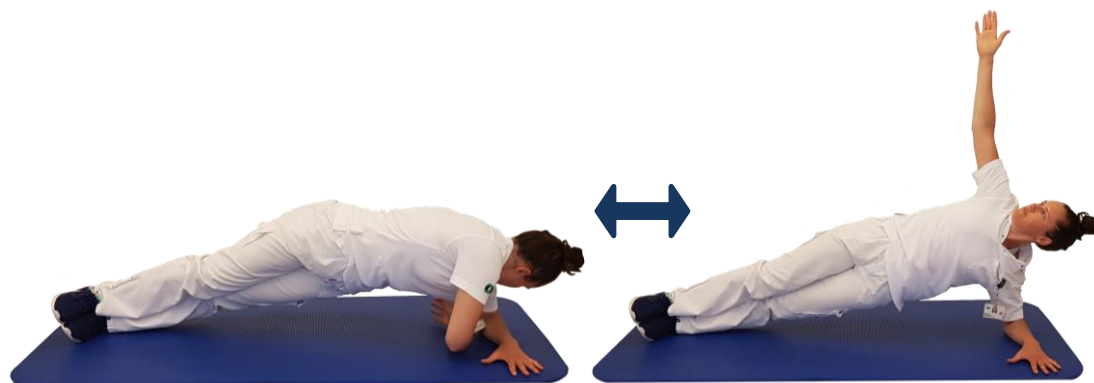
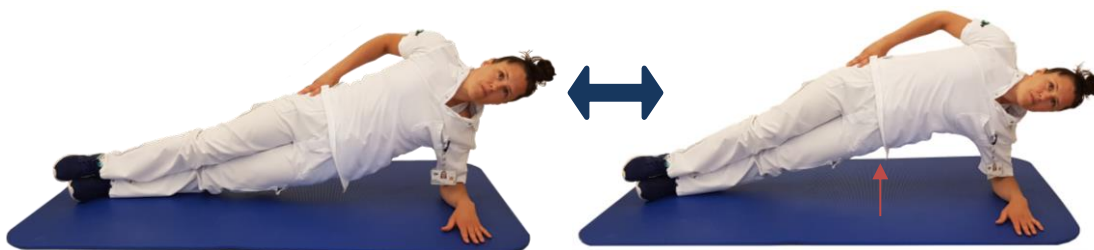


Instructions: Place knee and forearm on the ground, lift pelvis off the ground and maintain the position with alignment from head to knees. Elbow is positioned directly under the shoulder.

Modalities: isometric

Increase difficulty:

- On feet
- Dynamic movement: Lift / lower pelvis
- Upper body rotation



4 Strength training on fitness apparatus

Reminder: efficient strength training requires using correct loads. Load must not be too high nor too low. It must continuously be adapted to your capacities.

4.1 Quadriceps and Glutes: Leg Press

Single Leg

Instructions: Position foot, adjust seat so that knee is bent just over 90°. Push through your heels to extend leg until nearly straight (do not lock knees). Return slowly to initial position.

Modalities: endurance strength (concentric) / max strength (concentric)

Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		



Single Leg – Movement Resistance

Instructions: Position both feet on board (operated foot slightly centred), adjust seat so that knees are bent just over 90°. Push through your heels to extend legs until nearly straight (do not lock knees). Remove non-operated limb and slowly return to initial position by resisting the movement with one leg only.

Modalities: eccentric

Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		

4.2 Quadriceps: Leg Extension

Single Leg

Instructions: Fully extend leg and slowly return to initial position by resisting the movement.

Modalities: endurance strength (concentric) / max strength (concentric)

Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		



Single Leg – Movement Resistance

Instructions: Fully extend both legs. Remove non-operated limb and slowly return to initial position by resisting the movement with one leg only.

Modalities: eccentric

Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		

4.3 Hamstrings: Leg Curl

Single Leg

Instructions: Bend knee to bring heel as close as possible to buttocks and slowly return to initial position by resisting the movement.

Modalities: endurance strength (concentric) / max strength (concentric)

Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		



Single Leg – Movement Resistance

Instructions: Bend both knees to bring heels as close as possible to buttocks. Remove non-operated limb and slowly return to initial position by resisting the movement with one leg only.

Modalities: eccentric

Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		

4.4 Hip Abduction

Instructions: Push against the pads to open legs with full range of motion

Modalities: endurance strength (concentric)



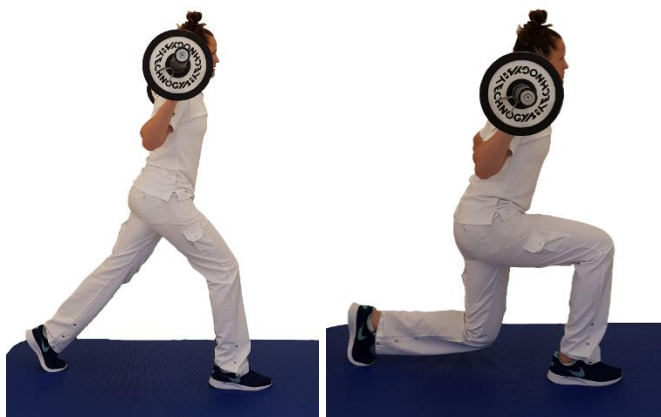
Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		

5 Strength Training with free and guided weights

5.1 Quadriceps and Glutes: Dynamic Forward Lunges

Instructions: Take a long step forward with operated leg, bend both knees until the back knee touches the ground, return to initial standing position

Modalities: endurance strength (concentric) / max strength (concentric)



Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		

5.2 Quadriceps and Glutes: Squats

Instructions: Place bar on shoulders, position feet parallel hip-width apart, bend knees to lower buttocks as far as possible toward the ground. Return to initial standing position.

Modalities: endurance strength (concentric) / max strength (concentric)



Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		

5.3 Hamstrings and Glutes: Romanian Dead Lift

Instructions: Hold bar in front of you, position feet parallel and hip-width apart, lean forward while keeping knee slightly bent and back straight.

Modalities: endurance strength (concentric) / max strength (concentric)



Session (date)	Load/Weight	Assessment - Difficulty
1.		
2.		
3.		
4.		
5.		
6.		

6 Functional exercises

6.1 Stability



Instructions: Stand on operated leg, use other foot to push objects as far as possible in various directions around you

Caution: Knee is kept above toes; body weight is kept on operated leg with other foot only used to push the objects

Increase difficulty: add weight (backpack filled with books/water bottles); unstable surface (folded towel, pillow, proprioceptive equipment)

6.2 Running

- Run backwards/forwards in a straight line, add accelerations/decelerations
- Zig-zag running
- Side steps

6.3 Jumping

Caution:

- Hips, knees and feet are kept aligned throughout the jump
- During two-legged jumps, body weight is equally balanced between both legs during impulse and landing
- Landing must be as silent as possible
- Before trying single leg jumps on operated knee, practice jumps on healthy limb

Increase difficulty: use a weight vest

Two-legged jumps

Instructions: Jump vertically on both feet. Repeat by jumping back and forth over a line and then side to side.

Increase difficulty: increase distance / add a 90° turn



Single leg jumps

Instructions: Jump vertically on one leg. Repeat by jumping back and forth over a line and then side to side.

Increase difficulty: increase distance / add a 90° turn

Jumps onto a step

Instructions: Jump down from a step. Begin with both legs then on one leg only.

Increase difficulty: Jump onto a step and back down again. Begin with both legs then on operated leg only.



Stepper

Instructions: Put one foot on the step in front of you, leave the other on the ground. Push off your leg to Jump and alternate legs. Repeat several times without stopping.



Jump rope

- Both feet simultaneously
- Both feet alternatively
- One foot



7 Management and traceability

Date	Version	Rédaction	Validation / Relecture	Classement / Archivage
11.05.2021	A	S. Kershaw A. De Nérès	Jean Lambert	Resp. de la gestion doc.