

## YOU MUST BE ABLE TO DO THIS! A single leg parallel squat.

All people need the ability to read, write and perform simple mathematics. These are necessary to function in our day to day lives. If you ever lost these abilities, such as after a stroke, your quality of life would change. Therefore these abilities need to last forever. But have you ever considered that a single leg parallel squat is necessary for life?



**You should.** If you love to ski and enjoy participating in activities, such as running, and team sports (basketball, soccer, baseball, etc) then you need to be able to perform a single leg parallel squat. Scientific research indicates that possessing this ability aids in injury prevention of knee injuries<sup>1,2</sup>, non-contact ACL injuries<sup>3-5</sup>, and low back injuries<sup>6</sup>.

Interestingly during AOA Fall Fitness testing 93% of athletes tested were unable to achieve the SLS standard – [click here for the report](#). This finding is consistent with my work with other Provincial Sport Organizations, where many athletes were unable to achieve a single leg parallel squat. The main reason is because athletes lack sufficient strength to control their body while performing a SLS<sup>1,7,8</sup>, and as a result they display dynamic valgus- inward movement of the knee and a loss of neutral spine position. The significance is increased injury risk and a loss in performance.



To illustrate this point, understand that during skiing an athlete will be subjected to forces that exceed 4 – 6 times their body weight on a single limb. Now using common sense, how safe will they be when they are unable to control just their body weight? Now what happens if they are fatigued and they get put into a position where their limb is at risk for an injury - perhaps an ACL rupture or worse!

The great news is that through appropriate strength and conditioning exercises we can achieve the SLS movement standard. This article is intended to provide you with exercises to help you achieve the movement standard. Remember these standards do not exist just for alpine racers. Everyone should be able to do this. Whether you are a recreational skier, a mom with kids, or you are a weekend warrior you must be able to perform a single legged squat. Give it a try – you may be very surprised. Compare each leg to each other and notice the depth you were able to achieve – click [here](#) for document on how to perform and how we interpret the single leg movement test (page 7 of 10).

A sample program is described below and the rationale for our approach can be found [here](#). Each exercise is fully described with video at <http://www.fitstoronto.com/Exercises.html>. The program is just a starting point. Try it. If you would like more information on how you can be screened you can email me at [thomaslam@fitstoronto.com](mailto:thomaslam@fitstoronto.com) or visit [www.fitstoronto.com](http://www.fitstoronto.com).

## **Week 1 – 3 (Perform routine three times per week)**

**Basic Strength Development** (rest 1 minute between sets)

Squat 15 x 4

**Leg Circuit** (repeat 4 times with 1 minute of rest between)

Step Up 10 / side

Lunge x 10 / Side

Hamstring Curl on Swiss Ball x 10

Clam Shell x 15 / side (slow tempo)

## **Week 4 – 6 (3-day routine)**

**DAY ONE** – Basic Leg Strength

**Basic Strength Development** (rest 1 minute between sets)

Squat (with weight) 12 x 4

**Leg Circuit** (repeat 4 times with 1 minute of rest between)

Glut Matrix 4 x times

Step-Up x 10 / side

X-Band Walk

**DAY TWO** – Force Absorption and Abduction

**Force Absorption** (Learn how to control and absorb forces. Land quietly keeping your chest upright and bending through this hips. Sequence: Vertical, Rest Between Sets: 1 minute, Set: 4 times)

Broad Jump and Stick

Hop and Stick

Lateral Hop and Stick

**Abduction Strength Endurance** (Perform each exercise with tubing around the knees (Abduction Band) for 20m per exercise. Sequence: Vertical, Rest between Sets: 1-2 minutes of rest between sets, Sets: 4)

Squat Jumps with Abduction Band

Lateral Lunge with Abduction Band

Diagonal Lunge with Abduction Band

Reverse Lunge with Abduction Band

**DAY THREE** – Basic Strength Development

**Basic Strength Development** (rest 1 minute between sets)

Squat 10 x 4

**Leg Circuit** (repeat 4 times with 1 minute of rest between)

Box Jump x 5

Hip Drive x 10 / side

Step-Up x 10 / side

Hamstring Curl on Swiss Ball x 10

## **Week 7 – 10 (3-Day Routine)**

**DAY ONE:** Basic Strength Development

### **Basic Strength Development** (rest 1 minute between sets)

Squat 8 x 5

### **Leg Circuit** (repeat 4 times with 1 minute of rest between)

Hip-Drive x 8

Single Legged Squat x 10 / side

Hamstring Curl on Swiss Ball x 15

Bulgarian Squat x 15 / side

### **DAY TWO: Force Absorption and Abduction**

**Force Absorption** (Learn how to control and absorb forces. Land quietly keeping your chest upright and bending through this hips. Sequence: Vertical, Rest Between Sets: 1 minute, Set: 4 times)

Pent Jump x 2

Hop 20m / side

Lateral Hop 20m / side

Lateral Jump 20m / side

**Abduction Strength Endurance** (Perform each exercise with tubing around the knees (Abduction Band) for 20m per exercise. Sequence: Vertical, Rest between Sets: 1-2 minutes of rest between sets, Sets: 4)

Squat Jumps with Abduction Band

Lateral Lunge with Abduction Band

Diagonal Lunge with Abduction Band

Reverse Lunge with Abduction Band

### **DAY THREE: Speed and Power**

**Power** (Emphasize explosiveness and reactive ability, Sequence: Vertical, Rest Between Sets: 1 minute, Sets: 4 times)

Bounding 20m

Multiple Broad Jump

Tuck Jumps 20m

Lateral Hops (3 hop back and forth)

**Single Leg Accessory Strength** (Perform Circuit **3 times**, Sequence: Vertical, No rest between exercises. Rest 2 minutes between sets)

Single Leg Squat x 12

Hip Drive x 8

Single Leg Squats x 8

Lunge x 10/side

1. Zazulak BT, Hewett TE, Reeves NP, Goldberg B, Cholewicki J. Deficits in neuromuscular control of the trunk predict knee injury risk: a prospective biomechanical-epidemiologic study. *Am J Sports Med.* Jul 2007;35(7):1123-1130.
2. Ingram JG, Fields SK, Yard EE, Comstock RD. Epidemiology of knee injuries among boys and girls in US high school athletics. *Am J Sports Med.* Jun 2008;36(6):1116-1122.
3. Hewett TE, Myer GD, Ford KR. Reducing knee and anterior cruciate ligament injuries among female athletes: a systematic review of neuromuscular training interventions. *J Knee Surg.* Jan 2005;18(1):82-88.
4. Alentorn-Geli E, Myer GD, Silvers HJ, et al. Prevention of non-contact anterior cruciate ligament injuries in soccer players. Part 2: a review of prevention programs aimed to modify risk factors and to reduce injury rates. *Knee Surg Sports Traumatol Arthrosc.* Aug 2009;17(8):859-879.

5. Alentorn-Geli E, Myer GD, Silvers HJ, et al. Prevention of non-contact anterior cruciate ligament injuries in soccer players. Part 1: Mechanisms of injury and underlying risk factors. *Knee Surg Sports Traumatol Arthrosc.* Jul 2009;17(7):705-729.
6. Cholewicki J, Silfies SP, Shah RA, et al. Delayed trunk muscle reflex responses increase the risk of low back injuries. *Spine (Phila Pa 1976).* Dec 1 2005;30(23):2614-2620.
7. Claiborne TL, Armstrong CW, Gandhi V, Pincivero DM. Relationship between hip and knee strength and knee valgus during a single leg squat. *J Appl Biomech.* Feb 2006;22(1):41-50.
8. Willson JD, Ireland ML, Davis I. Core strength and lower extremity alignment during single leg squats. *Med Sci Sports Exerc.* May 2006;38(5):945-952.