

Fenton Physical Therapy

# What Your Knees Want You To Know

An Effective and Essential  
Injury Prevention Program



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## **Fenton Physical Therapy**

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Video demonstration of the exercises  
found in this book can be viewed on  
our youtube channel at:

<http://youtu.be/LOXhp-1bGQ4>

# WHAT YOUR KNEES WANT YOU TO KNOW

## *An Effective and Essential Injury Prevention Program*

Since 2009, the research on anterior cruciate ligament (ACL) injury prevention programs has been consistently positive. These programs reduce the frequency of ACL injury and should be part of every team's training regimen. This is what the last five years of research on exercise programs designed to reduce the risks of knee injury has revealed.

Meta-analysis evaluations (combining the results of multiple ACL injury prevention studies) reveal that neuromuscular training programs reduced the odds of suffering an ACL injury by 60%.\*

There is ample evidence that starting the training at younger ages produces an even better preventative effect. In the adolescent population, the risks were cut by 73%.

Using an ACL injury preventative training program all year round is much more effective than using the program during only a portion of the season.

The intensity of the preventative programs performance is a factor. Programs that are performed as a formal aspect of practice and supervised by a coach have a better preventative effect than home based programs.

Plyometrics and strength training appears to be more important than balance training

### **Who Needs It Most**

The primary goal of any athletic training program is reducing the risk of injury. All college strength and conditioning programs have instituted ACL injury preventative training programs. Unfortunately, most ACL tears occur in younger, high school age athletes. Female athletes are particularly susceptible and in greater need of preventative training programs. To truly make any difference in the number of ACL injuries, we need to start with preventative training at earlier ages.

\*Yoo et al, (2009) *A Meta-analysis of the effect of neuromuscular training on the prevention of the anterior cruciate ligament injury in female athletes.* Knee Surgery, Sports Traumatology and Arthroscopy. DOI: 10. 1007-009-2.

# FASTER ENGINES AND STRONGER BRAKES

The exercises you perform in this program are designed to help improve single leg strength and deceleration skills. Single leg strength and deceleration skills have repeatedly been proven to be the most important areas of ACL injury prevention training.

Sports are single leg biased activities and athletes need to develop better strength while using only one leg. Performance asymmetries make an athlete more prone to injury. If during an exercise, one leg is stronger than the other leg, that motor control deficit needs to be eliminated with proper training. Bodybuilding and powerlifting type bilateral strength training is not optimal for preventing injuries in athletes.

Most lower extremity injuries happen when the athlete attempts to decelerate a jump, leap, or stride. The speed, loads, and angles are too much for them to control and a link in the lower extremity chain fails. Proper deceleration is a motor skill that can be improved with practice. Many strength training programs focus solely on improving strength and develop athletes with fast engines and weak brakes—not a good combination. Deceleration skills keep you safe on the field of play.

This injury prevention exercise program is easy to learn, and ideally, the training is implemented in a team format. ACL injury prevention training should be performed as part of every practice session. The exercises in this program are divided into two sets, one for the practice field and the other for the weight room. If your weight room does not have mini loop resistance bands or a drive sled, you can purchase them from [www.performbetter.com](http://www.performbetter.com).

This program should be performed year round, especially with female athletes. Coaches and athletes should not worry that the training will degrade on field performance. If time and scheduling are problems, try to make the weight room activities a priority.

*Michael S. O'Hara, P.T., OCS, CSCS*

# Field Exercises

## Single Leg Bridges

This exercise will improve single leg strength in the hamstrings, gluteal muscles, and core stabilizers.

Lay supine with the arms braced against the floor to stabilize the upper body. Bend the knees and place the feet flat on the ground. Lift the right leg up off the ground. Using the muscles in the back of the left leg, lift the hips up off the ground. Push up through the heel of the left foot and drive the left hip into full extension. Hold at the top for three seconds and then lower in a controlled manner. Perform two sets of ten to fifteen repetitions on each leg.

Common mistakes are allowing the pelvis to tilt and not fully extending the hip.



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## Walking Lunges

This exercise develops better single leg strength, reciprocal hip mobility, and balance. Athletes need all of these skills to be an efficient sprinter. Coaches can evaluate the athlete's movement symmetry during the walking lunge.

Stand tall with the feet hip width apart. Step forward with the right leg and lower your body down so the left knee nearly touches the ground. Push up to standing with the right leg and then step forward with the left leg. Keep a fairly upright front shin alignment and maintain a tall torso. As the athletes get stronger, have them carry dumbbells or a medicine ball during the exercise. Perform two sets of ten lunges with each leg.

Common mistakes are permitting the knee to collapse inward, a wobbly, unsteady torso, and uneven stride lengths. All of these can be eliminated with consistent practice.



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## Ninety Degree Jumps

This drill will teach the athlete to become more proficient at exploding, changing direction in space, and successfully controlling the forces involved in decelerating the landing.

Set up with a shoulder width stance. Jump up and turn 90 degrees in the air. Stick and hold the landing. Both feet should hit the ground simultaneously. The knees should line up with the feet and the torso stays tight and tall. Concentrate on a solid and stable landing position. Perform five to ten repetitions in each direction.

Common mistakes are landing with one foot hitting the ground before the other, allowing the knees to collapse inward, and/or the torso falling forward during the landing, failing to turn a full 90 degrees.



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## Three Steps And Stick

This drill teaches appropriate control of single leg deceleration.

The athlete will need ten yards of space on the field or court. Starting with the left leg, take three steps and then land softly on the right leg. Hold the landing position for three counts—like a gymnast sticking the landing. The goal is to decelerate the force of landing with flexion at the ankle, knee, and hip. The pelvis should be level and the landing leg knee should never buckle inward. Repeat by leading off with the right leg and landing on the left. Work on making each landing smooth and well coordinated.

Perform eight to ten repetitions on each leg.

The most common mistake is an inward collapse of the knee and a failure to “stick the landing”. Inward collapse of the knee is the position of injury for the ACL. A wobbly, unstable landing is evidence of inefficient control of deceleration. Both of these faults can be trained away with ongoing practice.



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# Weight Room Exercises

## Posterior Slides Or Rear Foot Elevated Split Squats

These two exercises allow you to train single leg strength with a degree of balance assist from the back leg. Try the posterior slider first, and then as the athletes get stronger, progress to the rear foot elevated split squat (RFESS). The athlete should be able to perform these drills in a smooth and graceful manner before adding resistance in the form of dumbbells. Work up to two sets on each leg.

When you walk or run, one hip must extend and the other must flex while the pelvic girdle and spine stay stable. As you accelerate from saunter to stride to sprint, you place a greater demand on this movement pattern. Many athletes have tight hip flexors and weak core stabilizers that inhibit this reciprocal hip motion. Restrictions in this movement pattern make you less efficient, slower, and far more likely to get injured. The posterior slide and RFESS restore this essential pattern of movement.

Ergonomically, it is easier to squat if you have short legs and a stocky torso. If you have long femurs and a long trunk, it is going to be difficult for you to efficiently fold up into a deep and graceful squat. The posterior slide and RFESS empower the vertically enhanced with a safe and effective way to train the lower extremities.

The posterior slide is performed with a glide disc, valslide, or simple furniture slider under one foot. If the flooring is appropriate, the athlete can use a dry towel under the foot. Place the slider under the left foot and stand tall. Slide the left foot back and lower the body with the right leg. Try to maintain a tall torso and a fairly upright shin angle on the right leg. Drive through the right heel and push back up. Perform six to eight repetitions on the right leg and repeat with the left leg.

You need a stable weight training bench to perform the RFESS. Stand with your back to the bench approximately one stride away. Place the right leg up on the bench and balance on the left leg. Lower under control and then push back up with the left leg. Perform six to eight repetitions on the right leg and repeat with the left leg.

Common mistakes with both of these exercises are failure to lower to full depth, a forward lean of the torso, and an inward collapse of the knee.



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## Mini Band Monster Walk

All of our muscles work as a team to create movement. Postural stress, injuries, and poor training practices can cause some of our muscles to lose communication with the rest of the team. One of the more common problems we find in physical therapy and performance training is fondly termed “gluteal amnesia”, or an inability to use the gluteal (butt) muscles properly. Strong, well developed, gluteal muscles prevent the inward collapse of the knee during deceleration and attenuate rotational stress at the lumbar spine. The mini band monster walks activate the gluteal muscles in a functional standing position.

You will need a resistance mini band loop—green or yellow resistance levels work well for most beginners. Place the mini band loop around the ankles. Assume an athletic stance with the feet straight ahead, knees bent, and hips flexed. Move the right foot forward 12 to 18 inches, and after planting the right foot, follow with the left. Try to keep the hips and shoulders level throughout the exercise. Keep the feet pointing straight ahead and maintain a continual tension on the resistance loop. Travel forward for ten steps with each leg and then rest. Perform the same wide stance stepping, but now travel backward for ten steps.

Common mistakes are allowing the feet to turn outward, wobbling side to side instead of stabilizing with the hip and torso muscles, not maintaining tension on the resistance band, and standing up straight and not holding an athletic stance.



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## Heavy Sled Push

If your weight room does not have a sled, you need to get one. Sled pushing improves acceleration, functional hip extension, and work capacity. It requires efficient single leg “triple extension” of the ankle, knee, and hip while maintaining a stable pelvis. The push reinforces the forward body lean necessary for efficient acceleration. No eccentric muscle activity is present during a sled push, so the athlete is able to perform a challenging training session and physically recover in time for the next practice session.

To perform the Sled Push, lean well forward and grasp the sled support posts. Push off the ball of the foot and reach the leg into full extension at the hip, knee, and ankle before planting and pushing with the other leg. Keep the abdominal muscles braced and the shoulder blades down the back. Select a weight that is a challenge for twenty yards and perform three twenty yard sets. The surface the sled travels over will dictate the amount of friction and loads you can utilize. Perform two or three sets of 20 yards.

Common mistakes include not completely extending the hip, shrugging the shoulders up toward the neck, and an uneven leg drive—one side more efficient than the other.



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## Single Leg Dead Lifts

This exercise will help develop single leg strength in the hamstrings, glutes, lower back, and upper back. You will need a pair of dumbbells.

Stand tall with a pair of dumbbells held at your side. Set the feet hip width apart with the knees slightly bent. Reach the left leg back and lower the weight using just the right leg. Think about sitting back with a long and stable spine—not bending forward. Keep the weight on the back of the right foot and the shoulder blades pulled down the back. Keep the dumbbells close to the leg as you reach them down to the mid shin level. Maintain a straight body alignment from the left ankle to the ear. Fire the hamstrings and gluteal muscles and return to the starting position. Finish all repetitions with the right leg and then switch to the left leg. Perform two sets of six to eight repetitions with each leg.

Common mistakes are collapsing at the lumbar and thoracic spine, failure to keep the dumbbells close to the legs, and not standing all the way back up to the starting position.



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