

# Anterior Cruciate Ligament (ACL) and Lower Extremity Injury Prevention Routine

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Warming up and cooling down are a critical parts of training for enhanced performance and injury prevention. The proper dynamic warm-up; enhances circulation, increases heart rate and ramps up the nervous system in preparation for physical activity. Beyond the preparation for activity, the proper warm-up may even prevent knee ACL ligament and other lower extremity injuries. In the Train 2 Play Sports Anterior Cruciate Ligament (ACL) and Lower Extremity Injury Prevention Routine there is special emphasis on the landing technique in controlling the knee and ankle. ACL prevention programs have been shown to reduce ACL injury by as much as 50%. (1,2,3,4,5)

It is essential to use **perfect biomechanical and technical form**; therefore time is emphasized rather than repetitions. It would be preferred to perform 5 repetitions with perfect technique in the allotted time rather than using poor form just to get a desired number of repetitions completed. Complete this program at the **BEGINNING** of the practice or as a stand-alone work out. Perform static stretching after practice, training or competition. The program should take less than 15-20 minutes to complete and should be done as a dynamic warm up and conditioning drill prior to practice or games.

## 1. Jog line to line (Perform for 30 sec)

**Purpose:** Allows athlete to prepare for training, increasing circulation, heart rate and neurological stimulation.

**Instruction:** Slowly jog from line to line.

Key components: Run with good form. Maintain the hips, knees and ankles in straight alignment. Pump arms forward and back in a straight line.



## 2. Shuffle side to side (Perform for 30 sec)

**Purpose:** Engages the hip abductors/adductors (inner and outer thigh). Improve lateral quickness.

**Instruction:** Start in an athletic stance with the knees and hips slightly bent with the arms out. Leading with the left foot sidestep pushing off with the right foot (back leg). When you drive off with the back leg, be sure the hip/knee/ankle are in a straight line without crossing the feet. Switch sides at the end

point and return to starting line.



### 3. Walking Lunges forward and backwards (Perform for 30 sec)

**Purpose:** Strengthen the knee extensors and flexors/hip extensors and flexors muscles.

**Instruction:** Lunge forward leading with your right leg. Lower the back knee straight down (close to ground without touching). Keep your front knee in alignment over your ankle. Don't allow the knee to move forward past the toes. Make sure you can see your toes on your leading leg. Control the motion and try to avoid the front knee from caving or moving inward. Once you reach the end reverse the motion lunging backward (reverse lunge) to the start line. When doing the reverse lung reach the right leg back and lower the knee close to the ground.



### 4. Single leg heel raise (Perform for 30 sec each leg)

**Purpose:** This exercise strengthens the ankle plantar flexors (calf muscle) and improves balance.

**Instruction:** Lift your right thigh (knee up) up and maintain your balance. Slowly raise the left heel off the ground moving on to your toes. Maintain good balance. You may hold your arms out in front or to the side to help with balance. Perform the exercise slowly.

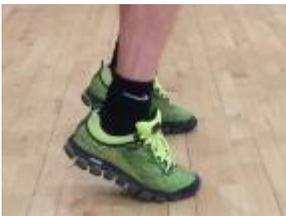


# Plyometric Jumps

The following exercises are jumps to help develop explosive power, strength, speed and vertical jump. In prevention of ACL and other lower extremity injuries, it is critical to perform the exercises correctly with good mechanical form. An important element in prevention is the landing technique. The athlete should land softly on the balls of their feet with knees and hips slightly flexed (bent). After landing on the balls of the feet, slowly roll back from the toes to the heels. Keep the knees in line with the ankle. **Do not allow the knees to “knock” or cave in (valgus).** Perform a soft landing! These exercises are basic and can be progressed to a plyometric box jump program. If used on the field or court use a line marking or a flat cone (2 inches) as a visual. If needed take a short 30second break between exercises if the athlete is fatiguing.



**Land with ankle under knees; do not allow knees to move in or “knock”**



**Land softly on balls of feet, slowly roll back to heels**

## 5. Double leg lateral pogo hops (Perform for 15 sec)

**Instruction:** Stand with feet together with the line or cone to your left. Hop to the left over the line or cone. Repeat this exercise rapidly moving from left to right over the line or cone.



## 6. Double leg forward/backward pogo hops (Perform for 15 sec)

**Instruction:** Stand with feet together with the line or cone in front of your toes. Hop to the over the line or cone, quickly jump back to the original spot. Repeat this exercise rapidly moving from front to back over the line or cone. Maintain a slight bend to the knee while performing the exercise.

*Dr. Mishock*



## 7. Single Leg pogo hops forward (Perform for 15 sec)

**Instruction:** Stand with left foot in front of the line or cone. Hop over the line or cone, quickly jump back to the original spot. Repeat this exercise rapidly moving from front to back over the line or cone. Do not snap your knee back to straighten it. Maintain a slight bend in the knee.



## 8. Single leg pogo hops forward (Perform for 15 sec)

**Instruction:** Stand with left foot with the line or cone to your left. Hop to the left over the line or cone. Repeat this exercise rapidly moving from left to right over the line or cone. Do not snap your knee back to straighten it. Maintain a slight bend in the knee.



## 9. Vertical jumps (Perform for 15 sec)

**Instruction:** Stand straight with hands at your side. Slightly bend the knees and push off jumping straight up as high as you can. It is essential to practice proper landing technique. Keep proper knee alignment, landing on the balls of the feet rolling back to the heels. Stick and control the landing check to make sure there is proper knee and ankle alignment. **Do not allow knees to move in or “knock”.**



## 10. Scissors jump (Perform for 15 sec)

**Instruction:** Lunge forward leading with your left leg. Keep your knee over your ankle, not going past your toes. Next, push off with your left foot/leg and propel your right leg forward into a lunge position. Alternate rapidly. Do not allow the knee to cave in or out. It should be stable and directly over the ankle. The body weight should come through the balls of your feet with a slightly bent knee. Stick and control the landing check to make sure there is proper knee and ankle alignment. Do not allow front knees to move in or “knock”



## 11. Lateral skater jump (Perform for 15 sec)

**Purpose:** Engage hip abductors/adductors (inner and outer thigh). Improve lateral quickness and explosion.

**Instruction:** Start on right leg, bring the left leg behind the right. Push-off jumping laterally to the left, landing on the left foot. Repeat to the other side. Stick and control the landing check to make sure there is proper knee and ankle alignment.



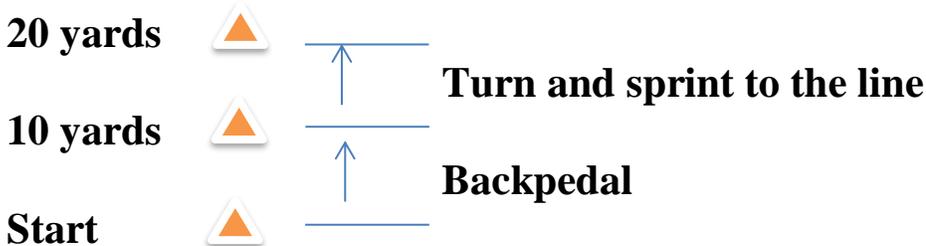
# Agility Runs

The agility runs could be done while dribbling a soccer ball or basketball to enhance specific sports skill.

## 12. Back pedal run to forward Sprint (Perform for 30 sec)

**Purpose:** Engage hip extensors/knee flexors/calf plantar flexors. Enhance transitional movements from back pedal to forward sprint.

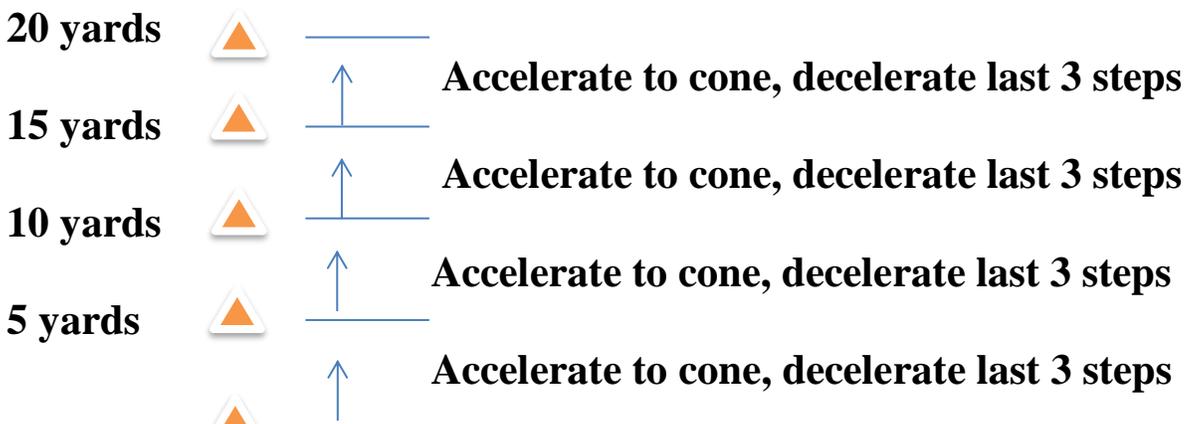
**Instruction:** Run backwards ½ distance to the side line or cone, turn and sprint the remainder of the distance to the sideline or cone. Keep the knees slightly bent landing on your toes. Make sure the athlete lands and pushes off the toes. Avoid locking of the knee joint.



## 13. Sprint with 3 step deceleration (Repeat 3-5 times)

**Purpose:** This exercise is used to teach the athlete how to maintain proper body control of the ankles, knees and hips while accelerating and decelerating. It increases dynamic stability of the ankle/knee and hip complex.

**Instruction:** Starting at the first cone or line, sprint forward to the second cone or line. As you approach the cone, use a 3 step quick stop to decelerate. Repeat this for multiple cones or lines. Do not let your knee extend over your toes when decelerating. Do not let your knee cave inward (valgus) while stopping. Perform run and walk back to the starting line and repeat 3-5 times.

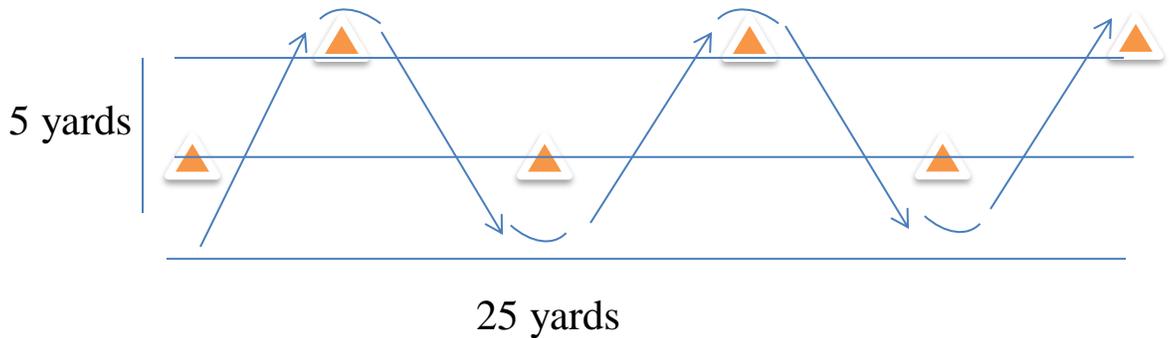


## Start

### 14. Zig-zag sprint (5 passes)

**Purpose:** To encourage and teach proper technique and stabilization of the hip/ knee/ankle. This exercise will work on proper knee alignment during pivot and push off while changing direction. During push off try to deter the “knock knee” position, a common cause of ACL and other knee injuries.

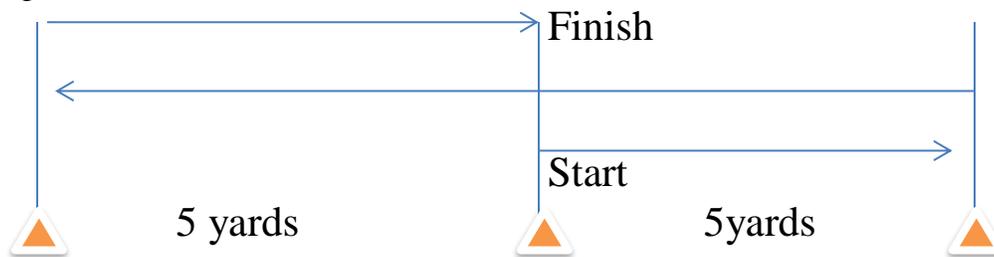
**Instruction:** Position three cones on two lines 5 yards apart so that the cones are on one line at 0, 10, and 20 yards apart. Cones on line two are 5, 15 and 25 yards apart. Start in a two point stance. Sprint diagonally 5 yards to the closest cone, plant the outside foot, and run around the cones. Repeat the drill going the opposite direction. Make sure that the outside leg does not cave in. Keep a slight bend to the knee and hip and make sure the knee stays over the ankle joint not past the toes.



### 15. Pro-Agility: 20 yard line sprint

**Purpose:** Improve ability to change direction by enhancing foot work and reaction time.

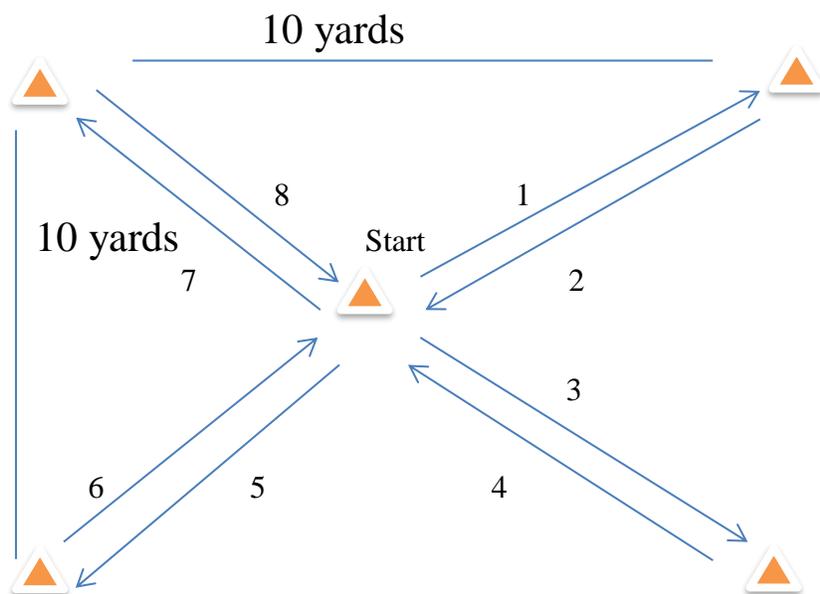
**Instruction:** Start in a two point stance at the starting line, the center cone. Sprint to the end line and touch with your hand. Turn back and sprint to the far cone (10 yards) and touch the line. Turn back and sprint 5 yards through the start line to the finish.



## 15. Optional: Star Agility Drill

Purpose: Improve ability to change direction by enhancing foot work and reaction time in all possible planes of motion.

Instruction: Start in a two point stance at the starting line, the center cone. Perform drill as fast as possible touching the cone; 1= forward run, 2 = backward run, 3 side shuffle right, 4 side shuffle left, 5 backward run, 6 forward run, 7=side shuffle left, 8 side shuffle right



# Post-exercise Training Static Stretches

Flexibility is the absolute gross range of motion of a joint. There are many anatomical factors that affect flexibility such as; joint capsule, ligaments, muscle, tendon, fascia (covering of muscle), and neural structures interacting together.

Increased flexibility is achieved with static stretching. Static stretching does not necessarily lead to increased performance and injury prevention. However, certain joints and muscle groups must have adequate range of motion in order to optimize length tension relationships of the muscle allowing optimum contractile force. Therefore, when muscles have good flexibility the muscle can contract with greater force thereby increasing functional performance.

From a clinical perspective, more important than general flexibility is the asymmetry of flexibility from side to side of a given region of the body. For example, tight hamstring on one side may lead to asymmetrical loading on one side of the body potentially leading to knee, hip or low back pain.

Perform these stretches following practice or training. By performing the static stretching routine, the athlete can improve and maintain range of motion and flexibility reducing stiffness in the lower extremity joints. All stretches should be performed gently to a point of tension and hold for 30 seconds and repeat 2 times. Perform deep breaths, air in through the nose and air out through the mouth.

## Knee Extensor Stretch (quad stretch)

**Instruction:** Stand near a wall or something sturdy for support. Grasp your left ankle and gently pull your heel up and back until you feel a stretch in the front of your thigh. Keep your abdominal muscles tight (abdominal brace). Keep your back straight and your hips forward. Once you reach this point of the stretch hold for 30 seconds and repeat 2 times on each side.



## Hip Flexor Stretch

**Instruction:** Kneel on your right knee with your left foot forward in front of you. Place your left hand on your left knee and bend your left knee forward. Place your right hand on your right hip to avoid bending the waist forward. Ensure that your torso is tall and erect. Keep your abdominal muscles tight (abdominal brace). The stretch should be felt in the front of the left hip/thigh. Once you reach this point of the stretch hold for 30 seconds and repeat 2 times on each side.



## **Knee Flexor Stretch (hamstring stretch)**

**Instruction:** Kneel on your right knee with your left knee extended and out to your side. Keep your left toe pointed up toward the ceiling. Place your left hand on your left knee and reach for your left toe. Place your right hand on your right hip and try to bend at the waist as you reach. Keep your abdominal muscles tight (abdominal brace). The stretch should be felt in the back of the thigh. Once you reach this point of the stretch hold for 30 seconds and repeat 2 times on each side.



## **Hip Adductor Stretch (Groin stretch)**

**Instruction:** Kneel on your right knee with your left knee extended and out to your side. Keep your left toe pointed forward with your foot on the ground. Place your left hand on your left thigh and lean to your left side. Place your right hand on your right hip. Keep your abdominal muscles tight (abdominal brace). The stretch should be felt on the inner thigh. Once you reach this point of the stretch hold for 30 seconds and repeat 2 times on each side.



## **Hip External Stretch**

**Instruction:** Kneel on your right knee with your left knee bent. Turn your left hip out bringing the outside of the knee and leg to the floor. Bring your torso to the floor on top of the left leg. Reach with both arms over your head. Keep your abdominal muscles tight (abdominal brace). The stretch should be felt on the left thigh and buttocks. Once you reach this point of the stretch hold for 30 seconds and repeat 2 times on each side.



## Ankle Plantar Flexor Stretch (calf stretch)

**Instruction:** Stand at arm's length from the wall or something sturdy. Place your left foot behind your right foot. Lean forward, slowly bend the right knee. Keep the left knee straight with the heel on the floor. Keep your back straight and your hips forward. Keep your toes pointed forward. The stretch should be felt in the right calf. Once you reach this point of the stretch hold for 30 seconds and repeat 2 times on each side.



## Cat-camel mobility Stretch

**Instruction:** Begin in quadrupedal position on hands and knees. Keep your knees under your hips and your hands under your shoulders. Rise up pushing your middle back toward the ceiling. Breathe out as you push your abdominal muscles in. The stretch should be felt in the middle and low back. Now sink the middle back in arching your spine. Breathe in as you push your abdominal muscles out. Keep your hands and knees still as you hold for 2 seconds. Compression should be felt in the middle back as you extend your thoracic spine. Repeat 10 times.



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