



## The Santa Monica Sports Medicine Research Foundation

### *The PEP Program: Prevent injury and Enhance Performance*

This prevention program consists of a warm-up, stretching, strengthening, plyometrics, and sport specific agilities to address potential deficits in the strength and coordination of the stabilizing muscles around the knee joint. It is important to use proper technique during all of the exercises. The coaches and trainers need to emphasize correct posture, straight up and down jumps without excessive side-to-side movement, and reinforce soft landings. This program should be completed 3 times a week. If you are using this program with athletes that are twelve or under, please perform the plyometrics over a visual line on the field or a flat 2" cone and land each jump with two feet. Do not perform single leg plyometrics with young individuals until they demonstrate substantial control. (see addendum) The field should be set up 10 minutes prior to the warm-up. This will allow for a smooth transition between the activities. A sample field set-up has been included in your packet.

This program should take approximately 15 - 20 minutes to complete. However, when you first begin the program, it may take slightly longer due to the fact that you must first become well acquainted with the program and the transitions. Along side each exercise you will notice a box with the approximate amount of time that should be spent on each activity. This will serve as a guideline to you in order to conduct your warm-up in a time efficient manner.

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### ***Section I: Warm – up***

Warming up and cooling down are a critical part of a training program. The purpose of the warm-up section is to allow the athlete to prepare for activity. By warming up your muscles first, you greatly reduce the risk of injury.

A. Jog line to line (cone to cone):

Elapsed Time: 0 - .5 minute

Purpose: Allows the athletes to slowly prepare themselves for the training session while minimizing the risk for injury. Educate athletes on good running technique; keep the hip/knee/ankle in straight alignment without the knee caving in or the feet whipping out to the side.

Instruction: Complete a slow jog from near to far sideline

B. Shuttle Run (side to side)

Elapsed Time: .5 to 1 minute

Purpose: engage hip muscles (inner and outer thigh). This exercise will promote increased speed. Discourage inward caving of the knee joint.

Instruction: Start in an athletic stance with a slight bend at the knee. Leading with the right foot, sidestep pushing off with the left foot (back leg). When you drive off with the back leg, be sure the hip/knee/ankle are in a straight line. Switch sides at half field.

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C. Backward Running

Elapsed Time: 1 – 1.5 minutes

Purpose: continued warm-up; engage hip extensors/hamstrings. Make sure the athlete lands on her toes. Be sure to watch for locking of the knee joint. As the athlete brings her foot back, make sure she maintains a slight bend to the knee.

Instruction: Run backwards from sideline to sideline. Land on your toes without extending the knee. Stay on your toes and keep the knees slightly bent at all times.

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## ***Section II: Strengthening***

This portion of the program focuses on increasing leg strength. This will lead to increased leg strength and a more stable knee joint. Technique is everything; close attention must be paid to the performance of these exercises in order to avoid injury.

A. Walking Lunges (1 minute)

Elapsed Time: 1.5 – 2.5 min

Purpose: Strengthen the thigh (quadriceps) muscle.

Instruction. Lunge forward leading with your right leg. Push off with your right leg and lunge forward with your left leg. Drop the back knee straight down. Make sure that you keep your front knee over your ankle. Control the motion and try to avoid you front knee from caving inward. If you can't see your toes on your leading leg, you are doing the exercise incorrectly.

B. Russian Hamstring (1 minute)

Elapsed Time: 2.5 –3.5 min

Purpose: Strengthen hamstrings muscles

Instruction: Kneel on the ground with hands at your side. Have a partner hold firmly at your ankles. With a straight back, lean forward leading with your hips. Your knee, hip and shoulder should be in a straight line as you lean toward the ground. Do not bend at the waist. You should feel the hamstrings in the back of your thigh working. Repeat the exercise for 30 seconds and switch with your partner.

C. Single Toe Raises (1 minute)

Elapsed Time: 3.5 – 4.5 min

Purpose: This exercise strengthens the calf muscle and increases balance.

Instruction: Stand up with your arms at your side. Bend the left knee up and maintain your balance. Slowly rise up on your right toes with good balance. You may hold your arms out ahead of you in order to help. Slowly repeat 30 times and switch to the other side. As you get stronger, you may need to add additional repetitions to this exercise to continue the strengthening effect of the exercise.

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## ***Section III: Plyometrics***

These exercises are explosive and help to build, power, strength and speed. The most important element when considering performance technique is the landing. It must be soft! When you land from a jump, you want to softly accept your weight on the balls of your feet slowly rolling back to the heel with a bent knee and a bent hip. These exercises are basic, however, it is critical to perform them correctly. Please begin these exercise using a flat cone (2 inches) or with a visual line on the field.

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A. Lateral Hops over Cone (30 seconds)

Elapsed Time: 4.5 – 5min

Purpose: Increase power/strength emphasizing neuromuscular control

Instruction: Stand with a 2” cone to your left. Hop to the left over the cone softly landing on the balls of your feet land bending at the knee. Repeat this exercise hopping to the right. Progress to Single leg hops

B. Forward/Backward Hops over cone (30 sec)

Elapsed Time: 5 – 5.5 min

Purpose: Increase power/strength emphasizing neuromuscular control

Instruction: Hop over the cone softly landing on the balls of your feet and bending at the knee. Now, hop backwards over the ball using the same landing technique. Be careful not to snap your knee back to straighten it. You want to maintain a slight bend to the knee.

C. Single Leg hops over cone (30 seconds)

Elapsed Time: 5.5 – 6 min

Purpose: Increase power/strength emphasizing neuromuscular control.

Instruction: Hop over the cone landing on the ball of your foot bending at the knee. Now, hop backwards over the ball using the same landing technique. Be careful not to snap your knee back to straighten it. You want to maintain a slight bend to the knee. Now, stand on the left leg and repeat the exercise. Increase the number of repetitions as needed.

D. Vertical Jumps with headers (30 seconds)

Elapsed Time: 6 – 6.5 min

Purpose: Increase height of vertical jump.

Instruction: Stand forward with hands at your side. Slightly bend the knees and push off jumping straight up. Remember the proper landing technique; accept the weight on the ball of your foot with a slight bend to the knee.

E. Scissors Jump (30 seconds)

Elapsed Time: 6.5 – 7 min

Purpose: Increase power and strength of vertical jump.

Instruction: Lunge forward leading with your right leg. Keep your knee over your ankle. Now, push off with your right foot and propel your left leg forward into a lunge position. Be sure your knee does not cave in or out. It should be stable and directly over the ankle. Remember the proper landing technique; accept the weight on the ball of your foot with a slight bend to the knee. Repeat 20 times.

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### ***Section IV: Agilities***

A. Forward run with 3 step deceleration

Elapsed Time: 7 – 8 min

Purpose: Increase dynamic stability of the ankle/knee/hip complex

Instruction: Starting at the first cone, sprint forward to the second cone. As you approach the cone, use a 3 step quick stop to decelerate. Continue on to cone 2 using the same strategy to deceleration. Do not let your knee extend over your toe. Do not let you knee cave inward. This exercise is used to teach the athlete how to properly accelerate and decelerate while moving forward and the hip, buttock and hamstring musculature.

B. Lateral Diagonal runs (3 passes)

Elapsed Time: 8 – 9 min

Purpose: To encourage proper technique/stabilization of the hip and knee. This exercise will also deter a “knock knee” position from occurring – which is a dangerous position for the ACL.

Instruction: Face forward and laterally run to the first cone on the right. Pivot off the right foot and shuttle run to the second cone. Now pivot off the left leg and continue onto the third cone. 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.

C. Bounding run (44 yds)

Elapsed Time: 9 – 10 min

Purpose: To increase hip flexion strength/increase power/speed

Instruction: Starting on the near sideline, run to the far side with knees up toward chest. Bring your knees up high. Land on the ball of your foot with a slight bend at the knee and a straight hip. Increase the distance as this exercise gets easier.

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***Begin your training session with your coach. After the completion of training, resume the PEP program at section V.***

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### ***Section V: Stretching***

It is important to incorporate a short warm-up prior to stretching. Never stretch a “cold muscle”. By performing these stretches, you can improve and maintain your range of motion, reduce stiffness in your joints, reduce post-exercise soreness, reduce the risk of injury and improve your overall mobility and performance. Note: this portion of the program may be moved to the end of your training session. Do a warm-up such as brisk walking for five to 10 minutes before stretching. Gently stretch to a point of tension and hold. Hold the stretch for 30 seconds. Concentrate on lengthening the muscles you are stretching. Breathe normally.

A. Calf stretch (30 seconds x 2 reps)

Elapsed Time: 10 to 11 minutes

Purpose: stretch the calf muscle of the lower leg

Instruction: Stand leading with your right leg. Bend forward at the waist and place your hands on the ground (V formation). Keep your right knee slightly bent and your left leg straight. Make sure your left foot is flat on the ground. Do not bounce during the stretch. Hold for 30 seconds. Switch sides and repeat.

B. Quadricep stretch (30 seconds x 2 reps)

Elapsed Time: 11 to 12 minutes

Purpose: stretch the quadricep muscle of the front of the thigh

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Instruction: Place your left hand on your partner's left shoulder. Reach back with your right hand and grab the front of your right ankle. Bring your heel to buttock. Make sure your knee is pointed down toward the ground. Keep your right leg close to your left. Don't allow knee to wing out to the side and do not bend at the waist. Hold for 30 seconds and switch sides

C. Figure Four Hamstring stretch (30 sec x 2 reps)

Elapsed Time: 12 – 13 min

Purpose: To stretch the hamstring muscles of the back of the thigh.

Instruction: Sit on the ground with your right leg extended out in front of you. Bend your left knee and rest the bottom of your foot on your right inner thigh. With a straight back, try to bring your chest toward your knee. Do not round your back. If you can, reach down toward your toes and pull them up toward your head. Do not bounce. Hold for 30 seconds and repeat with the other leg.

D. Inner Thigh Stretch (20 sec x 3 reps)

Elapsed Time: 13 – 14 min

Purpose: Elongate the muscles of the inner thigh (adductor group)

Instruction: Remain seated on the ground. Spread your legs evenly apart. Slowly lower yourself to the center with a straight back. You want to feel a stretch in the inner thigh. Now reach toward the right with the right arm. Bring your left arm overhead the stretch over to the right. Hold the stretch and repeat on the opposite side.

E. Hip Flexor Stretch – (30 sec x 2 reps)

Elapsed Time: 14 - 15 min

Purpose: Elongate the hip flexors of the front of the thigh.

Instruction: Lunge forward leading with your right leg. Drop your left knee down to the ground. Placing your hands on top of your right thigh, lean forward with your hips. The hips should be square with your shoulders. If possible, maintain your balance and lift back for the left ankle and pull your heel to your buttocks. Hold for 30 seconds and repeat on the other side.