

# PATELLOFEMORAL PAIN SYNDROME (RUNNER'S KNEE)

## What is patellofemoral pain syndrome?

Patellofemoral pain syndrome is pain behind the kneecap. It has been given many names, including patellofemoral disorder, patellar malalignment, runner's knee, and chondromalacia.

## How does it occur?

Patellofemoral pain syndrome can occur from overuse of the knee in sports and activities such as running, walking, jumping, or bicycling.

The kneecap (patella) is attached to the large group of muscles in the thigh called the quadriceps. It is also attached to the shin bone by the patellar tendon. The kneecap fits into grooves in the end of the thigh bone (femur) called the femoral condyle. With repeated bending and straightening of the knee, you can irritate the inside surface of the kneecap and cause pain.

Patellofemoral pain syndrome also may result from the way your hips, legs, knees, or feet are aligned. This alignment problem can be caused by your having wide hips or underdeveloped thigh muscles, being knock-kneed, or having feet with arches that collapse when walking or running (a condition called over-pronation).

## What are the symptoms?

KNEE

The main symptom is pain behind the kneecap. You may have pain when you walk, run, or sit for a long time. The pain is generally worse when walking downhill or down stairs. Your knee may swell at times. You may feel or hear snapping, popping, or grinding in the knee.

## How is it diagnosed?

Your healthcare provider will review your symptoms, examine your knee, and may order knee X-rays.

## How is it treated?

Treatment includes the following:

- Place an ice pack on your knee for 20 to 30 minutes every 3 to 4 hours for the first 2 to 3 days or until the pain goes away
- Elevate your knee by placing a pillow underneath your leg when your knee hurts.
- Take anti-inflammatory pain medicine, such as ibuprofen, as prescribed by your healthcare provider (adults aged 65 years and older should not take non-steroidal anti-inflammatory medicine for more than 7 days without their healthcare provider's approval)

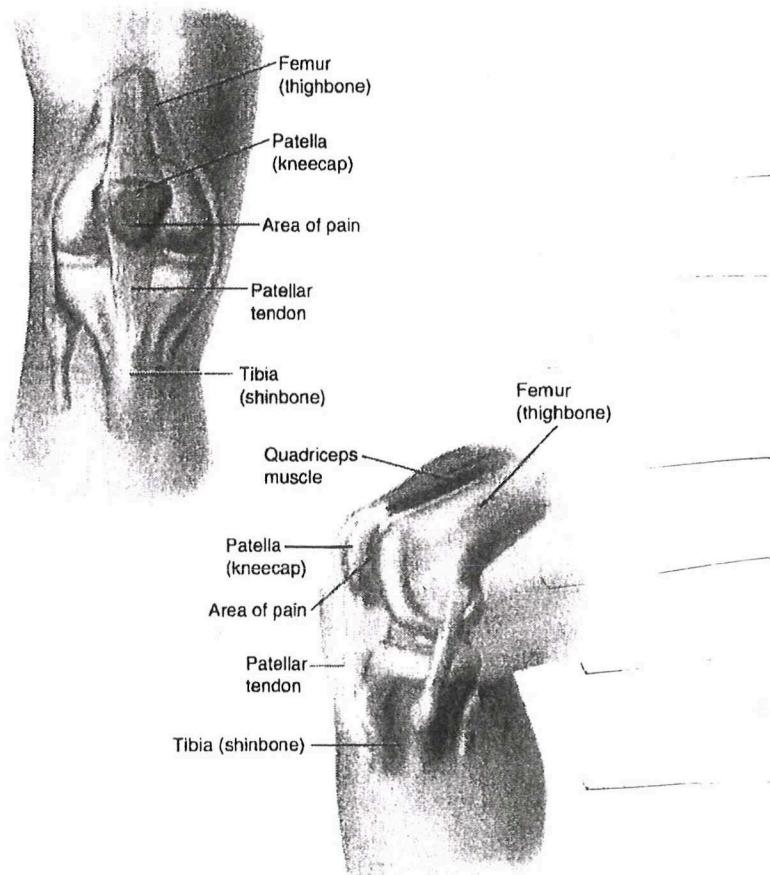
- Do the exercises recommended by your healthcare provider or physical therapist.

Your healthcare provider may recommend that you:

- Wear shoe inserts (called orthotics) for over-pronation. You can buy orthotics at a pharmacy or athletic shoe store or they can be custom-made.
- Use an infrapatellar strap, a strap placed beneath the kneecap over the patellar tendon.
- Wear a neoprene knee sleeve, which will give support to your knee and patella.

While you are recovering from your injury, you will need to change your sport or activity to one that does not make your condition worse. For example, you may need to bicycle or swim instead of run. In cases of severe patellofemoral pain syndrome, surgery may be recommended. Your healthcare provider will show

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you exercises to help decrease the pain behind your kneecap.

### When can I return to my sport or activity?

The goal of rehabilitation is to return you to your sport or activity as soon as is safely possible. If you return too soon you may worsen your injury, which could lead to permanent damage. Everyone recovers from injury at a different rate. Return to your sport or activity will be determined by how soon your knee recovers, not by how many days or weeks it has been since you were injured. In general, the longer you have symptoms before you start treatment, the longer it will take to get better.

You may safely return to your sport or activity when, starting from the top of the list and progressing to the end, each of the following is true:

- Your injured knee can be fully straightened and bent without pain.
- Your knee and leg have regained normal strength compared to the uninjured knee and leg.

- You are able to jog straight ahead without limping.
- You are able to sprint straight ahead without limping.
- You are able to do 45-degree cuts.
- You are able to do 90-degree cuts.
- You are able to do 20-yard figure-of-eight runs.
- You are able to do 10-yard figure-of-eight runs.
- You are able to jump on both legs without pain and jump on the injured leg without pain.

### How can I prevent patellofemoral pain syndrome?

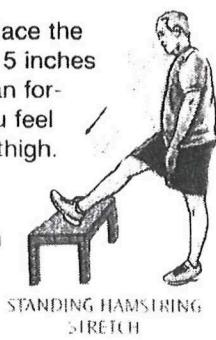
Patellofemoral pain syndrome can best be prevented by strengthening your thigh muscles, particularly the inside part of this muscle group. It is also important to wear shoes that fit well and that have good arch supports.

## PATELLOFEMORAL PAIN SYNDROME (RUNNER'S KNEE) REHABILITATION EXERCISES

You can do the hamstring stretch right away. When the pain in your knee has decreased, you can do the quadriceps stretch and start strengthening the thigh muscles using the rest of the exercises.

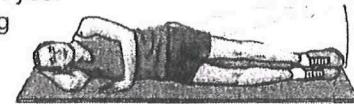


**1. STANDING HAMSTRING STRETCH:** Place the heel of your leg on a stool about 15 inches high. Keep your knee straight. Lean forward, bending at the hips until you feel a mild stretch in the back of your thigh. Make sure you do not roll your shoulders and bend at the waist when doing this or you will stretch your lower back instead. Hold the stretch for 15 to 30 seconds. Repeat 3 times for each leg.



**2. QUADRICEPS STRETCH:** Stand an arm's length away from the wall, facing straight ahead. Brace yourself by keeping one hand against the wall. With your other hand, grasp the ankle of the opposite leg and pull your heel toward your buttocks. Don't arch or twist your back. Keep your knees together. Hold this stretch for 15 to 30 seconds. Repeat 3 times on each side.

**3. SIDE-LYING LEG LIFT:** Lying on your side, tighten the front thigh muscles on your top leg and lift that leg 8 to 10 inches away from the other leg. Keep the leg straight. Do 3 sets of 10.



SIDE-LYING LEG LIFT

**4. QUAD SETS:** Sitting on the floor with one leg straight and your other leg bent, press the back of your knee of your straight leg into the floor by tightening the muscles on the top of your thigh. Hold this position 10 seconds. Relax. Do 3 sets of 10.



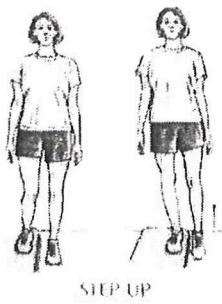
## PATELLOFEMORAL PAIN SYNDROME (RUNNER'S KNEE) REHABILITATION EXERCISES (continued)

**5. STRAIGHT LEG RAISE:** Lie on your back with your legs straight out in front of you. Bend one knee and place the foot flat on the floor. Tighten up the top of your thigh muscle on the opposite leg and lift that leg about 8 inches off the floor, keeping the thigh muscle tight throughout.

Slowly lower your leg back down to the floor. Do 3 sets of 10 on each side.



**6. STEP-UP:** Stand with the foot of one leg on a support (like a block of wood) 3 to 5 inches high. Keep your other foot flat on the floor. Shift your weight onto the leg on the support and straighten the knee as the other leg comes off the floor. Lower your leg back to the floor slowly. Do 3 sets of 10.



STEP UP

**7. WALL SQUAT WITH A BALL:** Stand with your back, shoulders, and head against a wall and look straight ahead. Keep your shoulders relaxed and your feet 2 feet away from the wall and a shoulder's width apart. Place a soccer or basketball-sized ball behind your back. Keeping your head against the wall, slowly squat down to a 45 degree angle. Your thighs will not yet be parallel to the floor. Hold this position for 10 seconds and then slowly slide back up the wall. Repeat 10 times. Build up to 3 sets of 10.



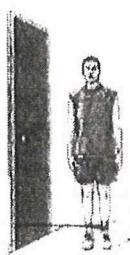
WALL SQUAT WITH A BALL

**8. KNEE STABILIZATION:** Wrap a piece of elastic tubing around the ankle of one leg. Tie a knot in the other end of the tubing and close it in a door.

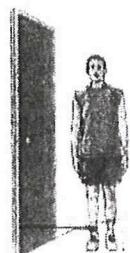
A. Stand facing the door on the leg without tubing and bend your knee slightly, keeping your thigh muscles tight. While maintaining this position, move the leg with the tubing straight back behind you. Do 3 sets of 10.



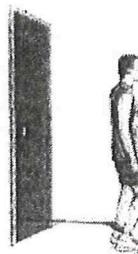
B. Turn 90° so the leg without tubing is closest to the door. Move the leg with tubing away from your body. Do 3 sets of 10.



C. Turn 90° again so your back is to the door. Move the leg with tubing straight out in front of you. Do 3 sets of 10.



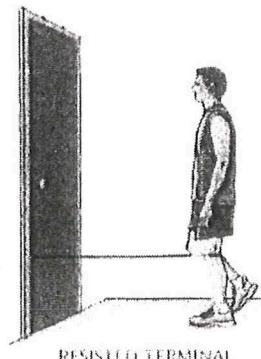
KNEE STABILIZATION



D. Turn your body 90° again so the leg with tubing is closest to the door. Move the leg with tubing across your body. Do 3 sets of 10.

Hold onto a chair if you need help balancing. This exercise can be made even more challenging by standing on a pillow while you move the leg with tubing.

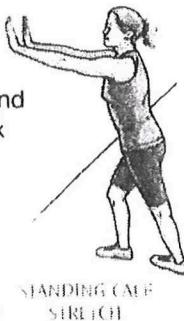
**9. RESISTED TERMINAL KNEE EXTENSION:** Make a loop from a piece of elastic tubing by tying a knot in both ends, and closing both knots in a door. Step into the loop so the tubing is around the back of one leg. Lift the other foot off the ground. Hold onto a chair for balance, if needed. Bend the knee on the leg with tubing about 45 degrees. Slowly straighten your leg, keeping your thigh muscle tight as you do this. Do this 10 times. Do 3 sets. An easier way to do this is to perform this exercise while standing on both legs.



RESISTED TERMINAL KNEE EXTENSION

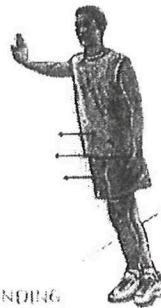
## PATELLOFEMORAL PAIN SYNDROME (RUNNER'S KNEE) REHABILITATION EXERCISES (continued)

**10. STANDING CALF STRETCH:** Facing a wall, put your hands against the wall at about eye level. Keep one leg back with the heel on the floor, and the other leg forward. Turn your back foot slightly inward (as if you were pigeon-toed) as you slowly lean into the wall until you feel a stretch in the back of your calf. Hold for 15 to 30 seconds. Repeat 3 times. Do this exercise several times each day.



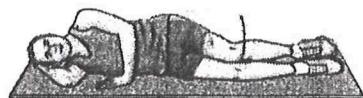
STANDING CALF STRETCH

**12. ILIOTIBIAL BAND STRETCH: SIDE-BENDING:** Cross one leg in front of the other leg and lean the opposite direction from the front leg. Reach the arm on the side of the back leg over your head while you do this. Hold this position for 15 to 30 seconds. Return to the starting position. Repeat 3 times.



ILIOTIBIAL BAND STRETCH: SIDE-BENDING

**11. CLAM EXERCISE:** Lie on one side with your hips and knees bent and feet together. Slowly raise your top leg toward the ceiling while keeping your heels in contact with each other. Hold for two seconds and lower slowly. Do 3 sets of 10 repetitions.



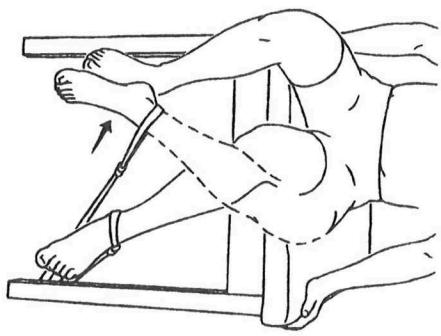
CLAM EXERCISE

contact with each other. Hold for two seconds and lower slowly. Do 3 sets of 10 repetitions.

KNEE

## HIP / KNEE - 58 Hip External Rotation: Resisted

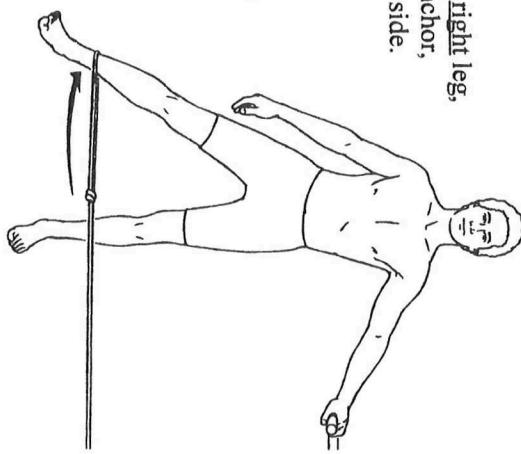
Sit with band loop around left ankle, anchor on same side. Keeping thigh flat and knee bent at right angle, pull ankle across body.



Repeat 10 times per set.  
Do 3 sets per session.  
Do 1 sessions per day.

## HIP / KNEE - 27 Strengthening: Hip Abduction – Resisted

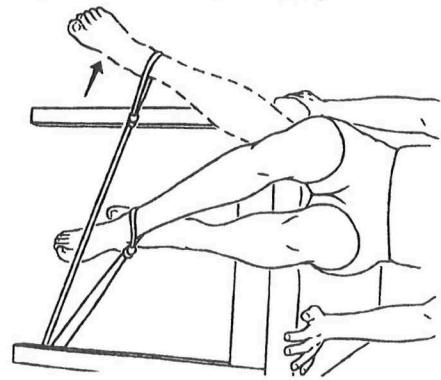
With tubing around right leg, other side toward anchor, extend leg out from side.



Repeat 10 times per set.  
Do 3 sets per session.  
Do 1 sessions per day.

## HIP / KNEE - 59 Hip Internal Rotation: Resisted

Sit with band loop around right ankle, anchor on other side. Keeping thigh flat and knee bent at right angle, pull ankle away from body.



Repeat 10 times per set.  
Do 3 sets per session.  
Do 1 sessions per day.

## HIP / KNEE - 30 Strengthening: Hip Diagonal – Resisted

With tubing around left leg, anchor behind on same side, begin with leg out behind. Pull leg across front of body as if kicking a soccer ball.

Repeat 10 times per set.  
Do 3 sets per session.  
Do 1 sessions per day.

