

## Patellofemoral Syndrome

Patellofemoral Syndrome (PFS) typically presents as front knee pain that results from inefficient patellar (kneecap) tracking. This malalignment can result from several factors including weakness in the quadriceps muscles, forcing turnout, tightness in the IT band, or knee hyperextension. Dance as an art form requires high demands from the knee joint to remain stable against stress and strain as well as keeping proper biomechanics during weight bearing squatting. Therefore, as a dancer flexes or bends the knee, such as in plié, the patella can slide to the outside of the joint. This can result in uneven wear on the articular surface of the kneecap.

Perhaps the most frequent technical fault found in dancers with PFS is inefficient turnout. If the dancer is trying to focus on turnout from the ground up, gripping at their feet instead of from the hip external rotators, this causes excessive torque at knee. Lack of core control and pelvic stability as well as flat feet or rolling in of the feet can all contribute to increase lateral torque at the knee and patellar instability.

Dancers with PFS may report poorly localized anterior knee pain typically exacerbated with physical activity especially deep squatting or grand plié. Common symptoms include pain with demi-plié, landing jumps and developpe movements. Daily activities such as ascending or descending stairs as well as sitting for prolonged periods of time can also exacerbate symptoms.

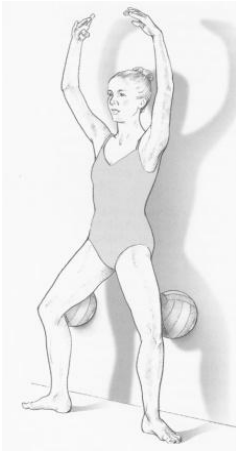
To improve the use of your hip turnout muscles to better support your knee you can try the following exercise:



**Clamshell/ Hip Rotator Strength** – Lying with hips and knees bent to 45° think of using deep rotator muscles in buttock to lift knee toward ceiling. Be sure pelvis does not roll backward and do not arch back.  
Do 3 sets of 10

**Reverse Clamshell** – Lying with hips and knees bent to 45°, keep your knees together and rotate your foot forward keeping your hamstring relaxed. Be sure to not roll your pelvis forward.  
Do 3 sets of 10

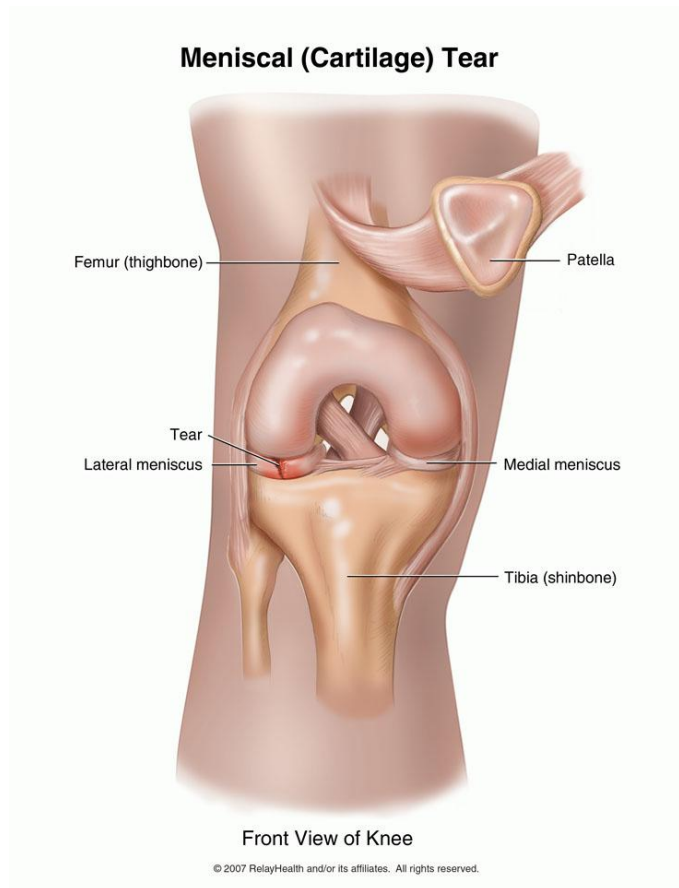




**Wall Plié/ Hip Rotator Strength** – Place back against wall with legs in a 2<sup>nd</sup> position demi plié (you can use two balls between knee and wall for resistance). Rotate thighs back pressing knees toward wall against resistance of ball. Be sure to maintain neutral spine and pelvis so that your back does not arch, and keep knees over toes. Hold for 4 seconds. Do 3 sets of 10

## Meniscal Tears

Meniscal tears involve an injury to the meniscus structures in the knee. The menisci are designed to act as a barrier and shock absorber between the femur and tibia. These "C" shaped structures can reduce friction at the knee during repeated flexion and extension. This injury can result from an acute trauma such as landing a jump or over time from repeated stresses on the knee. Meniscal tears also vary in severity from minor fraying to complete tears or avulsions. If a piece of the meniscus is torn, this may impede full movement of the knee joint and make locking the knee difficult. The most common mechanism of injury for meniscal tears is twisting the knee when the foot is planted. This can happen as a strategy to increase turnout.

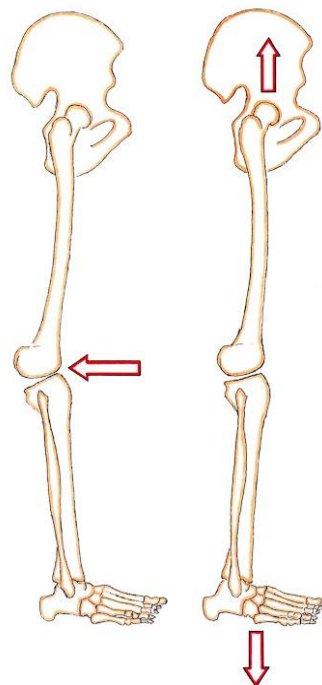
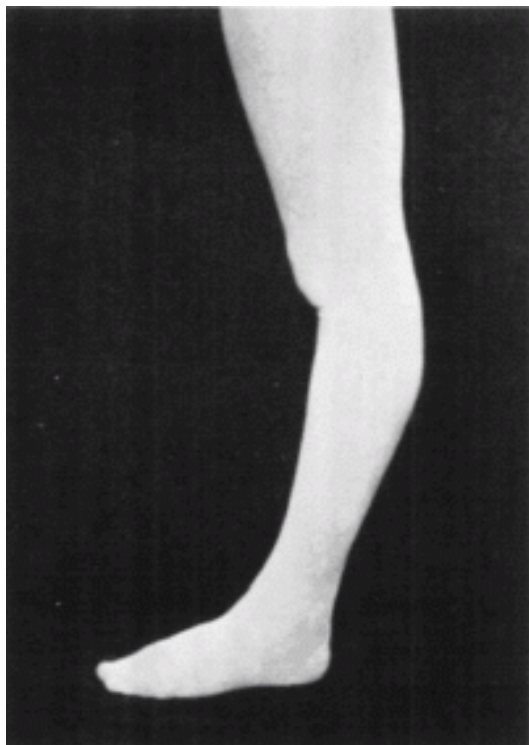


Dancers may report tenderness or pain well localized to the medial or lateral joint line. Swelling of the knee may not present over the course of the injury, but edema may present 2-3 days post injury. Although uncommon, a dancer may report the knee "giving out" with movement, which is typically an indication of quadriceps inhibition rather than ligamentous laxity. Other activities that can exacerbate symptoms include pain with walking and difficulty with fully extending or flexing the knee due to swelling and pain.

## **Knee Hyperextension**

Knee hyperextension, or genu recurvatum, is a significant issue concerning knee pain in dancers. Aesthetically, hyperextension of the knees is thought by some to complement the dancer. Hyperextension of ten degrees or more is common in classically trained ballet dancers. Due to the extreme demands for flexibility of the hips, knees and ankles, dancers tend to be ligamentously lax. The dancer may notice other joints of the body with similar hyperextension such as the elbow or thumb.

Hyperextension of the knees is not automatically an injury of itself. However, it has been found that hyperextension of the supporting leg can increase the likelihood of injury. If the ligaments supporting the back of the knee are excessively loose, the knee will shift backward when the dancer stands pulled up. Muscle imbalance in the thigh may increase the likelihood of having genu recurvatum. The quadriceps may be overactive, causing an imbalance between the quads and hamstrings. This can also contribute to an increased pull at the front of the knee thus forcing the knee backwards.



Often a dancer will notice, “my knees extend backward when I stand up straight at the barre.” These dancers tend to “hang” on their ligaments’ boundaries instead of using dynamic muscular control of the quadriceps and hamstrings. This may also be due to the physics concerned with keeping one’s center of gravity over the standing leg and ankle in point shoes. Symptoms may include pain with prolonged standing postures especially in forced turnout, discomfort at the back of the knee joint, and increased knee pain with pointè work.

## **Foam Roller Exercises for Major Muscle Groups around the Knee**

### **Hamstrings:**

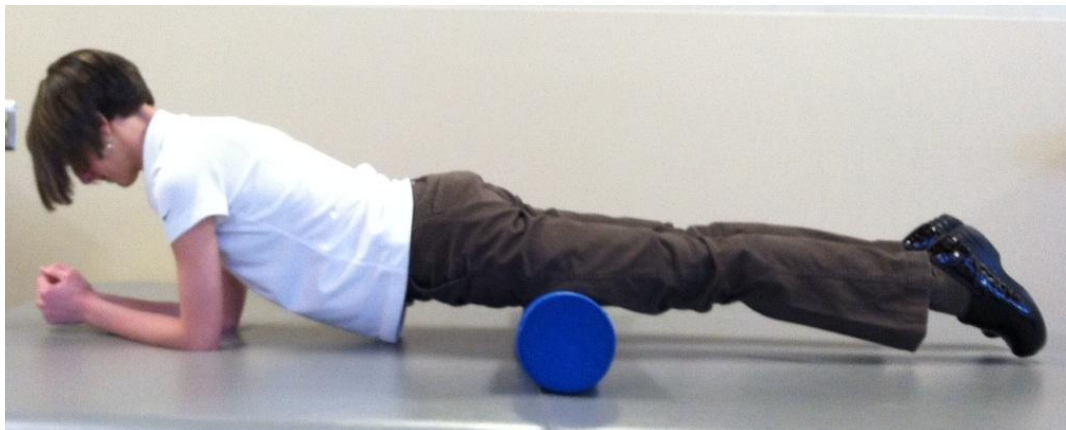
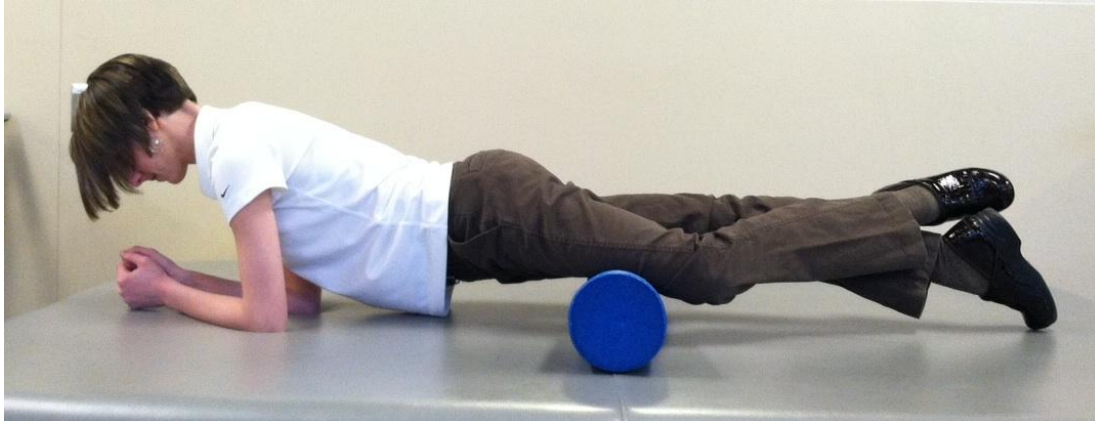
Sit down on top of the foam roller then position yourself just below the hip joint. Start at the top of the hamstrings and roll down the back of your thigh to the knee. Repeat for 30 seconds 2-3 times.



\*You can perform this exercise using two legs for less pressure or just one leg for more pressure. Roll over the hamstrings with your legs turned in and out to cover the entire muscle group.

**Quads:**

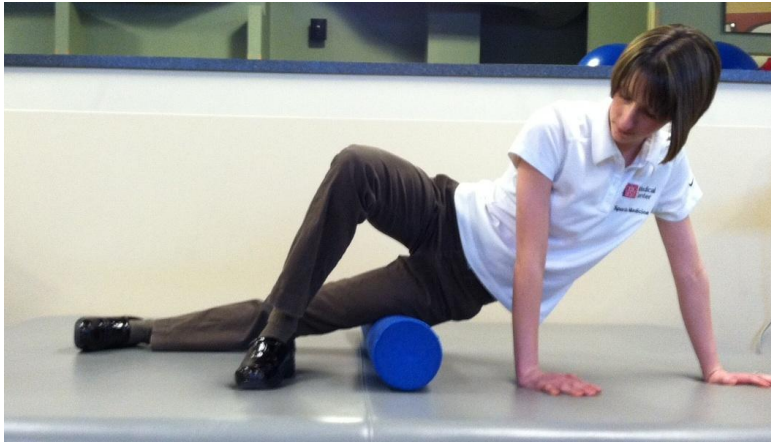
Lay on top of the roller facing the floor and use your hands for balance. Start near your hip joint and roll down the front of the thigh to the knee. Repeat for 30 seconds 2-3 times.



\*You can perform this exercise using two legs for less pressure or just one leg for more pressure. You may also keep your feet on the floor to support more of your body weight as needed.

**Iliotibial Bands (ITBs):**

Lie on the roller on your side, with the roller positioned just below the hip. Start near your hip joint and roll down the outside of your thigh. Repeat for 30 seconds 2-3 times on each leg.



\*You can take your top leg forward by bending the knee and placing your foot on the floor. This will decrease the pressure and improve balance as needed. If you want to increase pressure just keep the top leg in line with the bottom leg.

### **Resources:**

1. Bracilovic, A. (2009). *Essential dance medicine*. New York, NY: Humana Press.
2. Clippenger, Karen. (2007). *Dance anatomy and kinesiology*. Champaign, IL: Human kinetics.
3. Haas, Jacqui green. (2010). *Dance anatomy*. Champaign, IL: Human kinetics.
4. Leiderbach, M. (2008). *Dance medicine: strategies for the prevention and care of injuries to dancers; common knee injuries in dance*. La Crosse, WI: Orthopaedic section of APTA.
5. Solomon, S, Solomon J, Minton, S. (2005). *Preventing dance injuries*. Champaign, IL: Human kinetics.