Pointing you in the RIGHT DIRECTION

DANCERS' health CORNER

BY KATHERINE EWALT

Note: The Dancers' Health Corner is a regular column for *DSD* that presents information and/or advice about dance-related injury and injury prevention. The information is provided as a resource and should not be used to self diagnose or treat. Dancers who experience ongoing pain should seek the advice of a physician or clinician to avoid aggravating current symptoms or potentially causing other more serious injuries. Due to legal limitations, no individual diagnosis or treatment plans will be provided through this forum. If you have questions you'd like answered in this column, e-mail them to info@PAARTSsandiego.com.

Q: I am a hip hop dancer, and I have pain and tightness at the outside of my left knee, particularly with deep knee bending during hip hop dance, going up/down stairs, and when I wear high heeled shoes. What causes this pain and tightness, and why is it only in my left knee? — Katie P.

A: Pain and tightness at the outside of the knee is often the result of repetitive motion activities and long hours of training. Commonly, pain in this area is related to a friction condition referred to as Iliotibial Band Syndrome (ITBS). The iliotibial band (ITB) is a layer of connective tissue that begins at two muscles near the outside of the hip and travels down the outside boarder of the thigh, crossing the outside of the knee joint with fibers attaching to the patella (knee cap), outer side of the tibia (shin bone) and fibula.

ITBS is common in runners and active persons who perform repeated knee bending and straightening while bearing weight. In dance, this mechanism of injury is seen in activities such as plie, glissade, saute and jete as well as during variations of these movements in hip hop technique. As these actions are performed over and over in class and rehearsal, the iliotibial band repeatedly rubs across the lateral femoral condyle (bump of the thigh bone at the outside aspect of the knee) resulting in irritation. Over time, pain and tightness may develop; in severe cases the dancer may notice a snapping or clicking at the outside of the knee. Once a dancer develops symptoms during physical activity, it is common for similar pains to be noticed during activities of daily living that also require knee bending and straightening while weight bearing, such as walking up and down stairs.

Factors that contribute to the development of this condition in dancers include:

- Bony structure (how you are built)
- Tight iliotibial band
- Tight muscles in the hip, thigh and lower leg
- Weak muscular control at the pelvis and hip
- Biomechanics and dance technique
- Inclined surfaces

A dancer's bony structure may create lateral (outer) knee pressure making him or her more susceptible to ITBS. Pronated feet (arches that roll in), genu varus (bow legs), and/or a difference in leg length are all related to increased stress in the soft tissues of the outer knee. Pronation of the foot causes the tibia to rotate inward, which tightens the ITB causing it to rub with more force against the lateral femoral condyle. Similarly, bow-legged structure causes tightening of the muscles at the outer aspect of the knee and lower leg. In dancers who have differing leg lengths, the foot on the short leg must plantar flex (the direction of pointing the foot) in order to "reach" the floor. Similar to pronation, this pulls the soft tissues on the outer aspect of the knee and lower leg, causing the ITB to tighten and increasing friction.

Tightness at any point along the ITB can result in restriction of this tissue at the outside of the knee. It is important that dancers maintain the suppleness and flexibility of the ITB to limit the amount of friction that occurs during knee bending and straightening activities. Likewise, tightness in the hip flexors, hip rotators, quadriceps, hamstrings and calf muscles affect the biomechanics of the body and may contribute to faulty movement patterns leading to excess stress on the iliotibial band.

Proper alignment and dance technique (biomechanics)

play a role in preventing ITBS by limiting the amount of stress placed on the outer knee. In dance, a general rule for lower extremity alignment is to keep the knee in line with the second toe (the toe next to the big toe) when performing plie or deep knee bending. This skill requires adequate strength of the hip external rotators (the turnout muscles) and core stabilizers. That being said, hip hop dance is unique in that it often requires fast and repetitive deep knee bending with the knees coming together, moving apart or a combination of these movements. Again, maintaining flexibility is vital as often quick movements in a bent knee position result in tightening of the musculature of the lower extremities.

Performing activities on an inclined surface, such as a raked stage, and wearing high heeled shoes have individually been found to result in biomechanical compensations that affect the amount of stress placed at the knee joint. Facing downstage while dancing on a raked stage and wearing high heeled shoes contribute to tightness of the calves, hamstrings, quadriceps, hip flexors and musculature of the low back. It has also been found that the lateral gastrocnemius and peroneus longus (outside calf muscles) are more vulnerable to fatigue in women who wear high heeled shoes[1]. This scenario sets up a compensatory mechanism in the lower extremity as other muscles try to make up for fatigue in the calf to maintain stability of the knee, ankle and foot.

Several factors may be responsible for the pain only being felt in the left knee. At times, dancers perform choreography that is "one sided" and requires more knee bending, jumps, slides or extreme motions on one side. Repetitive use of one side over the other contributes to muscular imbalance and may result in increased tightness of the ITB as well as tightness in the other muscles of the hip, thigh and calf.

As mentioned, the dancer's skeletal structure may contribute to forces on the outside of the knee, such as one leg being longer than the other or one femur (thigh bone) sitting in a slightly different position in its socket. Lastly, the dancer's alignment and dance technique should be evaluated bilaterally to ensure proper positioning.

Any of these factors may be involved in the initial development of ITBS signs and symptoms. However, the dancer who continues to engage in aggravating activities may worsen the injury and develop compensatory movement patterns to avoid the pain. In general, the longer you have the symptoms before you care for the injury, the longer it will take to get better.

To help prevent Iliotibial Band Syndrome, it is suggested dancers include a structured stretching regimen as part of their daily dance routine[2]. Once symptoms begin, resting the area and applying ice to the outside of the knee will help to reduce pain and inflammation. In general, it is recommended that an ice pack be placed over the injured site for 20 minutes after activity or when pain is present.* Deep tissue massage can be affective in loosening the ITB, quadriceps, hamstrings and calf muscles as well as in decreasing pain. Core stability exercises should be implemented to improve alignment.

Additionally, ITB straps can be worn. These straps, which are available at most sporting good stores, are placed above the knee joint to provide minor compression and limit friction of the iliotibial band. If rest, ice, stretching, strengthening and use of the ITB strap do not alleviate the pain or discomfort, or if pain and discomfort worsen, it is recommended that you seek medical advice. **DSD**

**If significant pain, swelling or hives develop with the use of ice, discontinue immediately.*

[1]Gefen A, et al. Analysis of muscular fatigue and foot stability during high-heeled gait. Gait and Posture 2002; 15: 56-63.

[2]Reid D, et al. Lower extremity flexibility patterns in classical ballet dancers and their correlation to lateral hip and knee injuries. American Journal of Sports Medicine 1987; 15(4): 347-352.

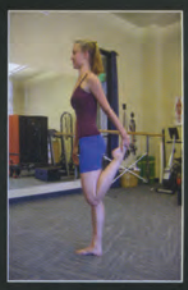
Katherine Ewalt, MS ATC, NCTM, HHP, is the owner and director of Performing Arts and Athletic Restorative Training Specialists (PAARTS) in San Diego. PAARTS is a multifaceted wellness studio specializing in the needs of performing artists, athletes and active people. Ewalt has worked in the fields of Sport and Performing Arts Medicine for 10 years and is actively involved with the International Association for Dance Medicine and Science (IADMS) and the National Athletic Trainers' Association (NATA) Performing Arts Medicine Task Force. For more information, please contact info@PAARTSsandiego.com or (619) 225-5762.

Stretching guideline: Perform 3 repetitions of each stretch for 30 seconds. Execute stretches on both lower extremities. If pain increases, discontinue the stretch.

Note: The side being stretched is in parenthesis.
Model for stretches: Claire Bletz

LEFT: Gastrocnemius Stretch (left)

RIGHT: Soleus Stretch (left)



LEFT: Hamstring Stretch (right)

RIGHT: Quadriceps Stretch (left)

LEFT: Iliotibial Band Stretch (left)

RIGHT: Iliotibial Band Stretch (left)

LEFT: Piriformis Streatch (left)

LEFT: Hip Flexor Stretch (left)