



### **Top Ten Prevention tips for dancers**

1. Proper training and teaching are essential to allow dancers of all ages to develop their skills without injury. It is particularly important to remember to maintain correct technique in positions which stress the spine, such as arabesque and attitude, and being aware of 'lengthening' the torso during any back-bending movements. Same goes for the hip! Don't fake turnout.
2. Take adequate rest to allow the body to heal itself from daily wear and tear.
3. Maintain energy levels by eating and drinking adequately. Calcium helps build strong bones, so drink lowfat milk. Chocolate milk is an excellent recovery drink!!
4. Conditioning and strengthening of the hip, back and also the leg muscles that support the arch are crucial.
5. Try to avoid dancing on hard or uneven surfaces, which could cause injury.
6. Take care of your shoes!
7. Dancers should adopt new training schedules slowly. Dancers should be encouraged to cross-train year round to maintain aerobic fitness.
8. Although not always possible when dancing, but more so off stage or out of class, wear supportive footwear, and if you need to wear orthotics, wear them as often as possible.
9. If dancers perform excessive pointe or demi-pointe work one day, they should focus on other types of work during the next workout.
10. Early recognition of symptoms is important. Stop activity if pain or swelling occurs. If the pain persists after a few days rest, consult a sports-medicine physician.

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# Common Dance Injuries

## Foot and Ankle Injuries

### Dancer's Fracture

"I landed badly from a jump and now it hurts to walk."

#### **Causes**

This is the most common acute fracture seen in dancers. This fracture occurs along the 5th metatarsal, the long bone on the outside of the foot. The typical method of injury is landing from a jump on an inverted (turned-in) foot. The dancer will usually experience immediate pain and swelling. He or she may or may not be able to walk.

#### **Treatment**

Treatment typically consists of ice, elevation, and limiting weight bearing activities. Consulting with a physician to confirm a fracture will be necessary. A dancer's fracture will require a period of immobilization while the injury heals. Rehabilitation should follow to rebuild foot and ankle mobility and strength.

### Sesamoiditis

"I have pain underneath my big toe, particularly while walking without shoes."

Sesamoid bones are unique in that they are not connected to any other bones in the body. There are two very small bones (about the size of a kernel of corn) on the underside of the forefoot near the big toe. These two sesamoids provide a smooth surface over which tendons controlling the big toe are located.

#### **Causes**

The sesamoids provide a support surface while the dancer is on demi-pointe. The tendon that runs between the sesamoids can become inflamed, causing sesamoiditis, a form of tendinitis. Pain is focused under the big toe on the ball of the foot. With sesamoiditis, pain may develop gradually. There may be pain while bending and straightening the big toe.

#### **Treatment**

The dancer may be required to rest and take time off from rehearsals while the pain and inflammation from sesamoiditis decreases. A consult with a physician is indicated to rule out a sesamoid fracture. A physical therapist or athletic trainer consult is also helpful to identify and correct muscle imbalances and assist with acute symptom relief. The use of a J-shaped pad around the area of the sesamoid to relieve pressure may be helpful, as is taping the toe so that it remains slightly downward (plantarflexed). It may take several months for the pain associated with sesamoiditis to be completely relieved. Surgical intervention to remove the sesamoid bones should only be considered after all conservative measures have been exhausted.

### Hallux Rigidus (or Limitus)

"I have pain in my big toe with full relevé."

#### **Causes**

This condition is characterized by pain and/or restriction of movement at the joints of the big toe. To achieve full demi-pointe the metatarsal phalangeal joint must be able to make a 90 degree angle. Dancers who start later in life may lack this much mobility. A dancer without mobility who forces a high demi-pointe will cause the bones in the joint to impinge on each other. If this is done repeatedly, bone spurs will develop leading to even further decreased motion in the joint, inflammation and eventual degeneration of the joint.

Compensations for lack of full mobility include sickling. This position will decrease impingement but

it is not an esthetically acceptable line and puts the dancer at risk for ankle sprains. An acceptable and safe compensation for this condition is a half demi-pointe position. The dancer must learn to rise onto the ball of the foot without forcing the foot into full demi-pointe.



### **Treatment**

During the acute stages, rest and ice are helpful to reduce pain and inflammation. A good way to ice this injury is with an ice massage for 5 minutes. Stretching of the foot can be done to help improve flexibility. The stretch into a demi-pointe position can be done in a non-weight bearing position, in a pain free range and should be held for 30 seconds. The dancer should assess the available pain free range of the joint and learn to work within that range. Taping the great toe to restrict full demi-pointe can be effective in relieving symptoms. The tape should be applied so that the toe remains slightly downward (plantarflexed). Mobilization of the metatarsal phalangeal joint by an experienced clinician is also quite effective.



**Ice Massage**



**Stretching of big toe and sole of the foot**

### **Plantar Fasciitis**

"My foot hurts when I walk barefoot, especially first thing in the morning."

### **Causes**

Plantar Fasciitis is an overuse injury affecting the sole of the foot. The tough, fibrous band of tissue (fascia) connecting the heel bone to the base of the toes becomes inflamed and painful. Most often people will experience pain first thing in the morning when they step out of bed. Dancers will often experience an increase in pain after class, or following lengthy weight bearing activities. Plantar fascia pain can also be influenced by tightness in the calf or the Achilles tendon, or dancing on a hard surface or a non-sprung floor.

### **Treatment**

The earlier plantar fasciitis is treated, the quicker it can be resolved. Rest and ice are the first treatments for plantar fasciitis. Anti-inflammatory medication can also be helpful. For persistent conditions, physical therapy or athletic training treatments to assist with tight tissues and identify

weakness is indicated. Chronic conditions respond well to the use of an overnight splint (issued by your physician or clinician) to provide a long duration stretch to the affected tissues.

### **Metatarsalgia**

"I have pain over the balls of my feet."

#### **Causes**

Metatarsalgia is characterized by pain and tenderness along the ball of the foot. For dancers, this is commonly caused by instability in the joints of the smaller toes. Repeated sprains and overstretched ligaments can lead to laxity, or increased flexibility in these joints. For a dancer, years of overwork and forcing of extreme motion in the foot can increase laxity and may cause subluxation of these joints.

#### **Treatment**

As with all acute inflammatory conditions, ice and rest are appropriate. Strengthening the muscles that control toe flexion can be helpful. This can be done with towel scrunches (using your toes to grab a towel placed on the ground and drawing it towards you). A metatarsal pad just behind the balls of the feet can help prevent subluxations and may relieve pain.

## **Common Injuries of the Ankle**

### **Achilles Tendinitis**

"My heel and lower calf hurt, particularly while running or jumping."

Tendinitis can occur in any of the tendons about the ankle, including the flexor hallucis longus tendon (the dancer's tendon), the peroneus brevis tendon, and the peroneus longus tendon. It most commonly occurs, however, in the body's longest tendon—the Achilles tendon. Able to withstand forces equal to and greater than 1000 pounds, this tendon connects the calf muscles to the heel bone (calcaneus) and is responsible for plantar flexion of the foot to achieve releve and performing jumps. Due to its' heavy workload in the dancing population, it is prone to inflammation (tendinitis). It unfortunately is also the most frequently ruptured tendon in dancers and non-dancers alike.

#### **Causes**

Most cases of Achilles tendonitis are due to overtraining of the dancer, particularly heavy training during a short period of time. Other contributing factors for Achilles inflammation would be:

- Returning to dance after a long period of rest
- A natural lack of flexibility in the calf muscles
- Dancing on a hard surface or a non-sprung floor

Aside from pain over the area of the Achilles, dancers with Achilles tendonitis can also notice:

- Mild pain after dancing that worsens
- Tenderness in the morning located ½" above tendon attachment to heel bone
- Stiffness that fades once tendon is sufficiently warm
- Swelling and inflammation

#### **Treatment**

As with all overuse injuries, the sooner the injury is addressed, the more positive the outcome. Rest and ice are immediate treatments for conditions that do not allow for any pain free activity. Active stretching of the Achilles is helpful. However, dancers need to exercise caution with stretching the Achilles beyond the point of comfort. Strengthening exercises should be introduced gradually. For chronic conditions, the use of an overnight splint to assist with dorsiflexion range of motion can be helpful. Orthotic prescription can be helpful to correct any structural imbalances in the foot. However, if a dancer has no correctable faults, orthotics may not assist with symptom relief.

### **Posterior Impingement Syndrome**

Posterior impingement syndrome (dancer's heel)

"I have pain with pointing my foot and relevé."

### **Causes**

Posterior impingement syndrome, commonly known as dancer's heel, involves compression of soft tissues at the back of the ankle. A bony-formation or bump behind the ankle causes this compression. The dancer generally feels discomfort at the back of the ankle when the toe is pointed or in relevé.

### **Treatment**

Dancers should use ice and anti-inflammatory medications to help reduce soft tissue swelling. Stretching of the tissues in the back of the heel (calf and Achilles) is important to reduce the stress placed on those structures. A physician and physical therapy/athletic training consults are indicated to identify joint mobility restrictions or other imbalances that might be contributing to the condition. Some health-care professionals may recommend steroid injections to assist with local inflammation. Finally, if non-surgical treatment does not help alleviate the discomfort, surgical intervention will be required to remove the bump that is compressing the soft tissue.

### **Anterior Impingement Syndrome**

"I can't achieve full plié on one side. And when I do, it's painful."

### **Causes**

Anterior impingement syndrome involves the top of the ankle where the shin bone (tibia) meets the ankle (talus). There can be direct contact between these bony structures. With hundreds or thousands of pliés, this direct contact can eventually result in a bony formation at the front of the ankle. This bony formation compresses the soft tissue and creates pain. A dancer will typically notice pain with deep pliés, as well as significant swelling at the front of the ankle joint.

### **Treatment**

Early recognition of symptoms is extremely important because anterior impingement syndrome is not reversible. Ice and/or anti-inflammatory medications can be helpful to reduce local swelling. A clinician can assist with re-establishing normal joint mobility or identifying areas of inadequate strength or flexibility. A dancer may want to try some simple ideas to help relieve stress to the tissues during class or performances, including:

- perform in street shoes
- use one-quarter to half-inch heel lifts
- discontinue forced pliés

With advanced cases, surgery is sometimes pursued. It should be understood by the dancer that surgery very often leads to a recurrence of the bone formation within three to four years.

### **Lateral Ankle Sprain**

"I rolled my ankle during class and heard a 'pop' sound."

Ankle sprains are the most common type of ankle injury for dancers. Ankle sprains involve the lateral (outside) structures of the ankle and occur when the ankle is inverted (turned or rolled outwards). A lateral ankle sprain is the result of tears to any of the lateral stabilizing ligaments. Sprains are graded 1st, 2nd, or 3rd degree (3rd degree being the most severe) depending on the involvement and integrity of these ligaments.

### **Causes**

Ankle sprains are usually sustained upon landing jumps, either improperly or landing on an object or another dancer's foot. It is common for significant sprains to also produce an audible 'pop' sound. Other related factors that can contribute to ankle sprains include:

1. working close to the limits of strength
2. a slight loss of balance
3. a lapse in concentration

Upon sustaining an ankle sprain, a dancer will usually notice swelling and pain over the lateral ankle. The severity of these symptoms will vary depending on the severity of the sprain. Some dancers are able to walk, some are unable to bear weight at all. Bruising over the lateral ankle can emerge within 1-3 days following an ankle sprain.

### **Treatment**

As with any injury that involves inflammation, apply the RICE treatment protocol:

- Rest — avoid using the ankle to prevent further damage.
- Ice — apply ice or cold packs to the ankle for 15–20 minutes each hour to help reduce swelling.
- Compression — wrap a tensor bandage around the ankle to help reduce swelling.
- Elevation — elevate above the heart and support the ankle while resting to prevent blood from pooling and increasing swelling.

The severity of the ankle sprain will dictate the amount of protection and immobilization the ankle requires. A Grade 1 sprain may only need the support of an ace wrap bandage or an Aircast splint. A Grade 3 sprain may need to be immobilized with a splint and the dancer will likely need to use crutches or a walking boot for ambulation. Ankle sprains should be evaluated by a physician to rule out any fractures. Follow-up treatment with a physical therapist or athletic trainer is crucial to develop strength and balance prior to returning to dance activities and thus reduce the potential for recurring sprains.

Shin splints, stress reactions, and stress fractures:

“I have pain in the front of my shins. It hurts worse during class.”

Shin splints, stress reactions, and stress fractures are all overuse injuries of the lower leg usually associated with forceful, repetitive activities such as running or jumping. Shin splints involve pain at the front of the lower leg in the shin region. The pain is caused by an irritation of either the periosteum (the lining of the tibia, or shin bone) or the muscles and tendons in the area. A stress reaction is defined by accelerated remodeling or re-absorption of bone. A stress fracture is a small crack or cracks that occur as a result of repeated loading of the bone when muscles are fatigued. Fatigued muscles transfer more of the load to the bone. Shin splints or stress reactions can progress to stress fractures if left untreated. Stress fractures can progress to complete bone fractures if left untreated. The feet are the most common site of stress fractures in dancers, and the tibia is the most common place for stress reactions or shin splints.

### **Causes**

All three conditions result in an aching pain that may become more severe during activity. Intensive dance rehearsal and a high percentage of time dancing on pointe or demi-pointe will increase the stress and pressure on the foot and tibia. As muscles become fatigued the dancer may have difficulty maintaining position, and the muscles transfer stress to other soft tissues and bone. When the bone is repeatedly stressed and has low bone mineral density levels, it can eventually result in a stress fracture. Dancing on hard floors increases the risk of stress fractures and stress reactions.

### **Treatment**

Treatment of shin splints may involve various techniques, which include:

- resting the area
- applying ice to control inflammation
- physical therapy/athletic training treatments
- correcting any underlying postural distortions that may aggravate or contribute to the injury (knee hyperextension, weak abdominal muscles, anterior or posterior tilted pelvis, pronation/supination of the foot, etc.)

With stress fractures, rest for the injured area is the only treatment that will allow the bone to heal. It may be necessary to unload the stress for a period of time by using crutches or a walking boot. A lack of pain does not mean that the bone has healed (many people do not report symptoms). A dancer should consult with their physician or clinician prior to returning to dance. Upon return to dance, the dancer should not experience any pain. If the dancer resumes activity too quickly, the stress fracture is more likely to progress to a complete bone fracture.

## Knee Injuries

### **Genu Recurvatum (Hyperextension)**

"My knees extend way back, and now they're painful."

The knee can sometimes extend "beyond straight", creating a convexity of the leg posteriorly (towards the back). This hyperextension of the knees is thought by some to complement the aesthetic of the leg with a pointed foot. In dancers, this often indicates a general predisposition towards ligamentous laxity. The dancer may notice other joints of the body with similar hyperextension.

#### **Causes**

Ballet dancers in general show more of a trend towards this hyperextension of the knees. Trouble arises when the dancer "locks" back in to his or her knees, or has an extreme amount of flexibility in the knee joint (looser ligaments/significant amount of hyperextension) and therefore places undue stress on the knee joint and lower leg rather than employing muscle strength for stance.

#### **Symptoms / Associated problems**

Hyperextension of the knees can put excessive stress onto other structures in and around the knee, which can become painful. Common associated problems include:

- A muscle imbalance in the thigh, in which the quadriceps muscles can be overactive and the hamstrings subsequently are not as well developed.
- Patella displacement or subluxation can occur, due to poor quadriceps development or general ligamentous laxity.
- The unusually high amount of loading placed on the lower leg can result in "shin splints" or even, in more severe cases, tibial stress fractures.

#### **Treatment**

The varied associated problems of hyperextended knees will require an assessment by a physician or clinician to determine where weaknesses may exist and which structures are consequently under stress. A well designed home exercise program can be crucial in correcting and preventing reoccurrence of pain.

A dancer should also consider an analysis of technique and alignment during training, as poor mechanics can aggravate injury. In particular, many instructors have developed different syntax and imagery to appropriately cue dancers with natural hyperextension to work in a more anatomically sound way – encouraging dancers not to "lock their knees" or "find the breath behind the knee" are common choices. It is also important that younger dancers with naturally hyperextended knees should be taught how to avoid "sitting into" their hyperextension. They should work in first position with the heels together, and should learn to feel the knees "pull up", and not lock back. In this position the knees will not feel straight, however the dancer will learn to feel the correct alignment.

### **Patello-Femoral Syndrome (Chondromalacia) - "Runner's Knee"**

"I have pain on the front of my knee. It gets worse with stairs, and sitting for a long time."

Patello-Femoral Syndrome (PFS) is a general term to describe pain affecting the joint surface between the patella and the femur underneath. Behind the patella is a cartilage lining which provides for a smooth gliding surface between these two structures. Chondromalacia is a softening or wearing away of this articular cartilage under the patella, resulting in pain and inflammation.

#### **Causes**

Typically, pain with PFS and chondromalacia will present over a period of time. Dancers will notice pain during class, especially with jumps and/or grande pli . The knee may begin to swell at the kneecap and may start to become painful with stairs and sometimes sitting for a long time. Overuse during training and technique or mechanical faults employed by the dancer can aggravate this condition. Very often, dancers will present with iliotibial band tightness along the outside of the thigh or weakness in the medial quadriceps muscle. If the condition persists over time, the cartilage behind the kneecap can begin to soften and become damaged due to the repeated compression on the femur.

### **Treatment**

If chondromalacia patella is identified in the early stages of inflammation, conservative treatment can be effective. Ice and anti-inflammatory medications can be helpful in reducing acute inflammation and pain. Dancers should modify their training activities when possible to reduce stress from jumping and excessive knee flexion (grande pli ). A physician, athletic trainer and/or physical therapist consult is essential to determine which structures in the knee exhibit excessive tightness or weakness. An examination of the foot, ankle, and hip should also take place as those joints transfer stresses to the knee. Dancers may be presented with various surgical options for patella-femoral stabilization. Surgical correction should only be attempted once all conservative treatment options have been exhausted.

### **Technical Tip:**

Dancers should make sure that the knees are fully 'pulled up' especially working in 5th position. Some dancers 'cheat' the 5th position and aim to get more turn-out by standing with the front leg slightly bent. Some will also complain that they cannot get the leg straight in 5th position, therefore allowing the knee to relax. This results in weakness in the vastus medialis oblique muscle (VMO), and tightness in vastus lateralis and the iliotibial band (ITB) which can cause uneven pull on the patella.

### **Patellar tendonitis/"Jumper's Knee"**

"The front of my knee hurts when I jump."

At the base of the kneecap (patella) is a thick patellar tendon, connecting the patella to the tibia bone below. This tendon is part of the 'extensor mechanism' of the knee, and together with the quadriceps muscle and the quadriceps tendon, these structures allow your knee to straighten out, and provide strength for this motion.

### **Causes**

Patellar tendonitis is the condition that arises when the tendon and the tissues that surround it, become inflamed and irritated. This is usually due to overuse, especially from jumping activities. This is the reason patellar tendonitis is often called "jumper's knee." Patellar tendonitis usually causes pain directly over the patellar tendon. A physician or clinician may be able to recreate your symptoms by placing pressure directly on the tendon. The tendon will often become visibly swollen as well.

### **Treatment**

The most important first step in treatment is to avoid activities that aggravate the problem. With patellar tendonitis this typically includes stair climbing and jumping activities. Dancers may need to restrict their class and rehearsals to limit these activities until symptoms improve. During the acute injury stage ice and anti-inflammatory medications may be helpful for pain relief. Stretching of the quadriceps, hamstring, and calf muscles prior to activity is very important to relieve stress on the patella tendon. A consult with a physician or physical therapist can be very helpful to evaluate strength, flexibility, or technique deficits that may be contributory factors in patellar tendonitis.



## Hip Injuries

### **Trochanteric Bursitis:**

"I have pain over the side of my hip."

Inflammation of trochanteric bursae is a common cause of hip pain in dancers. The greater trochanter of the femur is a broad, flat section of bone that serves to anchor several large muscles at the outer hip. The trochanteric bursa lies underneath the attachment of some of these muscles and serves to cushion and reduce potential friction between bones, tendons, and muscles.

### **Causes**

There are many potential causes of trochanteric bursitis in dancers. Some conditions can arise from acute injury or impact. Most commonly however, trochanteric bursitis has no specific method of injury. Potential causes can include overuse, a structural imbalance of the lumbar spine, muscular imbalances in the hip and/or pelvis, a leg length discrepancy, or a lateral snapping hip.

### **Treatment**

Conservative measures will normally be sufficient to resolve trochanteric bursitis. An assessment by a physician or clinician to identify structural or mechanical imbalances is essential. A stretching and/or strengthening program can assist with correcting such imbalances. For acute pain and inflammation, ice and anti-inflammatory medications can also be helpful.

### **Snapping hip:**

"My hip snaps when I do grande battement or developpe a la seconde."

### **Causes**

Usually painless and harmless, a snapping hip can occur as a muscle or tendon passes over a bony structure. Occurring frequently in dancers, two kinds of snapping hip exist.

- Lateral snapping hip, the most common form, generally involves movement of the IT Band over the greater trochanter.
- Anterior snapping hip, usually presents as a more internal kind of snapping, as the iliopsoas tendon passes over a bony prominence on the front of the pelvis or the femur.

### **Treatment**

If there is no pain associated with snapping hip, there is no need for treatment. Painful conditions should be assessed by a physician or clinician for soft tissue or joint restrictions or any strength or flexibility deficits. Dancers may need to reduce their rehearsal regimen until symptoms decrease. Anti-inflammatory medication may be indicated to assist with decreasing edema.

### **Iliacus tendinitis:**

"I have pain in the front of my hip, near my groin."

Diagnosed most often in younger dancers, iliacus tendinitis affects the iliacus muscle, at the lower portion of the iliopsoas muscle at the front of the hip. This can also be referred to as iliopsoas syndrome.

### **Causes**

Iliacus tendonitis often results from overuse during dance activities. It can affect modern dancers more often, due to the increased emphasis on hip flexion and internal rotation. Pain is most often felt in front of the hip, often in the groin. Pain and often crepitus is felt on palpation over the iliacus muscle.

### **Treatment**

Conservative measures are normally sufficient in dealing with the pain associated with iliacus tendonitis. A dancer may need to reduce their rehearsal regimen until symptoms decrease. Anti-inflammatory medication can assist with reducing swelling along the tendon. An assessment by a physical therapist or athletic trainer can assist with soft tissue management and correcting muscular or structural imbalances that may also be present.

**Piriformis syndrome:**

"I have pain in my buttock and low back."

The piriformis is a muscle that lies underneath the gluteus maximus muscle in the buttock. It is small compared to other muscles around the hip and thigh, and it aids in external rotation (turning out) of the hip joint.

**Causes**

The piriformis muscle and its tendon have an intimate relationship to the sciatic nerve--the largest nerve in the body--which supplies the lower extremities with motor and sensory function. Due to the nature of dance and the emphasis on hip rotation and turnout, the piriformis muscle can become tight and restricted in dancers. The proximity of the piriformis muscle to the sciatic nerve can cause pain to radiate into the buttock and lower extremity.

**Treatment**

Conservative measures are normally sufficient in dealing with pain. An assessment with an athletic trainer or physical therapist can be helpful to identify areas of hip weakness or restrictions that may be contributing factors. Deep tissue massage to the piriformis can be helpful in relieving muscle spasms. Anti-inflammatory medication can assist with reducing swelling in the muscle group and along the sciatic nerve. Dancers may have to temporarily reduce their rehearsal regimen to decrease acute symptoms.

**Stress fracture of the femoral neck:**

"I've had a deep pain in the front of my hip for a while now. It hurts during class."

Stress fractures of the femoral neck are not as common as other conditions illustrated here, but they can occur with dancers. Repeated training with either faulty technique or muscle imbalance can increase the risk for a stress fracture.

**Causes**

Dancers typically notice pain in the groin, hip girdle, or anterior thigh. Symptoms can occur during or after class and can be elicited with passive movement and stretching, particularly internal rotation of the hip or turn-in. A physician may request an X-ray or bone scan to confirm the diagnosis.

**Treatment**

Depending on the severity of injury, time off from class and rehearsals or performances may be indicated. Dancers may be required to avoid weight bearing on the hip with the use of crutches. Weight bearing is gradually increased over several weeks to a few months. Pool workouts may be helpful during the rehabilitative phase to decrease the load placed on the hip during exercise.

**Hip Injuries:Prevention/tips for dancers:**

1. Try to maintain flexibility in the hip joints, including the iliopsoas, iliotibial band (ITB) and gluteal muscles. This will help prevent injuries caused by friction. This may involve some stretches which are not covered in class, so try to do them after class when you are really warm, and hold them for a minimum of 30 seconds.

2. Keep a balance between left and right side leg strength, to avoid overworking muscles, and muscle imbalance issues.
3. Make sure you eat enough foods with sufficient calcium, for strong healthy bones.

## Back Injuries

### **Low back muscle strain and spasm**

"I pulled something in my back."

#### **Causes**

Muscle strains and lumbar sprains are the most common causes of low back pain. A low back muscle strain occurs when the muscle fibers are abnormally stretched or torn. Causes can include an acute injury such as lifting a heavy object or a sudden movement or fall. Other causes include repetitive injuries such as improper technique or working on the same lift over and over. Muscle tearing such as this will lead to guarding and spasm of the back musculature to protect the area from further harm. Dancers will typically experience pain exclusively in the low back area.

#### **Treatment**

Dancers will do well with conservative treatment of low back strains and spasm. Initial treatment will include rest, ice, and anti-inflammatory medicines. A consult with a physical therapist can help identify areas of weakness, tightness, or postural faults that may have predisposed the dancer to injury. The dancer may also want to critically look at any technical faults including lifting technique to help prevent future injury.

### **Kissing spines – interspinous sprain**

"I have pain when I overarch my back."

Kissing spines is a term for a condition in which the spinous processes of adjacent vertebra are touching. It is also known as Bastrup's disease or syndrome.

#### **Causes**

Kissing spines can either be caused by trauma or degenerative factors. Injuries that involve sudden, forceful flexion of the spine, such as driving accidents, falls, sudden torsions, or severe direct blows can be causative factors. It can also be caused by degenerative changes in the interspinous ligaments along the tips of the spinous processes of the vertebrae. It can affect the cervical vertebrae, but in dancers it commonly affects the lower lumbar vertebrae. Dancers will typically notice pain and limitation with both extension and flexion motions.

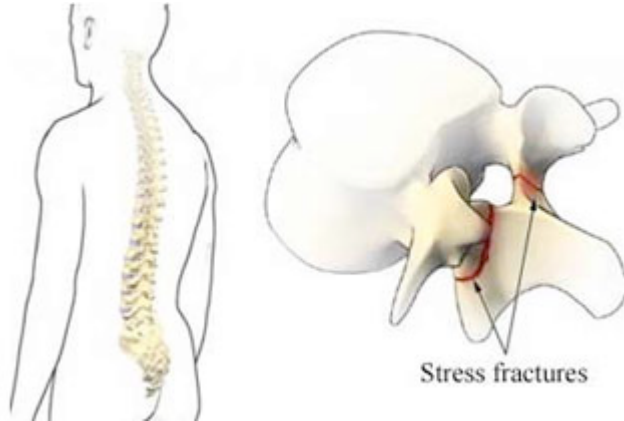
#### **Treatment**

Initially, ice and rest are indicated to reduce local tissue inflammation and swelling around the injured tissue. A physician may recommend anti-inflammatory medication to assist with pain and edema. A physical therapist consult is also valuable to help the dancer regain strength and mobility deficits. The dancer should also be instructed in proper body mechanics with everyday tasks (e.g., getting in/out of bed) to ensure no further unnecessary stress is applied to the injured area. Symptoms usually decrease after 3 days and should subside between 1-6 weeks. A safe return to full class or performance is ideally only possible when the dancer feels neither pain nor discomfort, so that muscles can react and perform appropriately. Any pain-avoiding behavior caused by remaining symptoms could place the patient at risk for re-injury.

### **Spondylolysis**

"My back hurts when I arch."

Spondylolysis is the occurrence of a stress fracture in one or more of the vertebrae of the lumbar spine. (See diagram below) It commonly begins on one side of the vertebrae, and then may extend to the other side.



### **Causes**

Spondylolysis can have a hereditary component, but also is attributed to repeated stress to the lumbar spine. Activities such as dance and gymnastics put a great deal of stress on the lower back and require over-stretching or hyperextension of the spine. Dancers may notice no symptoms until there is sudden trauma, such as a hyperextension injury. Pain will typically occur with port de bras or cambré backwards. The dancer may notice pain initially only with dancing. Pain may then occur with normal activities of daily living, and further progress to pain which interferes with sleep.

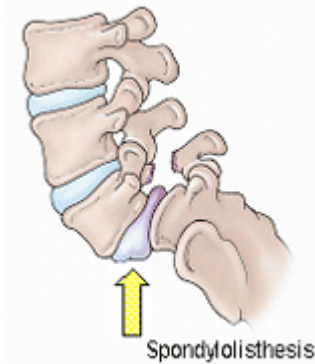
### **Treatment**

Physicians can diagnose spondylolysis with an x-ray to the lumbar spine. Dancers will likely be required to reduce their activity level and/or modify their technique in class. For severe cases, a short period of bed rest can be beneficial. Tissue healing can take as long as 2-3 months. During this time, participation in activities such as swimming, biking and limited weight lifting is usually permissible as long as it is pain-free. Physicians may prescribe a brace such as the modified Boston brace which prevents any extension of the lumbar spine. Dancers may be required to wear this brace for several hours a day, reducing this time as healing progresses. A physical therapist consult is helpful to assist the dancer with strength and flexibility training and to prepare the dancer for return to full dance activities.

### **Spondylolisthesis**

"I have back and buttock pain when I arch back."

Spondylolisthesis is the forward slippage of a vertebra on the one below. (See diagram below) It commonly will be present with spondylolysis and is typically seen in girls more than boys.



### **Causes**

Causes of spondylolysis include stress fractures (caused by repetitive hyper-extension of the back), and traumatic fractures caused by a direct force or sudden twist. The dancer will typically complain of localized pain or a pain that radiates into both buttocks, stiffness in the lower back, and increased irritation after activity. Dancers with spondylolysis usually display a significant lumbar spine curvature (lordosis) with tightness in the hamstrings.

### **Treatment**

Treatment varies depending on the severity of the spondylolysis. Most dancers require only strengthening and stretching exercises issued by a physical therapist, combined with activity modification (avoiding hyperextension of the back). Some physicians recommend the use of a rigid brace to assist with stabilization of the joint. Conservative therapy for mild spondylolysis is successful in about 80% of cases. For cases with severe pain not responding to therapy, if the slip is severe, or there are neurologic changes, the slipping vertebra might need to be surgically fused. This surgery will limit lumbar spine range of motion and has a higher incidence of nerve injury than most other spinal fusion surgeries. Therefore surgery is only considered after all conservative treatments have been exhausted.

### **Herniated Lumbar Disc**

"I have low back pain and pain occasionally shoots down my leg."

Between each vertebrae are discs, made up of a combination of strong connective tissues which hold one vertebra to the next. These discs act as a cushion between the vertebrae. As individuals age, the center portion of the disc (nucleus pulposus) may start to lose water content, making the disc less effective as a cushion. This may cause a displacement of the disc's center through a crack in the outer layer (known as a herniated or ruptured disc). A herniated lumbar disc can ultimately press on the nerves in the spine and may cause pain, numbness, tingling or weakness of the leg called "sciatica".

### **Causes**

A disc herniation may occur suddenly in an event such as a fall or an accident. Often, a twisting or torsional movement is involved. Disc problems may also occur gradually with repetitive straining of the lumbar spine.

### **Symptoms**

Most commonly, dancers will experience low back pain, but also leg pain over the outside of the thigh, the lower leg, or foot. The pain is often described as an electric shock type of symptom. Severe cases of herniated lumbar disc injury will appear as bowel or bladder problems. Individuals with bowel or bladder complaints or who are having numbness around the genitals require immediate medical attention.

### **Treatment**

An evaluation by a physician and physical therapist is critical to resolution of the dancer's symptoms. The physician may request an x-ray or MRI to identify the location and severity of the disc herniation. Anti-inflammatory medications may be prescribed to assist with acute pain and local

edema. A physical therapist will determine where physical deficits exist and instruct the dancer on postural corrections and activity modifications that might need to be made.

Conservative management of a herniated disc can often be sufficient to allow a dancer to return to full activity. If conservative management fails, surgical treatment may be recommended if there is a significant neurological component (i.e. leg weakness or numbness). Surgery is performed to remove a portion or all of the disc, and free up space around the compressed nerve. Recovery times from disc surgery vary from person to person, but a dancer should expect to have activity restrictions for 6-8 weeks following surgery.

### **Sacroiliac Joint Sprain**

"I have pain low in my back, especially when I lie on my side."

The sacroiliac joint is a firm, small joint that lies at the junction of the spine and the pelvis. The joint does not have a lot of motion, but it is critical to transferring the load of your upper body to your lower body and can become quite painful when injured.

### **Causes**

Certain situations increase the risk of straining the sacroiliac joints. During pregnancy, the ligaments in the sacroiliac area soften and lengthen. This may also occur with prolonged bending or lifting and with degenerative arthritis. In dancers, potential for sacroiliac injury is significant due to the extreme ranges of motion and artistic demands placed on dancers. Dancers with sacroiliac pain may or may not recall a method of injury. Symptoms may present over the sacroiliac joint, or it may be referred, usually to the groin and the posterior thigh, and less often to the leg. Pain may become worse when they lie on the affected side

### **Treatment**

During the acute phase of injury, pain may be relieved by rest and anti-inflammatory medication. Physical therapy to assist with joint mobilization and stretching and strengthening exercises can be very helpful. As with any ligamentous injury, a period of decreased intensity of class or rehearsals may be required for healing. Dancers are nearly always able to return to their usual daily routine after a few days or, at most, a few weeks of therapy.

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