

Iliotibial Band Syndrome by [Stephen M. Pribut, DPM](#)

Introduction:

Iliotibial band syndrome is an injury that has been seen over the past few years with increasing frequency. It appears to be related to weak hip abductor muscles. Strengthening the hip abductors and stretching the ITB and structures that attach in to it are usually the keys to recovering from this problem.

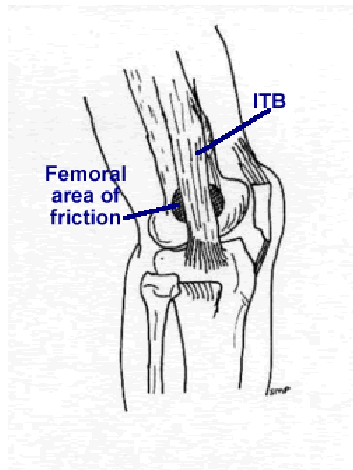
Symptoms and Causes:

Symptoms of the iliotibial band syndrome include pain or aching on the outer side of the knee. This usually happens in the middle or at the end of a run. A concomitant problem may occur at the hip called greater trochanteric bursitis. During flexion and extension of the knee the iliotibial band rubs over the femoral condyle which leads to irritation. Weak hip abductors, especially the gluteus medius is often found. Some other factors that may contribute to this syndrome include genu varum (bow legs), pronation of the foot (subtalar joint pronation), leg length discrepancy, and running on a crowned surface. We need to emphasize that over the past few years an association with weak gluteus medius muscles has been found in many runners with ITB syndrome.

The function of the muscles inserting into the ITB (Tensor Fascia Lata) is to abduct the leg. If the hip abductors are weak, then the ITB is being overworked. The ITB does not have an insertion that offers a favorable mechanical advantage. In fact, it is at a considerable disadvantage for the purpose of hip and leg abduction activity. Therefore when the hip abductors are weak, the tensor fascia lata must contract harder and over a longer period of time thus straining the ITB. Make sure that part of your cure is to strengthen your hip and leg abductors.

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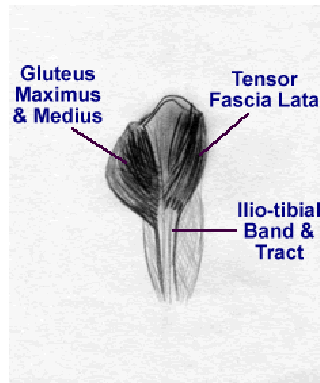
Circular track running may also contribute to ITB, since it stresses the body in a manner similar to that of crowned surfaces and leg length differences. Circular track running was found in research performed on track athletes in the year 2000 to cause asymmetrical muscle strength development. The study did not measure ITB and related muscle strength but found lower down on the leg that the inner leg had stronger inverter strength and the outer leg had stronger everter strength. While it was not studied the outer ITB would likely be placed under much greater stresses than the inner leg. The angles of force acting on it would be greater, just by virtue of the leg and pelvis position required to run around an oval track. All of these factors can be aggravated by a tight iliotibial band. Changes in training may also contribute to the development of ITB syndrome. It is always important to examine your training regimen and see what alterations have recently occurred. A rapid increase in running distances and times spent running often precedes the development of this injury.



ITB Friction Syndrome

Anatomy:

The iliotibial band is a thickening of the lateral (outer) soft tissue that envelopes the leg, which is called the fascia. In this area it is called the fascia lata. The thickened band is called the ilio-tibial band. The muscles that insert into the proximal (upper) portion of this band are the tensor fascia lata and a portion of the gluteus maximus and gluteus medius muscles. During its latter course it splits medially into the iliopatellar band and laterally into the iliotibial tract. At its insertion into the tibia at Gerdy's tubercle it blends with the Biceps femoris and the Vastus lateralis.



Hip Muscles

Self-Treatment:

Self treatment for this problem should include:

- Temporary decrease in training
- Side Stretching
- Avoid crowned surfaces or too much running around a track
- Shorten your stride
- Wear motion control shoes to limit pronation or if you have been wearing motion control shoes, try less controlling shoes.
- Carefully examine your training regimen (if you've been keeping a running diary - check it for possible training errors).
- Strengthen your hip abductors (gluteus medius, etc.)

Side Stretch

The side stretching is performed while standing as follows: Place the injured leg behind the good one. If the left side is the sore side, cross your left leg behind your right one. Then lean away from the injured side towards your right side. There should be a table or chair that you can hold onto for balance on that side. This stretch is the best of several that exist for this area. Be careful not to overstretch. Hold for 7 to 10 seconds and repeat on each side 7 to 10 times.



Hip Abductor Strengthening

The hip abductor's strength may be tested by trying to balance on one leg. You will probably find it difficult to balance on the affected leg. You may strengthen your hip abductor muscles by standing on one leg and lifting or tilting the other hip upward. Keep the knee straight on the leg you are standing on.

If your self-treatment has not been completely successful than a trip to a sports medicine specialist may include the additional treatment of either a steroid injection below the IT band and possible orthotics. Treatment is usually succesful for this problem.

References:

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 Terry GC, Hughston JC, Norwood LA. The anatomy of the iliopatellar band and the iliotibial tract. Am J Sports Med 1986; 14(1):39-45.



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Common knee injuries and runners knee - Do your knees sometimes give you the blues? If so, you're in good company: common knee injuries are the curse of many athletes, especially runners.

For instance, about 60 per cent of all runners are injured in an average year, and about one-third of those misfortunes occur at the knee, producing a yearly knee injury rate of one in five runners ('Running Injuries to the Knee,' Journal of the American Academy of Orthopedic Surgeons, vol. 3, pp. 309-318, 1995).

If your knee injury pain is lateral (on the outside edge of a knee), then it's likely that you are suffering from one of the most common knee complaints - iliotibial band syndrome (ITBS). As you may have learned the hard way, ITBS may aggravate your knee enough to drastically limit or even completely stop your training.

Iliotibial band syndrome has been around since man (and woman) first learned to run, but it wasn't actually described in the medical literature until 1975 (Sports Injuries and Their Treatment, p. 56, J. B. Lippincott Publishers, Philadelphia, 1975). The syndrome is often labelled an 'overuse' injury, but that's a very poor way to describe the origin of the problem, since it implies that the main source of difficulty is excess mileage. The truth is that runners can be afflicted with ITBS on a regime of just five to 10 miles per week, even though such volume would hardly constitute overtraining. The key source of iliotibial band syndrome disorders is actually a lack of strength and flexibility in the iliotibial band, sometimes combined with a perverse fondness for running either on the track or on crowned roads, as you'll see in a moment.

Abduction and adduction

What exactly is the iliotibial band? It's not a jazz group whose members tap in time to their music with their tibias. The central feature of the iliotibial band is a key muscle, the tensor fascia lata, which runs down the outside of the thigh just below the hip. Like all muscles, the tensor fascia lata has a band of connective tissue at each end which bind it to bone. The upper band merely ascends vertically a short distance to attach at the top of the hip (thus the name ilio-), but the lower one runs all the way down the side of the thigh before attaching to the lateral side of the tibia, just below the knee (hence the name -tibial).

Overall, the iliotibial band scoots down the outside of the leg from the hip to below the knee, kind of like a broad stripe in one's 'musculo-tendinous uniform'. If you're curious about the muscle's name, the word 'tensor' means 'makes tense', 'fascia' means 'band', and 'lata' signifies 'wide', providing a pretty accurate description of the characteristics of this key muscle.

If you do some digging in any human anatomy book, you'll find that the key action of the tensor fascia lata and its associated bands of connective tissue is supposedly to 'abduct the thigh' (in the patois of human anatomy, 'abduction' means moving a body part away from the midline of the body). At first glance, this 'key action' seems to make sense. If you activate a muscle which originates at the hip and runs down to the outside of the leg just below the knee, wouldn't it simply pull the leg outward, away from the other leg and from the imaginary centre line of the body, a bit like flapping a wing? Of course it would, but how useful is that motion during running? In fact, how instrumental is it to everyday life?

Someone who makes a habit of abducting his legs during movement should set his sights on the ballet stage, instead of athletic competitions. The real function of the iliotibial band during running is not to flap the leg outward but to control and decelerate adduction of the upper part of the leg. Adduction is the reverse of abduction; it's the movement of an anatomical structure toward the body's midline. And it's this very motion which requires constant control during running.

If that's not exactly crystal clear, picture yourself running for a moment. Let's say that you have 'toed off' from you left foot, soared through the air for a fraction of a second, and have just landed on your right foot. As you do so, your right foot tends to pronate (the ankle joint rotates in a clockwise direction and the foot rolls to the inside), your tibia rotates in a clockwise direction, and - lo and behold! - your femur (the bone in the upper part of the leg) moves inward (goes through adduction). If you still can't picture this, see for yourself by going through your running mechanics in semi-slow motion.

The role of the iliotibial band is to control this adduction - about 90 times per minute per leg as you run and almost 22,000 times during a four-hour marathon! No wonder the ITB sometimes complains! What makes things especially tough for the tensor fascia lata is that when the right foot makes contact with the ground and the left leg begins to swing through there is a natural tendency for the left hip to drop temporarily, pulled down by the omnipresent force of gravity. As it does so, the pelvic girdle 'rocks' like a seesaw; the right hip goes up as the left hip goes down.

As you probably guessed, since the ITB runs from the hip down to the knee, the upward movement of the right hip stretches the tensor fascia lata and overall ITB at the precise time that it is trying to shorten and control adduction of the right thigh. That constitutes an 'eccentric' movement of the tensor fascia lata, and you no doubt know that eccentric actions are the ones which can be especially trauma-provoking to muscle tissues.

Of course, that's one reason why mere stretching of the ITB can never be the complete answer to real or potential ITB troubles. One also has to fortify the tensor fascia lata and its associated connective tissues - making them strong enough to withstand all that relentless eccentric yanking. We'll show you how to buttress your iliotibial bands in a moment, but for now let's make it clear how to tell when you truly have ITB syndrome and not some other condition.

How to diagnose ITB syndrome - As mentioned, a key aspect of ITB syndrome is lateral knee tenderness.

As often as not, the pain won't really hit home until the first one or two miles of a workout have been completed ('Iliotibial Band Friction Syndrome in Runners,' American Journal of Sports Medicine, vol. 8, pp. 232-234, 1980). Once it starts, the pain tends to be persistent if you keep going - and frequently gets worse during downhill running (and while walking down steps). The discomfort may radiate up and down the leg, but - strangely enough - the pain will often almost disappear if you stop running and begin to walk slowly and with short steps.

If you have iliotibial band syndrome, a unique examination called the Noble compression test will often be 'positive'. As you lie on your back, your doctor will place his or her thumb over the lateral epicondyle of your troubled leg (the lateral epicondyle is the hard knob on the bottom, outside part of your thigh bone). With the thumb on your epicondyle, you will actively flex and extend your knee. If maximal pain occurs at about 30 degrees of knee flexion, watch out! You probably have ITB syndrome.

The reason your knee 'cries out' during this test is very simple: when your leg is straight, the ITB lies in front of the epicondyle; as you flex your knee the ITB actually passes over the lateral epicondylar surface. As you repeatedly flex and extend your knee (as you would during running), the ITB keeps moving back and forth against the epicondyle; if the ITB is inflamed and swollen, the friction associated with this epicondylar 'rub' can produce quite a bit of pain, especially when your doctor is forcing the ITB to be in close contact with the bone. Similarly, if you have ITB and you stand with all your weight on your affected leg and flex the knee to about 30 degrees or so, you will probably feel a lot of pain if you apply pressure to the outside of your knee.

(As an aside, walking 'stiff-legged' with the affected knee locked in place will often eliminate most of the pain, because it keeps the ITB from rubbing back and forth against the epicondyle.)

In truth, though, ITB problems don't always occur at the knee. Pain may also be present below the knee, where the ITB actually attaches to the tibia, and discomfort may also occur much higher up - in the tensor fascia lata itself or in its tendinous connection with the hip. Many runners recall an especially intense or prolonged workout just before their ITB troubles started. Often, ITB strikes near the beginning of the cross-country or track season, when athletes are attempting to step up their training loads. Having 'bow legs,' excessive leg-muscle tightness, a leg-length discrepancy, or very pronounced foot pronation can all increase the risk of ITBS.

Traditional iliotibial band syndrome treatment

The widely accepted way of taking care of ITBS once it arises is certainly less than perfect. Usually, athletes are told to cut back on their intensity and volume of training and to work out only on smooth, non-hilly terrain. Icing and non-steroidal anti-inflammatory medications are recommended to reduce discomfort and inflammation, and athletes with ITBS are cautioned never to try to 'run through' the pain.

Obviously, those are decent and logical suggestions, but note that not one of these strategies actually addresses the true cause of the ITBS. The athlete who alleviates the symptoms of ITBS with reduced workouts, drugs, icing, and hill phobia and then returns to normal training is often destined for another serious ITB flare-up, with the second episode frequently worse than the first. Unfortunately, severe cases of ITBS can last for up to six months!

Of course, stretching the ITB is often recommended as an ITBS cure-all, and stretching is almost never a bad idea. However, it's important that the stretching routine you adopt actually improves the flexibility of the ITB in a functional way. That can hardly be said for the traditional, popular ITB stretches prescribed for runners, which never mimic the biomechanical patterns associated with running. An over-emphasis on stretching may also lull runners into thinking they are truly getting at the root of their ITB problems, when in fact their gains in flexibility must be combined with advances in strength in order to make the ITB highly resistant to injury.

How to strengthen your iliotibial bands

To truly strengthen your ITB area, simply perform 'Walt Reynolds's ITB Special' on a nearly daily basis. Walt's ITB-saver is easy to carry out. The only equipment you'll need will be a wall or railing for support and some kind of four- to six-inch elevation (a bench or aerobic step will work fine).

Here's exactly what to do. Stand on the aerobic step or bench with your involved leg (the 'involved' leg is the one with the ITB problem), holding on to a rail or the wall with the opposite hand for support. Your legs should be fairly straight as you do this.

Now, with both knees 'locked,' lower the opposite, non-involved foot and hip a few inches toward the floor (of course, the non-involved leg is between the involved leg and the wall you are using for support. As you do so, your involved hip will move upward somewhat, so that it is actually higher than the non-involved hip. Your involved hip should also move a bit in a lateral direction (toward the outside). This 'swivel-hip' action is crucial to the exercise - and in fact is exactly what happens to the hips during the 'stance' phase of the gait cycle.

Next, attempt to shift most of your body weight to the inside part of the foot of the involved leg. This simulates the natural pronation of the foot which occurs during running, and it also engages and puts tension on your tensor fascia lata and iliotibial band, exactly as it would when you run. Make sure that a fair amount of your body weight is directed through your heel, not just your toes.

You've now come to a crucial part of the exercise. Bend your weight-supporting, involved knee slightly (about 10 to 20 degrees), but keep the non-involved foot off the ground or floor. Now, move the involved hip forward about four to six inches, while keeping the involved heel in contact with the step and your weight on the inside of your involved foot. As you do this, all of the action should be at the hip! Your knee angle should stay about the same throughout the exercise (eg, don't try to rock forward at the knee - do it from the hip). If you think of your pelvic girdle as a bowl of milk, that

'bowl' is rocking backward (ie, the bottom of the bowl is coming up and toward the front as the top of the bowl goes back slightly). As your involved hip moves forward, your upper body should move backward.

Very key points: as your involved hip moves forward, make sure that it stays in a lateral position (if it's your left hip, your left hip should be shifted to the left), and also be certain that your involved hip is higher than your non-involved hip. After you've moved your hip forward, move it straight backward - making sure it goes back four to six inches beyond the straight-up, starting position (the total hip-movement distance in this exercise is around eight to 12 inches, four to six inches toward the front and four to six inches back).

As your hip moves backward, your upper body will tend to bend forward. This action may seem strange to you, especially when you realize that in effect your hip is swinging back and forth over your foot in two different planes of motion - front to back (the sagittal plane) and also sideways (the frontal plane). Most runners envision the biomechanics of running quite differently - and tend to think that the key action during running is the swinging of the foot back and forth around the 'anchor point' of the hip.

However, the truth is that when the foot is on the ground, the foot is the anchor point, and the hip essentially rotates around the foot, not vice-versa. It's this action which puts mega-stress on the ITB, and that's why Walt has rather brilliantly designed this exercise to mimic the hip rotation involved in running and maximally fortify your iliotibial bands. It is this same back-and-forth motion which occurs 85 to 90 times per minute at each hip when you run - and which can turn one of your iliotibial bands into a tattered, complaining mass of red-hot tissue.

As you do the exercise, you should feel the burn - or if not the burn at least some pretty heavy-duty pulling and stress - up toward the side of your hip. If you don't feel anything happening, go back to the basic position and try again, making sure that your involved hip ends up in a lateral position and higher than the other hip - and also making certain that your weight is shifted to the inside of the involved foot. As your weight shifts to the inside of the foot and your hip moves laterally, your thigh is adducted, exactly as it is when you run, and your iliotibial band must work hard to control this adduction as your hip moves back and forth.

Try these advanced versions. Once you get really good at doing the exercise, you can try the advanced versions of Walt's Special, getting the arm on the involved side of the body into the act.

First, move the involved arm laterally and forward as your hips swing forward. Then, try moving the involved arm forward and over the front of the body as the hips begin to swing forward.

Of course, if your iliotibial band syndrome is red-hot right now, you'll have to wait a bit before you try Walt's Special. Otherwise, the remedial exercise itself might exacerbate your flare-up. If you're on the road to recovery from an ITBS setback, do the exercise as your symptoms allow, being careful not to overextend your iliotibial bands (start with just a few reps).

If you're basically symptom-free now but have had trouble with ITBS in the past, you can be fairly aggressive with this exercise. Start with 10 reps per day on each leg, and gradually build up to a set of 20 to 30 reps - carried out at two different times during the day. If you do so, your ITBS problems will become distant memories.

If you've never suffered from the agony of ITBS, do 10 to 15 reps of the exercise three to four times per week, anyway. And always use the exercise as an injury prophylactic during the weeks leading up to a major increase in your training (remember that ITBS tends to occur when the volume and/or intensity of training increase).

For example, if you are in a 'base' period of training but are planning to sharply increase your miles as you begin preparing, say, for a marathon, do at least one set of 15 reps of Walt's Special twice per day on each leg during the last three weeks before your training volume begins to rise significantly (this should be done almost daily). The same would apply to a shift from high-volume, 'aerobic' running to an emphasis on speed work.

Walt's unique exercise will keep you out of ITBS trouble in the future; as it bolsters your iliotibial bands, it will enhance your ability to control the adduction and rotation of your thigh bones (femurs) during running, reducing both fatigue and muscle soreness. As you gain greater control of your hips and thighs, there's also a good chance that your running economy will improve. Remember that you do not want to carry out the exercise only on the leg which has given (or is giving) you trouble. To balance your strength properly, do the same number of reps on each leg, even though one leg may be trouble-free.

Special risk factors

If you love to run on crowned roads, watch out! You are at increased risk for ITBS, compared to the runner who prefers flat surfaces, and your ITB troubles are likely to strike on the 'down' leg, the one positioned toward the outside of the road. That's why runners who run with the traffic tend to have ITB troubles in their right leg; those who run against traffic get the flare-ups in their left appendage. The reason for this, of course, is that the outside foot and leg are moving downward at a faster speed when they strike the pavement, compared to the inside foot and leg, because they have fallen a slightly greater distance. It's as though the outside leg is always running downhill. Thus, the total force on the outside leg will be greater, and there will be an increased need for 'thigh deceleration' by the tensor fascia lata and its associated iliotibial band. The tensor fascia lata will be shortening and generating more force at the same time that the 'pull' on it is unusually great. That's a recipe for injury! It's best to get off the 'crown' and run on the usually flatter shoulder - or else to choose a different, non-sloped location for your workouts.

It's an unwritten law of the universe that runners must run on a track counter-clockwise (anti-clockwise), rather than clockwise. This means that for the person who trains excessively on the track, ITBS will almost always strike in the left (inside) leg, because the left tensor fascia lata and its bands must control a greater deceleration of adduction than the right (outside) hip.

As Walt Reynolds puts it so eloquently, 'When a person runs on a curve to the left, he/she will compensate for the outward-pushing centrifugal force by leaning slightly to the left. The faster they run, the greater the lean must be (that's why very fast track sessions pose an increased risk for ITBS). You see the same thing in flop high jumpers' approach runs; they run fast and lean far to the inside - toward the bar. This lean with the upper torso can drastically change what happens biomechanically. As you lean into a left curve and your left foot hits the ground, pronation is exaggerated compared to running straight ahead, since the left foot tends to land more toward the outside and thus must roll to the inside to a greater extent than usual (there is more frontal-plane - side-to-side - movement than usually occurs). As this happens, the left thigh accelerates inward (adducts) to a greater extent than normal, creating a need for greater deceleration than usual by the iliotibial band and stressing the ITB considerably more, compared to running straight ahead. If you must run on the track, you should alternate back and forth between clockwise and counter-clockwise intervals.'

Got a longer leg!

Having a leg-length discrepancy also increases the risk of ITBS. When the two legs are unequal in length, the shorter leg receives greater stress in much the same way that the outside leg takes in more force during running on a crowned road. The momentum and ground reaction forces are higher for the shorter leg because that leg falls a greater distance before the foot makes impact with the ground. This increases ankle pronation and thigh-bone adduction - and thus the stress placed on the iliotibial band.

Women should suffer from ITBS more frequently than men, since their wider hips promote greater thigh-bone adduction and thus greater stress on the ITB. However, the research doesn't support this idea - and in fact suggests that men may actually be plagued by ITBS more often, perhaps because of their greater muscle tightness and inflexibility.

Speaking of inflexibility, it's important to stress once again that traditional stretches don't work very well at preventing or relieving ITBS. In one of the most popular ITB stretches, if the right leg is the afflicted leg, the left leg is crossed over in front of the right one, and the upper body is inclined to the right (a wall is usually used for support), placing a fair amount of stretch on the right iliotibial band.

One problem with this 'venerable' move is that it is not very functional (it doesn't replicate the movement patterns associated with running), but the other key drawback is that it does not strengthen or increase the resiliency of the ITB. It gives the ITB a little bit of a pull, but the tensor fascia lata and its associated bands don't have to control a blessed thing. The best exercises always bolster both flexibility and strength, and Walt's special exertion certainly does that!

If you've already got a severe case of iliotibial band syndrome, stay in shape by swimming and aquarunning: they will keep you fit without aggravating your condition. Cycling and stair climbing are usually out, because they can produce considerable rubbing of an inflamed ITB band on the outer edge of the femur, potentially delaying recovery.