# Part 1- Sprained Ankle Causes and Risk Factors

## Learn what a sprained ankle is, and the causes behind it.

A sprained ankle is one of the most common injuries faced by anyone who participates in sport and exercise. As a matter of fact, you don't even have to be engaged in any exercise to suffer from a sprained ankle. It seems that even while minding your own business, an ankle sprain can occur.

If you suffer from ankle sprain or are seeking to prevent its occurrence it is important to follow the information in this article. In addition, adding a few simple stretches to your fitness program will also help.

Ankle sprain is commonly associated with sports that require a lot of running, jumping and change of direction. Excessive twisting or turning of the ankle joint results in a rupture of the ligaments that hold the ankle in place.

I've had many requests for an article on sprained ankles, so to follow is the most comprehensive information I could put together. In fact, I found it hard to fit it all into one issue, so I've decided to split it into three parts.

In the first part, we're going to have a look at exactly what a sprained ankle is. I'll go over the structures that make up the ankle joint; we'll have a look at what happens when an ankle sprain occurs; we'll check out the symptoms associated with an ankle sprain; and then we'll finish off with a look at the major causes and risk factors that contribute to ankle sprain.

In the second part you'll find the most complete [treatment and prevention information for ankle sprain](http://www.thestretchinghandbook.com/archives/ankle-injuries-pt2.php). I'll outline a detailed, step-by-step process of firstly treating the initial injury, and then in part three, we'll look at a [rehabilitation program](http://www.thestretchinghandbook.com/archives/ankle-injuries-pt3.php) to make sure you never have to worry about ankle sprain again.

**What is a Sprained Ankle?**

An ankle sprain is an injury that results from a twisting action, which stretches or tears the ligaments of the ankle joint. (The term s**P**rain refers to an injury of the ligaments, as opposed to a s**T**rain, which refers to an injury of the muscle or tendon.) Remember; ligaments attach bone to bone, were as tendons attach muscle to bone.

**Anatomy of the Ankle Joint**

The foot and ankle joint is a very complex structure, made up of many bones, ligaments, muscles and tendons. As you can see from the diagram below there are many opportunities for an injury to occur at the ankle.



Ankle image from [Principles of Anatomy and Physiology](http://www.amazon.com/exec/obidos/ASIN/0470084715/stretching-20) by G.J. Tortora and N.P. Anagnostakos.

When an ankle injury does occur it usually affects one or more of the ligaments that help to hold the ankle joint in place. However, if the injury is severe enough damage may also occur to the tendons that attach the muscles to the bones.

There are a number of ligaments that keep the ankle joint in place and prevent a loss of stability. The ligaments that are commonly affected by an ankle sprain are the ones located on the lateral side (or outside) of the ankle.

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| Ankle Ligament picture used from "Modern Principles of Athletic Training," by Daniel D. Arnheim. |
| Ankle ligaments image from[Arnheim's Principles of AthleticTraining](http://www.amazon.com/exec/obidos/ASIN/0072560460/sportsinjury-20) by Daniel D. Arnheim. |

The three major ligaments that help to stop the ankle from rolling forward and outward are the **anterior talofibular** ligament, the **posterior talofibular** ligament and the **calcaneofibular** ligament.

These ligaments can be seen in the diagram to the right, and are located at the bottom edge of the circle.

Injuries to the ligaments of the ankle are usually graded into three categories, and these injuries are referred to as: first; second; or third degree sprains.

* A **first degree** sprain is the least severe. It is the result of some minor stretching of the ligaments, and is accompanied by mild pain, some swelling and joint stiffness. There is usually very little loss of joint stability as a result of a first degree sprain.
* A **second degree** sprain is the result of both stretching and some tearing of the ligaments. There is increased swelling and pain associated with a second degree sprain, and a moderate loss of stability at the ankle joint.
* A **third degree** sprain is the most severe of the three. A third degree sprain is the result of a complete tear or rupture of one or more of the ligaments that make up the ankle joint. A third degree sprain will result in massive swelling, severe pain and gross instability.

One interesting point to note with a third degree sprain is that shortly after the injury, most of the localized pain will disappear. This is a result of the nerve endings being severed, which causes a lack of feeling at the injury site.

From the explanations above you can see that pain and swelling are the two most common symptoms associated with an ankle sprain. You can also expect some bruising to occur at the injury site. The associated swelling and bruising is the result of ruptured blood vessels.

**Causes and Risk Factors**

There are a number of causes and risk factors associated with an ankle sprain. One of the most common causes is simply a lack of conditioning. If the muscles, tendons and ligaments around the ankle joint have not been trained or conditioned, this can lead to a weakness that may result in an ankle sprain.

A simple conditioning program that helps to even out any imbalances at the ankle will help considerably. For example, the calf muscles may be much stronger than the muscles in the front of the leg. This would lead to a strength imbalance. Or, maybe the Achilles is very tight while the anterior muscles are very flexible. This would lead to a flexibility imbalance. (In part 2, I'll go into a lot more detail about conditioning and imbalances.)

A lack of warming up and stretching is another major cause of ankle injuries. In an article titled, "Ankle Injuries in Basketball: injury rate and risk factors," by McKay, Goldie, Payne & Oaks, in the British Journal of Sports Medicine; the article states that "Basketball players who did not stretch during the warm up were 2.7 times more likely to injure their ankle than players who performed stretches."

There is also a number of other less common causes of an ankle sprain. They include things like wearing inadequate footwear, running or training on uneven ground, and simply standing on, or in something you're not meant to.

However, the most common risk factor associated with ankle sprains is a previous history of ankle sprains. In other words, if you've had an ankle injury in the past, chances are you're going to suffer another one if you don't take some precautions and do some conditioning exercises to strengthen your ankle.

Gail McKay, in a recent Sport Health article titled "Risk Factors for Ankle Injuries" stated; "The most common risk factor identified was a history of ankle injury. Therefore, ankle-injured athletes tend to face the downward spiral of recurrent ankle injuries. Hence, ankle injured athletes should be encouraged to undertake comprehensive ankle rehabilitation programs."

## Part 2 – Sprained Ankle Treatment & Prevention

## Get fast relief with this detailed, step-by-step ankle sprain treatment process.

In part 1, we took a look at exactly [what a sprained ankle is](http://www.thestretchinghandbook.com/archives/ankle-injuries-pt1.php). We had a look at the structures that make up the ankle joint; what happens when an ankle sprain occurs; the symptoms associated with an ankle sprain; and the major causes and risk factors that contribute to a sprained ankle.

In part 2, we're going to start off by looking at the risk factors and common causes of ankle sprain, and then look at a number of prevention strategies to help reduce those risk factors.

Then we're going to outline a detailed strategy for the complete treatment of an ankle sprain. Firstly, we'll look at the importance of the immediate treatment (the first 48 to 72 hours). Secondly, we'll outline the ongoing treatment necessary for a full recovery, and finally in part three, we'll look at the [rehabilitation and conditioning exercises](http://www.thestretchinghandbook.com/archives/ankle-injuries-pt3.php) needed to get your ankle joint back to 100%.

**Ankle Sprain Prevention**

In part 1 we outlined a number of common causes and risk factors associated with ankle sprains. They included: a lack of conditioning; inadequate warm up and stretching; inadequate footwear; training on uneven ground; and the big one, a previous history of ankle sprains.

So what are some of the things you can do to help prevent an ankle sprain?

1. **Warm Up properly**
A good warm up is essential in getting the body ready for any activity. [A well structured warm up](http://www.thestretchinghandbook.com/archives/warm-up.php) will prepare your heart, lungs, muscles, joints and your mind for strenuous activity.
2. **Plyometric Training**
Plyometric drills include jumping, skipping, bounding, and hopping type activities. These explosive types of exercises help to condition and prepare the muscles, tendons and ligaments at the ankle joint.
3. **Balancing Exercises**
Any activity that challenges your ability to balance, and keep your balance, will help what's called proprioception: - your body's ability to know where it's limbs are at any given time.
4. **Stretch and Strengthen**
I'll cover these in a lot more detail a little later on when I discuss rehabilitation and conditioning exercises.
5. **Footwear**
Be aware of the importance of good footwear. A good pair of shoes will help to keep your ankle stable, provide adequate cushioning, and support your foot and lower leg during the running or walking motion.
6. **Strapping**
Strapping, or taping can provide an added level of support and stability to weak or injured ankles. For a detailed description of how to strap an ankle properly, visit <http://www.smasa.asn.au/smartplay/ouch/injury_manage/taping.html>.

**Sprained Ankle Treatment**

The immediate treatment of any soft tissue injury is vital. Proper care and treatment now will go a long way towards a full recovery later.

Without a doubt, the most effective, initial treatment for ankle sprains is the R.I.C.E.R. regime. This involves the application of **(R)** rest, **(I)** ice, **(C)** compression, **(E)** elevation and obtaining a **(R)** referral for appropriate medical treatment.

Where the R.I.C.E.R. regime has been used immediately after the occurrence of an injury, it has been shown to significantly reduce recovery time. R.I.C.E.R. forms the first, and perhaps most important stage of injury rehabilitation, providing the early base for the complete recovery of injury.

When an ankle injury occurs and the ligaments have been damaged there is a large amount of uncontrolled bleeding around the injury site. This excessive bleeding causes swelling, which puts pressure on nerve endings and results in increased pain. It is exactly this process of bleeding, swelling and pain that the R.I.C.E.R. regime will help to alleviate.

R: (rest) It is important that the injured ankle be kept as still as possible. This will help to slow down blood flow to the ankle and prevent any further damage.

I: (ice) By far the most important part. The application of ice will have the greatest effect on reducing bleeding, swelling and pain. Apply ice as soon as possible after the injury has occurred.

How do you apply ice? Crushed ice in a plastic bag is usually best. However, blocks of ice, commercial cold packs and bags of frozen peas will all do fine. Even cold water from a tap is better than nothing at all.

When using ice, be careful not to apply it directly to the skin. This can cause "ice burns" and skin damage. Wrapping the ice in a damp towel generally provides the best protection for the skin.

How long? How often? This is the point where few people agree. Let me give you some figures to use as a rough guide, and then I'll give you some advice from personal experience. The most common recommendation is to apply ice for 20 minutes every 2 hours for the first 48 to 72 hours.

These figures are a good starting point, but remember, they're only a guide. You must take into account that some people are more sensitive to cold than others. Also be aware that children and elderly people have a lower tolerance to ice and cold. Finally, people with circulatory problems are also more sensitive to ice. Remember to keep these things in mind when treating yourself or someone else with ice.

Personally, I recommend that people use their own judgement when applying ice to themselves. For some people, 20 minutes is way too much. For others, especially well conditioned athletes, they can leave ice on for much longer. The individual should make the decision as to how long the ice should stay on.

My personal recommendation is that people should apply ice for as long as it is comfortable. Obviously, there will be a slight discomfort from the cold, but as soon as pain or excessive discomfort is experienced, it's time to remove the ice. It's much better to apply ice for 3 to 5 minutes a couple of time an hour, than not at all.

C: (compression) Compression actually achieves two things. Firstly, it helps to reduce both the bleeding and swelling around the ankle joint, and secondly, it provides support for the ankle. Simply use a wide, firm, elastic, compression bandage to cover the entire ankle and lower leg.

E: (elevation) Simply raise the injured ankle above the level of the heart at all possible times. This will further help to reduce the bleeding and swelling.

R: (referral) If the injury is severe enough, it is important that you consult a professional physical therapist or a qualified sports doctor for an accurate diagnosis. They will be able to tell you the full extent of the injury.

Before we finish with the initial treatment and move onto the next phase of the rehabilitation process, there are a few things that you must avoid during the first 72 hours.

Be sure to avoid any form of heat at the injury site. This includes heat lamps, heat creams, spas, Jacuzzi's and saunas. Avoid all movement and massage of the injured area. Also avoid excessive alcohol. All these things will increase the bleeding, swelling and pain of your injury. Avoid them at all costs.

**After the first 48 to 72 hours?**

So what happens after the first 48 to 72 hours? Lets first take a quick look at how damaged ligaments repair themselves.

When any sort of damage occurs to the ligaments, the body immediately goes into a process of repair. Where the individual fibres have been ruptures, or torn, the body begins to bind the damaged fibres together using a fibrous protein called collagen. Or, as it's more commonly known, scar tissue!

You see, when a ligament is torn, you would expect that the body would repair that tear with new ligament. In reality, this doesn't happen. The tear, or rupture, is repaired with scar tissue.

Now this might not sound like a big deal, but if you have ever suffered an ankle injury, (or any soft tissue injury) you'll know how annoying it is to keep re-injuring that same old injury, over and over again.

Scar tissue is made from a very tough, inflexible fibrous material. This fibrous material binds itself to the damaged ligaments in an effort to draw the damaged fibres back together. What results is a bulky mass of fibrous scar tissue completely surrounding the injury site. In some cases it's even possible to see and feel this bulky mass under the skin.

When scar tissue forms around an injury site, it is never as strong as the ligaments it replaces. It also has a tendency to contract and deform the surrounding tissues, so not only is the strength of the tissue diminished, but flexibility of the tissue is also compromised.

**So, how do we get rid of that annoying formation of scar tissue?**

Firstly, you must keep active! Don't listen to anyone who tells you to do nothing. Now is the time to start active rehabilitation. Most of the swelling will have subsided after the first 48 to 72 hours and you are now ready to start light activity.

Light activity will not only promotes blood circulation, but it will also activate the lymphatic system. The lymphatic system is vital in clearing the body of toxins and waste products, which can accumulate in the body following a sports injury. Activity is the only way to activate the lymphatic system.

Before we move on, a quick word of warning. Never, Never, Never do any activity that hurts the injured area. Of course you may feel some discomfort, but NEVER, NEVER push yourself to the point where you're feeling pain. Listen to your body. Don't over do it at this stage of the recovery, you've come too far to blow it now.

To remove most of the unwanted scar tissue, you now need to start two vital treatments. The first is commonly used by physical therapists (or physiotherapists), and primarily involves increasing the blood supply to the injured area. The aim is to increase the amount of oxygen and nutrients to the damaged tissues.

You see, ligaments receive very little blood supply, as compared to a muscle for example. So it's vitally important to increase the blood flow to the injured ligaments. This will help supply the ligaments with the oxygen and nutrients they need for a speedy recovery.

Physical Therapists accomplish this aim by using a number of activities to stimulate the injured area. The most common methods used are ultrasound and heat.

Ultrasound, or TENS (Transcutaneous Electrical Nerve Stimulation) simply uses a light electrical pulse to stimulate the affected area. While heat, in the form of a ray lamp or hot water bottle, is very effective in stimulating blood flow to the damaged tissues.

Secondly, to remove the unwanted scar tissue it is vital that you start to massage the injured ankle ligaments. While ultrasound and heat will help the injured area, they will not remove the scar tissue. Only massage will be able to do that.

To start with, the ankle will be quite tender. So start with a light stroke and gradually increase the pressure until you're able to use firm strokes.

Concentrate your effort at the direct point of injury, and use your thumbs to get in as deep as possible to break down the scar tissue.

Be sure to drink plenty of fluid during your injury rehabilitation. The extra fluid will help to flush a lot of the waste products from your body.

# Part 3 – Sprained Ankle Rehabilitation and Conditioning Exercises

## Use these sprained ankle exercises to strengthen and rehabilitate ankle sprain.

In part 1, we took a look at exactly [what a sprained ankle is](http://www.thestretchinghandbook.com/archives/ankle-injuries-pt1.php). We had a look at the structures that make up the ankle joint; what happens when an ankle sprain occurs; the symptoms associated with an ankle sprain; and the major causes and risk factors that contribute to a sprained ankle.

In part 2, we started by looking at a number of [prevention strategies to help reduce ankle sprain](http://www.thestretchinghandbook.com/archives/ankle-injuries-pt2.php). We then looked at the importance of the immediate treatment (the first 48 to 72 hours), and began to outline the ongoing treatment necessary for a full recovery.

In part 3, we're going to outline a detailed strategy for the complete rehabilitation of a sprained ankle. We'll look at the rehabilitation and conditioning exercises needed to get your sprained ankle back to 100%.

By now, you've come over 80% of the way. You may even feel that your ankle is fully recovered. Your treatment so far may have stopped the swelling and bleeding, it may have reduced the amount of scar tissue at the ankle, and it may have even started to heal the ligaments that were injured. But there is still one more important thing to do.

The last 20% can be the most crucial to your complete recovery. If you've ever suffered from a sporting injury in the past, you'll know how annoying it is to think you're recovered, and then out-of-the-blue, you're injured again and back to where you started. It can be one of the most frustrating and heart-breaking cycles an athlete, or anyone else for that matter, can go through.

**Sprained Ankle Rehabilitation**

Most people will refer to this phase of your recovery as the active rehabilitation phase, because, during this phase you will be responsible for the rehabilitation process. You will be doing the exercises and activities required to speed up your full recovery.

The aim of this phase of your rehabilitation will be to regain all the fitness components that were lost because of the injury. Regaining your flexibility, strength, power, muscular endurance, balance, and co-ordination will be the primary focus. Without this phase of your rehabilitation, there is no hope of completely and permanently making a full recovery.

The first point to make clear is how important it is to keep active. Often, the advice from doctors and similar medical personnel will simply be; rest. This can be one of the worst things you can do. Without some form of activity the injured area will not receive the blood flow it requires for recovery. An active circulation will provide both the oxygen and nutrients needed for the injury to heal.

**A Word Of Warning!**

Never, never, never do any activity that hurts your ankle. Of course you may feel some discomfort, but never push yourself to the point where you're feeling pain. Be very careful with any activity you do. Pain is the warning sign; don't ignore it.

**Range of Motion**

Regaining a full range of motion of the ankle joint is the first priority in this phase of the rehabilitation process. A full range of motion is extremely important, as it lays the foundation for more intense and challenging exercises later in the active rehabilitation process.

For those suffering a first degree sprain, range of motion may not have been affected, however, second and third degree sprains will almost always limit range of motion.

As you work through the initial stages of recovery, and your ankle begins to heal, start to introduce some very gentle movements. First bending and straightening your ankle, then as you get more comfortable with this simple movement, start to incorporate some rotation exercises. Turn your ankle from side to side, and rotate clockwise and anti-clockwise.

When you feel comfortable with these range of motion exercise, and can perform them relatively pain free, it's time to move onto the next phase of the active rehabilitation process.

**Stretch and Strengthen**

Now it's time to add some intensity to the range of motion exercises. The aim here is to gradually re-introduce some strength back into the injured muscles, ligaments and tendons.

When attempting to increase the strength of your ankle, be sure to approach this in a gradual, systematic way of lightly over-loading the muscles and tendons. Be careful not to over-do this type of training. Patience is required.

An effective and relatively safe way to start is to begin with **isometric** exercises. These are exercise where the ankle joint itself does not move, yet force is applied and the muscles are contracted.

For example: imagine sitting in a chair while facing a wall, and then placing the ball of your foot against the wall. In this position you can push against the wall with your foot and at the same time keep your ankle joint from moving. The muscles contract but the ankle joint does not move. This is an isometric exercise.

The above example can be used to strengthen the ankle in all directions. Pushing your foot to the left or right against something immoveable, and pushing down (as above) and pulling up.

It's also important at this stage to introduce some gentle stretching exercise. These will help to further increase your range of motion and prepare your ankle for more strenuous activity to come.

While working on increasing the flexibility of your ankle, it's also important to increase the flexibility of the muscle groups around the injured area. These include the calf muscles, and the anterior muscles of your shin.

**Balance and Proprioception**

Once you feel some strength returning to your ankle it's time to incorporate some balancing drills and exercises.

This phase of the rehabilitation process is often overlooked, and is one of the main reasons why old injuries keep re-occurring.

When ligaments are torn, as with a second or third degree ankle sprain, nerves are also damaged. These nerves send vital information to the brain about the specific position and location of the ankle joint in relation to the rest of your body.

Without this information the muscles, tendons and ligaments are constantly second-guessing the position of the ankle joint. This lack of awareness about the position of the ankle joint can lead to a re-occurrence of the same injury long after you thought it had completely healed.

Balancing exercises are important to help re-train the damaged nerves around your ankle joint. Start with simple balancing exercises like walking along a straight line, or balancing on a beam. Progress to one-leg exercises like balancing on one foot, and then try the same exercises with your eyes closed.

When you're comfortable with the above activities, try some of the more advanced exercises like wobble or rocker boards, swiss balls, stability cushions and foam rollers.

**Plyometrics and Sports Specific Exercises**

This last part of the rehabilitation process will aim to return your ankle to a pre-injury state. By the end of this process your ankle should be as strong, if not stronger, than it was before you injured it.

This is the time to incorporate some dynamic, or explosive exercises to really strengthen up your ankle and improve your proprioception. Start by working through all the exercises you did above, but with more intensity.

For example, if you were using light isometric exercises to help strengthen your ankle, start to apply more force to your ankle joint, or start to use some weighted exercises.

From here, gradually incorporate some more intense exercises. Exercises that relate specifically to your chosen sport are a good place to start. Things like skill drills and training exercises are a great way to gauge your fitness level and the strength of your ankle.

To put the finishing touches on your ankle recovery, I always like to do a few plyometric drills. Plyometric exercises are explosive exercises that both lengthen and contract a muscle at the same time. These are called eccentric muscle contractions, and involve activities like jumping, hopping, skipping and bounding.

These activities are quite intense, so remember to always start off easy, and gradually apply more and more force. Don't get too excited and over-do-it, you've come too far to do something silly and re-injure your ankle.

Article by Brad Walker and Injury Fix™

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