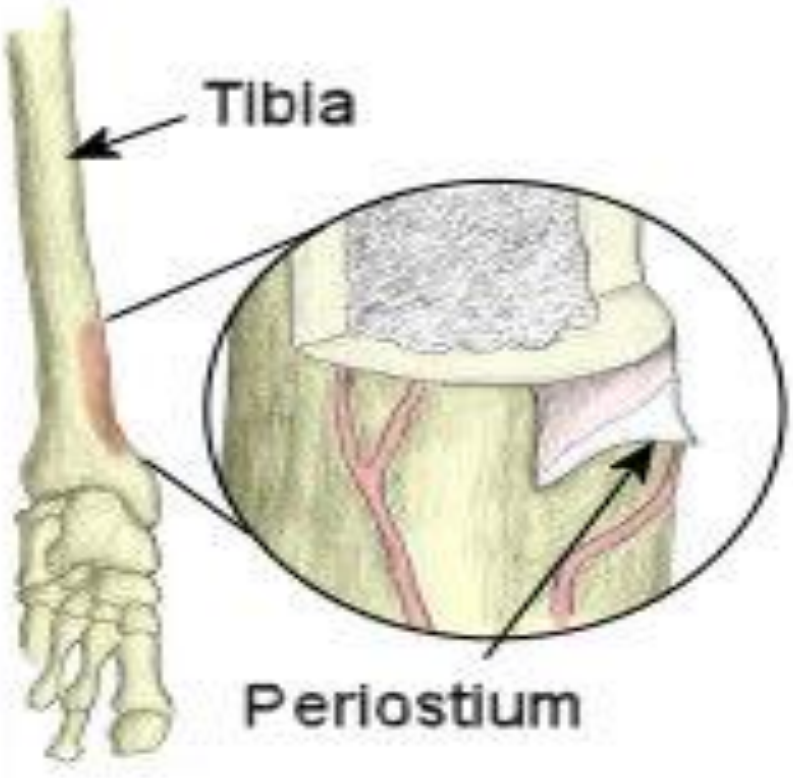
Shin Splints



1. What are shin splints?

The term shin splints is a name often given to any pain at the front of the lower leg. However, true shin splints symptoms occur at the front inside of the shin bone and can arise from a number of causes.
The most common cause is inflammation of the periostium of the tibia (sheath surrounding the bone). Traction forces on the periosteum from the muscles of the lower leg cause shin pain and inflammation. This has lead to the use of terms such as Medial Tibial Traction Periostitis.

2. Symptoms of shin splints:

- Pains over the inside lower half of the shin.
- Pain at the start of exercise which often eases as the session continues.
- Pain often returns after activity and may be at its worse the next morning.
- Sometimes some swelling.
- Lumps and bumps may be felt when feeling the inside of the shin bone.
- Pain when the toes or foot are bent downwards.
- A redness over the inside of the shin (not always present).

3. Shin Splints Treatment

Treatment for shin splints is as simple as reducing pain and inflammation, identifying training and biomechanical problems which may have helped cause the injury initially, restoring muscles to their original condition and gradually returning to training.

4. What can the athlete do about shin splints?

- Rest to allow the injury to heal.
- Apply ice or cold therapy in the early stages, particularly when it is very painful. Cold therapy reduces pain and inflammation.
- Stretch the muscles of the lower leg. In particular the tibialis posterior which is associated with shin splints.
- Wear shock absorbing insoles in shoes. This helps reduce the shock on the lower leg.
- Maintain fitness with other non weight bearing exercises such as swimming, cycling or running in water.
- Apply heat and use a heat retainer or shin and calf support after the initial acute stage and particularly before training. This can provide support and compression to the lower leg helping to reduce the strain on the muscles. It will also retain the natural heat which causes blood vessels to dilate and increases the flow of blood to the tissues to aid healing.
- Visit a sports injury clinic for treatment and rehabilitation.

5. What can a sports injury clinic or doctor do?

- Prescribe anti-inflammatory medication e.g. ibuprofen (always consult a doctor before taking medication).
- Tape the shin for support - A taping worn all day will allow the shin to rest properly by taking the pressure off the muscle attachments.
- Perform gait analysis to determine if you overpronate or oversupinate.
- Use sports massage techniques on the posterior deep muscle compartment but avoid the inflamed periostium close to the bone.

6. Causes

Shin splints can be caused by a number of factors which are mainly biomechanical (abnormal movement patterns) and errors in training. Here are the most common causes:

- Overpronation of the feet
- Oversupination of the feet
- Inadequate footwear
- Increasing training too quickly
- Running on hard surfaces
- Decreased flexibility at the ankle joint

7. Prevention

In order to properly treat shin splints and prevent them recurring, the causative factors must be taken into consideration. No matter how much rest, anti-inflammatories and massage are used, without correcting the cause of the injury; the symptoms will continue to return. Biomechanical problems such as overpronation and supination can be corrected using running shoes or insoles (or orthotics). Ensuring shoes/trainers are suitable your foot type and for the activity in question. As a rule of thumb with running, distances should not increase by more than 10% per week. For example, if you complete a total of 10 miles one week, do not increase above 11 miles the next week. This helps to ensure the muscles are not overworked. For runners, try to avoid always running on hard pavements as they provide no shock absorption. Try running some of the time on tarmac, grass or even sand to reduce the shock passed through the legs. Shin splints can be caused by overly tight muscles in the lower leg, including the calf muscles (gastrocnemius and soleus) and the shin muscles. Stretching on a daily basis and even receiving sports massage can help improve flexibility.

8. Shin Splints Assessment

The therapist will then physically assess the ankle and lower leg using a variety of methods, including:

- Observation
  The therapist may look at the lower leg, paying particular attention to the position and movement of the foot. Having fallen arches, overpronating or oversupinating are common contributors to developing shin splints.
- Palpation
  The therapist will palpate, or feel, the muscles of the shin. In cases of shin splints the muscle just to the inside of the shin bone (tibia) will be tender to touch. The therapist may also feel that this area feels quite lumpy.
- Ankle range of motion.
  The therapist will look at the range of motion at the ankle joint. They will usually get the patient to move the ankle through all of its movements by themselves before asking the patient to relax, allowing the therapist to move the ankle. In shin splints, there may be pain when the therapist pushes the foot down (stretching the shin muscles) and when the patient actively points the toes up. Dorsiflexion (pointing the toes to the ceiling) will often be limited, indicating tight calf muscles.

The therapist should also look at the position of your feet, looking for overpronation or oversupination. They may do this in standing, walking or even running. There are numerous other tests and assessments that the therapist may choose to perform, these are the most commonly used in cases of suspected shin splints.
Other conditions which must be ruled out when assessing suspected shin splints include stress fractures and anterior and posterior compartment syndromes.

9. Shin Splints Rehabilitation

Aims of rehabilitation

- Reduce pain and inflammation.
- Identify any biomechanical (movement) disfunctions that may be causing the problem.
- Improve the flexibility and condition of surrounding muscles.
- Gradual return to full activity
- Injury prevention

The time scales needed for each stage will vary considerably depending on the severity of each individual case and also the commitment to treatment advice. The full rehabilitation process may take anywhere from 3 weeks to 12 weeks. Only move from one stage to the next when you can achieve all exercises and tasks free from pain.

- Stage 1
- The main aim of this stage is to reduce pain and inflammation.
- Rest from activities that may cause pain. Stay off your feet as much as you can. Maintain fitness by swimming or cycling provided this is pain free.
- Apply ice or cold therapy. Cold therapy can be applied in a number of ways. There are a number of specialist cold therapy products available which can apply cold therapy and compression at the same time and are more convenient than ice. Cold should be applied along the shin and repeated every 3-4 hours or at least 3 times a day. The tissues along the shin are very superficial so ice should only be applied for only 10 minutes at a time. Continue this for at least 3 days.
- Taping the shin is a good way of helping the leg to rest if you cannot avoid being on your feet. It will support the muscle attachments at the sore spot on the shin taking some of the pressure and strain off the tissues.
- NSAID (Non steroidal anti-inflammatory drugs) e.g. ibuprofen may help in the early stages. Always check with a Doctor before taking any medication. Do not take Ibuprofen if you have asthma.
- Gentle stretching of the calf muscles at this stage can be very beneficial. Hold each stretch for 30 seconds at a time and repeat at least 3 times a day.
- After the first 3 days, sports massage to the calf and shin muscles can be used. This should initially be quite light around the painful shin, but can gradually become deeper over subsequent treatments as pain eases.

Biomechanical correction

In many cases of shin splints, the cause is often related to the way we move, especially our feet when we run. For this reason it is important to get your foot position assessed as early as possible when rehabilitating shin splints. If you ignore this potential cause, the pain will more than likely just keep returning.

If your feet roll in or overpronate excessively then this can contribute to the strain on the lower leg.

If the foot rolls in then the lower leg will also rotate inwards, making the surrounding muscles work harder than they normally would.

In addition the bones of the ankle will not 'lock' properly during the running action, again causing the muscles to take the strain rather than the bones.

This can be corrected by orthotic inserts preferably fitted by a sports injury professional or podiatrist. Off the shelf orthotic inserts and heat mouldable inserts are also available and are suitable for most patients although it is best to check with a sports injury specialist or podiatrist first.

The inserts should be worn at all times. Not just when training. Your feet are under tension even when standing.
One way of telling if you over pronate is by looking at your footwear. If you tend to wear out the inside front of your shoes then this is a strong indication that something is not quite right.

Stage 2

- Once day to day activities are pain free, flexibility and strengthening exercises can begin.
- Stretching the calf muscles can become more vigorous, using the heel drop method.
- Stretching the shin muscles can also start, albeit very gently.
- Sports massage should continue regularly.
- Strengthening the muscles of the shin will help prevent shin splints recurring. Start off by performing toe raises, provided this is pain free.
- Don't be tempted to return to exercise too quickly! This mistake is easily made but the condition will just return if a full rehabilitation programme is not followed.

Stage 3

- At this stage you can start to increase the intensity of your strengthening exercises. Incorporate a resistance band and calf raise exercises.
- Continue with stretching and massage as before.
- Start to add walking to your exercise program. Very gradually increase the speed and duration of your walks before incorporating hills provided you remain pain-free. Remember to always warm-up and stretch before and after activity.

Stage 4

- Provided walking has been pain-free for 2 weeks, you can start to gradually return to running.
- Apply tape to the shin to support it for the first few runs.
- Ensure you have the correct shoes for your running style or sport.
- After every training session apply ice to the shin for about ten minutes.
- Ensure you stretch properly before each training session and after. Hold stretches for about 30 seconds and repeat 5 times.
- Use massage regularly as this will help prevent the muscles tightening up; hardening and putting strain back onto the lower leg again.
- Below is an example of a gradual return to running programme. Begin each training session with a 5 minute walk followed by a stretch.

Day 1:	walk 4 minutes	jog 2 minutes	repeat 4 times
Day 2:	rest		
Day 3:	walk 4 minutes	jog 3 minutes	repeat 3 times
Day 4:	rest		
Day 5:	walk 3 minutes	jog 4 minutes	repeat 4 times
Day 6:	rest		
Day 7:	walk 2 minutes	jog 6 minutes	repeat 4 times

Continue increasing in this manner until you are confident enough to return to full training.

10. Prevention of shin splints

- Increase training gradually.
- Do not run too often on hard surfaces. You can do more training if you run off-road.
- Avoid running a lot on your toes. Not easy if you are a sprinter but varying the training surface can help.
- Ensure you have the correct footwear and that it is not too old. A pair of running shoes will have lost most of their cushioning after 400 miles. If you run few miles but your shoes are over 6 months old then they still may need replacing.
- Check you do not over pronate. See a podiatrist or Sports injury therapist / Physiotherapist that can assess this.
- Continue to stretch properly - especially the muscles at the back of the lower leg.
- Get a regular sports massage. This will help keep the muscles of the lower leg supple and in good condition.
- Apply ice to the shin after training. This may help keep inflammation down before it gets bad.
- Wear a shock absorbing insole

11. Stretching for shin splints

The following guidelines are for information purposes only. We recommend seeking professional advice before attempting any self treatment.
In most cases of shin splints, the calf muscles (Gastrocnemius and Soleus) are tight. The muscles at the front of the shin (especially Tibialis Anterior) also require stretching.

Gastrocnemius stretches
The Gastronemius muscle is the largest and most superficial of the calf muscles. It crosses the knee joint to attach to the Femur (thigh bone) and so to stretch the Gastrocnemius muscle, the knee must be straight. There are various ways of stretching this muscle, here are the two most common:

- The patient stands facing a wall with a wide stance and the leg to be stretched behind (image 1).
- They keep the heel down and the knee straight as they lean forwards, using the wall for balance and something to push against.
- A gentle stretch should be felt in the back of the lower leg. Hold this position for 30 seconds and repeat 3 times.
- The patient stands on a step making sure there is something to hold on to (a wall or banister etc).
- The toes should be positioned on the step, with the heel over the egde.
- The heel is slowly lowered, keeping the knee straight, until a stretch can be felt. Hold the position for 30 seconds and repeat 3 times.
- This stretch can be performed both feet together to start with but is more effective performed one leg at a time.

Soleus stretch.
The soleus muscle is located underneath the larger Gastrocnemius and it doesn't cross the knee joint. Therefore to stretch this muscle the knee must be bent to relax the overlying Gastrocnemius.

- The patient should stand facing a wall with the foot of the calf to be stretched at the back.
- The knee of the back leg should be bent towards the wall, keeping the heel on the floor.
- A stretch should be felt in the lower part of the back of the calf. Hold this position for 30 seconds and repeat 3 times.

Seated shin stretch
Stretching the muscles on the front of the lower leg can be difficult to achieve. The following are the two easiest ways of doing so.

- Kneel down and sit on your heels.
- Gently push down on the heels to stretch the front of the leg.
- Hold the stretch for 30 seconds and repeat 3 times.
- This stretch can be increased by stretching one leg at a time and gently pulling the knee up

Standing shin stretch

- Stand with your toes of one foot on the floor on the outside of your other foot.
- Bend the weight bearing leg to push your other ankle towards the ground.
- Hold this position for 30 seconds and repeat 3 times.

12. **Strengthening for Shin Splints.**

Strengthening the muscles of the lower leg can begin after the initial painful, inflamed phase has passed. Strengthening should be a gradual process and exercises should always be pain free.

Toe raises
Toe raises are a good starting point when looking to strengthen the shin muscles. Start with only a few repetitions and gradually increase the numbers.

- The patient should be sat with both feet flat on the floor.
- Keeping the heel on the ground, the patient should lift the rest of the foot up as high as possible.
- Hold for a couple of seconds before slowly returning the foot back to the floor
- Repeat 10-20 times and increase to performing 2-3 sets.

Calf raise
To strengthen all of the lower leg muscles, perform calf raises. These can initially be performed both legs together before being progressed to single leg only.

- Stand with the feet should width apart and knees straight. Make sure you have something to hold on to.
- Lift the heels off the floor as high as possible and slowly return to the floor.
- Progress on to one foot only
- This can be progressed even further by standing on a step with the heel off the back and lower the heel down past the level of the step.

Heel walking / Toe walking.
Walking the length of a room either on the toes or on the heels will help to strengthen the calf and shin muscles respectively. Make sure you do this slowly and under complete control.

Resisted dorsiflexion
Dorsiflexion is the ankle movement where the toes are pointed towards the ceiling. To progress in strengthening the shin muscles resistance should be used in the form of either pressure from a partner, or even easier, a resistance band.

- The patient should be sat on the floor with both legs straight.
- Loop the middle of the band around the upper foot (just below the toes), pass both ends of the band behind the other foot and up the outside of the other leg and hold the ends there.

- Push down on the band with the other foot to make it taught.
- Move against the resistance of the band to point the toes towards the ceiling. Return to the starting position under complete control

13. Shin Splints – Biomechanics

The cause of shin splints is usually related to our biomechanics, i.e. how we move. Podiatrist Ian Sadler talks to Sports Injury Clinic about shin splints, the cause of shin splints and shin splint pain. The podiatrist also talks about compartment syndrome and the involvement of the soleus muscle. Shin splints is a bit of an umbrella term used to describe any shin pain. Pain to the outside of the shin bone is more likely a form of compartment syndrome. Pain on the inside of the bone is 'true' shin splints. The Soleus muscle is heavily involved in the development of shin splints, where the muscle attaches to the inner Tibia. Poor mechanics can increase the stress on these attachments to the bone. The most common foot problem associated with shin splints is a very rapid overpronation of the foot. This can be corrected using insoles or orthotics, as well as through rehabilitation program to length the calf muscles.


Tibia
Periostium