

# Metatarsal Stress Fracture (excluding 2<sup>nd</sup> and 5<sup>th</sup> MT)

## What is it?

A stress fracture is an overuse injury of the bone. A bone will break or fracture when a stress placed on the bone exceeds its ability to withstand stress. A typical break or fracture will occur when an abnormally high force is applied to a normal bone. Stress fractures also occur due to a normal force being applied an excessive number of times to the bone with insufficient rest. Bones are constantly changing and responding to the workload placed upon them, there is a constant turnover of cells as the bone acts to repair itself. When the stress of repetitive loads overwhelms the ability of the bone to repair itself, small cracks will occur – this is known as a stress fracture. The metatarsals or the long bones in the foot are the second most common area to get a stress fracture. See figure 1 below.



Figure 1(a)



Figure 1(b)



## What are the symptoms?

Metatarsal stress fractures are usually characterised by increased pain with weight bearing exercise. The pain is usually localised to a point at the top of the foot. Sometimes pain will also be present at rest. Occasionally there will be swelling or redness at the point of tenderness although this is rarely the case.

## What should I do?

If you have or suspect you have a stress fracture you should avoid performing weight bearing activity on the injured foot. Avoiding tight shoes and high heels which will place extra stress on the forefoot is also important. The management of stress fractures must be appropriate or there can be long term problems. Inappropriate management of a stress fracture can, at the very least, result in long-term pain - while non-union (the bone not healing together) and osteonecrosis (bone

death) are two of the more severe outcomes that can occur as a result of poor management of the injury. This may then require surgery which in some cases may have been avoidable.

It is important not to forget that even once the fracture has healed sometimes long term training modifications need to be made. It may be as simple as using an orthotic to correct a biomechanical abnormality but sometimes it involves changes to the training load and dietary factors etc.

## How did I get it?

Stress fractures of the metatarsals can occur due to a multitude of factors. Unstable foot mechanics and excessive loading of the bone are the two most common, of many contributing factors. Bones are very resilient but force in this area can add up quickly. When running, the force that will travel through the foot is often 3-4 times body weight and when jumping the force can be as high as 10-12 times bodyweight. If there is an abnormal, rather than even, distribution of force due to altered biomechanics the degree of loading is compounded further. Other factors that may contribute to a stress fracture include changes in training load and / or frequency, training surfaces, footwear, biomechanical abnormalities (having a long second toe or flat feet) and muscle tightness or fatigue. Disturbances in a female's menstrual cycle may also be a contributing factor. Tight constrictive footwear or elevated heels may increase the workload and stress on the metatarsal bones. Such causative factors must be effectively addressed or injury will recur.

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## How is a diagnosis made?

A diagnosis is made on the history of the injury and on examination findings. Imaging studies such as x-ray, bone scan or CT/MRI may be used to confirm the diagnosis.

## What does rehab involve?

### WEEKS 0-2

#### Day to day activity:

Weight-bear as tolerated. For occupations with significant walking/weight-bearing a walking boot may be required. Limit unnecessary walking.

#### Exercise:

**Yes:** Swimming, upper body weight training, grinder

**No:** Walking, running, cycling, rowing, elliptical, anything with weight bearing

Sample exercise session for an endurance athlete:

- Swimming preferably with pull buoy to limit kicking
- Intervals on the grinder
- High rep no rest circuit of upper body weights.

### WEEKS 2-4

#### Day to day activity:

Weight-bear as tolerated. For occupations with significant walking/weight-bearing a walking boot may be required. Limit unnecessary walking.

#### Exercise:

**Yes:** Swimming, upper body weight training, cycling

**No:** Walking, running, cycling, rowing,

Sample exercise session for an endurance athlete:

As previous PLUS add in cycling.

Should aim to be performing a spin

class by the end of week 4. Remember just because you can add in some cycling doesn't mean that you should be cranking high resistance 7 days per week! It should be added in to slowly and progressively increase the load and provide some variety.

### WEEKS 4-6

#### Day to day activity:

Weight-bear as tolerated.

#### Exercise:

**Yes:** Swimming, upper body weight training, cycling, rowing

**No:** Walking, running,

Sample exercise session for an endurance athlete:  
as per previous plus rowing.

Sample rowing targets:

- aim for 2500m in 10 minutes.
- 1min row with 1 minute of rest. 10 intervals of 280m per minute
- 2000m in the shortest time possible

Concept 2 have a VO2 max calculator and well established records which you can test yourself against!

<http://www.concept2.com/us/interactive/calculators/vo2max.asp>

### WEEKS 6-8

#### Day to day activity:

Weight-bear as tolerated.

#### Exercise:

**Yes:** Swimming, upper body weight training, cycling, rowing, low volume of jogging on grass

**No:** running

Sample exercise session for an endurance athlete:

trial of 4 x 500m jog on grass 3 times over the 2 weeks separated by at least 2-3 days

### WEEKS 8-12

PODIATRY REVIEW WITH TREADMILL RUN TO ASSESS BIOMECHANICS

#### Day to day activity:

Weight-bear as tolerated.

#### Exercise:

**Yes:** EVERYTHING, be sensible with loading. Very slow increase in running volume.

Week 1: 2km run 3 times per week

Week 2: 4km run 3 times per week

Week 3: 6km run 3 times per week

Week 4: 8km run 3 times per week

Week 12 and onwards

Progress to high volumes of running. Carefully monitor volume and biomechanics or the risk of the injury reoccurring is high.

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Figure 2(a)

## Exogen:

Exogen is a form of Low Intensity Pulsed Ultrasound (LIPUS) which has been shown to accelerate bone healing. It needs to be applied daily at the same time every day if possible. There is free use of exogen at Sports Clinic NQ 5-6 days per week depending on opening hours. See Figure 2(a).



Figure 2(b)

## Alter G:

Sports Clinic NQ has the only publically available ALTER G treadmill in Queensland. See Figure 2(b) which illustrates this futuristic treadmill. Previously only available to professional athletes and members of the armed forces, the Alter G treadmill allows you to run at only a fraction of your bodyweight. The ALTER G treadmill allows you to run at as little as 20% of your bodyweight. This provides 3 benefits:-

- sport specific conditioning
- graded return to running
- appropriate bone loading to help healing.

## Frequently Asked Questions:

**Question:** Just wanted to clarify weeks on the timetable - week 0-2 then 2-4 - I think we'd discussed 1st week swimming and upper body only then 2nd, 3rd, 4th week add in bike? Is that right? And do you really mean I can't do spin class until 4th week (I've already been 3 times this week because I'm so sick of swimming. Also when can I restart pump classes?

**Answer:** The guidelines may seem conservative but they need to be! One major problem with stress fractures is they happen in endurance athletes who are pushing themselves quite hard. The natural tendency of people who suffer these injuries is to return to activity too soon. A conservative and sensible progression is important to recovery. Cycling should be added in with a sensible progression starting with very low resistance.

**Question:** There's a marathon in Hobart in 3 months that I was hoping to do - is that definitely out, even if I keep my fitness up with all this cross training? The next marathon after that is in 6 months which is so far away...

**Answer:** Provided everything runs smoothly you will be running by three months, but not running marathons. Aiming for an event so close will just make you push too hard and probably result in re-injury. If you return to high volumes of running without making a biomechanical, hormonal and training modification then re-injury is a certainty. It is better to take it slowly and only do it once. Aiming for the marathon in six months is a more realistic option.

**Question:** you mention the fact that running puts 3-4 times body weight through the feet - would losing weight help to prevent this from happening again

**Answer:** Regarding weight loss, if you are overweight then yes it would be worthwhile. Obesity is a risk factor for stress fractures.

If you are a healthy weight, female and engaging in serious training volume, losing weight would potentially cause some other risk factors for stress fractures. It is well established that high volumes of training and food restriction is a significant risk factor for stress fractures especially in women. The goal should be to eat a healthy diet that meets daily requirements.



**Go online for more information**

[www.sportsclinicnq.com.au/patient-information](http://www.sportsclinicnq.com.au/patient-information)

**Do you have a question?**  
Email [info@sportsclinicnq.com.au](mailto:info@sportsclinicnq.com.au)