

Dancers must be extra strict with their technique as they come to the end of barre work or centrework, when the muscles are beginning to tire.

Stress fractures have ended the career of many dancers. But though many dancers will experience pain in the shins, feet or hips during their career, we have learned a lot about the causes of stress fractures and how they might be avoided. Mark Forwood explains.

# TAKING OUT THE STRESS

**S**TRESS fractures are caused by repeated overloading of the skeleton. Think of trying to break a piece of wire by bending it back and forth. You weaken the wire with each bend until it can be broken easily. It's similar with stress fractures. They might occur because dance training stresses your bones for a long time, or because the amount of force you apply to the bone increases to more than you are used to. This might occur if a dancer has a thin body-type compared to others in the class, or if the dance training is too intensive (for example, by increasing the amount or intensity of dance classes too quickly after the holidays).

Increased strain on the bone could also occur if the dance floor was too hard (such as a concrete floor), or when girls start wearing pointe shoes for the first time. Feet need time to adapt to this unusual activity. These different factors all increase the amount of bending and twisting of bone. Like the wire, your bones then become weakened by microscopic cracks that start the process of a stress fracture.

## ■|| TECHNIQUE ERRORS

Of course, twisting and bending is fundamental to dance and these activities cause bones in the lower limbs to undergo

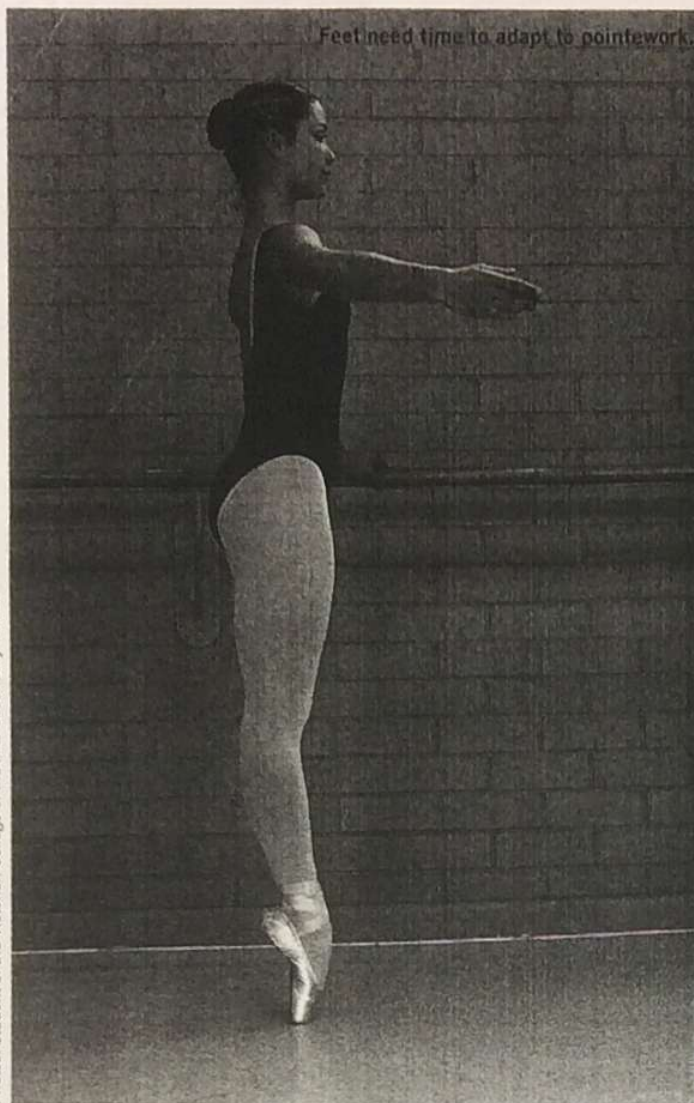
twisting and bending as well. The effect of these forces on the skeleton can be exacerbated by poor technique. This may be due to your own technique, but it could also be because you're fatigued and have less control over your body. It is very important to emphasise technical accuracy in your class.

A common problem is poor alignment of the knees and feet during plié. If you allow your knees to roll in, the twisting of your tibia (shin bone) is increased during preparation for turns or jumps. Another problem is the incorrect timing of foot placement during pirouettes or jumps en tournant. If you don't reach a full pointe



Feet need time to adapt to pointework.

Photos: Student of the Victorian College of the Arts Secondary School.



or demi-pointe during turns, more strain is placed on the muscles of the leg and foot (because the muscles are forced to contract strongly to stabilise the foot). Similarly, if a dancer has difficulty balancing in these poses and “wobbles”, the muscle loading of the leg will be increased.

**PREVENTION:** You can strengthen your ankles by performing additional relevés to demi-pointe (from both one and two feet). Activities to train your reflexes and “joint sense” (termed proprioceptive feedback) are also good. These include wobble-board activities (circular boards and tilt boards), with eyes open and closed. A physiotherapist can advise you of specific exercises if necessary. Dancers with abnormal foot posture (such as very high arches or flat feet) should also consult a podiatrist. Podiatrists can produce orthotics that fit into your dance shoes. The orthotics may help to correct poor postural alignment of the foot, and reduce excessive stresses.

“When muscles get tired, they lose that elasticity and the energy is transferred to your bones.”

#### ■ II MUSCLE FATIGUE

At the start of your class, your legs are like springs, allowing you to jump and rebound easily. At the end of class, you feel every landing in your bones and up your spine. Familiar? This is because, like elastic bands, fresh muscles can absorb the energy of landings. But when they get tired, they lose that elasticity and the energy is transferred to your bones. It also makes it difficult to maintain good posture and technique, which simply adds to the increased bending and twisting of your bones.

It is imperative that dancers are very strict with their technique at the end of barre and centre-work. Although barre-work might be considered quite “gentle” in terms of impact loading, dancers know that it is very demanding of the muscles. After 30-45 minutes, fatigue will be setting in. Then you go into centre-work, which involves even greater loading through jumps and turns and requires greater postural control. If you are fatigued, this contributes to overload on the bone, particularly in dancers with risk factors for stress fracture (such as technical errors or postural deviations).

**PREVENTION:** A brief interval of about 10 minutes between the work at the barre and centre-work can alleviate some muscle fatigue. This should not be used to “rest” or warm-down, but should be used as an opportunity to stretch the legs.

Stretching can be performed in pairs or groups of three making use of passive and active stretches and PNF stretches.

Dancers could also massage one another, concentrating on calf muscles and anterior muscles of the leg, hamstrings and thigh muscles. Stretching and massage are excellent for removing waste products from tired muscle.

## ■ II NUTRITION AND HORMONAL FACTORS

Some dancers restrict their diets to maintain a lean body. The combination of diet restriction, low body fat and hormone imbalance in female dancers greatly increases the risk of a stress fracture. Adult dancers require about 1000 mg of calcium (Ca) per day as the recommended dietary intake, and young dancers need 1200 mg per day.

As a guide, 1 glass of milk (250 ml, 300 mg Ca), a tub of low-fat yoghurt (200 g, 400 mg Ca) and a small 40 g block of cheddar cheese (300 mg Ca) would give you 1000 mg. This is best achieved through diet, and dairy foods in particular.

Ammenorrhoea (the absence or disturbance of periods) can also lead to rapid bone loss and place the dancer at risk of osteoporosis and stress fractures.

**PREVENTION:** Make sure you have a good nutritional diet. Hormonal problems should be referred to a doctor.

## ■ II NON-STEROIDAL ANTIINFLAMMATORY DRUGS (NSAIDS)

NSAIDs, such as Nurofen, Voltaren or Celebrex, are useful to reduce inflammation from injuries, but prolonged use can slow down bone healing and contribute to the progression of a stress fracture. This is because NSAIDs reduce pain (so a stress fracture could progress undetected), and also because they slow down the healing responses within the bone. Any musculoskeletal pain that continues beyond a few days, or that requires prolonged use of NSAIDs, must be referred to a physician for management.

It is important to diagnose the cause of any pain, and not simply mask it. Pain is your body's way of alerting you to injury and potential stress fracture.

## ■ II STRESS FRACTURE-PROOFING

Some doctors believe that specific exercises might prepare our skeleton for activities like ballet, although there is no scientific evidence to prove it. You might like to consider preventative exercises within your overall training load. They would be best performed outside your main dance classes (such as during rehearsals or choreography sessions), and only by those dancers who have no symptoms or diagnosis of stress fractures. They could easily be done at home.

Examples of activities include zig-zag hopping and long hops (that is, each hop over 50 cm). You could also include one or two dance jumps (such as with turns to different directions alternatively). Only a few jumps are necessary to cause a biological response in your bones. Shorter, more frequent activities are more effective than a few longer sessions. A preventative session might take no more than 5-10 minutes, 3-4 times per week and could include three sets of 10 hops on each leg (zig zag and 50 cm), plus three sets of two additional dance jumps (5-8 jumps with turn to each direction).

## ■ II SUMMARY

Stress fractures are an occupational hazard for dancers. If you have pain around bones or joints that lasts for more than a couple of days, or cannot be easily alleviated with rest, ice or regular analgesics, then you need to see your doctor. Hopefully, with careful training, these preventative strategies and a little bit of luck, you will never encounter such an injury. ■

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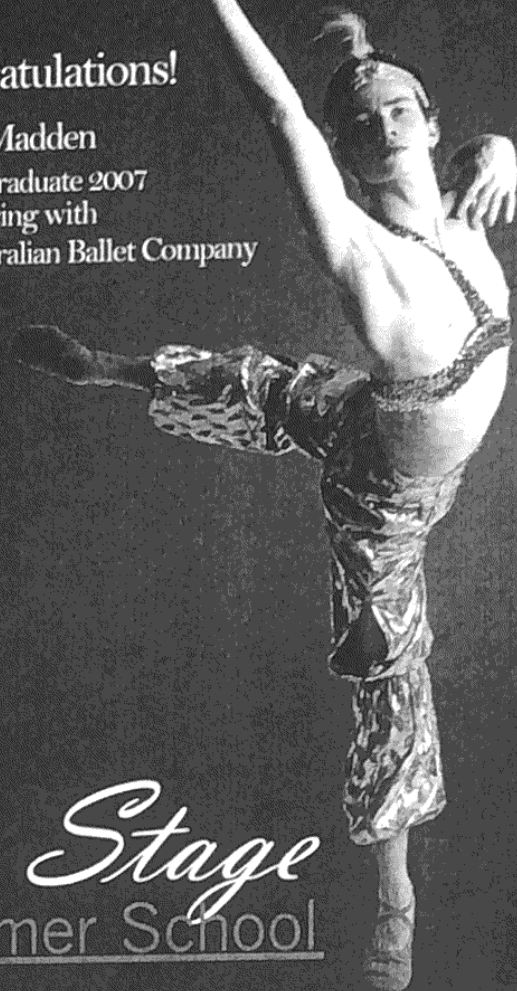


Photo: Roy Varley - Jarryd Madden 'Le Corsaire'

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