



THE DOCTOR IS IN

with Dr. Richard Beauchamp, M.D., FRCSC

STRESSED OUT

Two words that can really stress out a runner: stress fracture.

A stress fracture is a small crack in a bone brought on by repetitive loading and strain, resulting in pain and tenderness at the injury site. Stress fractures occur most frequently in the foot (metatarsals), the shin (tibia) and the hip (femur or pelvis). The condition can be accelerated by inadequate muscular support; therefore, maintaining balanced muscle and bone strength is the best way to avoid a stress fracture.

Bones are the skeletal structures that provide attachment points for muscles, ligaments and tendons, which exert force in order to generate movement. The bones also receive their strength from proper use of the adjacent muscles, so any situation where there is muscle weakness or misalignment can lead to weakening of the bones, which may in turn lead to fractures.

Proper amounts of calcium, sunlight and vitamin D are required for optimal bone health. It has been shown in some studies that supplements of calcium and vitamin D reduce the risk of stress fractures in female athletes between the ages of 18 to 35 years.¹ Bones also must be used in order to remain strong—therefore the importance of activity. Beware of the “female athlete triad” of amenorrhea, anorexia and osteoporosis. This is a leading cause of the higher incidence of stress fractures in women. Training in running shoes older than six months (about 300 to 500 miles for the average runner) has also been shown to be a risk factor for stress fractures.²

The development of stress fractures seems to be dependent on both the magnitude of force produced by running as well as the loading exposure; however, speed is more a important factor than the duration of the run.³ Stress fractures of the pelvis have been identified as a cause of low back pain in some women⁴ and a sacral (vertebra) stress fracture can be a cause of pain in the glutes.⁵ A tibial stress fracture can mimic the symptoms of shin splints, particularly early on in the condition.

The typical scenario of a runner who is developing a stress fracture often begins with the non-diagnostic complaint of “my foot/leg/hip hurts after my long run.” Initially, the pain improves with rest and avoidance of running. However, until the fracture heals completely, the pain remains or may even get worse. Eventually there is pain in the involved area with even simple movements such as walking slowly. If

the affected bone can be easily felt with your hand, there might be local tenderness to touching it. There may be swelling in the area and the skin overlying the bone may seem warm. Eventually, especially if untreated, a stress fracture can lead to a complete break in the bone.

If you suspect that you have a stress fracture, the wisest thing to do is to curtail your running for a week or two. The usual remedies of rest, ice and training modifications should always be tried first. A useful self-test is to hop on the injured leg. With most stress fractures, you will be unable to hop repetitively without significant pain. If the pain is persistent and accompanied by distinct tenderness at the bone, a visit to the doctor is in order.

Following a thorough local physical examination, further tests may be needed. Conventional x-rays are the standard tests to assess bony integrity and confirm that there are no gross bony injuries, deformities or other conditions (Figure 1). Some may argue that plain x-rays are probably not necessary and advocate proceeding directly to a bone scan. However, it may take several weeks to schedule a bone scan whereas a plain x-ray is available immediately at a relatively low cost. If the plain x-ray is positive and discloses some pathology, then treatment can be undertaken immediately. If the plain x-ray is not diagnostic, then further investigations such as a bone scan or MRI can be done later (Figures 2 and 3).

If any of the tests confirm a stress fracture, then immediate weight-bearing restrictions are required. Notice I didn't say “complete non-weight-bearing.” Some degree of loading is required for speedier healing of the bone. Bone responds to weight-bearing by producing more bone as part of the healing process. Generally, some degree of weight restrictions coupled with graduated weight increase and weight-bearing with external support (such as crutches, splints, or braces) should be done. This could also encompass aqua-therapy and other forms of supervised physical activity. Selective cross-training is an excellent way to stay in shape without causing further injury. Proper eating habits are also essential for complete and speedy bone healing. Adequate protein and vitamin intake is required for bone and soft tissue healing. Most stress fractures are healed in six to eight weeks. Graduated return to training and running is then possible.

One of the complications of a stress fracture is the development of a complete fracture where the bone breaks right through (Figure 4). This may have the same implications for a fracture occurring from a severe, single event trauma. This can be devastating and may require 6 to 12 months of treatment with no running. The time to heal for a stress fracture takes longer than a usual fracture does to heal; the reason being that with repetitive overloading as the cause, the blood supply and hence the healing ability of the bone is compromised. Hence the importance of treating stress fractures early and adequately before they become complete fractures.

Most stress fractures respond to an aggressive approach of restricted weight-bearing with alternative activities to maintain general fitness but allowing some weight transmission through the injured bone. This is best conducted under the supervision of a trainer or therapist who can monitor your activity and gradually increase your extremity usage according to your recovery trend. **RR**

References:

1. *Phy Med & Rehab* 2(10): 945-9, 2010.
2. *Clin Sports Med* 29: 399-416, 2010.
3. *Clin Biomech* 25(4): 372-7, 2010.
4. *Acta Ortho Belgica* 76(6): 838, 2010.
5. *Curr Sp Med Rep* 15(2): 73, 2016.

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Causes of Stress Fractures • Female Athlete Triad

• Training Errors (too much too soon too quickly)

• Anatomical Factors or Malalignment • Muscle

Weakness or Imbalance • Improper or Worn-out Shoes

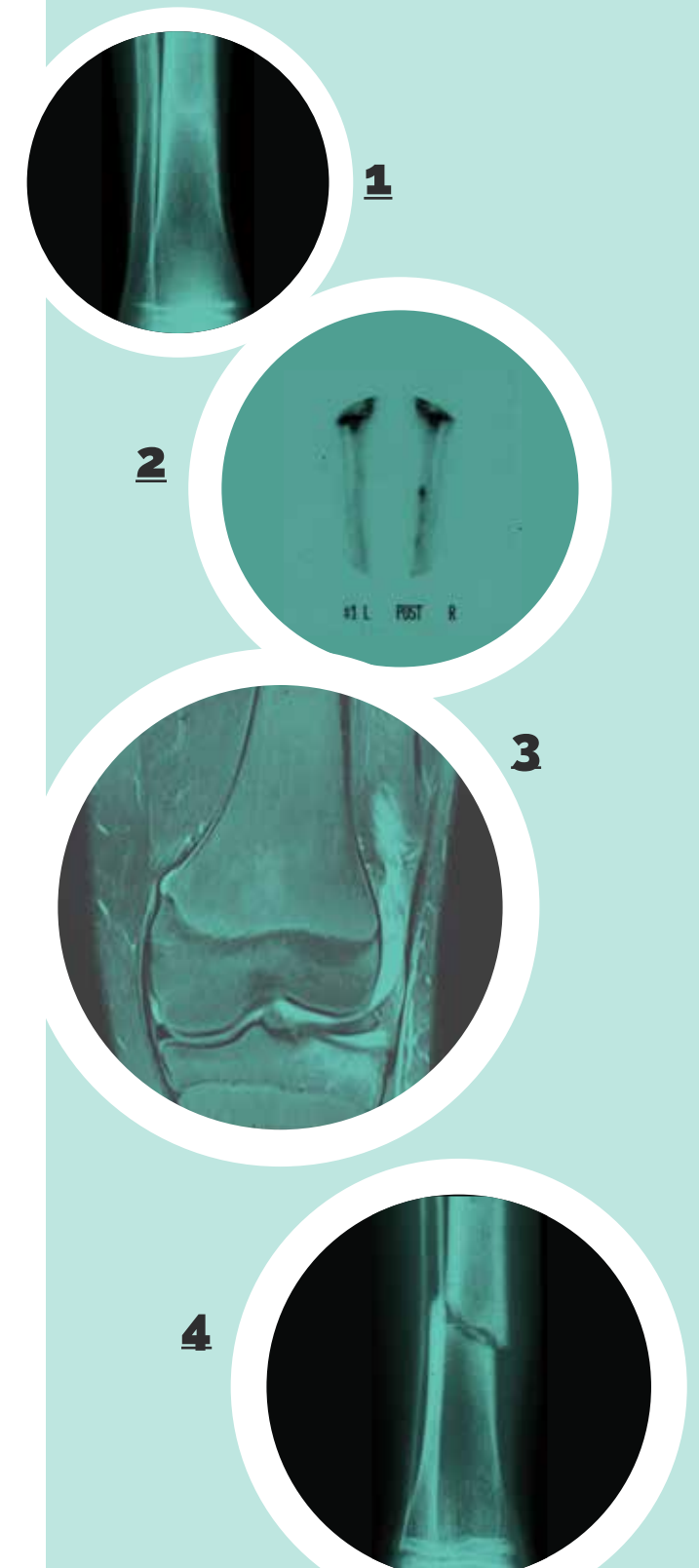


Figure 1. An x-ray of a shin bone that shows no signs of a stress fracture.

Figure 2. A bone scan showing black “hot” spots indicating an area of stress fracture.

Figure 3. MRI of a knee showing a bone bruise.

Figure 4. The same athlete as in Figure 1 but now showing a complete fracture.