*Chapter 6*

*Injuries and Care*

By Scott Flynn

U

nfortunately for some walkers and joggers, beginning a new program or even maintaining a program doesn’t always go as smoothly as planned. The physical challenges of beginning a new exercise program can place you at a greater risk of injury, illness or even death. Results from various studies suggest vigorous activity increases the risk of acute heart attacks and/or sudden cardiac death.1

In addition to the increased risk of cardiovascular events, muscle strains, joint sprains and pains, broken bones and soft tissue damage can occur as a result of walking and jogging. In a large study at the Cooper Clinic in Dallas, Texas, regular walkers and joggers were tracked for 8 years to determine how many of them required physician visits as a result of musculoskeletal injury. Of the nearly 3,000 participants, walkers were less likely to be injured compared with young and old male runners. In addition, the researchers found that running for greater than 30 min posed more risk than walking for a similar or greater time frame.2 Regardless of the differences in risk, when considering walking for fitness or jogging, one should consider all of the costs and benefits.

# Basic Treatment of Injuries

Most injuries occurring with walkers and joggers would be classified as soft-tissue injuries. This simply implies that fractures and other bone related problems occur less frequently. Of course, this is a good thing because many soft tissue injuries can be treated at home and don’t require the time or expense of visiting a physician. However, it is imperative that as you begin a program you become familiar with your body’s response to exercise so you’re able to differentiate between minor tweaks and strains and significant injuries that would require medical attention. If in doubt, see a physician.

## PRICE

The acronym PRICE describes the proper approach to soft tissue treatment.

P-Prevention

R-Rest

I-Ice

C-Compression

E-Elevation

Because prevention is so important, a larger section of text has been devoted to prevention at a later point.

### Rest

Once injury has occurred, treatment should begin as soon as possible. The first step in soft-tissue treatment comes from resting the injured area. Resting, or discontinuing use of the injured area helps prevent additional damage and allow for the natural healing processes to occur. The amount of resting or time off depends on the severity of the injury. In some cases, time off may not be required. In other cases, not resting, or just dealing with the pain, may lead to additional damage to the injured area and overuse to areas of the body that now must compensate for the damaged area’s inability to function properly. Post injury, rest should last for 24-48 followed by modified activity when possible.

### Ice

Ice, or cryotherapy, serves two purposes. First, it helps reduce inflammation by reducing blood flow to the injured area. Second, it helps with pain. Ice should be administered as soon as possible and continue for 48 hours in the pattern of 15-20 minutes per hour or several times per day. Continuing use in this fashion beyond 48 hours may delay healing. However, a single treatment of ice may be needed after modified exercises have been performed.

### Compression

Edema, or swelling may result from injury leading to pain, stiffness, and low blood flow. In order to attempt to manage the swelling, compressing the area may be necessary. This can effectively be done with an elastic bandage (such as an Ace bandage). Caution should be taken to avoid wrapping any bandage too tightly which will stop or significantly reduce blood flow to extremities beyond the injured area. Symptoms of a bandage that is too tight include skin discoloration, loss of feeling, and/or a tingling sensation in the area below the wrapped area.

### Elevation

When muscles contract, the contraction actions also serve as a pump, pumping blood in the veins back towards the heart. While resting an injured area, muscular contractions will be at a minimum making it easier for an accumulation of blood to occur, i.e. swelling. By elevating the injured area above the level of the heart, gravity helps push blood back to the heart and reduce swelling and removal of accumulating metabolites in the injured area. 3

## Additional Treatments

There are many methods athletes use to treat injuries. It is not within the scope of this class to explore them all. In many cases, those that require advanced treatments are elite or competitive endurance athletes rather than walkers and joggers who are simply trying to improve fitness and maintain good health.

### Anti-inflammatory Medications

Injuries often result in inflammation which causes pain, interferes with blood flow and delays healing time. Medications that reduce inflammation, anti-inflammatory medications, can be used in conjunction with other treatments to alleviate pain and obviously, reduce inflammation.

Over-the-counter anti-inflammatory medications are used most commonly. This includes drugs such as ibuprofen, aspirin and naproxen which are also grouped into a category of drugs known as Non-steroidal Anti-inflammatory Drugs (NSAID’s). These can be a very effective means of treating soft-tissue injuries when used properly (consult a pharmacist, physician, or the packaging for proper dosage amounts).

Steroidal medications differ from NSAID’s in their chemistry and the way the body processes them. These medications are administered under a physician’s supervision as shots or in oral form. Shots, like cortisone shots, are injected into the local area of the injury and linger over a long period of time to alleviate pain and inflammation.

### Surgery

While every attempt should be made to avoid it, surgery may be the only way to deal with some injuries. Fortunately, surgery isn’t a frequent treatment for walking and jogging related injuries. Most injuries can be treated at home, with physical therapy, and common sense. The key point is to not allow injuries to go untreated so that they get to the point where surgery might be needed.

## P for Prevention

The old adage, “An ounce of prevention is worth a pound of cure” holds true in walking and jogging. There is no better way to avoid treatment of injury than to prevent it from happening altogether. In a 2010, researchers published a meta-analysis of runners identifying multiple factors that could be implicated as possible causes of injury. Of those factors identified, only one strong correlation between injury prevention and weekly mileage was determined. Of the other factors cited such as strength, pre-exercise stretching, and shoes, the researchers found that more research was needed to connect these factors with injury occurrence.

However, in their findings of pre-routine stretching, it was noted that 95% of coaches still believed it helped prevent injuries and 73% believed there were no drawbacks.4 This raises the question of whether or not the science supports the anecdotal opinions of professional coaches. In other words, while significant scientific evidence may not exist supporting the claims of stretching or several other factors, there may still be a benefit to paying attention to areas like stretching which have long been believed to contribute to injury prevention. Of course, that goes for each factor.

Regardless, while not implicated specifically, walkers and joggers will almost certainly benefit from identifying these factors and taking action to minimize the associated risks.

### Factors Related to Prevention of Injury

Later in this chapter, the most common injuries associated with walking and jogging will be examined more closely. However, at this point the focus is turned to what is believed to generally be the most common causes of injury. It should be noted that identifying the causes also helps prevent the injury and helps identify the treatment strategy.

As these causes are outlined, it may be easier to understand by considering the muscles and bones in the legs as being links of a chain, beginning in the feet and ending where the gluteal muscles end (buttocks) attach to the hips in the lower back. Each muscle, or chain link, serves a specific purpose to aid in the running or walking movement. This chain, is often referred to as the kinetic chain.

*Muscle Weakness*

Muscle weakness has been identified as a problem for many runners with injuries in the hip, thigh and knees. Of course, this seems logical when you consider the strain and impact forces of walking and jogging. Once again, in thinking of the leg as a chain of connected muscles, beginning at the feet and ending in the lower back where the buttocks muscles attach to the hips, it’s easy to visualize how one weak link would cause the other links to have to “pick up the slack.” As a result, the additional load leads to overuse and compensation which leads to pain, inflammation and ultimately injury. Therefore, attempting to strengthen each “link” through strength training, an area of fitness often avoided by cardio-lovers, has long been recommended by coaches and other experts.

### Muscles to Be Strengthened:

* Gluteus Maximus
* Gluteus Minimus
* Hamstrings
* Calf muscles
* Quadriceps (vastus lateralis, vastus medialis, rectus femoris, bicep femoris)
* Core muscles (abdominal muscles and those surrounding the hips).

Muscle weakness in the feet and ankles is one of the primary arguments by proponents of barefoot running. Proponents believe that cushioned and motion control shoes serve as a “crutch” to muscles in the feet. This weakness leads to unnatural movement of the ankles and over-stress in the foot which causes the muscles in other areas of the body compensate. For example, inward rotation of the ankle requires additional rotation at the knee. The additional work of the illiotibial band (IT band), used to stabilize the knee, can lead to inflammation of the IT band. By walking and jogging without that support and cushion, or performing specific exercises, muscles are strengthened, and injuries avoided.

#### Anatomical Factors, Orthotics, Shoes

Unfortunately, some factors are genetic and can’t be modified very easily. For example, the degree of arch in the feet appear to be connected to injuries of the knee. High arches (cavus) can alter the way the foot contacts the ground, making it so the foot rolls from the outside to inward rotation. As a result (consider the kinetic chain), the ankle bends inward as does the knee making the muscles in the thigh and hip engage to stabilize the inward forces. Other genetic factors may be the width of the hips and differing leg lengths. Of course, little can be done to anatomically change these factors.4,6

However, physicians and shoe manufacturers attempt to minimize the effects of these genetic differences by using orthotics and shoes specifically designed for certain gait patterns (as mentioned in previous chapters). Conflicting evidence implies that either of these methods significantly reduce the risk of injuries in runners.6 Nonetheless, patients and consumers abundantly support the use of orthotics and motion control shoes showing they believe they are helpful.

#### Training Errors

Not only do weak muscles and anatomical factors pose a risk to joggers and walkers, but the type, frequency and volume of training also increase the risk of injury. Of all the factors listed, the one with the strongest correlation to injury is weekly mileage. In general, the greater mileage (40+ miles per week), the greater the chance of being injured. However, in some studies more mileage may have actually prevented knee injury although injury to the thighs and hamstrings were more frequent.

In addition to weekly mileage, the frequency and time also affected the occurrence rates of injury. Studies comparing runners of 1, 3 and 5 days a week for 20 weeks, and 15, 30, and 45 min for 20 weeks found that the rate of injury increased in both control groups, i.e. as volume and frequency increased, so did injury rates.

Changes in running schedules have also been linked to injury. For example, sudden increases in volume of training or modifying a running program to include more difficult types of workouts (hill training, interval training) may be too much for the body to absorb without a gradual build up. This was observed by researchers who examined injury rates of military recruits. Those recruits that entered basic training with a running background had fewer injuries than those who did not. 8

As outlined in chapter 2, starting out slowly and gradually increasing the volume and intensity are very important to staying healthy.

#### Stretching

Stretching has long been used before the warm-up phase of an exercise session with the intent of loosening up (reducing muscle tension), improving performance, and preventing injury (over-tension may lead to pulling or straining a muscle). Research over the years has not been able to confirm this idea and in some cases may actually show that stretching before exercise may actually have the opposite effect.9

More recently, studies have been designed to include stretching after the workout has been finished. The authors of one such study assessing hamstring injuries and stretching post-workout, followed a single team for four playing seasons and found that hamstring injuries decreased from 11 to 4 injuries and the number of days missed from injury went from 38 to 16. While more evidence is needed, injury prevention through stretching may be optimized by simply changing the timing of when it is performed.10

#### Warm up

Much like stretching, the warm up, a phase of the exercise session used to gradually increase body temperature through low-intensity movements, has been used under the pretense that it would help prevent injury, improve performance and help relieve muscle tension. In the context of injury prevention, a meta-analysis by Fradkin et al. concluded there was a small reduction of risk from using a warm up.11 Furthermore, another study used two intervention groups, one who just did the warm up and another that did the warm up and stretched. The warm-up plus stretching group had fewer injuries than the warm-up alone group. Once again, this seems to imply that much of the anecdotal evidence from those coaches and athletes may be more useful than the current scientific literature.

*Terrain and Running Surfaces*

Combined or in isolation, the type of terrain (hilly vs. flat) and the actual running surfaces (pavement vs. rocky vs. dirt path) are often linked to injuries. While there may not be large amounts of scientific evidence to support this idea, runners and walkers alike feel strongly that these factors strongly contribute to injuries.

For example, paved roads are not only unforgivingly hard surfaces but are also constructed so that they can easily drain water. To accomplish this, the middle of the road sits higher than the outer edges. When walking or jogging on roads, the inside leg/foot makes contact with the pavement at a different height than the outside leg/foot altering the “natural” gait pattern. Repeatedly running on these types of roads could lead to injuries such as iliotibial band syndrome (ITBS), knee pain, or ankle pain.

Or, running down-hill frequently may place additional stress on the quads and knee leading to knee pain and other problems. Much like volume and intensity, terrain and running surfaces should vary often to avoid potential injuries and boredom.

#### Weight

Elite endurance athletes pay close attention to achieving their “ideal” race weight. Not only is this good for performance but also to avoid injuries. During walking and jogging, tremendous stress is placed on the involved bones and muscles. Each step means the legs must absorb 2-3 times the body weight. It seems only logical that the greater the weight, the greater the chance of injury. This should be taken in to consideration when planning the volume and intensity of a training session. When excessive weight is present, resistance training should be included and volume and intensity should be kept low to gradually build muscles so they are prepared to absorb the impact forces of walking and jogging.

## Common Injuries

As specific injuries are outlined below, it is worth emphasizing at this point the descriptions are intended to be informative rather than definitive diagnostic and treatment information. For any injury that is serious or could become more serious if left untreated it is imperative to seek professional diagnosis and treatment from a trained physician.

### Medial tibia stress syndrome (MTSS)

Medial tibia stress syndrome (MTSS), better known as shin splints, is one of the most common lower leg injuries accounting for about 15% of all running injuries. Shin splints are small tears in the connective tissue where the soleus muscle connects to the anterior and medial area of the tibia (the middle and front area of the large bone of the lower leg).

***Symptoms*** Shin splints are easily identified by pain or discomfort that runs along the shin bone (tibia). Pain may go away during activities, once muscles are loosened up, and return during rest but may also be present before, during, and after the activity in more severe cases.

***Causes*** The exact cause of shin splints is unknown but is believed to be related to fatigue of the soleus muscle. As the soleus fatigues, the impact forces are absorbed more by the tibia itself. The additional stress causes the tibia to bend or bow, leading to connective tissue tearing. Those at greatest risk of developing MTSS are those with flat feet or high arches, inflexible muscles, running on uneven terrain such as frequently running downhill, running on pavement/hard surfaces, and improper or worn out shoes. However, those who try to do too much, too soon (mileage, intensity) are probably most likely to develop shin splints.13

***Treatment*** Fortunately, shin splints are very treatable at home. Rest from high impact activities is needed along with anti-inflammatory medications and ice. Exercises to strengthen the lower leg muscles should also be performed. In addition, shoes should be examined and replaced with a more suitable pair if needed. Finding alternate walking/jogging trails or paths could also be used to alleviate the volume of training that occurs on hard surfaces.

### Plantar fasciitis

Plantar fasciitis is the inflammation of the thick band of tissue (called fasciae) that connects your heel to your toes. This band supports the arch of your foot. If it is stressed too much, small tears in the fasciae develop leading to foot pain and inflammation.

***Symptoms*** Plantar Fasciitis can be recognized by stiffness and pain in the bottom of the foot, usually closer to the heel. This will likely be felt in the mornings or after a period of sitting, when the foot isn’t in use.

***Causes*** Overuse of the area in a fatigued state. For example, standing for long periods of time. Of course, the “too much too soon” concept also applies here. Flat or high arches and overpronation also are linked to plantar fasciitis along with shoe type. More often, individuals with really tight calves develop this condition.

***Treatment*** according to the American Orthopedic Foot and Ankle Society, stretching your calves is the best treatment for plantar fasciitis.7 You can also apply ice to the foot/feet affected 2-4 times a day for about 20 minutes to reduce the inflammation.14

### Muscle Soreness

Many believe the idea that if your muscles aren’t sore after a workout you haven’t done enough. While a good workout may cause muscle soreness, it is certainly not what defines the quality of a workout. On the contrary, you should not be sore after every workout. **Delayed Onset Muscle Soreness (DOMS)**, is a condition that occurs when microscopic tears form in the muscle tissue leading to stiffness and general soreness in the muscles. This is a result of stress placed on the muscles during activity. You’ve undoubtedly experienced this immediately following your first workout after a long period of inactivity. This soreness, DOMS, may continue for days while your muscles are naturally repairing themselves. You might even feel this way after the first two or three workouts. However, if you are continuously sore after your walking/jogging sessions, you need to reconsider what you’re doing as it is likely too much stress for your body to handle.

DOMS, when experienced occasionally, should not be a cause for major alarm. Unfortunately, there isn’t much that can be done to treat it. Rest and anti-inflammatory medication may provide some relief.

### Patellofemoral Pain Syndrome (Runner’s Knee)

Patellofemoral Pain Syndrome is a general term that describes pain in the part of the knee where the femur (thigh bone) and patella (kneecap) come together. Often called Runner’s Knee, this pain can result from several scenarios such as Chondromalacia Patella or patellar misalignment. In Chondromalacia Patella, the cartilage underneath the patella becomes worn and breaks down, leading to pain and inflammation in the surrounding area. With patellar misalignment, the kneecap doesn’t track in its normal pattern. Normally, the patella sits in a grove and tracks along the groove when the knees is bending. When misaligned, the kneecap tracks to one side causing irritation and pain.

***Symptoms*** According to the Academy of Orthopedic Surgeons, the most common symptoms is a dull, aching pain in the front of the knee. This pain can increase during repetitive activity where the knee is bending or after long periods of sitting.

***Causes*** Weak and inflexible quadriceps muscles play a significant role in this injury since these muscles are the primary stabilizers of the kneecap. Simple overuse is also connected to this condition.

***Treatment*** RICE is the suggested method to treat this condition at home. A change to lower impact activity may be required while healing to improve the response to treatments. Strengthening exercises combined with flexibility should also be used.15

### Iliotibial Band Syndrome (ITBS)

The iliotibial band is located on the outer part of the thigh and connects the pelvis to the tibia (bone in the lower leg) just below the knee. This band of tissue, supports and stabilizes the knee during activities like walking and jogging. As the IT band passes over the outside portion of the knee, it can often rub against a bony protrusion on the femur. When this occurs frequently, the area of the knee being rubbed can become inflamed, leading to ITBS.

***Symptoms*** Most often, ITBS can be detected by pain and possibly swelling in the outside portion of the knee especially when the heel impacts the ground when walking. This can also occur near the hip but more often occurs in the knee area. A clicking or popping sensation may also occur each time the knee is bent then flexed with ITBS.

***Causes*** There can be several causes to ITBS making it very difficult to pinpoint. Improper technique during walking or jogging, weak glute and thigh muscles, low arches, and simple overuse all contribute to development of this condition.

***Treatment*** Like other walking and jogging conditions, stretching, anti-inflammatory medications, strengthening and rest can be good short-term solutions. Long-term solutions should focus on technique, possible shoe changes, and a continued stretching and strengthening program.16

### Achilles injuries (tendonitis)

The Achilles tendon connects the muscles of the calf to the heel. This thick tendon can become irritated during activity causing pain and discomfort in the heel. This irritation of the tendon is called tendonitis (inflammation of the Achilles tendon).

***Symptoms*** Pain in the heel(s), sometimes going away during the activity but present before and after is the primary symptom of tendonitis.

***Causes*** The inflammation usually stems as a result from overuse, inflexible and weak calf muscles. Changes in shoes, such as those with a lower drop, might also contribute to tendonitis because the calves are now stretching more with each step.

***Treatment*** RICE is the best method of treatment to prevent making the condition worse. Anti-inflammatory medications, strengthening of the calves and stretching the calf muscles should also be used to prevent and treat this condition. 13

### Stress fractures

Unlike blunt-force fractures, stress fractures develop in the bones over time as a result of excessive use. Stress fractures of the foot and heel are most common in runners but can occur in areas such as the shins. Additionally, fractures in the bones cannot be treated as easily as other soft-tissue injuries.

***Symptoms*** Sharp pain in the specific area of the fracture develops and is sensitive to the touch and when walking and jogging.

***Causes*** Overuse is the primary cause of stress fractures.

***Treatment*** While many of the soft-tissue injuries can easily be diagnosed and treated at home, stress fractures require proper medical attention. Discontinuation of activity is necessary to give the bone time to heal. 13

### Muscle Strains, Hamstring Strains

Muscle strains are injuries of the muscle tissue caused by overstretching or overstraining the muscle. Strains can be detected by a pain, sometimes sharp in nature, to a particular area of a muscle. Hamstring strains are a common running injury along with calf muscle strains. All strains, especially in the hamstring, can be very frustrating to deal with because they can occur spontaneously and seemingly without warning, rhyme or reason. Pain may not be present during everyday activities but when attempting to jog or walk may surface making it a challenge to understand when resuming activity would be safe. Depending on the severity, activities can be put on hold for weeks.

Causes are related to over-tension which could occur for multiple reasons such as poor flexibility or poor strength. Treatment strategies include RICE, strengthening and gentle stretching of the injured muscle.

### Illness

While not exactly considered an injury, walking and jogging and illness should also be addressed. Many avid endurance athletes live by the adage,” above the neck, you’re okay to exercise, below is a no go.” This simply implies that if the illness is isolated to an area above the neck, you are probably okay to exercise without making the condition worse. Above the neck illnesses, much of the time are things like allergies, congestion, headache, etc. In other words, illnesses that likely won’t worsen if you exercise. Below the neck illnesses might include upset stomach, chest congestion, and body aches signaling more of a widespread infection. Exercise in this state may make the condition even worse, prolonging recovery. In this case, you should wait until 24 hours after the symptoms are gone to resume your exercise routine. Regardless of the location of the illness, caution and good old-fashioned common sense should be used. If you’re unsure, don’t exercise.

Stomach or gastrointestinal distress may pose an additional risk since they are usually associated with vomiting and/or diarrhea, i.e. fluid loss. To avoid dehydration, exercising during or after an illness with fluid loss should be avoided.

**Key Terms**

**Delayed Onset Muscle Soreness (DOMS)-**a condition that occurs when microscopic tears form in the muscle tissue leading to stiffness and general soreness in the muscles.

**Testing Your Knowledge**

1. The “C” in the acronym PRICE stands for:
   1. Cryotherapy
   2. Compression
   3. Conducive
   4. Conscience
2. Medications that should be used to treat ailments or injuries include:
   1. NSAID’s
   2. Steroidal drugs
   3. Physician prescribed drugs
   4. All of the above
3. The most effective “treatment” strategy for any athlete, walker, or jogger is to:
   1. Rest
   2. Use ice when injured
   3. Prevent the injury in the first place
   4. Elevate the injured area
4. Of the factors listed, the only one to found to have a scientific correlation between it and running injuries was:
   1. Weekly mileage (more equals more injuries)
   2. Low muscle strength
   3. Use of orthotics
   4. Not using a warm up
5. Weight is important in injury prevention because:
   1. The body must support 2-3 times it’s weight upon impact during running
   2. More calories burned is associated with increased injury
   3. Guys/girls often get distracted by lean individuals leading to more accidental injuries
   4. There is no correlation with weight and injury in walking and jogging
6. The most common lower leg injury to walkers/runners is:
   1. patellofemoral pain syndrome
   2. Medial tibia stress syndrome
   3. Plantar fasciitis
   4. Achilles injury
7. When faced with illness, and the decision to jog/walk that day, you should look at the symptoms. Symptoms that are below the neck (chest congestion, body aches, etc.) are a good indication rest is needed, no workout that day.
   1. True
   2. False
8. For many common injuries, treatments almost always include:
   1. Strengthening
   2. Flexibility
   3. Improve technique
   4. All of the above
9. Delayed onset muscle soreness (DOMS) is something you should experience after nearly every workout and indicates your workout was a good, effective one.
   1. True
   2. False

Answer key:

1. a.
2. d
3. c.
4. a.
5. a.
6. b.
7. a.
8. d.
9. a.

**References:**

1. American College of Sports Medicine, 7th Edition, ACSM’s Guidelines for Exercise Testing and Prescription, Philadelphia, PA, Lippincott, Williams and Wilkins, p. 10
2. Colbert LH, Hootman JM, Macera CA, 2000, Physical Activity-Related Injuries in Walkers and Runners in the Aerobics Center Longitudinal Study, Clinical Journal of Sport Medicine vol. 10(4):259-63.
3. WebMD.com, April 2017, Rest, Ice, Compression, Elevation (RICE)-Topic Overview <http://www.webmd.com/first-aid/tc/rest-ice-compression-and-elevation-rice-topic-overview>
4. Fields, Karl B., Sykes, Jeannie C., Walker, Katherine M., Jackson Jonathan C., 2010, Prevention of Running Injuries, Current Sports Medicine Reports, vol. 9 (3): p. 176-182
5. Ferber, Reed, Hreliac, Alan, Kendall, Karen D., 2009, Suspected Mechanisms in the Cause of Overuse Running Injuries, Sports Health, Vol. 1 (3): 242-246
6. Campitelli, Nicholas A., April 2017, Do Runners Need Orthotics, Podiatry Today, <http://www.podiatrytoday.com/blogged/do-runners-need-orthotics>
7. Boven AMP, Janssen GME, Vermeer HGW, et al. Occurrence of running injuries in adults following a supervised training program. Int. J. Sports Med. 1989; 10(Supp 3): S186Y90
8. Jacobs SJ, Berson BL. Injuries to runners: a study of entrants to a 10,000-meter race. Am. J. Sports Med. 1986; 14:151Y5
9. Ryan MB, MacLean CL, Taunton JE. A review of anthropometric, biomechanical, neuromuscular and training related factors associated with injury in runners. Int. J. Sports Med. 2006; 7:120Y37
10. Verrall, GM, Slavotinek, JP, Barnes, PG. 2005, The Effect of Sports Specific Training on Reducing the Incidence of Hamstring Injuries in Professional Australian Rules Football Players. Br. J. Sports Med.; 39:363Y8
11. Fradkin AJ, Gabbe BJ, Cameron PA. Does Warming Up Prevent Injury in Sport? The evidence from randomized controlled trials? J. Sci. Med. Sport. 2006; 9:214Y20
12. Van Mechelen W, Hlobil H, Kemper HCG, et al. Prevention of running injuries by warm-up, cool-down, and stretching exercises. Am. J. Sports Med. 1993; 21:711Y9
13. Aschwanden, Christie, April 2017, The Big 7 Breakdowns: How to Avoid and Recover from the Most Common Running Injuries, 2011, Runner’s World

<http://www.runnersworld.com/health/the-big-7-body-breakdowns>

1. American Orthopedic Foot and Ankle Society, April 2017, Plantar Fasciitis, <http://www.aofas.org/footcaremd/conditions/ailments-of-the-heel/Pages/Plantar-Fasciitis.aspx>
2. American Academy of Orthopedic Surgeons, April 2017, Patellofemoral Pain Syndrome, <http://orthoinfo.aaos.org/topic.cfm?topic=A00680>
3. Wedro, Benjamin, April 2017, Medicine.net, Iliotibial Band Syndrome, 2/22/2016, <http://www.medicinenet.com/iliotibial_band_syndrome/page2.htm>