The Tone Zone Runners

THE COMPLETE INJURIES REFERENCE GUIDE

By Carl Belcher 02/06/03

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INTRODUCTION

This supplement is designed to help runners of all abilities and styles to enjoy long years of uninterrupted running pleasure. We know from our experiences that runners are injured all too often. The good news is that the most common injuries are frequently attributed to overuse, so prevention is possible - with a little understanding and care.

At least in part, controlling injuries is as simple as choosing softer running surfaces and maintaining a high level of conditioning. It's when injuries do occur that things get complicated. Today's sports medicine for runners is more sophisticated than ever - and, perhaps, more confusing, with more terms, more therapies, more options. Meanwhile, confusion remains over the exact meaning of some familiar terms. Check three different sources for the meaning of 'runner's knee', for example, and you may well unearth three different definitions.

So we've compiled this comprehensive, authoritative guide from the Runner's World website (www.runnersworld.co.uk) to answer your everyday questions about injuries: what they are, how to recognise them, what causes them, how to treat and prevent them. For easy reference, that's exactly how you'll find most entries listed.

You can find entries listed alphabetically under both general and specific headings. Take, for instance, plantar fasciitis, one of the most common running injuries. You'll find plantar fasciitis listed among Foot Injuries and fasciitis among Soft Tissue Injuries.

You can use this guide to navigate yourself through a sensible, fruitful training programme. You can use it to help prevent injuries, and to diagnose and treat minor injuries as they crop up. Of course, sometimes your best bet will be to consult a doctor immediately, because no work of reference can take into account all the factors and circumstances that contribute to each individual's health.

Remember that we have a qualified Physiotherapist affiliated to the club to help with the treatment of injuries. There is also a club Podiatrist to help with biomechanical dysfunctions of the foot. If you want to know more about these professionals come talk to us or see the section on our notice board about Membership Services.

Because everyone is different, the information presented here cannot be used to diagnose or treat individual health problems. In the first instance, you should always consult your GP.

Remember we are always here to help!

Wishing you injury free running!

Carl

BONE INJURIES

SPURS

A bony spur is a benign growth extending away from a bone, often underneath the foot at the origin of the plantar fascia or at the insertion of the Achilles tendon.

Symptoms: A spur can be intensely painful, and inflammation may make it tender, hot and reddened.

Cause: Repeated stress of the bone lining pulling away from the heel bone can result in inflammation, and ultimate calcification, of the ligaments originating from the bone. A tight plantar fascia may also contribute.

Treatment: Begin applying RICE and take an anti-inflammatory medication. You can relieve the pain by reducing the pull upon the bone: wearing running shoes with a rigid heel counter and a well-cushioned midsole can also help. In the case of plantar fasciitis, an orthotic may well reduce the 'bowstring' pull upon the heel spur.

Prevention: When you resume training, start slowly on soft, forgiving surfaces. Applying ice after each run will help to reduce discomfort. Applying gentle warmth may help in the final stages of recovery.

STRESS FRACTURE (or fatigue fracture)

A stress fracture is a partial or hairline break through part or all of the bone. It commonly affects the lower ends of the lower leg bones near the ankle, the metatarsal bones within the foot, and occasionally the thigh bone (femur), or even the lower back.

Symptoms: Pain tends to occur gradually in the area of damage and increases during running and other weight-bearing activities as the fracture grows.

Cause: A stress fracture is an overuse injury which can be provoked by running on a surface you're not used to, particularly a hard one, or by training in shoes with insufficient cushioning. It is more likely if you are fatigued or have poor biomechanics. In women it has been linked to amenorrhoea (absent menstrual periods).

Treatment: Rest, also employing ICE. Healing time is reduced by prompt diagnosis, though during the first three or four weeks, stress fractures won't show on x-rays. A bone scan is more helpful in diagnosis. Normally treatment by rest is sufficient, but if the fracture site is painful even when you perform non-running exercise, then a plaster cast or crutches may be necessary to ensure greater immobility. This may take between two and six weeks, and you should only start running again when there is no pain. Try gentle jogging first.

Prevention: As this is an overuse injury, you should alter your training programme to reduce hill running. Only increase your mileage gradually, and wear absorbent shoes that limit shock to the lower limbs. If you suffer from excessive pronation or leg-length discrepancy, you will probably benefit from orthotics.

JOINT INJURIES

ARTHRITIS

Damage to the cartilage within the joint. This becomes unable to repair itself, and the opposing surfaces of the joint become roughened.

Symptoms: In milder cases you may suffer from no more than discomfort, and lubrication of the joint through exercise and movement may actually help to relieve the symptoms. In more serious cases there is pain and inflammation, which in turn causes further cartilage damage and breakdown in a vicious circle.

Treatment: Initially, rest and anti-inflammatories. Consult a doctor early on.

BURSITIS

The condition where a bursa (a fluid-filled sac that surrounds a joint) becomes inflamed. In runners the heel, knee and hip are most commonly affected.

Symptoms: Although there is often local pain or swelling, diagnosis to differentiate bursitis from other injuries may prove difficult.

Cause: Bursitis may be the response to overuse, or it may be caused by a direct injury.

Treatment: Apply ice after activity, and take anti-inflammatories. In some cases, a cortisone injection or draining fluid from the inflamed bursa may help. Relieving pressure with a felt pad around the bursa can also facilitate healing.

SPRAIN

This occurs when a ligament (which helps to hold two bones in apposition) is stretched beyond its normal limits.

Symptoms: The sprain causes swelling and pain (which may be mild or completely disabling) as a result of local bleeding and fluid accumulation.

Cause: In runners, a sprain is usually the result of an awkward landing.

Treatment: Start RICE as soon as possible, to limit swelling and bleeding. It may be possible to run with a mild sprain at low effort on a smooth surface, but if you do so, you should apply RICE afterwards. A severe sprain may lead to tearing of the ligament, which would require complete rest and possible immobilisation of the joint. At the same time, continue RICE and anti-inflammatories. When you're ready to begin exercising again, start by walking.

Prevention: Sprains are less likely on smooth surfaces. Runners with weak ankles should aim to strengthen them using appropriate exercises.

SYNOVITIS

An inflammation of the thin layer of connective tissue that lines the inside of a joint.

Symptoms: The joint is probably painful with movement, and there is local swelling, tenderness and/or redness.

Cause: Synovitis may be due to a metabolic disease such as rheumatoid arthritis, or it may simply be the result of local trauma while running.

Treatment: Depending upon the cause, a doctor may be able to induce a full recovery with rest, physiotherapy and possibly a cortisone injection, though this should not be administered until the cause is known.

Prevention: None as such, but local trauma can be limited if your muscles and joints are strong and healthy.

MUSCLE INJURIES

BRUISE (or contusion)

Symptoms: A bruise will almost certainly result in local muscle spasm as a result of bleeding at the site of injury.

Cause: This injury is usually the result of a direct blow, which causes small blood vessels to rupture or burst. The escape of blood into the muscle tissue causes additional irritation, with local pain and spasm.

Treatment: Use RICE initially and repeat for at least 48 hours, and even longer if the condition continues. Attempting to run it off may simply worsen it and prolong the time you lose to running. During rehabilitation, walk before you run.

CRAMPS

A sustained but involuntary contraction of muscles.

Symptoms: The most noticeable is always pain, though if you touch it, the muscle will feel very hard and sore.

Cause: There is no one cause of cramp, but contributory factors can include the worsening of a slight muscle strain, running without warming up, dehydration, fatigue and an electrolyte imbalance.

Treatment: Gently stretch and massage the muscle after the initial spasm relaxes. Heat and physiotherapy may relieve the pain.

Prevention: Ensure that you're well hydrated and have a balanced diet containing electrolytes, especially in warm and humid climates.

RUPTURE

Complete rupture of a muscle can occur following a major sprain. The muscles at the front and back of the thighs and calves can all be affected.

Symptoms: There may be acute immediate pain with a visible bulge, though in some cases shock (from the bleeding) may be more noticeable than pain. Any attempt to contract the muscle will fail to move the joint.

Cause: Ruptures are not very common. They are most likely to occur in muscles that are already damaged.

Treatment: Surgical reconstruction may not be required, as other muscles may develop to perform the task of the injured one. A full medical assessment is vital.

SPASM

A form of cramp, but often more sustained.

Symptoms: A spasm will cause severe local pain and tenderness that will stop you running.

Cause: As with cramps, dehydration, a previous injury or lack of a warm-up may all contribute to a spasm.

Treatment: Stop running and try to stretch the muscle gently. If it relaxes quickly, it's probably all right to run on. If the spasm returns, stop and treat it as you would a strain.

Prevention: Ensure that you're well hydrated and have a balanced diet containing electrolytes, especially in warm and humid climates.

SPRAIN

See 'Sprain' under 'Joint Injuries'.

STRAIN

Although it may also be referred to as a pull, a strain usually involves some tearing within the muscle or tendon structure.

Symptoms: Although overuse strains may not produce discomfort until several hours after exercise, they may also occur suddenly as a result of over-stretching, in which case you'll be forced to pull up lame. Spasm and swelling from torn blood vessels may also occur.

Cause: A strain can result from overuse or over training and over-racing.

Treatment: Use RICE and rest until the bleeding is contained and comfortable. This will probably take 48 hours. Resume training by walking slowly. You will probably need a rest period of several days before you can run.

Prevention: Proper warming up and stretching will help to reduce the likelihood of injury, as will a sensible, gradual approach to speed work.

SOFT TISSUE INJURIES

BLISTER

A collection of fluid within the outer layers of the skin.

Symptoms: The skin invariably swollen and sensitive to pressure, and occasionally reddened.

Cause: A blister is the result of irritation between two surfaces, such as socks or shoes and skin. The friction makes the outer and inner layers of the skin separate and fill with fluid.

Treatment: It is generally considered best to puncture the blister with a sterile needle and release the fluid. Don't pull off the outer skin, as this may expose sensitive, underdeveloped tissue underneath. Covering the blister with a plaster will help to prevent infection, but many runners prefer to leave the blister open and cover it with sterile lubricated jelly or powder.

Prevention: Clean and well-fitting socks and shoes are less likely to cause friction, though careful covering of vulnerable areas prior to a run, and avoiding wetness in the shoe, will also help to limit it.

BURSITIS

See under 'Joint Injuries'.

CALLUS

A thickening of the skin, usually over an area that is exposed to chronic irritation and friction during running.

Symptoms: Calluses are usually thickened and painless, providing there is no underlying bursa.

Cause: Constant friction and pressure make the skin thicken for self-protection.

Treatment: Thinning the callus by rubbing it with a pumice stone may help. Avoiding pressure by using felt pads or orthopaedic foam will allow the thickening to disperse over several months.

Prevention: Wear shoes that fit properly.

FASCITIS

Any inflammation of the fascial tissue that surrounds many muscles and loose connective tissue between ligaments, bones and tendons.

Symptoms: Invariably, pain.

Cause: This is a common overuse injury often associated with poor biomechanics.

Treatment: Use RICE and anti-inflammatories, and correct your gait using orthotics. Early correction should avoid the need for a cortisone injection.

Prevention: Exercises for the intrinsic muscles between the web of the foot, and wearing well-fitting and comfortable shoes, should help to stave off plantar fasciitis, the most common form of the condition.

PERIOSTITIS

If the thin, sensitive tissue surrounding a bone is irritated, it can be called a periostitis, this occurs most commonly along the medial border of the tibia.

Symptoms: There is usually pain over a two- or three-inch length of the tibia, and there may be some roughness or swelling.

Cause: Periostitis is almost certainly caused by overuse, poor biomechanics and poor footwear.

Treatment: You need a medical assessment, which may include x-rays and a bone scan. Although anti-inflammatories may ease the symptoms, and some running on soft surfaces may be possible, correcting the primary cause (whether this is in your foot or your shoe) is vital to prevent periostitis recurring.

SYNOVITIS

See under 'Joint Injuries'.

TENDON INJURIES

RUPTURE

This is relatively rare among runners, but it can occur. It is particularly liable to affect the Achilles and patellar tendons.

Symptoms: A rupture will make you unable to move the joint, and may well cause pain and shock. Partial ruptures may simply be painful and incapacitating.

Treatment: A complete rupture will almost certainly need surgical repair under general anaesthetic, though some partial ruptures respond to careful physiotherapy and rehabilitation, usually over several months.

Prevention: This may be impossible, though injury is less likely in those who run with a comfortable style in sensible shoes, and who have no biomechanical problems.

STRAIN

See under 'Muscle Injuries'.

TENDONITIS

An inflammation of a tendon.

Symptoms: Tendonitis is invariably painful and there may be swelling, though the pain often occurs before and after exercise and can be ignored by a runner during a race or heavy session.

Cause: Tendonitis is caused by overuse and the repeated action of running, though it may also occur as a result of wearing new or inflexible shoes.

Treatment: Use RICE until the condition is fully cured with anti-inflammatories, though physiotherapy may also be necessary.

Prevention: If your shoes are rubbing against the tendon, remove the heel tab. Instigate a proper Achilles stretching routine as part of your training, and only increase your weekly mileage very gradually.

FOOT INJURIES

ACHILLES BURSITIS

Bursae can develop both inside and outside the Achilles tendon insertion into the calcaneum bone of the heel. People who have unusually bumpy heel bones, and runners who are tall and have high arches and tight Achilles tendons, are susceptible to Achilles bursitis.

Symptoms: If there is enough friction between the shoe and your heel, these bumps may become painful.

Treatment: To avoid the friction, pad the heel area of your shoes or cut the shoe away from the afflicted area; rest until the pain subsides. If all else fails, a surgeon can remove the offending piece of bone and reshape the heel.

ACHILLES TENDONITIS (see also Tendonitis)

Symptoms: As well as persistent pain and swelling, there may well be a grating or crackling sensation as you move the ankle to and fro.

Cause: The major causes are overuse, change of terrain (e.g. running up steep hills if you're not used to it), a sudden increase in mileage, and wearing inappropriate shoes.

Treatment: RICE, but take special care with the use of anti-inflammatory drugs, which may mask an injury and a potential complete rupture. When running is possible, a heel raise may help to reduce the amount of stretching within the tendon.

Prevention: Wearing shock-absorbing shoes is vital, and you must ensure that there is no pressure on the Achilles tendon, e.g. from a heel tab. Proper warming up and stretching should limit the tendency to tendonitis, and make sure you're well prepared before you step up your weekly mileage.

ACHILLES TENDON RUPTURE

Symptoms: Probably sudden pain, often some shock and swelling, but particularly an inability to stand on the toes of the injured foot.

Treatment: Although some authorities recommend putting the foot in plaster and allowing the ruptured ends of the tendon to join naturally, surgical repair is usually the most successful treatment.

Prevention: Stretch conscientiously and take care of your feet and shoes (watching out for the heel tab). Older runners suffer more, as their tendons are less supple.

ACHILLES TENDON STRAIN

A milder strain of the Achilles may pass more rapidly if you catch it in time.

Symptoms: See 'Achilles Tendonitis'.

Cause: See 'Achilles Tendonitis'.

Treatment: Resist the urge to have heavy massage, as this may cause further friction and injury within the tendon. Occasionally, a very light massage will free scar tissue.

Prevention: As with all Achilles tendon injuries.

ANKLE SPRAIN

This normally involves either stretching or tearing of the ligaments on the outer side of the ankle joint, and may vary from mild to complete ligament rupture.

Symptoms: At the time of injury the pain may be very severe, then ease, then worsen again as local bleeding occurs. There may be visible bruising that tracks down towards the foot. The ankle will be unstable. Only x-rays can confirm that no fracture has occurred.

Cause: Any uneven terrain, tripping or stumbling may produce a sprain.

Treatment: Stop running immediately, as further damage can occur if you try to run on a sprain. RICE and anti-inflammatories will cure a mild sprain, but will need to be continued for longer in more serious cases. The worst sprains require total immobilisation, even though this may hamper rehabilitation, which must include strengthening of the lower-leg muscles (which limit ankle instability). Taping may be useful in early training to limit movement and avoid redamaging the ankle, but never do this when racing.

Prevention: Good ankle mobility, and the strength gained through simple exercises (such as standing on one foot), will limit the tendency to sprains.

ANKLE STRAIN

This is really a milder form of sprain, and should be treated as such.

BUNIONS

Swellings on the inner side of the foot, at the joint of the big toe.

Symptoms: There is usually tenderness, pain and stiffness over the crooked joint. Chronic bunions usually overlie arthritic joints, and are very painful.

Cause: Pronation, poorly fitting shoes and family heredity are all likely causes.

Treatment: Although most bunions eventually require surgery, it is sometimes possible to alter the foot alignment with an orthotic, retraining the muscles of the foot and using padding between the toes.

Prevention: Wearing well-fitting shoes with a wide toe box may avoid some pressure, and orthotics will help.

CORN

A hard area within the skin, caused as a result of rubbing.

Symptoms: Because they are deeper than calluses, corns are often painful.
Cause: Tight or ill-fitting shoes are undoubtedly the most common cause of corns, though it may be that the bone structure of the foot is abnormal.
Treatment: Although corns can be surgically excised, it is often sufficient to relieve pressure with a felt pad around the corn, allowing it to soften and drop out.
Prevention: Corns will recur unless the underlying cause is discovered. Support flat longitudinal arches, get rid of tight shoes, and consider surgery to correct chronically deformed feet.

HEEL BRUISE

This occurs if the fat pad between skin and bone fails to absorb the pressure of heel landing.

Symptoms: Pain and tenderness whenever you put weight on the heel.

Cause: Generally, a heel bruise results from stepping on a hard object such as a stone, or from running long distances on a hard surface in thin-soled shoes.

Treatment: See a doctor to distinguish this injury from other causes of heel bone pain. Mild heel bruises will respond to rest and adequate cushioning of the heel. More severe cases may be treated with a plastic heel cup to distribute the weight-bearing forces over a wider area.

Prevention: Never run long distances on hard surfaces in light, thin-soled shoes.

INGROWING TOENAIL

This usually affects the big toe, where the nail can grow into the flesh of the toe.

Symptoms: Local swelling, inflammation, redness and pain, together with a secondary bacterial infection.

Cause: Abnormal nail growth may be caused by tight shoes, or poor nail hygiene or trimming.

Treatment: Soaking the nail in antiseptic can help, but the best way to get rid of an ingrowing toenail is to use antibiotics to eliminate the infection and cut the nail correctly. This may include making a V-shaped nick in the centre and lifting the sides out of the flesh. If this fails, the nail must be surgically removed.

Prevention: Don't cut your nails too short or allow them to grow too long. Frequent cutting, wearing clean socks, and wearing shoes with a wide toe box, should all prevent chronic pressure on the toenail.

MORTON'S SYNDROME

Also called Morton's toe, this occurs in individuals with a long second metatarsal and a tendency to over-pronate. It may be symptomless, or may produce pain as the second toe absorbs a greater amount of landing pressure. It could cause a stress fracture to the second metatarsal. The name Morton is also linked to nerve pressure between the third and fourth metatarsal heads, where there initial numbness is followed later by searing pain as a small benign tumour (called a neuroma) develops.

Treatment: Orthotics can support the first metatarsal head where a long second toe exists, while a metatarsal arch support across the transverse arch may help an early neuroma. Some runners may need surgery.

Prevention: Don't ignore foot pain, and get the foot examined if the pain persists.

PLANTAR FASCITIS

An inflammation of the fascia which runs from the base of the toes to the heel bone, and which supports the bottom of the foot.

Symptoms: Pain and local tenderness that usually begins at the heel, then radiates out into the midsection of the foot. The pain becomes acute if you put pressure on the tender area.

Cause: Although this is an overuse injury, it is most common among runners with high arches or flat feet.

Treatment: Early treatment is crucial. To complicate matters, plantar fasciitis frequently occurs along with heel spurs. Orthotics, cushioned shoes and massage with ice or a golf ball may solve the problem.

RUNNER'S TOE

Symptoms: A toe becomes painful and the nail becomes red or blackened.

Cause: Tight and small running shoes will constantly rub the nail and nail bed, though blisters and stubbing the toe may also cause this painful condition.

Treatment: Despite the momentary pain, a doctor will make a hole in the nail with a red-hot needle (this should not be performed by non-medical people). The hole made by the needle will allow the old blood to drain out, and this can be gently squeezed before sterile and dry dressings are applied. The damage to the nail bed will often cause the toenail to fall off, though this may take many weeks. During this time, protect the nail bed with a plaster.

SESAMOID PAIN

The sesamoid bones - the bones located under the big toe which serve as a fulcrum for take-off - can become inflamed.

Symptoms: You may experience pain when you try to push off and rise onto your toes.

Treatment: Rest and ice may help, together with physiotherapy.

Prevention: To prevent recurrence of sesamoid pain, you need to assess the causes.

SPRAINS

Any of the small ligaments or muscles joining the foot bones can be sprained or strained.

Symptoms: There will usually be acute pain at the time of the injury, followed by tenderness and swelling.

Cause: Any abnormal stress or force on a ligament, such as a fall or running on uneven ground in unsupportive shoes, can separate the bones and cause a sprain. Sprains can range from mild to severe.

Treatment: Start RICE at once, and continue until the area is painless. Localised physiotherapy can also help. If the pain persists you should see a doctor, in case it indicates a fracture or more serious damage.

Prevention: Proper warming up is important, and wearing supportive shoes may limit damage, but any runner can develop a sprain.

STRAIN

The terms 'strain' and 'sprain' are largely interchangeable. See 'Sprain'.

STRESS FRACTURE

Also known as 'march fracture' since World War One, when many soldiers developed this injury after being required to march long distances in ill-fitting shoes. The metatarsal stress fracture commonly affects the second toe with a hairline break.

Symptoms: Pain occurs gradually in the area of the damaged bone, and it increases as you continue to exercise.

Cause: A stress fracture is an overuse injury, made worse by running on hard surfaces in shoes with insufficient cushioning. Poor biomechanics and overtiredness increase the likelihood of injury.

Treatment: While you get a diagnosis, rest from any exercise that causes you pain. Unfortunately, a stress fracture probably won't show up on an x-ray for three to four weeks, although a bone scan will show the damage sooner. You can do any painless exercise (e.g. swimming or cycling), but your recovery should only include walking and running when these are pain-free.

Prevention: Wearing good shoes that absorb shock, and running on soft surfaces, will limit the opportunity for stress fractures to develop. Orthotics may also help to spread the load on landing.

LOWER LEG INJURIES

COMPARTMENT SYNDROMES

These affect the four rigid sheaths that contain the lower leg muscles.

Symptoms: The two posterior compartment syndromes usually produce dull, cramping pain, while those to the lateral and anterior compartments can be acutely painful, especially to the touch. Pain will persist after you stop running, and you may feel numbness or tingling in the feet.

Cause: Compartment syndromes often affect untrained runners who cover longer distances than they're ready for. As you do more exercise, increased blood flow can cause swelling within the muscle; the inelastic sheath is unable to contain the pressure and becomes painful.

Treatment: RICE is important in the acute phase, and you should reduce your training, then build up gently, and check that your shoes are appropriate for the distances you intend to run.

SHINSPLINTS

A vague term describing pain in the lower leg. The pain may be caused by a stress fracture, compartment syndrome or periostitis.

Symptoms: Invariably, pain, the site depending on the cause.

Cause: Multiple, including over-pronation, overtraining and shoes that fail to support the foot properly.

Treatment: Depends on the cause, though rest may be required for total healing.

Prevention: You can generally limit shinsplints if you increase your training in gentle increments only, observe shin and foot pain carefully to prevent them worsening, and seek early treatment.

STRESS FRACTURE (tibia)

Hairline fractures in the tibia typically occur at the end of the bone near the ankle, though they may also be observed elsewhere.

Symptoms: A crescendo pain, starting as a dull ache and progressing in intensity as time passes. Typically, the pain decreases at night. The site may be tender and slightly swollen.

Cause: Stress fractures of the tibia are overuse injuries, worsened by higher-than-usual mileage or running on hard surfaces.

Treatment: If you have the symptoms, assume that the pain is caused by a stress fracture until you can prove otherwise. This will prevent a complete fracture of the bone, which would mean spending months in plaster. It is essential not to undertake any activity that is painful.

Prevention: To limit the likelihood of a stress fracture, increase your mileage gradually, wear shoes with good shock-absorbing qualities and run on soft surfaces.

KNEE INJURIES

BAKER'S CYST

An accumulation of fluid behind the knee joint, also known as a popliteal cyst.

Symptoms: Baker's cyst usually causes nothing more than a painless swelling.

Cause: A weakness of the capsule of the knee allows it to bulge and fill with synovial fluid from the knee joint. In adults, there may be local disease such as arthritis, torn cartilage or other forms of inflammation.

Treatment: Baker's cyst can only be treated once a cause is established, though many runners require no treatment at all.

CHONDDROMALACIA PATELLAE

Also known as 'Runner's Knee', this is literally a softening of the cartilage of the patella. The back surface of the kneecap fails to run smoothly through the groove at the front of the femur. The condition may be worsened if there is an unequal pull from the quadriceps muscles.

Symptoms: These may be of two types, either a persistent ache or a sudden acute pain (angina of the knee) halfway through a run. The pain disappears when you are forced to stop.

Cause: Simplistically speaking, chondromalacia patellae is the result of a quadriceps muscle imbalance caused by performing inappropriate activity (e.g. leg extensions on a machine) or sustained damage to the knee or leg. In reality, there are multiple causes that are not yet fully understood.

Treatment: It does no harm to perform straight legs quadriceps exercises, preferably under the guidance of a knowledgeable doctor or physiotherapist.

Prevention: Chondromalacia patellae may be the result of overpronation, or simply bad training habits (e.g. always running on one side of the road) or shoes. Analysis by an expert should help to locate the cause.

ILIOTIBIAL BAND SYNDROME (ITBS)

The iliotibial band - a sheet of connective tissue that runs down the outside of the thigh, from the hip to beyond the side of the knee - can rub against the femur above the knee.

Symptoms: Pain along the outside of the knee or hip, especially when you stride.

Cause: If the iliotibial band is tight or the foot is forced in (as the lower foot is when you run on a camber), this bowing may cause friction between band and femur.

Treatment: Rest and ice will reduce acute inflammation, and changing sides of the road may help! Padding the outer side of the foot reduces the bowleg effect, but you may need a full biomechanical assessment and orthotics.

Prevention: Try to run on soft surfaces and avoid cambers, though this cannot fully compensate in the runner who is bow-legged to start with!

OSGOOD-SCHLATTER'S DISEASE

This condition usually affects growing boys between the ages of 10 and 14, and is caused by overuse.

Symptoms: Pain at the front of and immediately below the knee, where the insertion of the patellar tendon becomes acutely inflamed.

Cause: Over-exercising, frequently accompanied by a growth spurt.

Treatment: Rest, ice packs and anti-inflammatories will reduce the pain, but as no damage normally occurs as a result of Osgood-Schlatter's Disease, runners can be allowed to compete within their pain limits. Avoid injections if possible, as the disease is self-limiting.

Prevention: Osgood-Schlatter's Disease is less likely in the child who plays a variety of sports, rather than concentrating on one.

SYNOVITIS (Also called 'Water on the knee')

If the tissues that line the knee joint become inflamed, they secrete excess lubricating fluid.

Symptoms: The swelling will cause discomfort and limit flexion, and sometimes extension and weight-bearing as well.

Cause: Although overuse may be involved, synovitis may be part of a generalised disease process that should be investigated.

Treatment: RICE and anti-inflammatories in the early stages. If the condition persists, consult a doctor.

Prevention: Strengthening the quadriceps and building up your training gently should help in those cases where overuse is the cause.

UPPER LEG INJURIES

HAMSTRING PULL

The hamstring muscles cover two joints, the hip and the knee. They can be strained throughout their length.

Symptoms: There is usually some severe pain at the time of injury, followed by muscle spasm, loss of strength, and pain when you put weight on the legs.

Cause: Sudden contraction of the hamstrings, as when sprinting, is the most common cause. A pull may also be the result of overuse on a long run involving hill climbing, or may be caused by a runner having particularly strong quadriceps muscles compared to the hamstrings.

Treatment: RICE until full rehabilitation has occurred. Owing to the type of muscle within the hamstring, a pull can be slow to heal, and must be gently stretched and worked up to training. Severe tears will require the use of crutches.

Prevention: Runners often stretch the hamstrings wrongly - try to stretch them over one joint at a time. Don't forget to warm up!

QUADRICEPS STRAIN

Long-distance runners occasionally tear the large muscles at the front of the thigh.

Symptoms: There will be a sudden pain, most probably when running downhill, and it is possible for the muscle to rupture completely. There is local tenderness and swelling.

Cause: Apart from running downhill, a sprint start when you're unprepared for it can cause a quadriceps strain.

Treatment: RICE until the muscle is fully stretched and rehabilitated.

Prevention: Proper stretching and warming up - inflexible quadriceps are more likely to tear.

HIP INJURIES

BURSITIS

Bursitis of the hip involves inflammation of the bursae that surround either of the bony swellings that are part of the hip joint.

Symptoms: There is likely to be pain and tenderness, though often without much visible injury. There is usually a mild discomfort when you're at rest, and in more extreme cases this becomes severe pain when you're running. The range of movement of the hip is likely to be limited.

Cause: Once again, the finger points to overuse, though this may be compounded by direct bruising or a disease such as infection or arthritis.

Treatment: Although RICE may help, more chronic injuries will need full medical assessment, anti-inflammatory medication, and possibly a cortisone injection.

Prevention: A proper warming up and stretching routine will help to limit the straining that frequently causes bursitis.

STRAIN

This vague term may imply injury to muscles, ligaments and tendons around the hip joint at the upper end of the femur (thigh bone).

Symptoms: There is usually pain when you make a particular movement, though there may also be tenderness on pressure, and even muscle spasm.

Cause: Overuse of the hip joint, though failure to stretch it through its complete range of movement will increase the likelihood of injury.

Treatment: RICE and ice massage will help, and physiotherapy, stretching and heat should be used to aid recovery in the later stages.

Prevention: Stretching and sensible training.

GROIN INJURIES

GROIN STRAIN

This is a non-specific title covering many injuries within the groin area. These include a hernia, osteitis pubis (inflammation of the junction of the pubic bones), a tear of the adductor muscles (which pull the thighs together), and injury to the muscles at the front of the hip.

Symptoms: Pain on moving the hip may be felt in both the groin and the abdomen or thigh.

Cause: An inadequately trained hip, which lacks a full range of movement, is often to blame, though hernias appear to strike at will.

Treatment: If RICE, stretching and physiotherapy fail to produce early relief, medical assessment is vital. Chronic injuries take longer to heal, and if surgery is needed for a hernia, this shouldn't be delayed.

Prevention: As with all injuries in this area, a good range of movement will limit the likelihood of injury.

LOWER BACK INJURIES

LOWER BACK PAIN

Running can be both a cause of lower back pain and a cure for it. It can help suppleness, but also increase tension in the overtrained. It is now recognised that much pain comes from the sacroiliac joints where the spine joins the pelvis, and this pain is more likely in individuals with weak abdominal muscles. Lower back pain deserves and requires full medical assessment - self-help may actually worsen the condition.

SCIATICA

The pain which can extend beyond the lower back, even to the ends of the toes, when a nerve emanating from the spine suffers pressure at some part of its length.

Symptoms: Initially you may simply feel a dull ache, but often there may be pain extending down one leg, which can cause weakness, numbness and a limp.

Cause: Congenital abnormalities of the lumbar and sacral vertebrae may combine with the jarring from running, together with biomechanical problems of the feet, knees or leg length, and cause poor posture which irritates or damages the sciatic nerve.

Treatment: Rest - many cases of sciatica get better in spite of medical treatment. When in severe pain, lie on the floor on your back with your hips and knees at right angles and your calves supported on a chair or pouffe.

Prevention: This may be impossible, but a supple lumbar spine and strong abdominal muscles will limit the chance of sciatica occurring.

ABDOMINAL INJURIES

STITCH

A form of muscle cramp thought to be caused by a spasm of the diaphragm (the large, dome-shaped muscle dividing the abdomen from the chest).

Treatment: It may help while running to take a deep breath and hold it, thus stretching the diaphragm.

Prevention: An irritated diaphragm is more likely to go into spasm, so you should eat your pre-race meal at least three hours before competing. Drinking plenty of fluid helps to keep the intestinal organs supple and pliable. A stitch is a symptom of lack of training, for the diaphragm has to be trained in the same way as other muscles.

TREATMENTS

Some of the treatments an injured runner may be prescribed:

ACUPUNCTURE

The ancient art which is based on the theory that the body is full of energy pathways, and that there is an ideal state of optimum energy flow. This therapy involves treatment at 'trigger points' which relieves areas of stress to restore normal energy flow - and thus, optimum comfort and performance. While acupressure is non-invasive, using pressure applied with fingers, thumbs and the heel of the hand, acupuncture involves the insertion of fine, sterile needles to a depth of a few millimetres. Its advocates claim that acupuncture is especially effective in reviving exhausted and overstressed muscles.

ANTI-INFLAMMATORY AGENT

Any medication that suppresses the inflammatory process. Both aspirin and ibuprofen have an anti-inflammatory effect, but the drug paracetamol does not. Some are available over the counter, some only on prescription. An acute injury usually requires a short course of a high-dose anti-inflammatory (NSAID), but many have side effects and can cause stomach irritation or bleeding, dizziness, nausea, tinnitus (ringing in the ears) and hyperventilation. Consult a doctor before taking NSAIDs.

APPLIED KINESIOLOGY

A fairly new spin-off from chiropractics. The applied kinesiologist studies movement to identify areas of muscular weakness, and then prescribes strengthening exercises to help stave off injuries that may be 'waiting to happen'. In treatment, the applied kinesiologist relies heavily on standard chiropractic techniques, and may even borrow from traditional physical therapy techniques and acupuncture theory.

AQUARUNNING

Running in water. A fairly new alternative for injured runners; aquarunning allows them to keep 'running' while avoiding the normal stress of impact. It also offers the extra benefit of resistance. If you try to move with the same speed as you would on land, you will meet 850 times the resistance! Wear a flotation device or just run in the swimming pool. Devote the same time to warming up, cooling down and stretching that you would on dry land.

ARTHROSCOPY

A diagnostic or surgical procedure in which the surgeon examines the inside of a joint. It is less invasive than traditional surgery, requiring just one or two tiny holes in the joint, into which the surgeon inserts the arthroscope - an instrument with a system of lights and lenses which allows them to view the inside of a joint. Commonly used on the knee, arthroscopy requires considerably less time for rehabilitation than traditional surgery. Patients are usually walking within two days and running in a week or two.

CHIROPRACTIC

Manual manipulation of the spine to achieve a proper skeletal orientation with regard to the other systems of the body, especially the neural and muscular systems. By relieving pressure on the nerves and correcting these relationships, chiropractic realignment can relieve discomfort and enhance performance.

CRYOTHERAPY

Local application of cold for therapeutic reasons. Cold - applied with commercial cold packs, ice bags, ice compresses or ice massage - effectively reduces pain and swelling immediately following an injury. Generally, ice should be applied several times a day, for 15 minutes at a time. It also may be helpful before training sessions and races. See also 'RICE'.

ELECTRICAL MUSCLE STIMULATION (EMS)

Otherwise known as electro stimulation or electrotherapy, a treatment and preventive for muscular atrophy that comes with immobilisation of a limb. It also may be helpful in reducing swelling and pain around an injured joint, and for treating spasms.

HEAT THERAPY

Treatment involving hot compresses, whirlpools, ultrasound, heat lamps or hot pads. It is generally used after ice therapy has helped to seal and stop fluid accumulation at the point of injury. Heat promotes healing by dilating the small blood vessels in the area, increasing blood flow and the influx of healing nutrients. It also helps to reduce the pain and spasm sometimes associated with muscle injury.

HYDROTHERAPY

Water-related treatment that includes everything from whirlpools to underwater therapy. Some devices (whirlpools) mimic a massage effect; others make use of hot or cold water. With acute injuries, hydrotherapy can be used to chill the area to prevent further tissue damage. With some other injuries, heat helps to reduce soreness and restore mobility.

ISOKINETIC REHABILITATION MACHINE

A device used to treat the arms and legs, hips, knees, ankles and back. Isokinetic means that there is 'accommodating resistance'. You set the speed of the machine, and it provides resistance that relates directly to the energy you invest. (Isotonic machines, by contrast, have a fixed resistance. You set the weight and you must work through that resistance on every repetition, regardless of your strength or fatigue level.) Costing tens of thousands of pounds, isokinetic rehabilitation machines can be found at many sports medicine clinics and fitness centres.

LASER THERAPY

Therapy involving the shooting of a helium-neon laser into the injured tissue to increase circulation, thus speeding the arrival of healing nutrients and the removal of wastes and by-products.

MASSAGE THERAPY

Ranging from the gentle, soothing strokes of Swedish massage to the deep, cross-friction strokes of the Cyriax method. Shiatsu massage, or acupressure, uses pressure on specific trigger points to relieve areas of biomechanical stress. All forms of massage can speed athletic recovery by soothing tense muscles and speeding the flow of healing nutrients (through the bloodstream) to the injured areas; the latter also helps to flush lactic acid and other metabolic waste products out of the system. The Cyriax method works deep into the muscles to break up scar tissue and adhesions. Massage also has psychological benefits.

MICROCURRENT THERAPY

A technique that uses a low-level current of electricity to restore electrical balance to injured tissue. It is based on the theory that since all tissues have electrical charges, there is an optimum electrical balance that is disturbed by injury. Microcurrent therapy is an acupuncture type stimulation achieved using electricity instead of needles.

ORTHOTICS

Devices that are custom-made by a podiatrist or orthopaedic surgeon and inserted into shoes to protect and support the foot, and to correct musculoskeletal misalignment (caused, for example, by flat feet or leg-length discrepancy). Over-the-counter 'foot supports', in contrast, are not necessarily corrective, although their added cushioning and support may be beneficial.

PNEUMATIC BRACES

Air-filled braces that were used initially in the treatment of leg stress fractures, but are now being used for sprains as well. With these braces, it is possible for the athlete to continue training runs while healing; the brace allows flexion and extension of the foot, while prohibiting lateral movement.

REHABILITATIVE EXERCISE BIKE

An isokinetic machine used for rehabilitation. It offers 'accommodating resistance' - you set the speed of the bike, and it provides resistance that relates directly to the energy you invest. You can find these machines at many sports medicine clinics and fitness centres.

RICE (Rest, Ice, Compression, Elevation)

The basic first-aid measures which are recommended for most running injuries. The acronym RICE makes it easy to remember the formula: rest, ice, compression and elevation. Generally you should stop and rest as soon as you realise that an injury has taken place. Use ice (ice bags, commercial cold packs or ice massage) to control pain and swelling, on and off in 15- to 20-minute periods throughout the next 24 hours. Compression (preferably from an elasticised bandage) helps to control swelling by inhibiting internal bleeding and fluid accumulation. Elevate the injured limb above the level of the heart to help control swelling and pain.

TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION (TENS)

In this treatment, a device sends electrical signals to nerves near an injury site; the constant neural stimulation masks or blocks pain signals so that an athlete can go on with rehabilitation exercise. TENS usually consists of two small electrodes connected to a hand-size dual channel stimulator; the athlete can adjust the amplitude, gradually increasing it to a comfortable intensity. TENS reportedly reduces muscle atrophy, joint stiffness and the need for narcotic pain relievers.

ULTRASOUND

Use of high-frequency sound waves outside the normal range of human hearing to produce deep heat that is applied directly to an injured area. Ultrasound sends heat deeper into the tissues than any other treatment. This decades-old procedure, which is given in a series of six- to 10-minute treatments, is among the most commonly prescribed healing strategies. It is painless and accurate.

HOW TO AVOID INJURIES

Follow the tips below and you'll be guaranteed to be less prone to injury:

COOL-DOWN

A period of gradually diminishing activity after a workout. Follow it with stretches. Never stop exercising abruptly; always cool down.

HYDRATION

Taking in liquids. You should drink at least one litre of fluid - and possibly more - for every hour that you run. A runner may lose up to two litres of sweat per hour, which means possible dehydration in as little as two hours. Any time that you're going to be running for more than two hours, you should plan to drink as much as you can tolerate - the colder the better. Always drink before you feel thirsty.

PLYOMETRICS

Explosive exercises (which mimic such things as a sprinter's start or a cross-country runner's burst up a short, steep hill) that help to increase muscle strength and power. Be sure that you have a solid strength base before trying plyometrics, and even then, begin slowly so as to avoid injury. An example of a plyometric drill is the single-leg bound: starting on either leg, hop forwards with maximum extension; do 10 hops, then repeat on the other leg.

PROGRESSIVE MUSCLE RELAXATION

A relaxation technique which many athletes have found useful as a recovery aid. The name goes a long way towards explaining the technique. You start in a quiet, relaxed environment, usually lying flat on your back, and begin with a certain muscle group - say, your feet; concentrate on relaxing those muscles, then work progressively up the body, relaxing each muscle group as you go.

STRENGTH TRAINING

All runners can use weightlifting to prevent injury by strengthening areas of weakness and to increase speed. Runners often concentrate their strength-training efforts on the upper body, with high-repetition, relatively low-weight sessions. To save their energy for running, racers should generally cut down on weight-training sessions when the racing season begins.

STRETCHING

Used after warming up - say, an easy jog - to reduce muscle tension, develop flexibility, promote circulation and generally prepare the body for hard exercise. Stretch after warming up, because a warm, pliable muscle is less likely to tear than is a cold one. Stretch your legs and lower body especially, but don't ignore the upper body. Many athletes prefer yoga for their stretches.

WARMING UP

Mild exercise done before a workout to warm the muscles by increasing respiration and circulation, both of which help deliver much-needed oxygen to your muscles.