5 most common running injuries

It is thought around 80% of all running injuries are related to the overloading of tissues due to a) training errors or b) biomechanical issues. As a general rule, limiting the increase in training load (time or distance) to no more than 10% at any given time can help to control the overload of tissues (bone, muscle, tendon, ligament and fascia) associated with running.
Unfortunately there is greater risk of lower limb tissue overload if you have altered trunk, pelvis or lower limb biomechanics which increases load on certain tissue e.g. patella femoral joint, resulting in injury.
Your running style is self optimised and is dependant on many factors. There is no ideal running style to copy (see Picture 1). The majority of runners heel strike, next in line are those who strike asymmetrically, followed by mid-foot strike and lastly the less common forefoot strike runner. It has been suggested aspects of running can be learned to improve and optimise tissue loading and performance and can be done without drastically changing from e.g. a heel strike to a forefoot strike.
From a training view point reviewing stride width/length and cadence may help improve tissue loading, also, strength and conditioning exercises can help with the tissues ability to manage load and therefore help/or prevent injuries, improve lower limb biomechanics lessening the load and tissue damage.
In this article we will review the biomechanical issues related to overloading lower limb tissues and discuss the importance of lower limb alignment in the prevention and treatment of common lower limb running injuries.

Lower limb alignment and lower limb injuries:
The alignment of your trunk and lower limbs plays an important role in the prevention of abnormal musculoskeletal loading at the hip, knee and ankle joints.
Neuromuscular and biomechanical research supports the concept of poor or altered lower limb alignment contributing to the development of lower limb soft tissue injuries and joint pains. Remain et al cited 51 research articles that provided some degree of evidence that proximal (ie trunk or hip) factors may influence knee loading and therefore contribute to injury.

Injuries commonly seen due to abnormal loading include increased stress on the anterior cruciate ligament of the knee. Indeed it has been suggested an increase in knee values (knock knees) during running/activity of only 5 degrees can increase the load on the anterior cruciate ligament by 6 times! Patella tendinopathy , ITB syndrome (runners' knee), anterior knee pain and meniscus (cartilage) injuries are other commonly encountered knee problems secondary to poor mechanics.

Poor lower limb mechanics have also been linked to anterior impingement of the ankle joint, Achilles tendon pain, plantar fasciitis (fasciopathy) and numerous other foot problems.

Runners presenting with anterior hip joint impingement and low back pain often also demonstrate poor lower limb mechanics contributing to pain symptoms.

Research informs us that underlying mechanisms such as impaired sensorimotor control, delayed muscle response, altered activation or proprioception are all contributing factors in poor lower limb alignment.

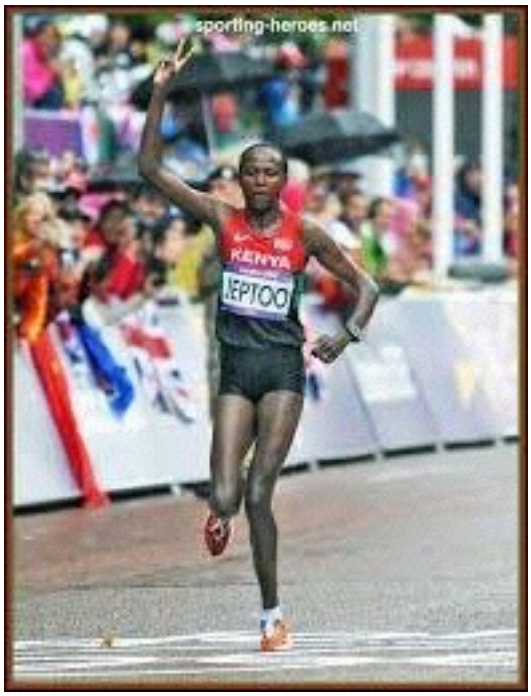
Biomechanical issues such as joint laxity, increased joint translation (this may occur in joints with ligamentous injury such as an anterior cruciate ligament tear), joint stiffness and muscle weakness can all contribute to poor lower limb alignment.

Runners carrying an injury often have more pronounced substitution patterns on movement usually resulting in lower muscle activity levels compared to their non injured side. Research has shown that in the lower limb quadriceps, hamstrings, gluteus medius, tibias anterior and gastrocnemius are the main muscles demonstrating lower muscle activity when a joint problem is contributing to muscle inhibition. Studies have also demonstrated muscle weakness in the injured limb one year post injury compared to the non injured limb.

Runners suffering from anterior knee pain have demonstrated deficits in hip muscle strength in abduction, external rotation and extension, delayed onset gluteus medius, and a loss of trunk strength.

The most commonly seen mal-alignment of the lower limb in runners is a combination of poor trunk/pelvis core control leading to a pelvis ipsilateral drop and rotation, hip adduction/internal rotation, knee valgus (knee drifting inwards), rotation at the tibia and pronated feet.

This pattern of movement can be identified when the patient performs test procedures that isolate loading on the lower limb. Often the greater the load the greater the chance of lower limb mal-alignment.
Video analysis of running technique at various speeds will also highlight poor trunk/ pelvis and lower limb alignment issues.



Picture 1. There is no ideal running style. As this picture demonstrates even with very poor alignment this world class runner can win international running events. Nobody is going to attempt to "improve" her running style. If it ain't broken don't tamper with it.

If this runner started to complain about e.g. anterior knee pain then her running style may be a problem that should be addressed.

Diagram 1

Poor lower limb alignment demonstrating ipsilateral pelvic drop and rotation. This leads to a counter rotation at the trunk, counter rotation at the hip and tibia (shin) leading to a rotated knee joint.

This is often accompanied by a pronated foot.

Diagram 2.

On landing from a small height the knee rotates inwards leading to hip joint internal rotation, ipsilateral hip drop and spinal side flexion in an attempt to keep balanced.

How does poor lower limb alignment occur

During the loading phase of the gait cycle (immediately after heel strike) the hip flexes, adducts and internally rotates, this action should be countered by the hip extensors, abductors and external rotators. If this action is not corrected (due to diminished muscle strength or muscle poor co activation) then poor lower limb alignment ensues. This action can also be seen when the lower limb is loaded for example when stepping down off a step (diagram 1) or when landing during a hop movement analysis (diagram 2). It is precisely this abnormal pattern of movement that has been identified as strong predictor of developing ITB syndrome in female runners.

A common compensatory action is to elevate the contralateral pelvis and leaning of the trunk towards the stance limb. This is often called Trendelenberg sign. This

reduces the demand on the hip abductors which over a period of time will weaken compounding the problem.

Treatment of poor lower limb alignment may involve some or all of the components listed below . An expert analysis of your movement patterns by **HEALTH ROOMS** physiotherapy staff will identify specific needs to be addressed aiding your return to pain free and efficient running.
Treatment aims should include:

- establish good core co-contraction
- improve lower limb balance
- improve strength in identified weak muscles
- increase stretch of any restricted tissues/joints
- establish improved muscle co contraction/patterning and running technique.

Rehabilitation should provide a graduated programme leading to pain free running.

In our series of articles " The 5 most common running injuries" we will often refer to altered lower limb alignment/ mal-alignment. Hopefully having read the preceding article has empowered you with a basic knowledge of what is meant by poor lower limb alignment and will assist your understanding of each article.

Contact the **HEALTH ROOMS** for further advice, expert assessment and evidence based treatment.