

# Gait Analysis

**Gait is the way in which we move our whole body from one point to another. Most often, this is done by walking, although we may also run, skip, hop etc. Gait analysis is a method used to assess the way we walk or run to highlight biomechanical abnormalities.**



## *What are biomechanical abnormalities?*

Being able to move efficiently is important in avoiding injuries. Having joints capable of providing sufficient movement and muscles capable of producing sufficient force is vital to generate an efficient gait cycle. If joints are stiff (usually caused by muscle tightness), limiting range of motion, or muscles are weak, the body must find ways of compensating for the problem, leading to biomechanical abnormalities.

Examples of biomechanical abnormalities include:

- Overpronation
- Oversupination
- Increased Q angle
- Hip hiking (or hitching) - lifting the hip on one side
- Ankle equinus - limited ankle dorsiflexion
- Pelvic tilt - can be either anterior, posterior or lateral

Biomechanical problems such as these are usually caused by muscular imbalances (tight muscles working against weak muscles), although they can sometimes be caused by structural problems, such as leg length discrepancies resulting in hip hiking.

## *What is Gait Analysis?*

Gait analysis is usually performed by a professional, such as a podiatrist or physiotherapist, although it is now becoming more widespread and readily available with many specialist running and sports shops now gaining the equipment and staff who are trained in gait analysis.

Gait analysis usually involves walking or running on a treadmill. In some cases the professional will simply watch the way that you move, looking in particular at your feet, ankles, knees and hips. In more specialist settings, a video recorder will often be set-up behind the treadmill, which will record film of your gait cycle. This can then be relayed to a laptop where slow motion and freeze frames can be used to carefully assess your running or walking style. This form of gait analysis usually focuses on the feet and ankles. Watch our video on treadmill gait analysis [here](#).

Many injuries are often caused, at least in part, by poor biomechanics. Runners and athletes whose sports require a high level of running and jumping should make sure they have had a gait analysis and buy the correct footwear to avoid future overuse injuries. The following are a list of common overuse injuries associated with poor gait biomechanics:

- Shin splints
- Plantar fasciitis
- Iliotibial band syndrome (runners knee)
- Patella tendonitis (jumpers knee)
- Patello-femoral knee pain
- Achilles tendonitis
- Lower back pain

One way that you can get an idea for yourself whether you pronate, supinate or have a neutral foot strike is to look at the wear of your trainers or shoes. These must be shoes which you worn a lot so that there is a pattern of wear on the sole. Watch our video on assessing trainer wear [here](#).

## ***The Gait cycle in walking and running***

The gait cycle is the continuous repetitive pattern of walking or running. The gait cycle is split into two main phases, stance and swing, with one complete gait cycle including both a stance and swing phase.

The stance phase is the period where the foot is in contact with the ground and equates to 60% of the cycle when walking. The swing phases makes up the remaining 40%. During walking there is a period called double stance, where both feet are in contact with the ground. The swing and stance phases can be further divided into:

### **Stance**

- Heel strike - The point when the heel hits the floor
- Foot flat - The point where the whole of the foot comes into contact with the floor
- Mid stance - Where we are transferring weight from the back, to the front of our feet
- Toe off - Pushing off with the toes to propel us forwards

### **Swing**

- Acceleration - The period from toe off to maximum knee flexion in order for the foot to clear the ground
- Mid-swing - The period between maximum knee flexion and the forward movement of the tibia (shin bone) to a vertical position
- Deceleration - The end of the swing phase before heel strike

When running, a higher proportion of the cycle is swing phase as the foot is in contact with the ground for a shorter period. Because of this there is now no double stance phase, and

instead there is a point where neither feet are in contact with the ground, this is called the flight phase. As running speed increases, stance phase becomes shorter and shorter.

### **Corrections to your Gait Cycle**

If it is found that there is an abnormality of your gait cycle. This can usually be correct with a change in footwear, the use of orthotics or an exercise programme.

Running shoes usually cater for those who either overpronate, oversupinate or have a neutral position. It is important to make sure you have the right running shoes for your style of running.