## The Impact of Strength Deficits on Pain and Performance - by Owen Hynes, Physiotherapist at Kieser, Pymble

Strength training is an important tool for runners to help improve performance and decrease the chance of injury. A recent study has shown that specific strength training can reduce the risk of exercise-related injuries by 50%. At Kieser, we combine physiotherapy, strength assessments and strength training. We work with many elite AFL, rugby and soccer teams as well as runners and triathletes.

Our equipment allows us to strength test individual muscle groups such as the quadriceps, hamstrings and the lower back. We then compare people's strength test results against what's average for that person's age, weight and gender and give the client a percentile ranking of where they rank in comparison to the norm.

There is a thought in the running community that if a person walks or runs, then they must have reasonable lower limb strength. This is often not the case. Despite years of running, a person's lower limb muscle strength can still rank well below average compared to their peers. Considering that they are likely to be more active than most, an underlying strength deficit will significantly increase a runner's chances of developing an injury and will also limit their running times.

What has become apparent in many acute and overuse running injuries, is that there is often an underlying strength deficit. These strength deficits can be local to the site of pain or further up or down the chain. A good example is a runner who is experiencing knee pain. They may have reduced strength in their quadricep muscle on the same side as their pain or even weakness in the gluteal region, both of which will increase the load on the knee joint.

The below graph shows the results of a strength test conducted on a patient experiencing chronic right knee pain. B1 measures the strength of the quadricep muscles. As you can see, their right quadricep was measured to be 30% weaker than their left. The quads, in particular VMO, provide stability to the knee joint. Therefore, when one side is considerable weaker, there is greater stress to the joint and a higher chance of developing knee pain.

## Isometric chart
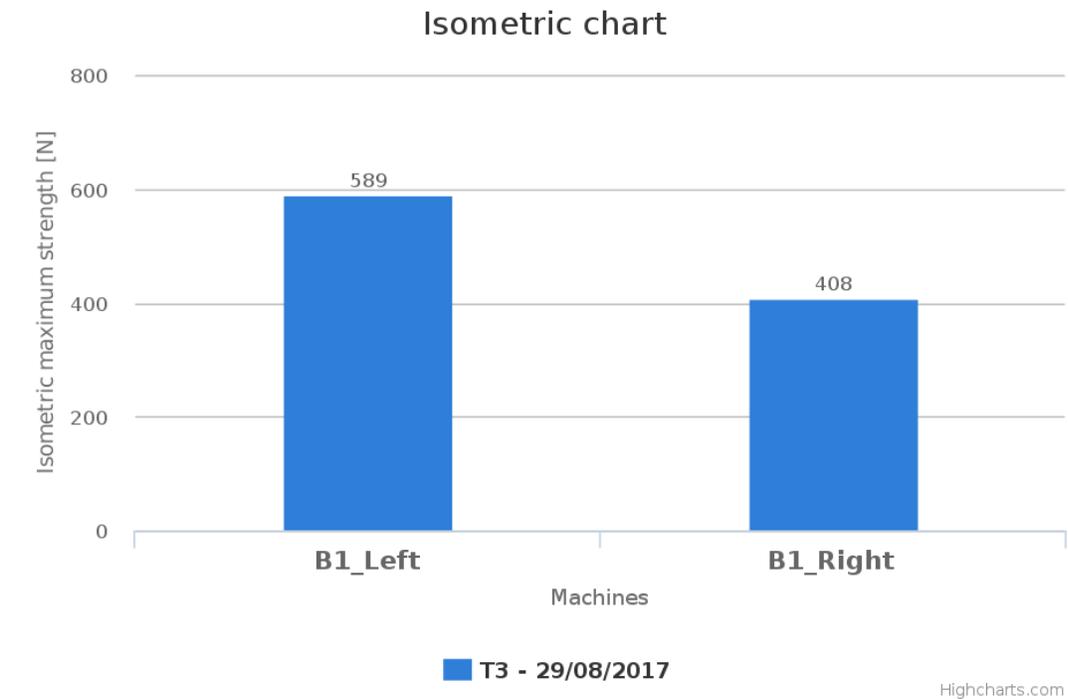


When combined with a thorough history and biomechanical analysis, these objective strength measurements provide a comprehensive understanding of the underlying cause of pain. Addressing these strength deficits allows a runner to return to running/ continue running rather than avoid it for fear of pain.

The below graph shows the strength tests results of a social runner whose goal was to improve their running times. In this graph, the 1st percentile is the lowest rank whereas the 100th is the highest.

- A3: glute medius- a muscle in the gluteal region important for lower limb biomechanics
- B1: quadriceps

– B7: hamstrings

## Normative Percentile
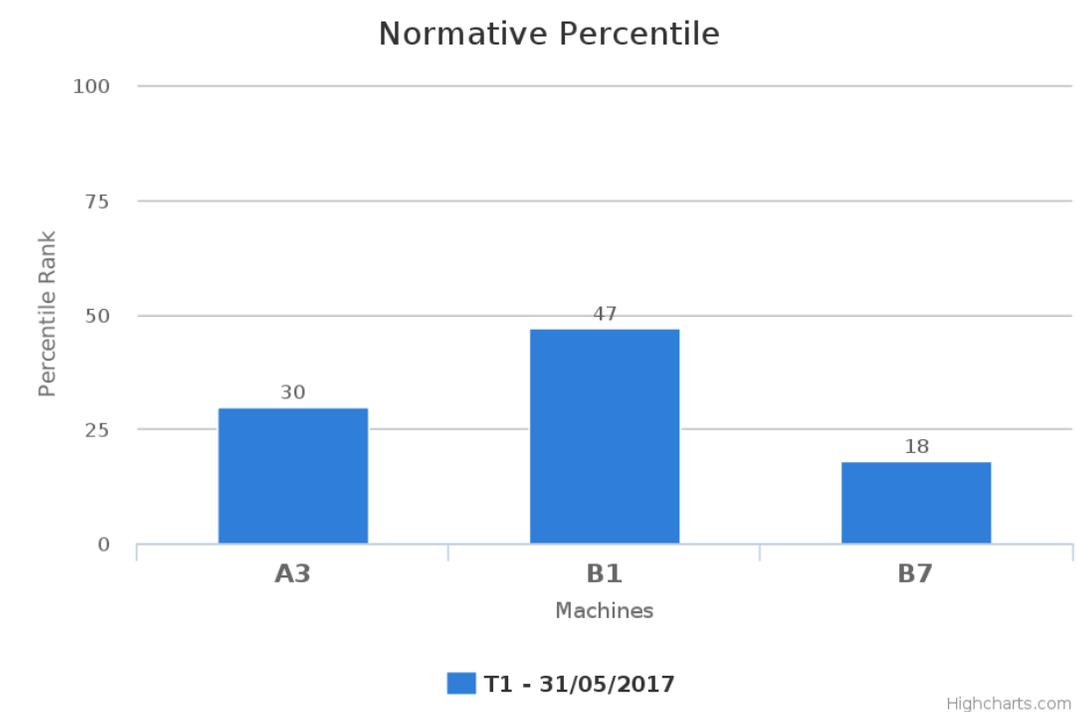


As you can see, this patient was ranked in the 30$^{th}$ percentile for glute medius. Given that this muscle plays a very important role in controlling joint forces further down the leg, weakness in this muscle leads to a reduction in running efficiency and premature fatigue.

When a runner's prime moving muscles such as the quadriceps and hamstrings are weak (such as in the example above), there is a reduced capacity to generate forward propulsion. In other words, a decreased capacity to run as fast for as long. In long distance running, which predominantly relies on the aerobic energy system, a muscle that does not have the strength to repetitively contract over 5, 10, 42 kilometers will fatigue faster and will limit the intensity at which a person can run. Identifying weak muscle groups and engaging in a strengthening program to address this can lead to improved running efficiency and faster times.

For our runners at Kieser, we perform a 1-hour assessment. This involves a thorough history, biomechanical analysis and strength testing relevant to the condition/ patients' goals.

If you would like to book in for an assessment, mention that you are a Turramurra Trotter and receive a gap-free initial assessment.