



Strength Training for Running

Part One - Needs Analysis

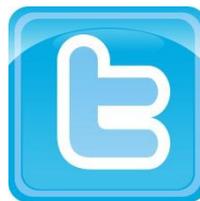
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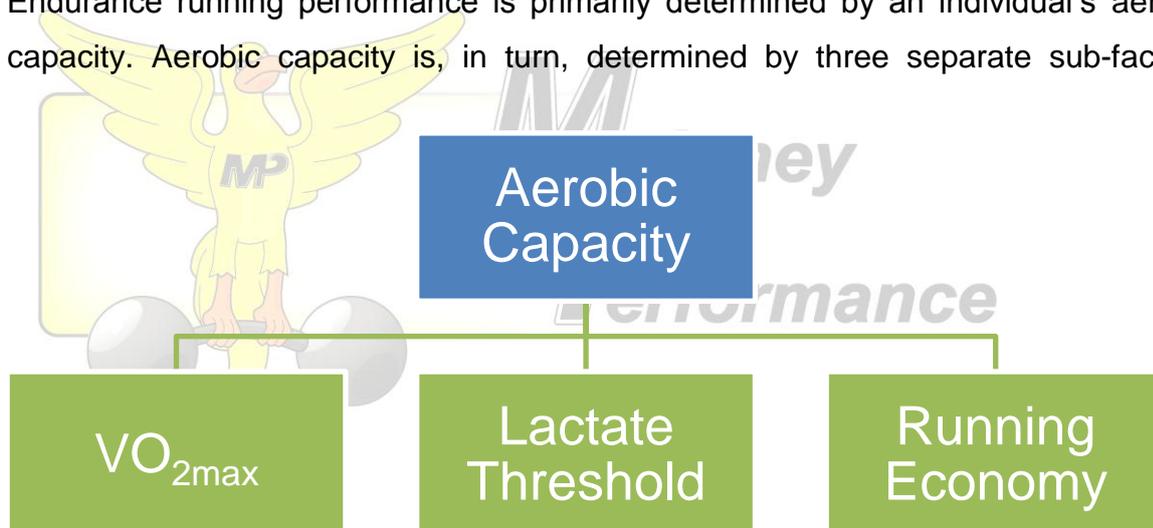
Running - A Needs Analysis

In order to maximise the potential benefits to performance, a proper strength training programme needs to be built around the specific demands of running. In order to achieve this, a process known as a needs analysis should be undertaken. The needs analysis should investigate two crucial areas:

- The determinants of running performance
- Common running injuries and their potential causes

Determinants of Running Performance

Endurance running performance is primarily determined by an individual's aerobic capacity. Aerobic capacity is, in turn, determined by three separate sub-factors:



Maximal Oxygen Uptake (VO_{2max}) - *the maximum volume of oxygen that can be used by the body in one minute*

Improving VO_{2max} will enable an athlete to rely on aerobic energy production at greater running speeds. This is important because aerobic energy production is sustainable, anaerobic energy production is not. Interval training has been shown to be more effective than traditional endurance training for improving VO_{2max}, near maximal intensities (i.e. repeated sprints) appearing to elicit the greatest improvements.

Lactate Threshold - *the point at which lactate starts to accumulate in the blood stream*

Improving lactate threshold will also enable an athlete to rely on sustainable aerobic energy production at greater running speeds. As with VO_{2max} , high intensity intervals have been shown to be a more effective method for improving the lactate threshold than traditional endurance training methods.

Running Economy - *a measure of how efficiently an individual uses oxygen while running at a given pace*

Improving running economy will enable an athlete to either expend less energy running at a given speed or allow them to increase their speed without increasing the relative intensity. Strength and power training improves running economy by decreasing the relative force (i.e. %_{max}) that is applied during running by increasing the maximum force that you are able to produce. Plyometric training will also reduce the relative forces applied, this works by increasing the body's ability to use elastic energy.

Common Running Injuries

Running injuries don't just have a big impact on performance, they tend to have to some pretty detrimental effects on day-to-day living. It's important we know the types of injuries that commonly occur in order to condition the body appropriately and try to prevent them occurring.

Some risk factors are common to almost all injuries. These must be key considerations when designing your training programme, both in the weight room and out on the redways. These general risk factors include the following:

- Sudden increases in volume and/or intensity of training
- Inadequate recovery from training
- Muscle weakness and/or imbalance
- Increased body mass (not necessarily body fat)

By being aware of the general risk factors you can do a lot to ensure that your training is not increasing your chances of injury. There is more you can do though. Some of the injuries that are particularly common amongst endurance runners have been linked to some specific risk factors. The following are the 5 most common injuries in endurance runners:

- Anterior knee pain (patellofemoral syndrome)

Weak quadriceps are widely accepted as the key risk factor for anterior knee pain. Studies also suggest that glute/hamstring weakness and poor ankle flexibility may be important too.

- Iliotibial band (ITB) syndrome

ITB syndrome is linked to poor control of the hip, knee and ankle during running. This is typically indicative of weakness in the glutes and hamstrings together with poor proprioception (balance/movement control).

- Plantar fasciitis

Poor ankle flexibility appears to be the strongest predictor for plantar fasciitis. Excessive pronation of the foot and/or inappropriate footwear is also an important factor.

- Tibial stress syndrome (shin splints)

Shin splints are linked to poor control of the hip, knee and ankle, and particularly to individuals with a tendency for their knee to collapse inwards. Excessive pronation is an important factor once again here.

- Achilles tendonitis

Achilles problems are strongly related to the strength and endurance of the calf musculature.

Summary

Understanding the demands of endurance running is crucial in order to design a training programme with the maximum potential for improving performance. Common injuries and their associated risk factors should also be identified; the training programme should seek to minimise these factors.