



Endurance Sports Training

The Running Glossary

By Ben Wisbey

Training

Cross-training exercising in a way which does not involve your own sport. For example a runner may do some cycling during the off-season to maintain fitness but have a break from running. This type of training can be good for recovery or during injury, however the best method of improving your running is to run.

Fartlek This is a Swedish word meaning 'speed play'. Fartlek is traditionally an unstructured type of training performed over natural terrain. The speed of the session is intermittent, varying from jogging to fast bursts, depending on the terrain and how the athlete feels. Fartlek training can train both the **aerobic** and **anaerobic** systems, depending on the make-up of the session.

Hill repeats These are aimed at developing strength endurance and anaerobic threshold or anaerobic capacity. Do them at an intensity similar to that of your 10km race intensity. Hill training has also been shown to be beneficial in improving running economy if the hill is of moderate grade (4 to 6%). It is ideal if each hill takes approximately 2-3 minutes to complete, followed by a an easy jog back to the bottom of the hill between each repeat. Hill training allows high intensity intervals to be done without placing too much impact stress on the body.

Intervals training Here's a form of training that alternates bouts of intense exercise with periods of passive or active recovery. Intervals are aimed at improving your performance by allowing you to complete more high-quality work than you would be able to in a single block. The intensity, duration, repetitions and recovery are all variables that can be altered to adjust the type of interval being performed. Intervals are important for runners of all distances and abilities as they allow improvements in speed and performance.

Plyometrics This form of training aims to develop explosive power through jumps, hops, skips, etc. Plyometrics can improve your running technique by training you to minimise the time your foot spends on the ground, and thus reducing braking forces. However, plyometrics should only be done after you have built a strength base using less demanding techniques.

Recovery run An easy run used as active recovery to promote muscle recovery while still offering endurance improvement. Recovery runs are best done at a very low intensity over flat, natural terrain.

Speedwork This type of training is aimed at improving your speed/performance over the desired racing distance. Speed training encompasses a wide range of training techniques, including fartlek, intervals, sprints, strides, etc. Typically speed training is done at a pace anywhere between your **anaerobic threshold** and maximal sprint speed. A general rule to follow when using speed training is that the speed should be greatest when the duration is lowest, and vice-versa.

Strides/run-throughs Strides are aimed at improving technique (and therefore running economy), speed and explosive power. Strides can be 50 to 150m runs conducted at anywhere between 10km race pace and maximal speed. They can be beneficial for runners of all distances and abilities. The speed that you do your strides will generally depend on the distance of the event you are aiming for. For example a 5km runner will do strides at close to maximal speed while a marathon runner may do strides at 10km race pace. There should be a full recovery between each stride. There are many benefits to be gained from strides, and they can be tailored to suit all types of runners.

Tempo training A form of training that generally uses 1 to 4 intervals of long duration, at an intensity below anaerobic threshold. Tempo training is a great method of improving running economy, and is a key form of training for the half marathon and marathon runner.

Lactate tolerance threshold A method of training that is aimed at improving the body's ability to produce and deal with high amounts of lactic acid in the muscles. This generally takes the form of short maximal efforts with a short rest or long maximal effort to fatigue. Lactate tolerance is an important physiological characteristic for runners competing in events 5000m or less.

Running technique

Supination Outward rotation of the foot during ground contact. This means more weight is placed on the outside portion of the foot. Supination occurs primarily during heel strike and toe-off to absorb shock. Excessive supination can lead to injury.

Pronation Inward rotation of the foot during ground contact. This means more weight is transferred to the inside portion of your foot. Pronation occurs during running to absorb shock. Excessive pronation or over-pronation can lead to injuries.

Stride length The distance from where one foot lands to where the same foot lands during the next cycle. Stride length is a key aspect of running speed. Over-striding is one of the most commonly occurring problems with running technique.

Stride frequency – This simply means the number of strides you take per minute. It is a measure of leg speed and is also called running cadence. Stride frequency is very important at high speeds, such as sprinting.

Physiology

Aerobic energy system This is the primary energy system for the distance runner. It produces energy at a slow rate through the use of oxygen and is only limited by carbohydrate stores. This system uses both carbohydrates and fats as a fuel source and is the primary source of energy in all events from 1500m through to the marathon.

Anaerobic threshold (AT) This is the point at which lactic acid production exceeds lactic acid breakdown. Exercise at intensities above this threshold cannot be maintained for extended periods. You should be able to maintain running intensities at AT for 15 to 20km.

ATP It stands for adenosine triphosphate, and is the only form of energy that can be used directly by the cell to generate muscle contractions. For energy to be supplied to the cells, carbohydrate, fat and protein are broken down into ATP. The body has only enough ATP stored for about 3 to 8 seconds of maximal activity, before these stores must be replenished through one of the energy systems.

ATP-CP energy system This is the energy system you use for short sprints or exercise of a short explosive nature. This system develops energy rapidly but for a very short time because there is only a limited supply of creatine phosphate in the muscles.

Carbohydrate Carbohydrate is the primary source of energy used by the body during both rest and exercise. The body stores carbohydrate in the liver and muscles in the form of glycogen. When full, the stores offer about enough energy for up to a 30km run. Carbohydrate is used to a greater extent during high intensity exercise while low intensity exercise, such as your long runs, uses a combination of fat and carbohydrate. Traditionally, simple or complex carbohydrates have been the terms to describe carbohydrates that are either simple sugars (like lollies) or complex starchy foods (rice, pasta); however, more recently the glycaemic index has been used to rate the speed at which food is absorbed.

Cardiac drift – This describes the gradual increase in heart rate during prolonged exercise due to dehydration and an increase in temperature. It is the reason why your heart rate may be higher towards the end of an event than it was in the middle despite the fact that you've maintained the same speed.

Creatine phosphate (CP) This substance is used in the production of **ATP**. CP provides a quick method of regenerating ATP for quick energy production. CP is used in short maximal duration efforts, however CP stores are limited and only last for up to eight seconds. This is the theory behind using a creatine monohydrate supplement: if the muscles have greater creatine stores, then ultimately this will lead to a greater amount of short-term CP energy. Creatine supplementation is of little value to endurance athletes.

Glucose This is the primary form of fuel used by the body. It is a carbohydrate that is easily broken down to provide energy.

Glycogen This is the form in which carbohydrate is stored in the muscles and liver. Muscle glycogen is the main metabolic fuel used during heavy and prolonged exercise. When these stores get depleted, fatigue sets in. One way the body adapts to exercise is an ability to store more glycogen than an untrained body does.

Lactic acid This is a product of anaerobic energy production (the lactic acid energy system). Excessive lactic acid production is associated with muscle fatigue, causing a decrease in running intensity. In the presence of oxygen, lactic acid is broken down and recycled as a fuel source. When you exercise at high intensities however, the body produces lactic acid faster than it can recycle it.

Lactic acid energy system This energy system can produce energy at a fast rate without using oxygen. This is a very important energy system for runners who operate above their anaerobic threshold including in events right up to 10,000m. A by-product of this system is lactic acid, which can accumulate in the muscles and cause fatigue, and a subsequent drop in exercise intensity.

Strength endurance The ability of a muscle to continually produce movement over time. It is important for runners, primarily during long or hilly events, however it is also important in order to prevent fatigue and maintain intensity during shorter events. Strength endurance is best developed during hill running or long runs.

VO2 max This is your aerobic capacity, of the maximum amount of oxygen that your body can use during maximal intensity exercise and is measured in mL/min/kg of body weight. This method has traditionally been used as a measure of an athlete's ability. However, over the last 10 years other performance characteristics have been shown to be equally, if not more important in predicting performance.

Injury

This information is provided as a guide only. If you suffer from any pain or potential injury, you should see a physiotherapist or sports medicine doctor.

ITB syndrome A condition that includes inflammation of the iliotibial band caused by friction of the band with the outer part of the knee joint. The iliotibial band (ITB) is a thickened band that runs down to the lateral aspect of the thigh to stabilise the knee. ITB syndrome is often caused by a tight ITB, which is associated with over pronation and uneven running surfaces. One sign of ITB syndrome is pain at the side of the knee when running up or down hills.

RICER is an acronym for effective treatment of sports injuries: Rest, apply Ice, apply Compression, Elevate the injury, and Refer to a sports doctor for follow up treatment. These procedures should be followed as soon as the injury occurs.

Runner's knee a term used to describe pain around the kneecap, associated with running. The severity of the injury worsens with the distance run and the pain can be severe walking up and down stairs. The problem is thought to be a form of

patellofemoral pain syndrome. Runner's knee has also been used to describe **ITB syndrome**.

Shin splints This common running term describes a number of overuse injuries characterised by pain around the shin. These conditions are often associated with overtraining, running on hard surfaces or poor running technique. Some of the injuries termed shin splints include stress fractures, tendonitis and compartment syndrome. Treatment depends on the exact injury but generally involves rest, ice treatment and stretching.

Ultrasound treatment a method of treating disorders such as deep, soft tissue injuries. This treatment is thought to accelerate healing and relieve pain.

Miscellaneous

Core stability is a term used to describe the strength and control of the muscles in the core region of the body such as the abdominals, obliques and transverse abdominis (which encircle the body similar to a belt). These muscles are important for pelvic stability and good running technique.

Hitting the wall This term describes what happens to a runner when the muscles have used all stored glycogen. It is associated with fatigue and a decrease in exercise intensity. The time it takes to reach this point depends on the glycogen stores at the beginning of exercise and the rate of carbohydrate consumption during exercise. If it happens to you, you'll know. The best way to avoid it is to make sure you use a sports drink or sports gel during runs over 20km.

Electrolytes These are the sodium and potassium salts which you lose during sweating. You can replace them during exercise by using a sports drink containing electrolytes. Doing this will reduce dehydration, lessen the chance of getting muscle cramps and maintain homeostasis. Severe depletion, which can happen in ultra distance events may lead to hyponatraemia, a severe problem caused by excessively low electrolytes in the blood.

Ergogenic aids –Ergogenic aids are defined as anything that will enhance performance, but nowadays it is usually used in reference to drugs and nutritional supplements. Ergogenic aids are anything from EPO to vitamin supplements, from steroids to creatine – even your sports drink.

Negative splits This simply means running the second half of a race faster than the first half. For example, a runner in a 10km race who takes 18:00 for the first 5km and 17:45 for the second 5km split. Aiming for negative splits should keep you from going out too fast in the beginning when you're feeling fresh and caught up in the general excitement, and thus keep some energy in reserve for a strong finish.

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