

## **Improving/maintaining maximum oxygen uptake (VO<sub>2</sub>max)**

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There are many things that happen to the body as outcomes of the ageing process. In broad terms, as we age the process of cell replication accumulates errors and this leads to changes in function. Some of the negative factors (as far as running speed is concerned) can be slowed, halted, or even reversed for a while. VO<sub>2</sub>max is one of the things that declines with age, particularly with a sedentary lifestyle. VO<sub>2</sub>max is a measure of the maximum capacity of the muscles to use the oxygen taken up in the blood to generate energy. It is particularly relevant to distance runners where aerobic energy generation is the prime energy source.

VO<sub>2</sub>max is expressed as mls of oxygen per kilogram of body mass per minute - ml/kg/min. Excessive body fat does not contribute to VO<sub>2</sub>max and hence a reduction in body fat is one way of increasing VO<sub>2</sub>max - providing sufficient body fat is retained for essential body functions such as transport of fat soluble vitamins, padding the foot, as an energy source, etc. In terms of fitness, improving VO<sub>2</sub>max means getting as much oxygen into the blood as possible, transporting that oxygen to muscle fibres efficiently (and removing waste products), and having muscles that are trained to use that oxygen to generate the maximum amount of energy possible. Factors that impinge on the transport aspect of the process include maximum heart rate, stroke volume (volume of blood pumped by the heart per cycle), capillarisation and the capacity of red blood cells to take up oxygen (which depends on it being bound to haemoglobin which in turn depends on iron levels). Maintaining trained muscle mass, where energy is generated and used, appears to contribute more to maintaining VO<sub>2</sub>max with age than cardio-vascular factors.

approximately to your best 3000m race speed. Your best 5k speed is likely to be approximately 95% of this and your best 10k speed, 90%.

How can you improve  $\text{VO}_2\text{max}$  or slow loss of capacity? Longer runs of around 60 minutes at 65-70% of your  $\text{VO}_2\text{max}$  speed will assist in maintaining cardio-vascular fitness and will also assist you to maintain a good lean muscle mass to body fat ratio. Running shorter distances at 90-100% of your  $\text{VO}_2\text{max}$  speed with timed recoveries can contribute to improved  $\text{VO}_2\text{max}$  - sessions like 6x800m at 3 - 5k race pace with recoveries only as long as you need to maintain the pace through the session. You can also try 5x1000m at 5k pace, starting with a 400m walk recovery and then gradually reducing the recovery time by jogging and/or cutting back the recovery distance until your 1000m times fall off. A 5k race is another good  $\text{VO}_2\text{max}$  session. In general, if you want to increase or maintain your  $\text{VO}_2\text{max}$ , you have to build sessions at or near  $v\text{VO}_2\text{max}$  pace into your training program, but remember to match ambition to ability and also to schedule recovery time after every demanding session.