

vVO2max and tlimvVO2max

Billat (1999)^[1], a professor of Sport Sciences at the University of Lille, has shown that in a four week period it is possible to improve an athlete's [lactate threshold](#), [VO2max](#) and running [economy](#). To understand Billat's work we need to be aware of two new variables - vVO2max and tlimvVO2max.

<p>VO2max on its own is a poor predictor of performance but using the velocity (vVO2max) and duration (tlimvVO2max) that an athlete can operate at their VO2max will provide a better indication of performance.</p>	<p>Billat (1999)^[1] conduct a four week trial with a group of athletes. The athletes had 6 training sessions a week - 4 easy sessions, one vVO2max session and one lactate threshold workout. At the end of the trial vVO2max increased by 3% and running economy increased by 6%.</p>
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Why the improvements?

Running at vVO2max increases leg muscle strength and power, and enhanced strength tends to improve [economy](#) (muscle cells are stronger, fewer needed to run at a particular pace, thus the energy expenditure is lower). vVO2max effort boosts neuromuscular responsiveness and coordination which reduces [energy expenditure](#).

What are "vVO2max" and "tlimvVO2max"?

vVO2max

vVO2max is the minimal running velocity which produces [VO2max](#) i.e. causes your [muscular system](#) to utilise oxygen at its highest possible rate.

tlimvVO2max

tlimvVO2max is the maximal amount of time a runner can keep going at vVO2max. During the research Billat was able to show that tlimvVO2max, on average, was 6 minutes. Billat found the best predictor of tlimvVO2max is lactate threshold speed i.e. the higher your lactate threshold speed the longer your tlimvVO2max. See the [lactic page](#) to find out how to improve your lactate threshold.

What types of training sessions are there?

There are three training sessions that you could use:

- 30-30 session
- 60-60 session
- 3-3 session

The 30-30 session

This session comprises of:

- 30 seconds at 100% of $vVO_2\max$
- 30 seconds recover at 50% of $vVO_2\max$

This cycle is repeated for as long as the 30 seconds at 100% $vVO_2\max$ can be sustained. Based on achieving 1800m in the 6 minute run then in 30 seconds we can cover 150 metres. The 30-30 session would comprise of 150 metres in 30 seconds followed by 75 metres in 30 seconds. This is repeated until you are unable to maintain the 150 metres in 30 seconds. The 30 seconds at 100% $vVO_2\max$ is important, as this is the element from which the gains in fitness will be achieved. The recoveries need to be run slowly and reasonably close to 50% $vVO_2\max$.

The 60-60 session

This session comprises of:

- 60 seconds at 100% of $vVO_2\max$
- 60 seconds recover at 50% of $vVO_2\max$

This cycle is repeated for as long as the 60 seconds at 100% $vVO_2\max$ can be sustained. Based on achieving 1800m in the 6 minute run then in 60 seconds we can cover 300 metres. The 60-60 session would comprise of 300 metres in 60 seconds followed by 150 metres in 60 seconds. This is repeated until you are unable to maintain the 300 metres in 60 seconds.

The 3-3 session

This session comprises of:

- 3 minutes at 100% of $vVO_2\max$
- 3 minutes recover

This cycle is repeated for as long as the 3 minutes at 100% $vVO_2\max$ can be sustained or 5 repetitions have been completed.

Based on achieving 1800m in the 6 minute run then in 3 minutes we can cover 900 metres. The 3-3 session would comprise of 900 metres in 3 minutes followed by 3 minutes recovery. This is repeated until you are unable to maintain the 900 metres in 3 minutes or 5 repetitions have been completed.

