



CYCLING

These simple workouts will help cyclists boost their VO₂max

Competitive endurance cyclists are always searching for ways to boost their aerobic capacities (VO₂max) but are seldom quite sure which workouts will produce the greatest effect. Now, new research carried out at Odense University in Denmark demonstrates that some very simple, moderately intense training sessions will do the job.

In the Danish study, eight cyclists rode their exercise bikes at an intensity of 80-90% VO₂max (88-95% of maximal heart rate, 260-300 Watts) for 30 minutes per workout, three times a week. Eight other athletes performed intervals workouts which consisted of 10 seconds of all-out exertion at a stratospheric intensity of 880-1025 Watts, alternated with 50 seconds of rest. In the latter case, there were 20 work intervals per training session, and three workouts per week.

After just five weeks, the athletes who had ridden steadily at 80-90% VO₂max for 30 minutes per workout achieved an extremely useful 6% increase in VO₂max, from 53 to 56 ml/kg/min, while the intervals group failed to boost VO₂max. This was true even though the interval group had consumed about twice as much total energy per workout.

The interval group did gain one advantage over the continuous exercisers, however; they were better at doing interval workouts! During a test completed at the end of the five-week study, the interval exercisers were able to carry out 26 intervals at a high power output, while the continuous people could only manage 12. Of course, the interval athletes possessed higher anaerobic capacities as well.

The Danish study is especially interesting because it reinforces the notion that a fairly modest training session – 30 minutes at 80-90% VO₂max – can be a potent source of improved aerobic capacity in a fairly short period of time. It also reminds endurance athletes that super-high intensities and fast-tilt interval sessions aren't always necessary to boost VO₂max; in fact, if the intensity is very high and the interval is fairly short, such efforts may not raise aerobic capacity at all.

In addition to the '30 minutes at 80-90% VO₂max session', another workout is a proven VO₂max booster: exercising for five-minute intervals at the maximum intensity which you could sustain in a race for 15-20 minutes. As your VO₂max goes up, your basic endurance will also increase, and your race times will improve significantly.

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(‘Training Specificity in Relation to Intermittent Exercise Performance’, Biochemistry of Exercise Ninth International Conference Abstracts No. 19, p. 18, 1994)

PRE-COMPETITION

Now we know why tapering works: it's a question of USEE

Scientific studies have shown that 'tapering' – reducing one's training for one to three weeks prior to competition – can produce dramatic improvements in performance but haven't been sure exactly why this is so. Now research from the University of Puerto Rico Medical School shows that tapering boosts competitive efforts by increasing the elasticity of muscles, or, more precisely, by enhancing the way in which muscles use 'stored elastic energy'.

'Stored elastic energy' may sound like a mouthful, but it's easy to understand. When a muscle is stretched (as it usually is before it contracts), it contains more energy than it does when it's non-stretched, just as the rubbery part of a catapult contains more energy – and can hurl an object faster and farther – when it is in the fully stretched position. This energy which is stored in a muscle is extremely useful to the athlete, because it helps the muscle shorten (contract) powerfully without the need to burn up further energy.

For example, when a football player runs towards the goal, the hamstring muscles are stretched each time a leg swings forward. This pre-stretch gives the hamstrings a boost when they contract, rocketing the leg backward, and thrusting the player towards the ball or the goal. Pre-stretching a muscle is a great way to boost muscle power output, and save energy. The way in which the energy put into a stretched muscle is used to produce raw power is simply called the utilisation of stored elastic energy (USEE). The better the utilisation, the more powerful and efficient the athlete.

At the University of Puerto Rico, 29 young swimmers undertook a 21-day taper. USEE was evaluated four times: before the taper began, at the end of seven days of tapering, after 14 days, and again following the full 21 days of tapering. Interestingly enough, USEE actually decreased by about 25% after seven days of tapering, indicating that a seven-day taper was too short.

However, compared to the beginning of the tapering period, USEE had risen by about 17% after 14 days of tapering (and by about 55% compared to one week earlier). By far the best