KOOLSTOF

TRAINING GUIDE FOR CYCLISTS

Everyone can benefit from a Training or Coaching Plan!

Koolstof Sports Coaching, 48 Queen Street, Lower Ground Floor, Exeter, EX4 3SR.
Tel: 01392 247516 www.koolstofcoaching.com info@koolstofcoaching.com

POWERbreathe

"Breathing Strong in the saddle – The quickest and easiest way to enhance performance"

Over the past decade, a quiet revolution has taken place in sports training. Once viewed with scepticism, breathing muscle training is now seen as one of the "quickest and easiest" routes improved in performance. Professor Alison McConnell, the author of "Breathe Strong, Perform Better", is the scientist at the heart of this revolution, and she explains why a little heavy breathing is just what the doctor ordered.

It sounds too good to be true – three minutes off your 40km time trial with nothing more than five minutes per day of additional training. But published research has shown repeatedly that specific breathing muscle training improves sports performance, and in as little as four weeks. What's more, there's no need to even break a sweat.

Knowing this, it's no surprise that elite sport was quick to take advantage of breathing training, especially in the UK, where it was developed. One of Britain's greatest Olympians, oarsman and quadruple gold medallist Sir Matthew Pinsent, has said of breathing training, "Advances in sport science knowledge are few and far between, but numbered amongst these rarities is the discovery that breathing has such a profound influence upon performance that it merits specific training". So why haven't you heard about it? Precisely because it seems too good to be true, and because people like you are rightly wary of the claims made by those whose products promise much, but deliver little. But breathing training really is different, it's backed by high-quality published research that withstands the scrutiny of even the most cynical coach. Appetite whetted? Then read on.

The How

Resistance (weight training) is a routine part of most serious athletes' training schedules, but the idea of applying these principles to the breathing muscles has been slow to reach the mainstream.

Breathing Muscle Trainer

By using a device that can be likened to a dumbbell for your breathing muscles (e.g., the POWERbreathe®), the strength, power and endurance of these muscles can be increased. These are muscles like any other, and they respond readily to the right kind of training. A typical training regimen consists of 30 breaths, inhaling against a moderate intensity load, twice per day. Training sessions last less than two minutes, and can be undertaken virtually anywhere, making this one of the quickest and easiest training adjuncts around. The results are literally breath taking, particularly since the training requires so little time, and is effective in virtually any sport.

The Why

The underlying mechanisms for the improvements in sports performance are not as you might first assume. Most people assume that the benefits come from increased uptake of oxygen in the lungs, but they don't. Nevertheless, the mechanism does involve oxygen delivery. Over the course of the past decade, an important vascular reflex has been discovered, which originates from the breathing muscles. Intense breathing muscle work activates the reflex, causing limb blood flow to be restricted, impairing delivery of oxygen and removal of muscle metabolites. The good news is that breathing muscle training increases the intensity of breathing work required to activate the reflex. So it's possible to work harder, and longer, before the reflex directs blood flow away from the limbs. As a result, performance can be improved in a wide range of sports and exercise modalities. It's that simple, and that profound.

Breathing muscle training also makes breathing feel easier, this because the muscles are stronger. So breathing training is not just for the serious athlete. Being stronger also increases the endurance of the breathing muscles, delaying fatigue, which also lessens breathing effort. Also, because breathing feels easier, and because the limb muscles are better supplied with blood (delivering oxygen and removing metabolites), leg discomfort, and the sense of effort associated with exercise (perceived exertion) is also lower – exercise simply feels easier.

But that's not all. Most people don't appreciate that the breathing muscles are an important part of the system that stabilises the trunk and pelvis. In cycling, the core provides the foundation from which pedal force is generated, so the stabilising action of the core is very important for the production of cycling power. This is illustrated by the fact that external stabilisation of the trunk (i.e., relieving the core muscles of the need to stabilise the trunk) significantly reduces the metabolic cost of cycling. The effect is greatest at pedalling speeds that induce the highest pedal forces. In other words, cyclists expend a lot of energy stabilising their trunk in order to optimise power production.

And there's more. The body position required by cycling, especially when using aerobars, actually impedes breathing. Research suggests that cyclists who are inexperienced in the use of aerobars exhibit detrimental effects on their breathing and mechanical efficiency compared to cycling in the upright position. For example, compared with upright cycling, aerobars resulted in a lower maximal oxygen uptake and lower maximal ventilation. In addition, breathing appeared to be constrained, such that breath volume was lower and breathing frequency was higher. This is a very inefficient breathing pattern; indeed, the study found that mechanical efficiency was lower when using aerobars, i.e. the same amount of cycling work required more energy.

The explanation for this resides in the influence of a crouched body position on breathing muscle mechanics during cycling. First, there is an effect on diaphragm movement caused by the large organs of the abdominal compartment (stomach, liver, and gut). These organs lie immediately below the diaphragm, and they are effectively a noncompressible mass (visceral mass) that must be pushed out of the way by the descending diaphragm. When a cyclist is crouching forward, the abdominal organs press against the diaphragm, impeding its movement; the volume of the abdomen is also reduced, which means there is less space to accommodate movement of the visceral mass during breathing.

To make matters worse, the abdominal wall, which normally bulges forward during inhalation, is also stiffer because it contributes to core stabilization and forward flexion, increasing diaphragm work still further. In addition, the extreme hip flexion brings the thighs closer to the abdominal wall, where they can also impede its outward movement during inhalation. These effects conspire to impede the free movement of the diaphragm and rib cage muscles, increasing inspiratory muscle work. Studies show that the aerobar position has fewer detrimental effects in cyclists who have used aerobars for a prolonged period, so it appears likely that the inspiratory muscles adapt to the increased demands imposed by aerobars. A shortcut to this adaptation is to train the inspiratory muscles so that they are able to cope with the mechanical changes induced by the aerobar posture (see below).

By now you may be wondering how the improvements from breathing training stack up against other additions you could make to your training. In a study of cyclists, breathing training improved 40km time trial by 4.6% (around three minutes), and required less than 30 minutes per week of additional training. In contrast, whilst additional interval training can deliver the same improvement in 40km performance, a study showed that it required more than three times the amount of training per week, not to mention the commitment to complete 8 bouts of maximal cycling per session, each bout lasting two and half minutes. The choice is yours, but breathing training wins hands down for my money.

The Wherefore

Just as resistance training techniques have evolved, so too has breathing muscle training. Where once the focus of resistance training was on training individual muscles, modern approaches train movements, i.e., functional training. The principle of functionality is even more important when it comes to the breathing muscles. The muscles of the trunk must not only deliver adequate breathing, they must contribute simultaneously to movements that are an integral part of sport. Everything from the swinging of a racket, to the pull phase of front crawl swimming, requires a contribution from muscles whose primary role is considered to be breathing. Hence, functional breathing training methods have been developed, in order to enhance the ability of the breathing muscles to meet the demands of breathing and functional movement. These can be as simple as incorporating breathing training into a basic core stability exercise, such as the plank, to incorporation into the core stability challenges of front crawl swimming.

Breathing muscle training during a core stability exercise

Breathing muscle training (replicating the cycling position in the TimeTrial/Triathlon or Drop Bars) with impaired abdominal wall movement.

Breathing muscle training during a pelvic stabilisation challenge

Breathing muscle training during simulation of front crawl

Finally, let's consider whether there are any 'behavioural' changes that can be made to improve your breathing in the saddle. Here's an "on-your-bike" exercise that's similar to a popular breath control exercise undertaken by swimmers to improve their stroke-to-breathing rate. Practicing this will help you develop a controlled, efficient breathing pattern. The best time to practice this exercise is during a phase of the ride when the cadence is relatively constant; the exercise doesn't need to be done for more than a minute or two at a time, so it should be possible to practice this exercise several times during a typical ride. The idea is to extend inspiratory and expiratory time for as long as you can (i.e., for a fixed number of pedal revolutions) so that you breathe as infrequently as you can tolerate. It's important that you extend the breathing phases by slowing them down, not be holding your breath at the end. Start by extending the duration of both inspiratory and expiratory time roughly equally, but once you're accustomed to this, you can mix it up by shortening one phase and extending the other phase disproportionately.

So if you're looking for something to give your competitive career an extra boost, or you simply want to make your physical endeavours feel easier, then get into some heavy breathing – it might sound too good to be true, but the science says it really does work.

The information in this article is taken from Alison's comprehensive guide to breathing training for sport, "Breathe Strong, Perform Better", published by Human Kinetics. If you want to know more about breathing training, or Alison's book, visit **www.breathestrong.com**. Alison will also be giving a presentation and demonstrations at The London Cycle Show and will be on 'The BikeRadar Training Hub' staffed by Koolstofcoaching.com on January 14th.

Koolstofcoaching.com are one of the first official POWERbreathe demonstrating centre in the UK and have been trained in using the K5 to accurately measure your inspiratory muscle strength, set the resistance levels to train with demonstrate how to use the POWERbreathe to maximum efficiency.

Professor Alison McConnell is the world's leading expert on breathing muscle training, and author of "Breathe Strong, Perform Better", a comprehensive guide to breathing training. Alison is also the creator of the POWERbreathe® range of breathing muscle trainers. She holds a BSc from the University of Birmingham (UK), and Masters and PhD degrees from the University of London (UK). Alison is Professor of Applied Physiology at Brunel University in London, and is a Fellow of both the American College of Sports Medicine and the British Association of Sport and Exercise Sciences.