



BREATHING & EXERCISE

ARTICLE 9: Sport-specific POWERbreathe® training: running

Introduction

In the previous two articles, we explored how to undertake specific POWERbreathe® training in order to optimise your swim and cycle phases in triathlon. By the time you reach the run phase, research suggests that your inspiratory muscles are already very fatigued^(1, 2). Interestingly, this fatigue does not appear to worsen during the run phase, which suggests that physiological mechanisms are operating to protect the vital inspiratory muscles from further compromise. These mechanisms are designed to reduce the work of breathing, and to ensure that the inspiratory muscles receive an adequate blood flow.

The only way to reduce the work of breathing during exercise is to reduce the breathing requirement, and that means reducing your exercise intensity. Furthermore, the only way to ensure that muscles receive an adequate blood flow is to redirect it away from other skeletal muscles (see article 3). Both of these protective mechanisms ensure 'survival', but they also mean that you have no choice but to SLOW DOWN. However, it doesn't have to be that way. By training the inspiratory muscles to meet the specific demands of the swim and cycle phases, you should be able to enter the run phase without residual inspiratory muscle fatigue, and that means that you'll be able to complete the run faster than you ever thought possible. But running places its own demands upon the inspiratory muscles, so in order to ensure that your inspiratory muscles are equipped to meet these head on, we're going to look at why and how running specific POWERbreathe® training should be undertaken. In it, we will consider the role of the diaphragm as part of the 'core' stabilising system during running.

Why is your posture during training important?

Running involves a state of almost continuous postural instability and your 'core' muscles have to work hard, not only to ensure that you remain upright, but also to ensure that your sacroiliac joints (SIJs) and spine function properly. They also ensure that your spine is protected from the damage caused by ground reactions forces (see Definitions, below).

The SIJs connect the fused section of your lower spine (the sacrum) to the pelvis (hip girdle); they are nature's shock absorbers, protecting your spine from the shock wave that hits your pelvis each time your foot strikes the ground, producing a ground reaction force. These joints also provide positional information that allows the trunk and legs to work in harmony. Its therefore important that the SIJs are allowed some movement and compression, but not too much, and this is where the deep 'core' stabilisers of the pelvic girdle come in; they add stability to the SIJs, and promote spinal compression, allowing the SIJs and spine to move within safe limits. The 'core' stabilisers therefore protect the spine and SIJs from damage⁽³⁾.

What's this got to do with breathing? Well, the deep 'core' stabilising muscles are part of an elaborate internal corset of muscles that stabilise the entire trunk (see Definitions, below). If you've ever had sore ribs and abdominal muscles after a cross country run, then you'll know what I mean, because this is a sign that your 'core' stabilisers have been put through their paces by the postural challenges produced by uneven terrain. What most people don't appreciate is that the diaphragm is a vital component of your 'core', and that your rib cage muscles are also involved in making compensatory adjustments for postural instability. In effect, these muscles 'catch' and restrain the torso when it is thrown outside the centre of gravity by a poor foot placement.

Research has shown that the diaphragm's dual role in controlling posture and breathing can create a conflict, and when push comes to shove, breathing always takes priority⁽⁴⁾. This means that in situations where breathing demand is high, and/or the diaphragm is fatigued, the breathing function of the diaphragm takes precedence over its role in protecting the spine. Research has also shown that people with SIJ pain show impaired diaphragm contribution to SIJ stabilisation⁽⁵⁾, and that people with breathing-related disorders also have higher rates of lower back pain⁽⁶⁾, highlighting the vital role played by the diaphragm in postural control and injury prevention.

If you fail to train your diaphragm as part of your 'core', you are neglecting a vital component of the 'core', something that could leave you vulnerable to injury. Joe Public may get away with this, but for a multi-sport athlete, weak links are all too often exposed by the extreme demands of training and competition. Injuries happen, but you can minimise risk by taking some simple precautions; ensuring that you have a balanced 'core', by training the diaphragm to meet its dual demands, is one such precaution.

What do you need to do? As with most of the advice I've given in this series, its not 'rocket science'. You simply need to train your inspiratory muscles in a way that prepares them for their dual role during running (breathing pump and postural stabilisers). This means creating conditions where you need to engage your 'core' during unstable movements; then just add the POWERbreathe®.

Principles of posture specific POWERbreathe® training

As was the case in the previous articles on POWERbreathe® training for the swim and cycle phases, my aim here is to give you the knowledge to set you on your way to devising your own exercises. Everyone is different, especially when it comes to the state of training of your deep 'core' muscles, so you need to know how to devise challenges that address *your* weaknesses. These 'advanced' principles should only be attempted once you have completed your 'Foundation' training (article 6).

Here's a reminder of the three main principles of posture-specific POWERbreathe® training, and how to determine the right number of 'reps' to achieve your training goals:

Principle 1:

POWERbreathe® training is resistance training; there are good reasons why POWERbreathe® should not be and need not used during any aerobic training (see article 7 for an explanation of these reasons).

Principle 2:

POWERbreathe® is a resistance training tool, so think in terms of 'reps and sets' (see table below). Decide whether you are training for, say, strength (low reps / high load), or power (moderate reps / moderate load), and then devise an exercise/movement that

challenges the muscle of your torso in a similar way to the challenge that they face during aerodynamic cycling. Then perform the exercise/movement using the rep/load combination that is most appropriate.

Principle 3:

Simulate as closely as possible the postural conditions associated with the sporting activity. In the case of running, you have to contend with postural instability. This can be simulated by undertaking your POWERbreathe® training whilst engaging in exercises that are posturally challenging.

Playing with ‘reps and sets’

If you want to introduce intensity specificity into your POWERbreathe®, then here’s a reminder of a few principles to apply:

Suggested POWERbreathe® training regimens.

All regimens should be carried out 5-7 days per week. Training loads can be identified by ‘trial and error’ (see Top-tips for optimal training in article 6). As your ability to complete the sets improves, increase the training load by 1/4 turn of the load adjuster.

Four week block	POWERbreathe® training regimen				
	Load	Repetitions	Sets	Rest between sets	Times per day
Strength	10RM	10	3	60 sec*	2
Strength/Power	30RM	30	1	-	2
Speed/Endurance	20RM	20	4 to 6	60 sec*	1
Endurance (up to 30 min)	40RM	40	6	240 sec*	1
Endurance (over 30 min)	60RM	60	4	180 sec*	1

NB. Repetition maximum (RM) = the load that you can only just complete the prescribed number of repetitions, e.g., a 10 rep max is a load that you can only complete 10 reps of before 'failure' (see above for definition of failure).

**If you become dizzy due to hyperventilation, hold your breath between sets, and/or use the re-breathing advanced Top-tip from article 6.*

Here are three exercises to get you on your way...

'The lunge plus'

You need to build up to this exercise in stages.



- The first stage is to become accustomed to executing a static lunge, and to engage your 'core' muscles during the lunge (pull the tummy button towards the spine by contracting transversus abdominus, rectus abdominus, and your obliques).
- Concentrate on your breathing, inhaling as you sink down into the lunge, and exhaling as you rise.
- Now add the POWERbreathe, again, inhaling as you sink down into the lunge, and exhaling as you rise. Focus on engaging your diaphragm. Don't forget to do half of your POWERbreathe 'reps' with your right foot in front, and half with your left in front. Finally, build progression by adding some more instability; place your front foot on an unstable surface such as a balance cushion and keep the 'core' engaged throughout.

'The sit'

The best way to achieve this is to use a 'core' stability accessory such as a 'Swiss Ball', or 'Balance Ball'.



- Place yourself in a posture where your upper body muscles are engaged in postural stabilisation activity, such as sitting on the ball, slightly extended at the hip, with the shoulders leaning back behind your centre of gravity.
- Engage your 'core' muscles by pulling your tummy button towards the spine (see above).
- Take one foot off the floor and inhale as you do so, taking care to keep your pelvis level. Return your foot to the floor as you exhale and then inhale again as you raise the other foot.
- Once you are comfortable with this, add the POWERbreathe.
- An advanced version would be to sit on the ball without your feet in contact with the floor. Keep the 'core' engaged throughout.

'Superman plus'

This is a standard exercise for 'core' stabilisation, to which I have added a couple of 'twists'.

- Place yourself on 'all fours' with your shoulder and hip joints at 90 degrees to your trunk.
- Engage your 'core' muscles by pulling your tummy button in towards your spine (see above).
- Now raise and extend the opposite arm and leg simultaneously (right arm and left leg) so that your arm and leg are extended and flat (making a 180 degree angle to your trunk).
- Hold for a few seconds and then return to all fours. Repeat with the other arm and leg.

- Once comfortable with this movement, inhale deeply using your diaphragm as you raise your limbs, and return to all fours as you exhale. Repeat with the other arm and leg.
- Once you have mastered this, add the POWERbreathe, again inhale deeply using your diaphragm and return to all fours as you exhale.
- Finally, build progression by adding some more instability; put your knee or hand on an unstable surface such as a balance cushion. Keep the 'core' engaged throughout.



Definitions

'Ground reaction force': According to Newton's 3rd Law of Motion (Law of Reaction), to every action, there is an equal and opposite reaction. The reaction force supplied by the ground is known as the ground reaction force, which is the reaction to the force the body exerts on the ground due to gravity.

'Core': a muscular corset forming an abdominal 'box' that is bounded by the muscles of the abdominal wall (front), paraspinals and gluteals (back), pelvic floor and hip girdle (bottom), and diaphragm (top). The 'core' stabilises the upper body, pelvis and spine.

'Balanced core': equality of function throughout the 'core' muscles; all muscles being trained to the same extent.

Engaging the 'core': pull the tummy button towards the spine by contracting transversus abdominus, rectus abdominus, and obliques (imagine you're trying to do up the zip on a pair of jeans that you out grew some time ago!).

Summary

In this article we learned the principles of devising sport-specific POWERbreathe® training for the run phase. As was the case with training for the swim and cycle phases, you should experiment with different postures that simulate aspects of the competing demands of breathing and maintaining posture/'core' stability.

References

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