



## BREATHING & EXERCISE

### **ARTICLE 7: Sport-specific POWERbreathe® training: swimming**

#### **Introduction**

By now, you should be pretty convinced that POWERbreathe® is the quickest and easiest route to an improvement in your time-trial performance. In the previous article, I explained how to lay down the foundations of your POWERbreathe® training and offered some tips on how to get the best results from this. In the next three articles, I will give you the knowledge to help you to devise your own sport-specific exercises for the swim, cycle and run phases.

As we saw in previous articles, each phase of the triathlon brings unique challenges to your inspiratory muscles, and your training needs to meet these head on. Swimming is possibly the most extreme challenge, because the environment, apparel and breathing 'gymnastics' all conspire to make life tough for your inspiratory muscles. This is why the highest levels of inspiratory muscle fatigue reported in the scientific literature are induced by swimming – a whopping 29%<sup>(1)</sup>. However, research also suggests that, during the triathlon, significant fatigue is not observed until after the cycle phase. In other words, athletes pace themselves in such a way that inspiratory muscle fatigue is minimised during the swim. What this indicates is that athletes are losing valuable time during this phase, because they are 'saving' their inspiratory muscles for later in the race.

It doesn't have to be that way, because its possible to train specifically to meet the breathing demands of swimming. In order to be 'specific', this training needs to take into account factors such as posture and the external resistances acting on the chest from the water, as well as from a wetsuit.

## **Why is your posture during training important?**

The mechanics of breathing are altered by your posture for two reasons:

- 1) Gravity influences the mechanical operating lengths of the inspiratory muscles and the forces that they must overcome. This is primarily because gravity acts on abdominal contents, and depending upon whether you are upright or laying down, this weight pulls or pushes the diaphragm in different directions. For example, when you are upright, the weight of the liver and intestines pulls diaphragm downwards; when you are lying down, their weight pushes the diaphragm into the thoracic cavity. The former (upright) shortens the diaphragm, whilst the latter lengthens it (laying down). The diaphragm is strongest when it is longest (laying down). However, when we are lying down, the movement of the diaphragm is impaired because it has to work against the weight of the intestines pushing against it.
- 2) Your breathing muscles are also a vital part of the muscles that make up your 'core' stabilisers' (more on this in a later article). Swimming is a 'supine' (laying down) activity, which has the effect of reducing the operating strength of your inspiratory muscles by about 16%<sup>(1)</sup>, and that's before you've even begun to exercise. In addition, swimming requires the involvement of your trunk muscles to generate propulsive force; these are the very same muscles that you also use to breathe. In order to train your inspiratory muscles 'specifically' to meet these challenges, you need to complete your POWERbreathe® training under conditions that simulate the challenges that swimming presents.

## **The three principles of posture specific POWERbreathe® training**

Its really very simple, and my aim here is to give you the knowledge to set you on your way to devising your own exercises. Everyone is different, and for some people, certain postural challenges will be harder than others, so you need to know how to devise challenges that address your own weaknesses. These 'advanced' principles should only be attempted once your have completed your POWERbreathe® 'Foundation' training (see article #6).

### **Principle 1:**

POWERbreathe® training is resistance training and as such, I do not recommend that POWERbreathe® is used during any aerobic training. There are four very good reasons for this:

- 1) POWERbreathe® is not deigned to meet the airflow requirement of exercise;
- 2) Combining POWERbreathe® with aerobic training will impair the benefits of the aerobic training for the rest of your body, because you will not be able to train as hard when you're fighting to breathe in against a POWERbreathe®;
- 3) The POWERbreathe® training loads that can be tolerated during exercise are very low compared to those that can be achieved by using POWERbreathe® as a separate resistance training tool (if you wanted to make your legs stronger, you wouldn't go running with weights on your ankles, you'd do a specific, functional exercise like a weighted squat - think of POWERbreathe in the same way);
- 4) Most importantly, its completely unnecessary to introduce this degree of specificity, since the most important aspect of the specificity is posture, not the rate of breathing.

### **Principle 2:**

POWERbreathe® is a resistance training tool, so think in terms of 'reps and sets' (see table below). Decide whether you're training for, say, strength (low reps / high load), or power (moderate reps / moderate load), and then devise an exercise/movement combination that challenges the muscles of your torso in a similar way to the challenges that they face during swimming. Then perform the exercise/movement using the rep/load combination that is most appropriate.

### **Principle 3:**

Simulate as closely as possible the postural and environmental conditions associated with your sporting activity. In the case of outdoor swimming, you have to contend with compression of your rib cage due to the pressure from the surrounding water *and* your wetsuit.

You can simulate this using a resistance band (a broad piece of elastic material used in rehabilitation). Wrap the band around the lower quarter of your rib cage and apply a small amount of tension; just enough for you to feel some opposition to normal breathing. With the band secured in place, undertake your POWERbreathe® training as normal. Focus on expanding the lower rib cage in order to maximise benefits, and be careful not to allow breathing effort to shift away from the site of the resistance band, and towards the upper rib cage muscles and shoulders. You can add the band to any of your exercises, but do them without the band for at least two weeks before attempting this. To add progression, just increase the tension on the resistance band.

### **Playing with 'reps and sets'**

The respiratory demands of any given event will depend upon its intensity and duration. Tactics aside, virtually all competitive events require athletes to compete at an intensity that is close to the maximum that can be sustained for the time taken to complete the prescribed distance. In other words, for any given distance, the breathing demands are directly related to the competitive distance; shorter distance events are undertaken at higher intensities, with greater breathing demands. If you want to introduce intensity specificity into your POWERbreathe®, then here are 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 two exercises to get you on your way...**

Because these exercises require a simultaneous combination of forceful inhalation and postural movements, you may find that you need to spend a week or so just doing them without the POWERbreathe®. Once you can do at least 20 'reps' without the POWERbreathe®, you can then try the exercises using it.

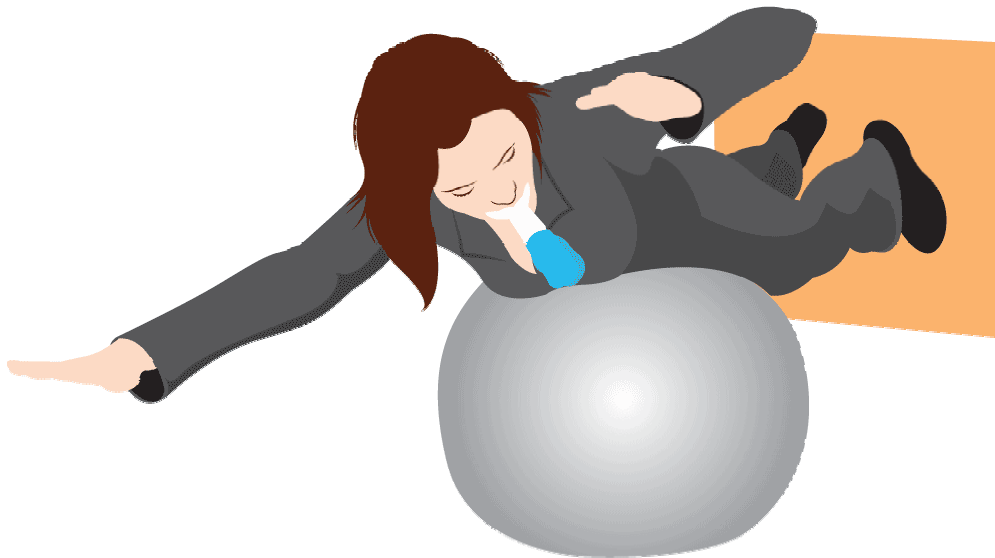
#### ***'The Inspiration'***

You will need a 'core stability' accessory such as a 'Balance Ball' (select a diameter that is suited to your height) Lie face down with your hips on the ball and your feet anchored gently against a wall. In this position, simulate the movement associated with the recovery phase of your stroke, and taking your face out of the water to breathe.

Using front crawl as an example, relax over the ball with the POWERbreathe® in your mouth and perform a hyperextension movement by engaging your 'core' (see Definitions,

below) and contracting your back muscles; as you raise your upper body, twist as you would during the stroke so that your shoulders and head 'roll' to one side (accentuate the 'roll' for the purposes of this exercise).

At the same time as you raise your body, breathe in forcefully through your POWERbreathe®. Next, return to the starting position, exhaling gently as you do so. On the following 'rep', twist in the opposite direction so that the training stimulus is balanced (even if you normally breathe only to one side). For other strokes, simulate the movements of the breathing phase and breathe in through your POWERbreathe® whilst doing so. Progression can be developed by adding a resistance band around the rib cage, and/or by holding a dumbbell or disk weight on your chest.



### ***'The Stroke'***

You will need a rubber cord with handles, or an elastic rehabilitation band. Anchor the cord/band against a fixed object that can withstand the force of you pulling against it. Face the anchor point and simulate the desired stroke by pulling against the resistance so that it resists movement in a direction that mimics the pull phase of the stroke. With your POWERbreathe® resting in your mouth, breathe in through your POWERbreathe® during the pull phase. You can use one or two cords depending upon whether you want to execute the exercise 'one-sided' (e.g., a set on the left side followed by a set on the right), or both sides at once. You can also use a machine weight pulley to produce the resistance. As outlined above, progression can be developed by adding a resistance band around the rib cage.

## **Definitions**

**'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.

**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 about the principles of devising sport-specific POWERbreathe® training for the swim phase. By trying out different movements that simulate aspects of the dual demands of breathing and maintaining posture, you can identify those that present the greatest challenges to you. I gave you two exercises to get you going, but using the guidance in this article, you should now be able to devise your own exercises by combining postural exercises with POWERbreathe® training. It's not rocket science - just apply some common sense and some basic training theory (overload and specificity). But, remember the third principle of training theory – reversibility. If you stop doing it, the benefits will disappear, so make POWERbreathe® an integral and permanent part of your preparation. In article 8, we'll apply these principles to the cycling phase of triathlon.

## **References**

1. Lomax ME, McConnell AK. *Inspiratory muscle fatigue in swimmers after a single 200 m swim. J Sports Sci. 2003 Aug; 21(8):659-64.*

**Alison K. McConnell, BSc, MSc, PhD, FACSM, Professor of Applied Physiology, Centre for Sports Medicine & Human Performance, Brunel University**