

Photo: Cor Vos

Are you a heavy breather?

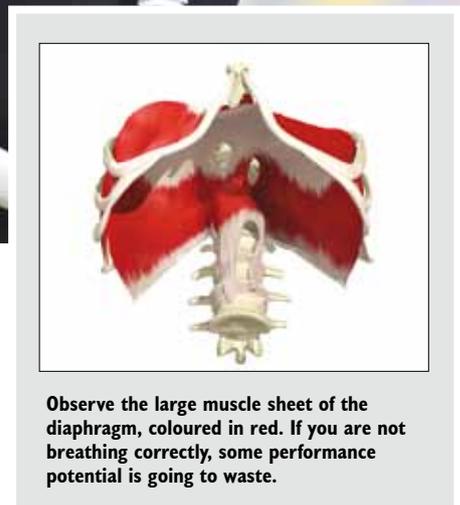
By Tanya Bell-Jenje (MSc Physio)

More controlled breathing can reduce neck and back pain and also improve performance.

WHEN YOU are riding at pace, are you breathless and wheezing like a fish out of water? Do you suffer from back or neck pain or both? Read on to find out why.

First we need to understand the role of the diaphragm in breathing, core stability and as a source of pain. Practitioners often ignore diaphragmatic bracing or splinting, or misdiagnose it as exercise-induced asthma when the cyclist complains of back pain or shortness of breath during intense exercise.

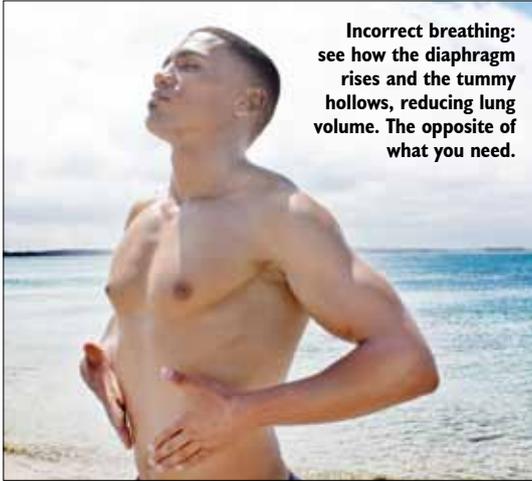
The diaphragm is a large sheet of muscle separating the chest cavity from the abdominal cavity – it resembles an enormous Portuguese Man of War jellyfish – and it links the lumbar spine and pelvic girdle to the neck and shoulder girdle. During inspiration (breathing in), a correct breathing pattern sees the diaphragm descend, the abdomen bulge outwardly while the lower ribs swell laterally. This is logical as to increase lung



Observe the large muscle sheet of the diaphragm, coloured in red. If you are not breathing correctly, some performance potential is going to waste.

volume, you need to increase the size of your lungs.

One of the vital roles of the diaphragm is to produce and control intra-abdominal pressure, in conjunction with the pelvic floor, as well as the abdominal and deep back extensor core muscles. These muscles co-contract and work together via fascial connections to form a rigid cylinder that provides stability to the trunk and offers postural control.



Incorrect breathing: see how the diaphragm rises and the tummy hollows, reducing lung volume. The opposite of what you need.



Correct breathing: visualise the tummy as it swells forwards and to the sides during inspiration. The hand on the upper chest makes sure NO movement occurs here as you breathe in.

Apical breathing, the incorrect pattern

Now, place one hand on your diaphragm (just below the V formed by the bottom ribs) and the other hand on your upper chest, between the two collar-bones and take a breath. Does your diaphragm ascend and your stomach hollow? Does your upper chest expand? If so, you have an inverted or apical breathing pattern and it is clearly counter-productive. Here you are trying to breathe deeply to aerate your lungs and provide additional oxygen to the leg muscles so you can climb a hill, but you are simultaneously driving your diaphragm upwards into your chest cavity, restricting movement of the ribcage and reducing your lung capacity. People with diaphragmatic splinting and an apical breathing pattern are forced to constantly over-work certain cervical (neck) and shoulder muscles to lift the rib cage when breathing and the result is chronic neck and/or shoulder pain.

We often see this pattern develop in athletes who have performed too many oblique sit-ups, and in girls who spend a lot of time in bikinis trying to hold their stomachs in. Anxiety can be a factor (visualise how you breathe, driving your shoulders up to your ears when stressed). Poor bike setup, forcing a forward head posture (refer to the article in the Dec/Jan issue of *Ride*), and overactive neck muscles (accessory muscles of respiration such as the Sternocleidomastoid and Scalenes) when cycling will also encourage this abnormal breathing pattern to develop.

Find the source

Treatment directed at the site of pain will result, at best, in short-term relief. In this instance, the source of the problem is diaphragmatic bracing and a physiotherapist with knowledge of this problem can help you to correct and retrain your breathing pattern to both reduce pain and improve performance.

In a recent study, respiratory function was tested in patients with back and neck pain who had failed to improve with manual therapy and exercise. They were all found to have low-end tidal carbon dioxide levels (ETCO₂). This hypocapnia (deficiency

of carbon dioxide in the blood) changes respiratory chemistry, resulting in an alkaline pH and can lead to many physiological changes. Among these, decreased oxygen to the tissues and smooth muscle constriction were noted. In this study, retraining breathing improved ETCO₂ and trunk pain and function improved by a whopping 93 per cent. This highlights the link between breathing difficulties and back pain (McLaughlin et al, 2011).

HERE'S WHAT TO DO

Bend your knees and relax your shoulders. Place your hands over your diaphragm. Visualise that you have swallowed an umbrella. As you breathe in, the umbrella opens (i.e. the diaphragm descends), expanding anteriorly (to the front) and laterally (to the sides), resulting in swelling of the abdomen. As you breathe out, so the umbrella closes, and the diaphragm rises,

or ascends to assist in removing the used air from your lungs. Initially this may feel unnatural (as if you are not getting enough air) but if you keep practising you will retrain your nervous system to recognise this as the correct breathing pattern.

Now try the same technique while in a slumped, seated posture. This relaxes the neck muscles. Use the same umbrella-visualisation technique.

Progress to correct breathing on the bike. Initially you can try on the flats, but the aim is to progress to getting it under control on gentle drags and ultimately even on steeper climbs. Your shoulders must remain relaxed. Focus on the abdomen swelling towards the front and sides as you breathe outwards, while keeping the upper chest relaxed. This is a simple, way to reduce back and neck pain and also to improve oxygenation and therefore performance on the bike. 



TANYA BELL-JENJE (BSc Physio (UCT), MSc Physio (WITS))

Tanya is a founding partner of Bell & Rogers Physiotherapy Practice, situated in Melville and Wilgeheuwel Hospital, Johannesburg (www.bellrogersphysio.co.za). She has been medically involved in sport for many years at national and international level, is a respected local and international lecturer and a seriously keen cyclist.

References:

McLaughlin L, Goldsmith C, Coleman K. Breathing evaluation and retraining as an adjunct to manual therapy. *Manual Therapy* 2011; 16(1): 51-52. Cagnie B et al. The influence of breathing type, expiration and cervical posture on the performance of the craniocervical flexion test in healthy subjects. *Manual Therapy* 2008 13(3) 232-238. Hagins M, Lamberg E. Individuals with low back pain breathe differently than healthy individuals during a lifting task. *JOSPT* 2011 41(3): 141-148.