

BREATHING

The diaphragm is a dome shaped slow twitch skeletal muscle that forms the bottom of the thorax. The diaphragm has a central tendon that is attached to the ribs and vertebrae of the spine. The lungs are roughly divided into the superior, the middle and the lower lobe. As air is drawn into the lungs an increased volume is required. The dome of the diaphragm flattens and is lowered roughly 2cm. At the same time, the ribs will expand outward and elevate to increase the lung volume.

There are **three common breathing pattern**:

1. Upper lung breathing – uses the neck muscles as primary muscles of respiration which leads to muscle imbalance around the neck and shoulders.
2. Abdominal breathing – the abdominal muscles bulge outward with inspiration. The abdominal muscles are required for posture and stability. This breathing pattern is usually due to posture (increased lumbar flexion), a tight ribcage and thoracic spine. This is often mistakenly called diaphragmatic breathing and is commonly used in relaxation techniques.
3. Rib cage breathing – this is the ideal. This pattern allows the abdominal muscles to provide a stability role allowing for maximal expansion of the lower lobes. *Remember that as the diaphragm can only lower 2-3cm. Improving rib expansion will allow more oxygen to enter the lungs (especially the lower lobes where the most oxygen exchange takes place).* Posture is extremely important for correct breathing as a flexed or bent posture makes it very difficult for the diaphragm to work correctly. Imagine the diaphragm as a piston; the straighter the shaft the more efficient the piston.

First, practice taking a deep breath. Typically during a normal breath we use only 10 to 15% of our lungs. And during exercise, we increase the rate, not the depth of our breathing. Although deep breathing is more work and uses a bit more energy, the pay off can be that 1 - 2% edge in a competitive situation. Here's 4 ways to make it happen:

- **Exhale more completely.** If you exhale more completely, it is easier to take a deep breath. The usual rhythm is exhale to a count of 3 followed by inhaling to a count of 2.
- **Belly breathe.** As you concentrate on deep breathing, you will push your diaphragm down and thus the abdominal contents out. If you are doing it correctly, your abs will expand more than your chest.
- **Widen your hand position.** A 2 cm wider hand position will open up your chest and decrease the difficulty of drawing in a deep breath.
- **Synchronize your breathing.** Try to synchronize your respiratory rhythm to that of your foot cadence. Remember the 3:2 ratio of exhale to inhale.

However, a variation of pursed lip breathing focuses on the rhythm of respiration. Ian Jackson has developed a program, [BreathPlay](#), which teaches skills in controlling ones expiration (and as a result inspiration) of air. He notes that ", athletes discover that pushing air out is a much more efficient way of meeting oxygen demands than sucking air in. They also discover how the active outbreath can bring powerful precision to any movement. The BreathPlay paradigm advocates using the active outbreath to setup a spinal stretch which is then released with the passive inbreath." **It taps into the power of both "focus" and "hypnotherapy" to achieve performance gains.**

A minute-volume test measures the volume of air breathed per minute, in liters. At maximal effort, Bill managed to breathe 205 liters in a minute. After about ten days of BreathPlay practice, he was tested again and registered a startling jump to 237.1 liters per minute. So, he was ventilating about 15% more air, even though he felt he was getting less.

Polish world cycling champion Stan Szozda, spent considerable time developing his lungs. According to him, the secret to success was breathing, and the way to improve it was through regular training. Each day he would inhale to his maximum and hold it, stretching his lungs to their max. He carried this over to swimming, trying to go as far as possible underwater (so-called hypoxic training).

He believed that lungs lose flexibility and capacity without training, just as muscles do. Whenever Szozda wound up his road sprint, you could hear him coming by the sound of his intense exhalations. He was a master at hilltop finishes and long sprints because of his ability to control his breathing. Here are four ways to improve yours:

1. Use Your Diaphragm

Anyone who grew up watching the old Superman TV series got the wrong idea. I figured that by lifting my shoulders and sticking out my chest I could blow down buildings. I was wrong. The key is the stomach. By pushing it in and out, not up and down, you are best able to access your full lung capacity because you are using your diaphragm muscle.

2. Change Your Rhythm

To gain control of your breathing, concentrate on a specific pattern of inhaling and exhaling, then coordinate it with our running or ski stroke. This idea has been expounded by numerous people, most notably Ian Jackson in his book *BreathPlay*. Skip Hamilton, a senior staff member of the Carpenter/Phinney Bike Camps and member of Bicycling's team in the '96 Race Across America, has worked with Ian and simplified the approach.

Hamilton teaches breathing in varied rhythms because most riders tend to fall into one set pattern while riding, especially on hard climbs. For instance, that always exhale with the same-side down-stroke, and they often breathe in for half a stroke and out for half a stroke. For most people, this means breathing out as they push down with the right leg. To change the pattern, exhale longer every few breaths. You'll automatically change your rhythm.

Hamilton calls this "switch-side breathing." You will be breathing out on both the left-and the right-side down-stroke over the course of a ride. Cyclists at the Bike Camp report that using this simple technique gives them a feeling of fresher legs-almost like having an extra gear. The tactic of switch-side breathing is only a starting point. Try many variations.

For instance, by counting ski strokes I extend the length of each breath. Eventually you'll become aware of balancing your breathing and skiing. Play with any number of patterns and breathing techniques, such as: Even breathing. Try a rhythm where you take long, even breaths and begin exhaling at the top of a stroke. Alternate legs each time. By tying your breath to the step stroke you are less likely to exhale incompletely and start gasping.

Use a consistent gear and effort. Try counting-1, 2, 3 in: 4, 5, 6, out. Quick in, long out. Alexi Grewal, '84 Olympic gold medallist, used to work on exhaling as slowly as possible-like a weight lifter timing the push phase with a breath. Because cycling is pretty much a continuous push phase, he would inhale deeply and quickly (1-2 count) then slowly exhale (3-5 count) like air leaking from a balloon.

3. Breathe Through Your Nose

Recently making the rounds in Colorado was a book called "Body, Mind, and Sport" by John Douillard. It advocates nasal breathing exclusively during exercise as a way to a Zen-like experience. I have yet to meet anyone who has achieved enlightenment using this technique, but athletes who have tried it report that it's a good tool for moderating effort.

The amount of air you can inhale through your nose is limited, so it acts like a natural governor on your pace. Your performance capacity rises because when you use both your nose and mouth, efficiency

improves. Legend has it that Apache warriors used to prepare for the rigors of the desert by taking long runs with their mouths full of water. The reasoning was sound. Focusing on holding in the water without swallowing taught mental discipline. Breathing through the nose taught moderation of intensity in order to endure the distance.

Not breathing heavily through the mouth slowed dehydration from vapor loss. Wisdom of the ancients. One caution: It is easy to overdo nasal breathing. Be careful or you might hyperventilate

4. Flare Your Nostrils

Anyone who watches professional sports is bound to notice a piece of tape on some players' noses. This product, called Breathe Right Nasal Strips, is making its way into the cycling world, especially off road. The principle is simple: The device acts like a spring, pulling out the sides of your nose and opening the nasal passages. How much this actually adds to performance has yet to be measured. (During efforts at more than 80% of maximum, 95% of a rider's breathing takes place through the mouth. That said, Breathe Right does give you the sensation of more air coming in. George Hincapie of the Motorola pro team tried it at the Tour DuPont one spring and was favorably impressed. He only used it one day because he took some ribbing from fellow riders. Fashion consciousness won out, though the look hasn't stopped other riders and pro athletes. What will mastering these techniques do for your cycling? Imagine ascending a tough hill. As you approach the climb, you focus on breathing. Taking even, measured breaths, your body stays relaxed.

As the hill steepens, you back off slightly, adjusting your output to match the effort needed. Instead of tensing, you are fluid-even though the effort gets progressively more difficult. Because you are closely monitoring your breathing, you are also keenly aware of your heart rate. In this way, the hill seems to pass harmlessly under your wheels and you're already rolling towards the next one, breathing efficiently and recovering. One final note: Use these breathing techniques as tools, but don't let them distract from a good ride.

Videos:

- Why we are lazy - With Every Breath You Take part 2
<http://www.youtube.com/watch?v=gXeEBe11EOc>
- Transfer from Lungs -The Miracle Of Respiration Part 5 of 7
<http://www.youtube.com/watch?v=2TrQkSHpoxQ&feature=related>
- Rib Cage or Diaphragmatic Breathing for Advanced Yoga Meditation2
http://www.youtube.com/watch?v=cc_fQMdKJqU&feature=related
- PowerLung User Guide Part 8 - Tips for Success
<http://www.youtube.com/watch?v=42m9acRptyc>
- Exercise #2 - With Every Breath You Take part 5
<http://www.youtube.com/watch?v=7SOuN93CWJA&feature=related>
- Exercise #1 - With Every Breath You Take part 4
<http://www.youtube.com/watch?v=czeTw6PLVQY&feature=related>
- Correct Breathing - With Every Breath You Take part 3
<http://www.youtube.com/watch?v=23ctmPTwgGY&feature=related>
- Brain Control -The Miracle Of Respiration Part 6 of 7
<http://www.youtube.com/watch?v=oHupiKNBZ84&feature=related>
- Abdominal breathing not Diaphragmic Breathing - For Meditation, Hypnosis, or Anxiety
<http://www.youtube.com/watch?v=tIQxES-DslQ&feature=related>