Breathe Easy
Eucapnic Breath Retraining

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The Importance of Breathing

Recall a time when you felt really healthy and happy, inspired and in harmony with what life was offering you. You might have noticed how your breath flowed easily, effortlessly and with lightness into your chest and belly. At times like this you are filled with the gentle expansiveness of life force in full bloom. When you are sick or perhaps stressed and out of harmony, you may find that the breath comes with difficulty, is more irregular and comes from high in the chest, rather than involving the lower ribs, pelvis and belly. Perhaps it is accompanied with sighing, yawning or gasping. Your breath may seem to lack a sense of ease or fullness and a feeling of stuffiness can sit thick and heavy in your chest.

Good breathing creates more than just a transitory sense of well-being. It has vast implications on health. When you are breathing optimally, body chemistry is kept in balance by each breath. Every breath you take has the capacity to either balance acid/alkaline levels keeping cellular pH at its optimal level, or begin the process of disrupting the fine-tuning of your homeostatic balance. Take five or six breaths incorrectly and your pH starts to become unbalanced. If not corrected, this disruption of pH has the potential to affect every chemical reaction in your body and the efficiency of your metabolism. Breathing incorrectly for three minutes is enough to decrease the amount of oxygen to the brain and heart by 30 percent. If your breathing is incorrect for years, you pre-dispose yourself to a range of chronic illnesses -- from heart disease to asthma to chronic fatigue.

According to Charles Stroebel, professor of psychiatry at the University of Connecticut Medical school, breathing can be implicated in 50 percent-70 percent of diseases. Dr. Konstantin Buteyko, former head of the Laboratory of Functional Diagnostics in the Siberian Soviet Academy of Sciences, claims that more than 150 chronic diseases are contributed to, or directly caused, by incorrect breathing.

The somatic structure of the body suffers during incorrect breathing. If the situation is so chronic that your habitual unconscious breathing pattern is affected, the muscles associated with breathing will be used incorrectly 22,000 times per day. During proper breathing, all the 20 primary and secondary muscles of respiration function in a balanced way. Incorrect breathing predisposes a person to chronic muscle dysfunction, muscle pain and syndromes like chronic headache and backache.

Why Do We Breathe Wrong?

The most common disturbance of breathing is hyperventilation or over-breathing. The reasons for this are many and largely have to do with modern lifestyle, a reason why the condition is so common.

Breathing, for the most part, is an unconscious process controlled by chemical receptors in the brain and the major blood vessels. Evolution has given us mechanisms to constantly adjust, modify and fine tune the breath so that it keeps our chemistry balanced. However, modern lifestyle conspires to work against the ancient wisdom of our body. Our 21st century nervous systems are still wired exactly the same as our hunter/gatherer ancestors. The effect of the primitive "flight or fight" mechanism of the sympathetic nervous system on our breathing means there is an increase in breathing as our nervous system gets ready for dealing with a

perceived threat. The chronic disturbance in breathing many people in the modern world suffer from appears to be made worse by the emotional constraints we civilized people must put on ourselves to behave in quiet, polite and socially acceptable ways, when in reality we can feel very differently. We frequently are obliged to present a calm demeanor when our body is actually getting our breathing ready for a bout of intense physical activity.

Lack of exercise, chronic illness, modern diet and pollution of our food, air and water also disturb breathing by affecting the efficiency of the internal respiration or aerobic metabolism of our cells. All of these factors, among others, contribute to disturbing the subtle balancing mechanism which keeps our breathing at the level that creates robust, resilient health and longevity.

The good news is that despite everything that is working against us, good breathing can be trained. Once established as an unconscious process, good breathing improves our resistance to stress, disease and increases the efficiency of aerobic metabolism inside the cell. The way to fix breathing is not by doing a few deep breathing exercises on the odd occasion you think of them. One must do daily breathing work that is based on a thorough understanding of the physiology of breathing and the principles of how to retrain or reset the breathing center in the brain. Unconscious and conscious breathing patterns must be altered to truly affect long-term health and well-being. Eucapnic Breathing Retraining achieves this retraining of unconscious breathing patterns. Within five days most people show substantial, objective signs of significantly improved breathing.

Eucapnic Breathing and CO2's Role in Health

Good breathing is "eucapnic" breathing. This word comes from the Greek word "eu," meaning healthy or good. "Capnic" refers to carbon dioxide. As we know, the two gases regulated by breathing are oxygen and carbon dioxide. The other main gas in atmospheric air -- nitrogen -- is generally considered to be inert. The case can easily be argued that the widespread impact of incorrect breathing on health, for the average person, is due to a disturbance of the levels of carbon dioxide, and that optimal health relies on maintaining the correct levels. Breathing that creates the optimal conditions for health should meet certain criteria: it should supply optimum levels of O2 to cells and tissues, it should maintain optimum levels of CO2 in the blood, and it should maintain optimum pH.

Most people don't have a problem with the idea that good breathing should supply optimal levels of oxygen. But unless they have recently looked at a physiology book, they balk at the idea that carbon dioxide is anything but a waste product. Many people also don't realize that if the levels of CO2 are below physiological norms, the utilization and uptake of oxygen will be impaired. This effect of carbon dioxide is part of what is known as the Bohr effect. This physiological law states that if the levels of CO2 decrease in the blood, even by just a small amount, hemoglobin binds more tightly to the oxygen it is carrying around, not releasing it to the cells of vital organs like the brain and heart. This is the reason we become dizzy when we hyperventilate. Hyperventilation makes us breathe out too much CO2, and the extra oxygen we take into our lungs cannot be used by the body. Normal ventilation levels (at rest) are about 4-6 liters per minute. If we increase the level of ventilation by increasing the speed and depth of breathing for a few minutes, the percentages of CO2 carried in the blood -- relative to oxygen -- drop quickly. The change in pH of the red cells means that oxygen gets locked into hemoglobin and does not get released to the tissues where it is needed for metabolism. When we hyperventilate, oxygen levels to vital organs (including the brain) drop dramatically and we feel dizzy. Because of the drop in oxygen, brain wave patterns change from alpha to theta and delta patterns. This will predispose epileptics to seizures and in non-epileptics impair the thinking/reasoning function of the brain's cortex.

One of the most important reasons we must maintain correct levels of carbon dioxide has to do with the way it controls pH. The lungs and the kidneys are the two main organs controlling pH. They work together to

maintain proper functioning of the bicarbonate buffering system in the body. If we lose too much carbon dioxide from over-breathing, the kidneys are forced to compensate. Renal compensation, if it leads to too much loss of bicarbonate, may ultimately lead to a depletion of the body's capacity to stabilize pH at its ideal level.

It is also the levels of CO2, rather then the levels of oxygen, that control our habitual breathing pattern. In most common situations, including exercise and moderate asthma attacks, oxygen never drops low enough to trigger the drive to breathe. It is the constant fluctuation of carbon dioxide that the body's chemical receptors in the breathing control centers are most sensitive to. When a person reaches their ventilation threshold level of CO2, they feel the desire to breathe, on an unconscious level, the major muscles of breathing (i.e. the intercostals and diaphragm) simply begin to contract, initiating an inhalation. If the body perceives that the levels of CO2 have increased too much, this will activate all the secondary or accessory muscles of breathing, such as the neck and shoulder muscles.

Checking for Incorrect Breathing

Look at the breathing pattern. Is it irregular, erratic, punctuated with sighs and gasps for air? The irregularity in breathing is often most evident when people are speaking. As mentioned, the problem with the way most people in the modern, civilized world breathe is that they tend to over-breathe or hyperventilate too often in their daily lives. This occurs mostly in response to stress or metabolic dysfunction. The over-breathing is not matched by an increase of physical activity so the body tries to balance the effects of over-breathing by suspending the breath. People who over-breathe also frequently hold their breath and breathe irregularly. The response is known as hypocapnic apnea.

Check the person's general appearance. The classic signs of poor breathing include mouth breathing, forward head posture, rounded shoulders, thoracic kyphosis and sunken chest. However, many people with poor breathing present with a very rigid and upright body position.

Check to see if the client is able to take a normal, deep diaphragmatic breath. This means that on an "in" breath, the belly slightly distends and the lower ribs move up and widen. The shoulders and upper chest should be relatively still. If they are chronic hyperventilators they will also be much more likely to be paradoxical breathers. These folks, if asked to take a deep breath, will suck their belly in and lift their chest and shoulders on inhalation.

Assess the primary muscles of respiration -- the intercostals, sternocostalis and the diaphragm. In chronic hyperventilation, the diaphragm will descend and flatten. The person will be unable to take a deep or satisfying breath. On palpation you will feel that the subcostal margin is tight and does not soften or dome on exhalation. Tightness in the intercostals will manifest as a very tight rib cage with soreness between the ribs.

Assess the accessory muscles of respiration. Someone who has been chronically over-breathing will tend to have shortening and tension of the accessory muscles of breathing. Most obvious and easiest to check are the scalenes, sternocleidomastoid and serratus posterior superior. Postural muscles, like the upper trapezius and medial scapula group including levator scapula, will tend to be tight. If you want to check further, you can also assess the muscles associated with diaphragm function. These include the abdominals, serratus posterior inferior, quadratus lumborum and psoas. These lower muscles may be tight because of chronic tension in the breathing pattern.

Check the ventilation threshold to carbon dioxide by measuring breath-holding time. To do this assessment you must check the length of time, in seconds, from the end of exhalation to the first clear and distinct desire to breathe. The measurement is known as a Control Pause. It has been shown by a number of different

researchers (Nixon, Buteyko) that shortened breath-holding time correlates with chronic hyperventilation, low CO2 levels in the lungs and blood, a lowered anaerobic threshold and a low level of bicarbonate buffer stores in the blood. In healthy breathing, breath-holding time after exhalation should be between 30-60 seconds. Breath-holding time below 20 seconds is usually associated with symptoms directly related to breathing. These symptoms generally are very responsive to breathing re-education.

Knowing what symptoms are commonly associated with hyperventilation can help you detect this condition. Severe hyperventilation is associated with symptoms such as breathlessness, anxiety and panic attacks, tetany and muscle spasms, light-headedness, dizziness, palpitations and chest pain. Digestive symptoms include reflux, abdominal bloating, frequent belching and sub-costal pain. Less severe hyperventilation may be associated with a tendency for headaches, as well as neck, back and shoulder pain. With all levels of hyperventilation there is a tendency toward fatigue, low stress tolerance, poor mental function, lower fitness levels, poor immune system, poor blood sugar control, tendency toward allergies and even fibromyalgia, and chronic fatigue-type symptoms.

Fixing the Breath

We can use breathing to create or regain health. The key lies in training the breathing center in the brain to maintain optimal levels of CO2 and oxygen. Most people think that by forcing themselves to breathe deeply they can increase the amount of usable oxygen. This only works up to a point. Once the balance between oxygen and carbon dioxide is disturbed, specifically by excess lowering of carbon dioxide, oxygen is not taken up efficiently by the tissues of the body. It is not the oxygen you breathe in that is important -- it is the efficiency with which you can use it.

If a person has been habitually over-breathing for a period of time the receptors in the breathing center adapt and the respiratory threshold for CO2 levels is set at a lower level. Through correctly training the breathing center in the brain to respond appropriately and maintain optimum levels of CO2, you can restore a correct breathing pattern.

A number of mechanisms can create viscous cycles that perpetuate chronic hyperventilation. One example is that secondary to the low levels of carbon dioxide, a secondary tissue hypoxia develops. This encourages a shift to anaerobic metabolism resulting in increased blood levels of lactic acid. The increased levels of acidity stimulate the peripheral chemoreceptors in the aorta and carotid arteries to send messages to the brain to increase the breathing. Considering that the problem was initially caused by over-breathing and excess loss of carbon dioxide, one can see how it requires some external interventions to help the body return to a state of healthy balance.

The protocols of Eucapnic Breathing involve using techniques to increase the person's tolerance to carbon dioxide. This allows normal or healthy breathing and optimal tissue levels of oxygen to be re-established. A variety of techniques have been developed which enable the intensity of training to be tailored to individual needs and the level of disturbance of the breathing. The simplest technique, which can be used easily by anyone, is simple "Breath Following." This is very similar to meditation techniques which focus the attention of the mind on the breath. Meditation and other relaxation techniques have been shown to increase a person's tolerance to carbon dioxide.

To do "Breath Following," sit with the spine straight and the head balanced over the shoulders. Observe the movement of air in and out of the body. Feel the sensations which arise in all the four stages of the breath -- inhalation, the pause after inhalation, exhalation and the pause after exhalation. The exercise should be done without any attempt to force the breathing. One should be a detached, but very attentive observer. The breath will naturally begin to slow and soften. As attention is focused on the belly, you should begin to notice

movement here, as the breath begins to arise from lower in the body. If one uses a capnometer to measure CO2 levels, you will see the levels begin to rise.

Breath Following, or variations of it, are used by many breath workers. The training effect of techniques like Breath Following are quite mild and effective only if used for long periods of time. Stronger effects and much more dramatic clinical results are achieved by the use of techniques which teach hypoventilation or under-breathing in combination with specific breath-holding exercises. The hypoventilation protocols discussed here were pioneered in Russia. Several variations exist, including Intermittent HypoxicBreathing and the Buteyko Method. Both these methods have been subject to extensive research, and in the last few years have made their way into the Western world where they have begun to receive significant attention.

Dramatic Results of Hypoventilation

Eucapnic Breathing incorporates the Buteyko Method. This method was developed in Russia were it has been used to treat a range of chronic illnesses most notably asthma but also certain types of immune dysfunction, circulatory, nervous, hormonal and metabolic diseases. Clinical research in Russia has shown the breathing method to be very successful in the treatment of these diseases.

In 1980, a trial with this breathing method was conducted at the First Moscow Institute of Pediatric Diseases at the direction of the Government Committee for Science and Technology of the Soviet Ministry of the USSR. Fifty-two children suffering from moderately severe and severe asthma were tested over three months. All children responded positively to the breathing method, asthma attacks, rhinitis and nasal mucus became less frequent and then disappeared. After five days, 75 percent of the children discontinued all bronchodilator medication, and 15 percent were able to reduce medication.

In the last decade, the Buteyko Method has gained attention outside of Russia. Its use has spread to the United Kingdom, Germany and Australia. Research in Australia on the use of the Buteyko Method with asthmatics showed that after three months, asthmatics were able to reduce bronchodilators by 90 percent and steroids by 40 percent. This shows a very powerful medication-sparing effect for something as simple as the act of breathing. The reduction in medication was accompanied by an improvement in quality of life for asthmatics learning the Buteyko Method. Dr. Buteyko's explanation for how such a simple method works revolves around carbon dioxide. He believes that asthma itself is not a disease but just a defense mechanism the body produces against the loss of CO2. Low levels of CO2 are known to produce bronchospasm and asthmatics are known to have low levels of CO2 in the lungs and blood during mild and moderate asthma attacks. Carbon dioxide has been shown to be a bronchodilator, so increasing local levels in the lungs during an attack can relieve spasm of the bronchi.

Other interesting research shows that use of the breathing method was able to improve the function of the immune system in asthmatics. After three days of learning the Buteyko Method, subjects' levels of autohemolysin plaque-forming cells (associated with autoimmunity) decreased. Skin microflora levels, which are elevated when immunity is low, decreased. At the all Union Scientific Center of Radiation Medicine in Russia, this breathing therapy was used with 50 victims of the Chernobyl nuclear accident. Of the patients studied, 83 percent showed an improvement in their symptoms and in the objective measurements of their immune system.

MusculoSkeletal Therapy Enhances Retraining

It is the muscles of the body that allow the lungs to carry out the function of breathing. The movement of air in and out of the lungs, allowing gas exchange at the capillary network of the alveoli, only happens because the muscles attaching to the thorax create changes in the intra-thoracic volume. The air moves in and out of the

lungs because the pressure inside the thoracic cavity becomes either less than atmospheric pressure as in the case of inspiration, or greater than atmospheric pressure as in the case of expiration.

The muscles function together in respiration in an action called respiratory synkinesis. Incorrect breathing patterns occurring with chronic habitual hyperventilation give certain classic changes. Muscles of respiration, and the thorax in general, tend to be held in a position of partial inhalation. The lungs become over-inflated. This is associated with a rigid and hypomobile thorax. Also, when lungs are over-inflated, the diaphragm becomes unable to function properly due to the fact that it stays partially descended and flattened. It does not dome adequately on exhalation, and breathing becomes restricted to the point of being unable to take a deep or satisfying breath. There is a lack of motion of the abdominal muscles during respiration and there is a lack of coordinated activity between the abdominal muscles and the diaphragm. The person demonstrates an inability to lift the lower ribs or breathe into the posterior thorax during inspiration. Accessory muscles of respiration which are postural (e.g. sternocleidomastoid and scalene muscles) tend to be shortened. Phasic muscles associated with respiration (e.g. abdominals, serratus anterior) are found to be weak.

Once breathing is normal, meaning that ventilation levels are appropriate for the level of physical and metabolic activity, the person's use of the breathing muscles will also improve. However, if shortness, spasm or weakness remains in the muscles responsible for respiratory synkinesis there will be a greater tendency for breathing dysfunction to reoccur when stress or other triggers stimulate the individuals tendency to hyperventilate.

By working on the muscles of breathing to normalize their function, one can enhance the effectiveness of Eucapnic Breathing Retraining, achieving faster and longer lasting results. Habitual incorrect use of respiratory muscles tends to reinforce incorrect breathing. A commonality I've found is that after working on a client to release dysfunction in primary and accessory muscles of breathing, several instant improvements are seen. The client usually finds they have an increased freedom of breathing, less breathlessness and, more objectively, a noticeable increase in the breath-holding time after expiration (i.e. the control pause), showing there has been a change in the ventilation threshold to carbon dioxide.

The combination of Eucapnic Breathing Retraining with effective techniques to release and normalize the function of the thorax, diaphragm and other muscles of breathing, will enhance health in a profound and lasting way.

Dr. Rosalba Courtney is an osteopath, acupuncturist and naturopath who has been in practice for more than 25 years and who now resides in Australia. She has worked with many breathing techniques, combining them with her osteopathic work. Courtney has studied with Dr. Buteyko in Russia and was the founding chairperson of the Buteyko Practitioners Association. Through her research and clinical experience she developed Eucapnic Breathing. She trains practitioners in the United Kingdom, Australia and the United States in Eucapnic Buteyko Breathing. She developed a course in Eucapnic Breathing for Bodyworkers to teach somatic therapists how to combine bodywork and breath work in what she has found to be the most clinically effective ways. Her courses are available through Alive and Well Institute of Conscious Body Work in San Anselmo, Calif. For information on the course, call 415/258-0402. Courtney can be reached by calling 61-2-99187422 (Australia), fax to 61-2-99187489 (Australia), e-mail to crthouse@geko net.au, or visit her website at www.breathingco2.com.

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