Hyperventilation

This section is a simple explanation of the theory of overbreathing and the role of carbon dioxide in the body. There's no medical jargon here, but the information may seem a little complex simply because it's not everyday reading material. My advice is to read through this section slowly and return to it occassionally.
You don't need to know this information off by heart, but it is important to at least have a basic understanding of the theory. In my experience, people who apply breathing exercises without having a good understanding of the concept of overbreathing and the role of carbon dioxide do not receive the full benefits.

Buteyko Breathing Method

Over four decades, Russian scientist Professor Konstantin Buteyko completed pioneering work on illnesses that develop as a result of breathing more air than the body needs. His life's vocation provided humanity with what is arguably the greatest discovery to date in the field of medicine.

As a medical student, he discovered from his observations of hundreds of patients that their breathing was closely related to the extent of their illnesses. The greater the volume of air inhaled by a patient, the worse the sickness, he noted. This newly-discovered relationship between breathing and health was so precise that he was even able to predict accurately the exact time sick patients would pass away.

As a result of his research, Buteyko went on to devise a breathing programme for his patients, based on reducing the amount of air that passed through their lungs. When each patient applied reduced breathing, all physiological functions including pulse, volume of breathing per minute and blood pressure were monitored. As time went on, the results helped Buteyko to refine and improve his method.

His theory is based on breathing, the life force of any organisim. We humans can live without water and food for many days and weeks but we cannot live without air for more than a few minutes. One wonders then why something so vital to life receives so little attention.

It can often take many years before a medical discovery is acknowledged and incorporated into everyday

practice. This was the case with Buteyko's theory, but his experience is reflected through medical and world history. For example, Professor Lister discovered that many illnesses such as sepsis could be passed from doctor to patient by the contaminated hands of the doctor. Lister tested his hypothesis by disinfecting his hands prior to each operation and this resulted in a decrease in the death rate of his patients. It took many years for this discovery to be accepted by the medical community who only did so when patients' relatives started demanding that doctors disinfect their hands before operating. asthma books

Although research conducted in Russia in 1962 proved unequivocally the soundness of Buteyko's method, it was not until 1983 that the Committee on Inventions and Discoveries formally acknowledged his work. This recognition, which begs the question of how many more people would have benefited from the discovery if it was acknowledged earlier, was backdated to January 29th, 1962.

Buteyko's discovery on October 7th, 1952 has improved the health and saved the lives of many thousands of people. Now that his discovery is becoming better known in the Western world, it will save the lives of many more.

Breathing Volume

Clinically, overbreathing is known as hyperventilation which means breathing more air than the body needs. If this is happening on a day-to-day basis, it is called chronic hyperventilation. 'Hyper' means over and 'ventilation' means breathing

The standard volume of normal breathing for a healthy person is three to five litres of air per minute. During an asthma or panic attack, this breathing level can increase to more than twenty litres per minute, a level which is detrimental to health and unsustainable for a lengthy period. Less obvious and more prevalent is habitually breathing a volume of between five and twenty litres per minute. Based on genetic factors, according to Professor Buteyko, this results in an individual developing illness.

Severe overbreathing can be fatal if it is sustained over a short period of time, so it is plausible to accept that there will be negative health effects caused by less severe but still excessive breathing over a long period of time.

Long-term overbreathing leads to the build-up of organ damage, resulting in the development of illnesses specific to the hereditary traits of each person. Professor Buteyko's method restores correct carbon dioxide levels and therefore leads to an overall improvement in general health.

In Russia, this therapy is practised by an estimated two hundred qualified medical doctors in the treatment of a hundred varied illnesses including hypertension, tinnitus, diabetes, and hypo/hyperthyroidism. The results of treating asthma with the Buteyko Method are swift, so it is used in the West mainly in the treatment of this condition.

Volume of breathing of a person with asthma

Scientific research conducted by Professor Buteyko over three decades and scientific trials at the Mater Hospital in Brisbane in 1995 demonstrated **that people with asthma breathe a volume of ten to twenty litres per minute between attacks and over twenty litres during an attack**. For example, the average volume of air measured during the Mater Hospital Buteyko Trials was 14.1 litres per minute, although other researchers showed a volume of 15 litres (*Johnson et al 1995*) and 12 litres (*McFadden & Lyons 1968*).

Often, overbreathing is not obvious or noticeable and therefore was called 'hidden hyperventilation' by Professor Buteyko. Other researchers, such as Robert Fried in his book *Hyperventilation Syndrome,* have agreed with this description. In addition, hidden ventilation has been observed at my own Asthma Care Clinic; many people show no outward signs of hyperventilating, yet their asthma as indicated by history and drug regime may be quite serious. These same people benefit significantly from exercises aimed at reversing hyperventilation. Earlier in this book, we learned a simple way of measuring the extent of our overbreathing by performing a simple test developed by Professor Buteyko called the control pause. As overbreathing is related to the extent of our illness, we can determine the state of our asthma by our control pause. An improvement of the control pause coincides with improvement in our condition.

Carbon Dioxide

Ever since Lavoisier proved in the eighteenth century that oxygen was essential to life, carbon dioxide – which is an end product of our metabolism – became known as a waste gas. Lavoisier compared bodily functions to the process of fire; both fire and the human body absorb oxygen and produce carbon dioxide and heat.

The sustenance of life requires oxygen and carbon dioxide. Just as excess oxygen results in damage to the lungs when the toxicity level is higher than antioxidants can counteract, too little carbon dioxide impairs the correct functioning of all organs.

The key to Buteyko theory is that carbon dioxide is not just a waste gas; it is essential for all metabolic functions. Dr. Yandell Henderson put it well when he wrote: "*carbon dioxide is the chief hormone of the entire body, it is the only one that is produced by every tissue and that probably acts on every organ,*" in the *Cyclopedia of Medicine* published in 1940.

Evolution of the lungs and atmospheric changes of carbon dioxide

An estimated five hundred million years ago, when the first prototype of human lungs evolved, the level of carbon dioxide in the atmosphere was approximately twenty per cent. This high concentration was due to excessive volcanic activity which produced CO_2 in abundance, and a scarcity of plant life meant that such a large quantity was not absorbed and recycled.

Over millions of years, the amount of plant life on earth increased and carbon dioxide levels continued to decline to the present day rate of just .035 per cent. Our lungs adapted to less carbon dioxide by creating air sacs to retain the higher amount of five to six-and-a-half per cent necessary for human life. The womb is a perfect environment for the survival of human life, and it contains a carbon dioxide concentration of between seven and eight per cent.

How does overbreathing affect carbon dioxide?

If you breathe in a large volume of air then you will breathe out a large volume. Humans don't inhale air to store it in any form in the body, so therefore the volume exhaled has to be the same as the volume inhaled. asthma

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Exhaling a large volume of air results in too much carbon dioxide being carried from the alveoli within our lungs and into the atmosphere. To understand this, imagine a plastic straw. Place tiny droplets of water along the inside of the imaginary straw. You already know that if you breathe out very gently through the straw, you will not blow out these little droplets of water. However, if you breathe out very quickly, the quantity of air you exhale will carry the droplets of water out with it. This is similar to what happens in our lungs; the more air we inhale causes more air to be exhaled, and this greater quantity of exhaled air results in too much carbon dioxide being carried out of the body.

Medical science has long recognised that the required amount of carbon dioxide in the little air sacs of the lungs, the alveoli, for a healthy person is between five and six-and-a-half per cent. This is well illustrated in any university medical textbook. However, constant overbreathing leads to a loss of carbon dioxide and the concentration may drop as low as three-and-a-half per cent. Butekyo found that a level of below three per cent led to death.

Carbon dioxide fixed at incorrect level

Under normal conditions, the respiratory centre located in our brain – called central chemoreceptors – instructs us to breathe based not on the level of oxygen, but on the level of carbon dioxide. Oxygen only becomes the main stimulant driving respiration when its concentration becomes very low, as in the event of asphyxiation.

The way our respiratory centre works is easily explained by comparing it to a household heating thermostat. We set the thermostat at the desired temperature and when the temperature goes below this level, the heating system switches on. When the room warms up to the desired level, the thermostat sends an instruction to switch the heating off again.

Our respiratory centre is the regulator or thermostat for our carbon dioxide. When the level of carbon dioxide goes below the amount set by the respiratory centre, a message is sent to decrease breathing to restore the level of the gas in the body. Decreasing breathing results in an accumulation of carbon dioxide, thus restoring it to set

levels. Likewise, when the level of carbon dioxide is higher than the amount set by the respiratory centre, a message is sent to increase breathing. This increased breathing blows off the additional carbon dioxide and brings it back to the level set by the regulator.

However, breathing more than your body needs over a period of hours, weeks, months, or years will result in the day-to-day levels of carbon dioxide remaining low. Our respiratory centre becomes accustomed to or fixed at this lower level of carbon dioxide and determines it to be 'correct'**.** Our respiratory centre will therefore instruct us to overbreathe to maintain this low level of carbon dioxide, even though the rest of the body's organs and tissues are suffering.

Reversing hyperventilation is achieved both by observing our breathing and by practising exercises to recondition the body to accept a higher but more correct level of carbon dioxide. Essentially hyperventilation is a bad habit which we aim to change.

If a patient can't understand that their asthma is being caused by overbreathing, a hyperventilation provocation test can prove useful. The patient is instructed to take many big breaths, as if they had just finished a race. Generally within two minutes, the patient will start to feel the onset of symptoms such as chest tightness, blocked nose, wheezing and coughing. When the symptoms begin, the patient is instructed to reduce breathing and the symptoms reverse. In practice, about seventy per cent of patients will experience symptoms from deliberate hyperventilation within two minutes. Naturally, this technique is used only as a last resort to prove to the patient that symptoms are a direct result of overbreathing; the patient is always instructed to stop hyperventilating well in advance of an attack. It is not advisable to practise this test without medical supervision.

Why is carbon dioxide so important?

Carbon dioxide is essential to human life. Loss of it due to overbreathing is, according to Professor Buteyko, the primary cause of asthma. For people who are predisposed to developing asthma, maintaining the correct level of carbon dioxide is very important for the following reasons:

· Transportation of oxygen

Oxygen is relatively insoluble in blood, so ninety-eight per cent of the gas is carried by haemoglobin molecule. The release of oxygen from haemoglobin is dependent on the quantity of carbon dioxide in our alveoli/arterial blood. If the level of carbon dioxide is not at the required level of five to six-and-a-half per cent, oxygen has a stronger "bond" to haemoglobin and so is not released to tissues and organs.

What this means is that oxygen is being carried with the blood on a round trip around your body, without reaching its proper destinations such as the cells, tissues and organs. A vicious circle ensues because low oxygen levels will stimulate the respiratory centre, leading to a further increase in breathing and loss of carbon dioxide… such as during an asthma attack.

This bond was named after the two physicians who discovered it and is now known as the Bohr Werigo Effect. It is important to know that blood is ninety-eight per cent saturated with oxygen at a breathing volume of three to five litres of air per minute.

· Dilation of blood vessels

Carbon dioxide dilates the smooth muscle around airways, arteries and capillaries. Reduced carbon dioxide causes smooth muscle to constrict, so people genetically predisposed to develop asthma have greater narrowing of the airways. Reduced carbon dioxide also results in arteries and capillaries constricting. When arteries and capillaries narrow, the heart must work harder to distribute blood throughout the body, resulting in increased heart beat and for some people higher blood pressure. Following an increase in carbon dioxide, there is greater oxygenation of body cells and tissues due to the dilation of blood vessels. Instant feedback comes in the form of reduced symptoms and increased body warmth due to improved blood circulation.

Maintaining PH balance

It is very important that the human body stays within normal acid/alkali (PH) balance. Acid PH is measured from one to seven, with one being much more acidic. Alkaline PH is measured from seven to fourteen, with the

most alkaline being fourteen. Neutral PH is seven.

The human body requires a slightly alkaline PH of 7.365 on this scale of one to fourteen, and even small shifts in the body's PH balance can be catastrophic. According to the eighth edition of Guyton's *Medical Physiology* textbook: "*The lower limit at which a person can live more than a few hours is about 6.8 and the upper limit approximately 8.0*".

When carbon dioxide leaves the lungs, the body becomes more alkaline resulting in reduced metabolic functioning and poorer immunity. Professor Buteyko believes that inflammation and allergic hyper-responsiveness is caused by an immune system which does not function correctly due to low carbon dioxide. asthma books

Pollen, dust mites, allergens, stress, and other asthma triggers are not the cause of asthma. They trigger an attack when the immune system is already hypersensitive. People with a poor immune system are also more susceptible to developing colds and 'flu. When the immune system is strengthened, triggers no longer cause an attack and there is a significant reduction in the incidences of colds and 'flu.

· Maintaining nature's steroid

Cortisol is the body's natural steroid. Hyperventilation causes an inadequate production of cortisol. When the body is not producing enough to meet its own needs, then it must be supplemented with synthetic drugs such as Becotide or Flixotide. When hyperventilation is reversed, adrenal functioning improves and leads to less need for steroidal medication. This has been proven in the Mater Hospital trials held in Brisbane in 1995, which concluded that there was 50 per cent less need for steroid medication when hyperventilation was reduced. Furthermore, those who reduced their breathing volume the most were able to reduce their steroid intake the most.

Controlling mucus production

Mucus forms an important part of the body's defence system by trapping foreign particles and invaders, and

deactivating them before they reach the lungs. Mucus is constantly brushed up to the throat by tiny hair-like structures called cilia, thus removing potential threats. When carbon dioxide is low, the body produces more mucus. While mucus plays an essential role in the airways, excessive mucus narrows the airways and results in greater breathing difficulty.

A combination of all these factors leads to the classical asthma symptoms of chest tightness, coughing, excess mucus production, wheezing, shortness of breath, nasal problems, sleep problems and lethargy. Buteyko cites asthma as the body's defence to stop and reduce the amount of carbon dioxide being lost. When carbon dioxide increases to normal, the defence mechanism is no longer needed, and the result is no asthma symptoms.

Therefore correct carbon dioxide levels result in:

1 Greater oxygenation of tissues and organs due to Bohr Werigo effect.

2 More open airways thus allowing unrestricted breathing.

3 Better immune system functioning. For example, the immune system is strong enough to withstand colds and infections but not hypersensitive enough to perceive harmless particles such as dust mites, pollens and other triggers as threats.

4 More adequate production of cortisol, the natural steroid necessary to control inflammation.

5 Less mucus production resulting in less restricted airways