Hyperventilation and Asthma

At this point, it's reasonable to ask if there is any evidence available from Western medical experts that helps to clarify the link between hyperventilation and asthma.

A number of scientific and medical papers have been written that prove hyperventilation plays a predominant role in the onset of asthma symptoms. Some experts have argued that asthma symptoms arise because of a loss of carbon dioxide while others cite additional effects of hyperventilation such as water and/or heat loss from the airways. More significant is the existence of a number of studies and papers in the Western world that support the premise of Buteyko's theory.

In an article entitled *Hyperventilation Syndrome and Asthma*, Demeter notes: "Hyperventilation whether spontaneous or exercise induced, is known to cause asthma."[1] His study shows that a large number of patients with hyperventilation syndrome also had asthma, and that treatment by bronchodilating drugs and explanation proved to be highly effective in reducing symptoms. The paper lists a number of symptoms of hyperventilation, including chest tightness, dyspnea (difficult breathing), palpitations, dizziness and others with which most asthmatics will be familiar.

Furthermore, Demeter states that these symptoms are the result of hyperventilation rather than its cause.

Demeter possibly offers an explanation as to why hyperventilation syndrome receives very little attention in the treatment of asthma. Firstly, he explains that it is very difficult to make a diagnosis of hyperventilation in laboratory tests and secondly "no mention is made of any link" between hyperventilation syndrome and asthma.[1]

For a paper by Elshout et al which was published in the highly respected medical journal *Thorax*, a study was done to determine what happens to airway resistance when there is an increase of carbon dioxide (hypercapnia) or a decrease (hypocapnia).[2] Altogether, 15 healthy people and 30 with asthma were involved. It was found that an increase of carbon dioxide determined by measuring end tidal CO_2 resulted in a "significant fall" in airway resistance in both normal and asthmatic subjects. This simply means that an increase of carbon dioxide caused

the airways to become less restricted, resulting in a reduction of asthma symptoms.

On the other hand, a carbon dioxide decline did have a negative effect on the airways of asthmatic subjects, but led to no change in the healthy persons. The conclusion drawn was that "hypocapnia may contribute to airway obstruction in asthmatic patients, even when water and heat loss is prevented."[2]

So while a loss of carbon dioxide has no affect on individuals without asthma, it does cause airway obstruction leading to asthma symptoms among those with asthma.

In another paper, entitled *The mechanism of bronchoconstriction due to hypocapnia in man*, Sterling writes that "hypocapnia (loss of carbon dioxide) due to voluntary hyperventilation in man causes increased resistance to airflow". Furthermore, when subjects inhaled an air mixture containing five per cent carbon dioxide "bronchoconstriction was prevented, indicating that it had been due to hypocapnia, not to mechanical factors associated with hyperventilation"[3]

The following is a quotation from a paper entitled *Demonstration and treatment of hyperventilation causing asthma*: "Hyperventilation, leading to airways cooling, will cause bronchoconstriction in vulnerable individuals" but, "because attacks of asthma are accompanied by hyperventilation of physiological origin, the role of hyperventilation in causing asthma attacks may be overlooked".

In the study, a twenty-year-old man with a lifelong history of asthma was taught breathing exercises over a period of five sessions of thirty minutes each over five months. The patient "resumed physical activities and became capable of performing levels of exercise never previously achieved". The article concludes that "this case demonstrates that training in controlled breathing can help patients who hyperventilate to avoid some attacks of asthma".[4]

Prolonged hyperventilation

We already know that when hyperventilation occurs over a small period of time, it's not a problem. In this situation, the respiratory centre senses the decrease of carbon dioxide and so automatically reduces or stops the breathing process to enable it to restore to preset levels.[5] In this situation therefore, hyperventilation is only a

short-term phenomenon. Books to help asthma.

However, if overbreathing is prolonged over a long period of time, physiological changes occur in the body resulting in hyperventilation becoming a more permanent state.[5] Demeter also supports this when he states "prolonged hyperventilation (for more than 24 hours) seems to sensitize the brain, leading to a more prolonged hyperventilation."[1] Hyperventilation becomes habitual or long term, so even when the primary cause is removed, the behaviour is maintained.

Let's amalgamate this with Buteyko's theory. The lifestyle of modern man increases breathing volume which in turn causes a loss of carbon dioxide, resulting in asthma for persons genetically predisposed. As increased respiratory volume is a common symptom of an attack,[6] asthma plays a role in increasing hyperventilation and therefore symptoms. Simply because an asthma attack can occur over a relatively long period of time, the respiratory centre can become used to accepting a lower level of carbon dioxide. In turn, this leads to increased breathing volume over the long term.[1, 5] One feeds the other; hyperventilation leads to an increased breathing volume, and this in turn leads to further hyperventilation.

Water and heat loss

Another area not altogether separate from prolonged hyperventilation is that of exercise-induced asthma [EIA]. Exercise-induced asthma affects up to ninety per cent of asthmatics. While the main theories explaining EIA are water loss or cooling of the airways, [7, 8, 9] Buteyko and others [2, 12] cite loss of carbon dioxide. I have concentrated mainly on the theory of carbon dioxide throughout this book because it has already been well researched by Buteyko and is easily understood. However, lets briefly examine water and heat loss theory.

On commencement of physical exercise, the volume of breathing increases. The airways are therefore required to condition a greater volume of air and this causes the dehydration and cooling effect which plays a primary role in producing asthma symptoms. According to Anderson, the greater the volume of ventilation, the greater the loss of water and cooling of the airways and so the greater the severity of bronchoconstriction. [10]

It is very interesting to note that similar effects to EIA can be reproduced by voluntary hyperventilation. In

other words, asthmatic symptoms similar to those caused by exercise can be produced by taking in large volumes of air through the mouth over the course of a few minutes. [11, 12, 13]

Therefore, it can be accepted without question that the volume of air inhaled and the condition of this air plays a noteworthy role in producing symptoms. It is also logical to state that the airways become dryer and cooler with a greater volume of air passing through. This is not just solely applicable to people undergoing exercise; it also relates to the volume of air inhaled during rest.

Another good question

So how does this relate to Professor Buteyko's work? Well, based on the research detailed already in this appendix, we know that increased ventilation causes bronchoconstriction. We also know that the volume of air typically inhaled by an asthmatic during rest is far greater than the accepted normal level. For example, the reported volume as measured in a number of trials was 15 litres [14], 14.1 litres [15] and 12 litres.[16]

In summary, prolonged hyperventilation causes a resetting of the body's acceptable level of carbon dioxide, allowing the respiratory system to maintain chronic overbreathing. This larger volume of breathing is the primary element in producing asthma symptoms. Therefore, breathing exercises aimed at reversing hyperventilation should have a vital role in reducing asthma symptoms.

Quite simply, the more you reverse your overbreathing, the greater the improvement to your asthma. Your control pause will indicate the extent of the correction of your breathing. At forty seconds, your breathing will be corrected and asthma will not be presenting any symptoms. It is as simple as that.

Difficulty of measuring carbon dioxide levels

The role of carbon dioxide in causing asthma has often been a contentious issue among medical professionals, and it is very difficult to prove. Carbon dioxide can be a difficult gas to measure and some methods involve considerable medical risk such as puncturing an artery. More commonly, carbon dioxide is measured by an instrument called a capnograph. A capnograph measures the amount of carbon dioxide in exhaled air, which is

equal to the content within the lungs. However, for the following reasons, the measurement of end tidal carbon dioxide is not as straightforward as it would seem:

1 Once a patient is conscious of having their breathing monitored, their breathing rate and depth will change, giving an untrue measurement. If a mask is placed over the person's face, then the mask will create some resistance, thus reducing the volume of air.

2 The length of each breath plays a crucial role in determining the amount of carbon dioxide in exhaled air. For example, if the patient is instructed to exhale a long breath, breathing will slow down, thus increasing the level of carbon dioxide in the blood. This carbon dioxide will enter the measurement chamber and give a high but false reading of carbon dioxide.

3 If the patient is taking small breaths, then air from 'dead space' – the 150ml part of the airways where no exchange of gas takes place and where there is a very low level of carbon dioxide – enters the chamber along with alveolar air from the lungs. This produces a low but false measurement of carbon dioxide.

Can Buteyko Breathing help explain some old practices?

Apart from the evidence documented above, along with positive verbal feedback from many thousands of people worldwide, there is anecdotal evidence which may prove helpful in demonstrating the link between asthma and overbreathing

Comedy affects asthma

For example, why would asthma get worse following a long period of time talking; fits of laughter; [17, 18] a stressful period; a large meal; a night sleeping with the mouth open; being in a stuffy warm environment, or blowing into a peak flow meter or Spirometry a number of times?

Quite simply, all of these cause overbreathing and overbreathing causes asthma symptoms. All people with asthma will intuitively realise the relationship between these events and their symptoms. For example, if you are

in stitches of laughter while watching a comedy or funny film, your laughter will involve large inhalations of air through your mouth in between each laugh. In addition, the increased excitement will in turn increase your breathing. It is not uncommon for asthma symptoms to be worse following attendance at a comedy show.

Asthma books

Swimming

It's accepted that swimming is a very beneficial exercise for people with asthma. It's known that the maximal breathing volume per minute is lower during swimming than during other sports such as running or cycling.[19, 20, 21]

While the effect of reduced asthma symptoms is primarily believed to be due to the inhalation of warm air,[19, 20] the role of carbon dioxide can offer a realistic explanation. For example, if inhaling warm air is beneficial, then remaining in the shower under hot water for an hour each day may help to reduce attacks. A more plausible explanation is that during swimming, reduced breathing results in an increase of carbon dioxide causing bronchodilation.

Unfortunately swimmers are not aware of this link and may spend the rest of their day overbreathing or worse – mouth breathing.

Late onset asthma

Late onset asthma is becoming more common among women and it usually occurs following a stressful period. While a person may be overbreathing for their entire life, the additional increase of breathing due to a stressful event can push their carbon dioxide levels to fall and asthma is activated as a defence mechanism. The respiratory centre becomes set at this lower level of carbon dioxide and so breathing is maintained at a high and unhealthy volume.

Affluence

The incidence of asthma increases relative to modern affluence. This is due to the changes in our lifestyle; it isn't anything to do with our genetic make-up, because this takes thousands and millions of years to evolve. What we call modern civilisation culminates in a greater consumption of processed foods, overeating, overclothing, stress and lack of physical activity. All of these factors contribute to overbreathing and are common in countries with the highest incidence of asthma.

Growing out of it

Why do some children grow out of asthma and others don't? Again, Buteyko Breathing can offer a possible explanation for this. Some children automatically and unconsciously reduce their breathing. Those who don't continue to have asthma into adulthood.

Brown paper bag

Doctors used to recommend breathing into and out of a brown paper bag to stop an asthma attack. While this is not an altogether safe practice, it's based on the concept of restoring the carbon dioxide level to dilate the airways. This is based on the same Buteyko Breathing concept – the restoration of CO_2 levels. Buteyko breathing, however, relies on natural accumulation of carbon dioxide by reduced breathing and so is therefore safer.

References

1) *The American Journal of Medicine*; December 1986; Volume 81; p989. *Hyperventilation Syndrome and Asthma*. (Demeter, Cordasco.)

2) *Thorax;* 1991; 46, 28-32. *Effects of hypercapnia and hypocapnia on respiratory resistance in normal and asthmatic subjects*. (F.J.J. van den Elshout; C.L.A. van Herwaarden,; H.T.M. Folgering.)

3) *Clin Sci;* 1968; 34, 277-285. *The Mechanism of Bronchoconstriction due to hypocapnia in man.* (G.M. Sterling.)

4) *British Journal of Psychiatry*; 1988; 153, 687-689; *Demonstration and treatment of hyperventilation causing asthma.*

5) *The American Physiological Society*; vol 33; October 1953; p445- 461; *Physiological effects of hyperventilation.*

6) *The New England Journal of Medicine;* May 9th, 1968; 278 (19) 1027-1032; *Arterial Blood gases in asthma*. (McFadden and Lyons.)

7) *J Appl Physiol* 64; 2167-2174, 1988*; Intra-airway thermodynamics during exercise and hyperventilation in asthmatics.* (Gilbert, I.A.; Fouke, J.M.; and McFadden, E.R. Jr..)

8) *J Clin Invest* 90; 699-704, 1992; *Airway cooling and rewarming. The second reaction sequence in exercise-induced asthma*. (Gilbert, I.A.and McFadden, E.R. Jr..)

9) *J Clin Invest* 76; 1007-1010, 1985; *Intra-airway thermal profiles during exercise and hyperventilation in normal man.* (McFadden, E.R. Jr. and Pichurko, B.M..)

10) *Journal Allergy Clin. Immunol;* 2000; 106:419-28; *Exercise induced asthma is the right diagnosis in elite athletes?* (Anderson and Holzer.)

11*) J Allergy Clin Immunol*; May 1984; 73(5 Pt 2):676-9; *Simplified eucapnic voluntary hyperventilation challenge*. (Rosenthal R.R..)

12)*Nihon Kyobu Shikkan Gakkai Zasshi;* October 1990; 28(10):1332-7; *Bronchoconstriction in isocapnic hyperventilation-induced asthma.* [Article in Japanese] (Ohtsuka, A.; Koyama, S.; Yashizawa, T.; Kikuchi, H.; Horie. T..) asthma books

13) *Chest;* March 1994; 105(3):667-72l; *Eucapnic voluntary hyperventilation as a bronchoprovocation technique. Comparison with methacholine inhalation in asthmatics*. (Roach, J.M.; Hurwitz, K.M.; Argyros, G.J.; Eliasson, A.H.; Phillips, asthma books Y.Y..)

14) *J Appl Physiol;* September 1995; 79(3) books on asthma 892-901; *Regulation of ventilatory capacity during exercise in asthmatics*. (Johnson, B.D.; Scanlon, P.D.; Beck, K.C..)

15) *Med J of Australia*; 1998, 169, 575-578; *Buteyko breathing techniques in asthma, a blinded randomised controlled trial*. (Bowler, S.D.; Green, A.; asthma books Mitchell, C.A..)

16) *The New England Journal of Medicine;* May 9th, 1968; 278 (19) 1027-1032; *Arterial Blood gases in asthma*. (McFadden and Lyons.)

17) *Pediatr Pulmonol;* August 2003; 36(2):107-12; *Mirth-triggered asthma booksasthma: Is laughter really the best medicine?* (Lingoes, G.; Morton, J.A.R.; Henry, R.L.A..)

18) *Laughter is major asthma trigger*. March 28th, 2002, *New Scientist.*

19) *J Sports Med Phys Fitness;* 1988; 28:394-401; childrens books on asthma*A comparison of various exercise challenge tests on airway reactivity in atopical swimmers. (*Reggiani, E.; Marugo, L.; Delpino. A.; Piastra, G.; Chiodini, G..)

20) *Sports med*; 1988; 6:271-78; *Pulmonary structure and function in swimmers*. (Cardain, L. and Stager, J..)asthma books

21) *Med Sci Sports Exercise;* 1987; 19: 51-55*; Physiological responses of tri athletes to maximal swimming, cycling and running*. (Kohrt, W.M.; Morgan, D.W.; Bates, B.; Skiner, J.S..)