

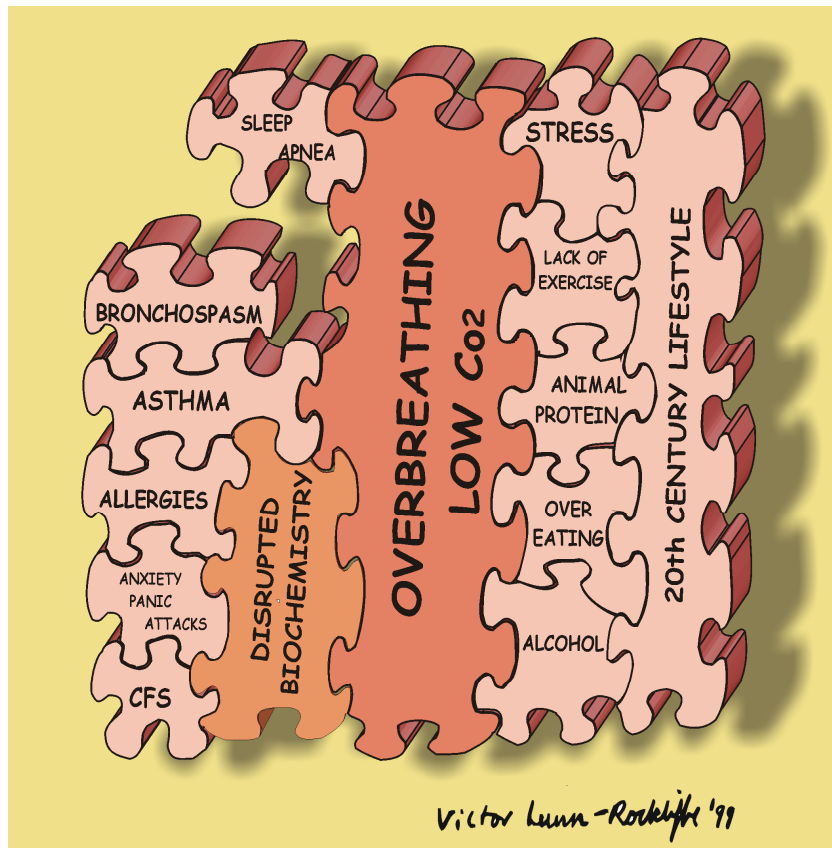
Buteyko

For the Reversal of Chronic Hyperventilation

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Revision 1.2



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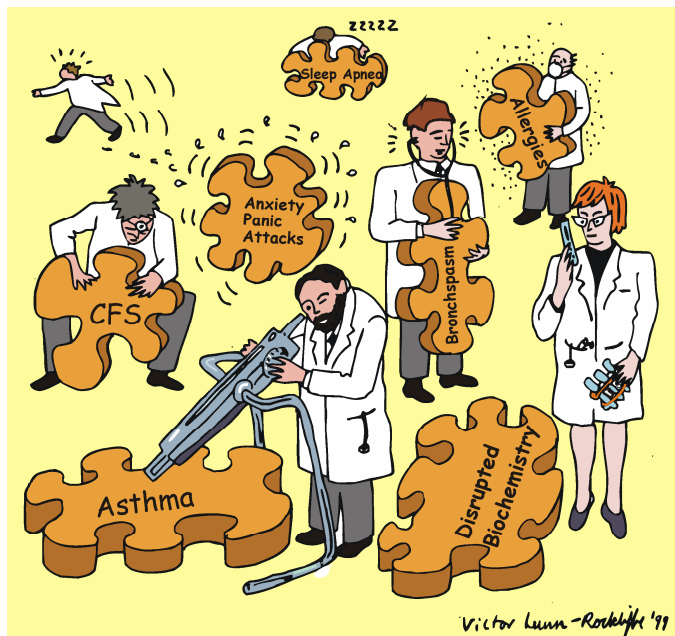
1. What is Chronic Hyperventilation Syndrome?

Chronic Hyperventilation Syndrome [CHVS] is a vast complex of bizarre^{29,31,16} protean^{1,29,31,18} symptoms and disorders that are caused by habitually breathing too much. Technically it is not a syndrome at all since the symptoms are so variable. Notwithstanding that chronic hyperventilation [CHV] has a compelling appeal as the physiological basis for the many chronic disorders we see today, mainstream medicine has consistently failed to deal with it since its discovery over 100 years ago.^{1,16,18,24,29}

In 1975 British cardiologist, Claude Lum wrote:¹⁶

Some forty years ago Kerr, Dalton and Gliebe wrote "Patients presenting the well-known pattern of symptoms haunt the offices of physicians and specialists in every field of medical practice. They are often shunted from one physician to another, and the sins of commission inflicted upon them fill many black pages in our book of achievement."

Unfortunately I believe this to be still true today, despite the many and excellent reviews which have appeared in the intervening years.



The millennium has rolled over and, despite the astonishing results seen in the clinical trials^{2,6,19,20,21,25} on Buteyko for asthma, CHVS has still received no recognition from mainstream medicine.

2. How does CHV develop?

Chronic hyperventilation develops from any chronic, un-discharged stress on the body including elements of western lifestyle, leading to a depletion of carbon dioxide (CO₂) and bicarbonate (HCO₃⁻).^{14,16}

The respiratory centre, situated in the brain stem, paces breathing in order to maintain pH according to the Henderson-Hasselbach equation:

$$pH = 6.1 + \log \left(\frac{[HCO_3^-]}{0.03[CO_2]} \right)$$

Hence, to maintain pH, the ratio of CO₂ to bicarbonate in the cerebrospinal fluid (CSF) needs to remain **constant**. Since the blood-brain barrier is extremely permeable to CO₂, this is readily accomplished by regulation of breathing.¹⁰ If the body is stressed, breathing increases, CO₂ is reduced and a state of alkalosis develops. If this stress is sustained, the kidneys compensate by dumping bicarbonate in order to reestablish normal pH in the blood.^{10,16} However, the blood brain barrier is only very slightly permeable to bicarbonate resulting in a very slow diffusion of bicarbonate from the CSF into the blood¹⁰ **if the stress is sustained for a very long time (chronic stress)**. When the stress eventually dissipates, the CSF is left with a low bicarbonate concentration.^{10,16} To maintain pH the CO₂ will also have to be kept low and a habituation to low CO₂ will have taken place.¹⁴ The resulting low CO₂ and bicarbonate has a devastating effect on all significant biochemical processes.^{7,14,16,18,24, 29}

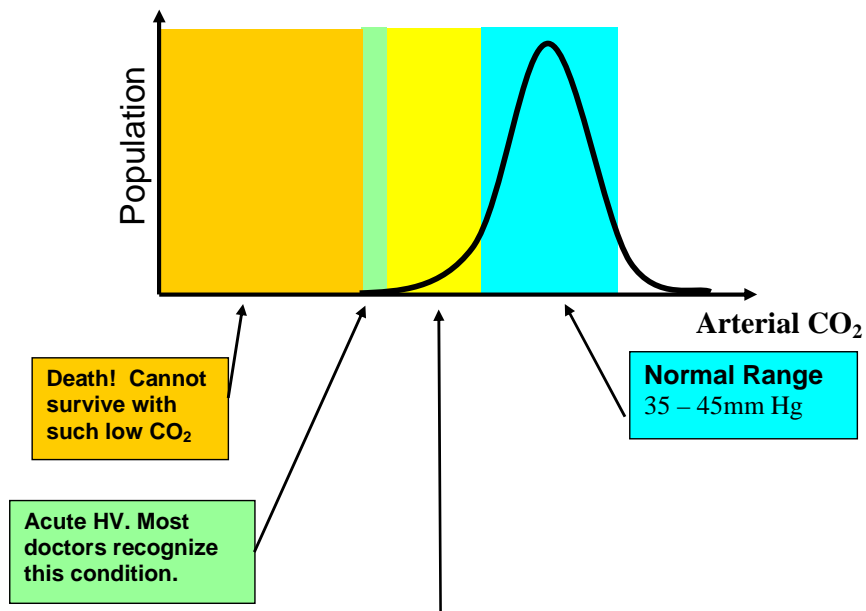
3. How does Buteyko therapy work?

Buteyko therapy is a simple educational programme aimed at reversing CHV. In the same way as chronic stress leads to CHV, so too a deliberate reduction in breathing over a period of time reverses this process to restore CO₂ back to a normal level.

"The essence of my method is in decreasing the depth of breathing. You would ask me how. The best way is through relaxation of the muscles that potentiate the breathing action. What then occurs is a sensation of having insufficient air if the breathing is reduced. These are all the instructions - the whole of the method." — K.P. Buteyko.⁴

4. What happens to patients with CHVS?

Consider the following population distribution for arterial carbon dioxide. The normal range is between 35 and 45mmHg. Most people could be expected to fall into this range. Those who fall below this range but are not acutely hypocapnic, do not have hypocapnia recognized as the possible cause of their disease by mainstream medicine.^{1,16,18,24,29}

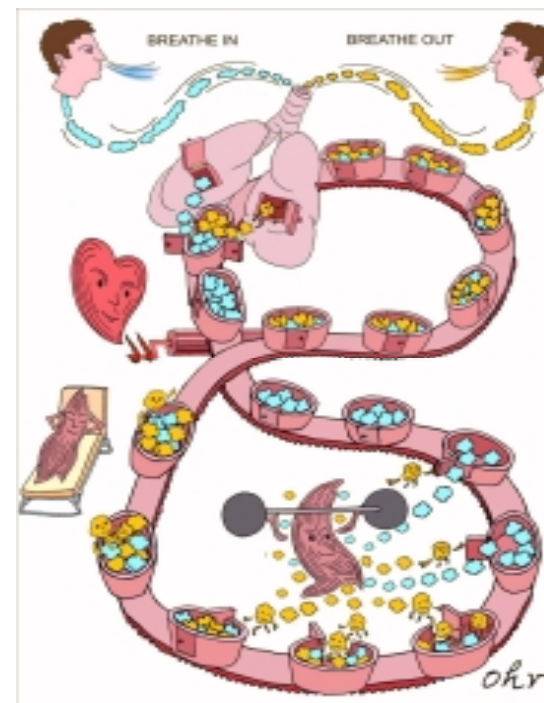


Here we have a population of chronic hyperventilators. Doctors do not recognize this condition. While patients are often referred for psychological therapy and sometimes even given anxiolytic drugs, many are sent home without treatment. They are variously categorized as patients with hypochondriasis or somatization disorders. Western medicine has no effective therapy for these patients. **These are the patients that would profit from Buteyko Therapy.**

5. Physiological consequences of low CO₂.

1. Poor oxygenation of tissues due to a depressed Bohr effect.^{5,7,18,29,31}

Once oxygen attaches itself to the hemoglobin in the lungs, it is transported to the tissues where it is needed. CO₂ is necessary to fully offload the Oxygen into the tissues. When the baseline level of CO₂ is too low, the oxygen is not fully unloaded resulting in tissue hypoxia. The consequence is a feeling of *breathlessness*, which aggravates the condition, frequent yawning and sighing, build up of acids, such as *lactic acid*, in the body and joints leading to *fatigueability*,^{16,18,31,30} *exhaustion*⁵ and *pain in muscles*^{5,16,18} and joints.

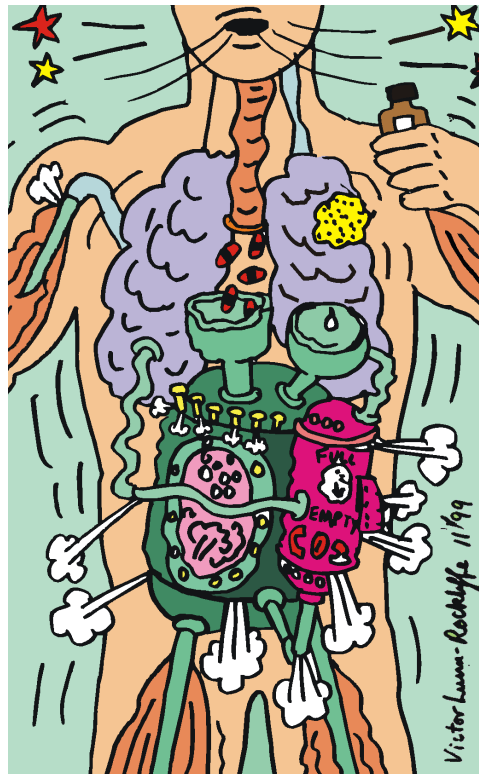
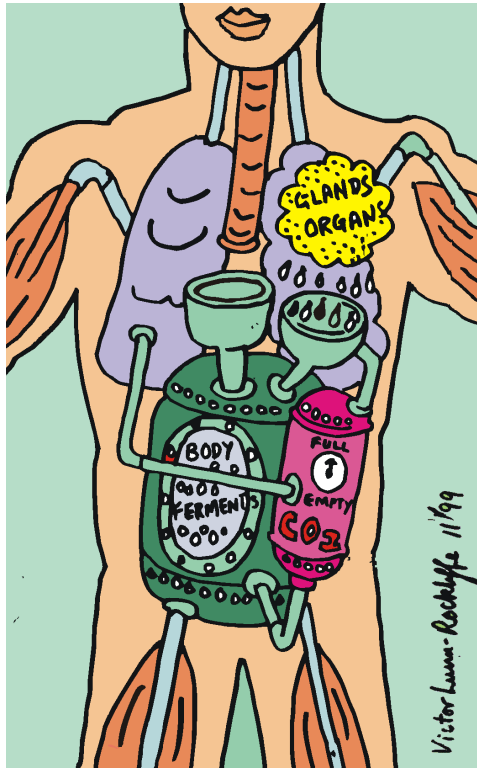


2. Muscle spasms.^{5,7,16,24,29}

Since calcium transport across the cell membrane involves CO₂, hypocapnia results in a redistribution of Calcium, which tends to accumulate inside the cells leaving the extra cellular fluid depleted.²⁴ This directly affects the ability of smooth muscle to relax.¹¹ Hence, hyperventilation is associated with spasms in smooth muscle, resulting in dysfunctional gut motility as in *spastic colon*²⁴, and *irritable bowel syndrome*,²⁴ spasm in the bronchioles as seen in *asthma*,^{5,7,12,16,24,29} spasm in arterioles^{5,7,16,24,29,31} resulting in *hypertension*²⁴ and *ischemia*,²⁴ as well as spasm in glands and ducts. In addition, esophageal spasm can result in *dysphagia*,^{5,16} *Globus Hystericus*^{5,16,30,31} and together with spasms in the diaphragm and sphincter, various degrees of *hiatus hernia*²⁴ may develop with associated *gastric reflux*. Hypoxia due to a depressed Bohr effect together with *ischemia* can produce *angina*,²⁴ *headaches*,¹⁶ *migraines*^{5,24} and *syncope*.^{5,7,16}

3. Profound biochemical derangements caused by chronic hyperventilation include: *hypophosphatemia*,^{18,29,31} *elevated lipids*,²⁴ *elevated sugar levels*²⁴ and *elevated lactic*¹⁶ and *uric acid*²⁴ apart from disturbances to *calcium homeostasis*.

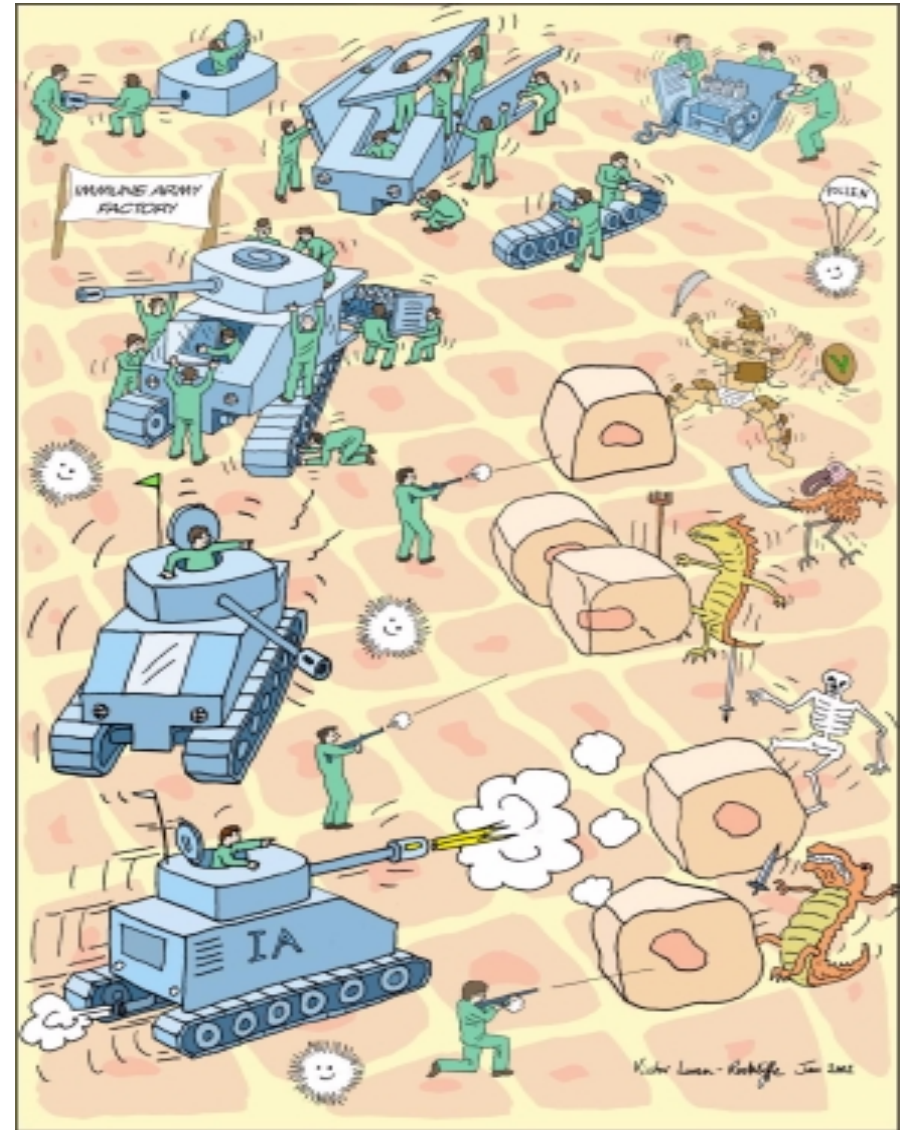
CO₂ is directly involved in all biosynthetic processes including the biosynthesis of amino acids, nitrogenous bases, fats and carbohydrates.¹⁴ It is also involved in stimulating the production of hormones such as insulin.¹⁴ It also stimulates the production of gastric secretions.¹⁴



CO₂ affects the production of acetylcholine in nervous tissue and the excitability of nerves.^{5,14,31} High CO₂ tends to have a calming effect on the nervous system, while low CO₂ causes *increased sympathetic tone*,^{16,18,29,30,31} *decreased parasympathetic tone*,⁵ *paresthesia and numbness*,^{1,5,7,16,18,24,29} *twitching eyelids*,¹⁶ *visual and auditory disturbances*,^{5,7,16,29,31} *seizures and fits*,^{7,16,29} *tremors and shaking*,^{5,16,30,} *ECG and EEG abnormalities*.^{7,24,29,30}

6. Immune System

Particularly vulnerable is the immune system, a finely tuned biological warfare mechanism responsible for identifying, differentiating and destroying pathogenic invaders. Disturbances to the biochemical environment in which the immune system has to function can be

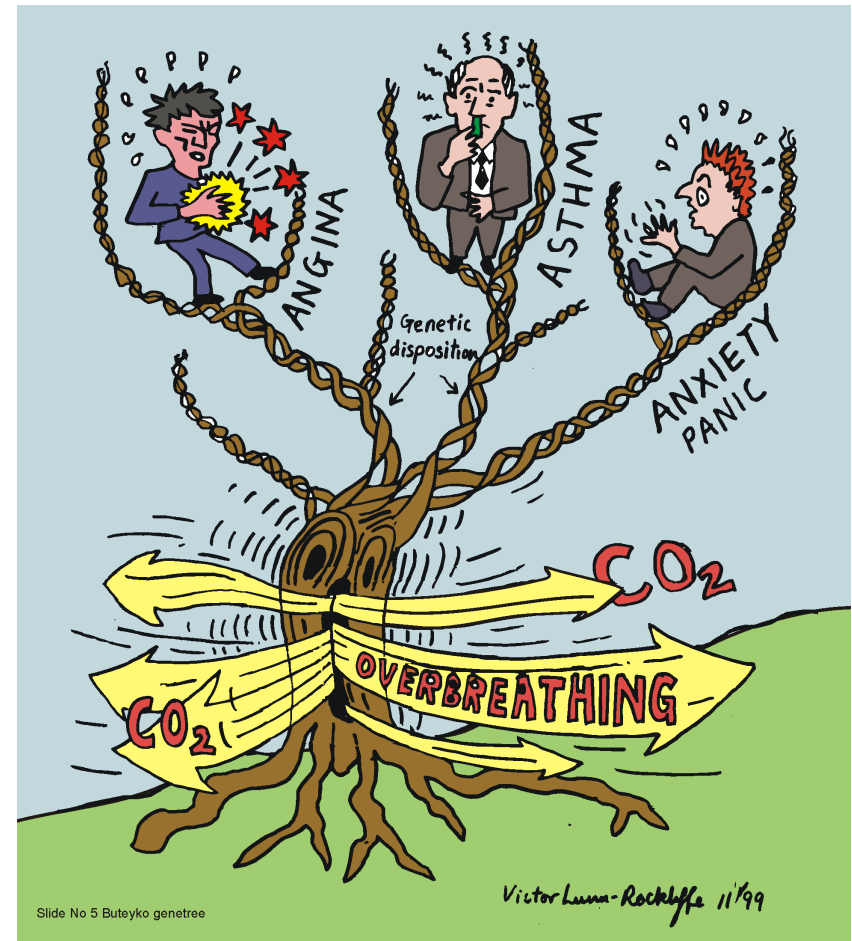


expected to lead to variable forms of immune system failure. As a result the system may over react to pollens or other non-pathogenic invaders. It may fail to deal effectively with bacteria and viruses and could even attack the body's own cells as in autoimmune diseases such as arthritis, diabetes, and multiple sclerosis. The immune system is also responsible for recognizing and removing cancer cells. It should come as no surprise that post-traumatic, post-viral, post-partum and psychological stresses can lead to major failures of the immune system.



7. Other Symptoms and disorders

Chronic hyperventilation affects every organ, body part and system.¹⁶ The protean nature of the symptoms makes this disorder particularly insidious. The symptoms that will manifest in an individual depend mainly on **genetic predisposition**. Asthmatics, for example, have bronchioles that are particularly efficient at closing up whenever the lungs are hyperventilated.



Slide No 5 Buteyko genetree

Apart from the symptoms already discussed, the mainstream medical literature provides us with an astonishing array of symptoms directly attributable to CHV. For example:

Cardiovascular: Palpitations,^{1,7,16,18,24} cardiac neurosis,^{1,5,24} myocardial infarction,²⁴ arrhythmias,^{5,7,24} coronary artery stenosis,^{7,24,29,31} tachycardia,^{5,16,24,29,30} failure of coronary bypass grafts,²⁴ right ventricular ectopy,²⁴ mitral valve prolapse,^{1,5,24,30} low cardiac output/stroke volume.³¹

Digestive: Dry mouth,^{1,18,31} flatulence and belching,^{1,5,18,31} duodenal spasm,²⁴ vomiting,¹⁶ bloating,^{16,18} constipation,¹⁶ epigastric pain,¹⁶ aerophagia,^{5,16,24,30} diarrhoea.¹⁶

General: Failure of transurethral resections,²⁴ edema,²⁴ restlessness,²⁴ Da Costa's Syndrome,^{18,24,29} excessive sweating,^{5,29,30} burnout,²⁴ Raynaud's Disease,^{16,24} chest pains,^{1,5,7,16,18,24,29,32} weakness and listlessness^{1,5,16,18,24,29}

Neuromuscular: Muscular stiffness and aching,^{16,24} myalgia,^{5,16} cramps,⁵ fibromyositis,³¹ muscle spasm.^{5,7,16,24,29}

Neurological: Paresthesia and numbness,^{1,5,7,16,18,24,29} headaches,¹⁶ syncope,^{7,5,16} diplopia,¹⁶ feeling of chilliness,³⁰ hot/cold sensations,³⁰ dizziness,^{5,7,16,18,29} hyperactivity,⁵ epileptic fits and seizures.^{7,16,29}

Respiratory Disorders: Asthma,^{5,7,16,24,29} choking,³⁰ chest tightness,^{5,7,16,29} irritable cough,^{5,16,31} dyspnea,^{7,18,24,29,30} Shortness of breath or air hunger.^{1,7,16,18,24,29}

Psychological: Tension,^{5,16,31} fear of insanity,⁵ depersonalization,^{5,30} hallucination,⁵ lack of concentration and memory loss,^{1,5,31} nightmares,^{5,16} unreal feelings,^{5,30,31} panic attacks,^{5,24} anorexia,¹⁸ depression,¹⁸ feelings of inadequacy,¹⁸ anxiety,^{16,24,29,31} maladjustments in life,¹⁸ phobias,^{1,5,16,18,24} obsessional behaviour.¹⁸ It is also known that K.P. Buteyko worked on the role of hyperventilation in addictive behaviours such as alcoholism and drug dependency.

8. Buteyko for Asthma

With over 40 years of experience in treating patients with chronic hyperventilation (CHV) disorders in the USSR, Dr. K.P. Buteyko confirmed the observations of Kerr, Dalton and Gliebe in the 1930's, that CHV developed mainly from life style.¹⁷

For example, he found that in children, the three most important reasons for developing asthma and other hyperventilation disorders are:¹⁵

1. Over feeding.
2. Over heating (too much clothing, too many blankets from over protective parenting)
3. Too little physical activity.



Dr. K.P Buteyko

Theory

- Bronchospasm results directly from low alveolar CO₂
- Inflammatory hyper responsiveness due to malfunctioning immune system (see pages 8, 9)

The first Clinical Trial in the west.²

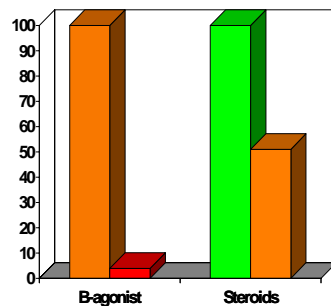
Double blinded controlled trial (Brisbane 1995)

- 170 candidates presented, stratified and randomized:
 - 19 to BBT
 - 20 to Control
 - 20 normals were also tested
- Average of 23 years of asthma (3-60)
- "Buteyko" was never mentioned.
- Controls taught standard physiotherapy relaxation and diaphragmatic breathing techniques.
- Trial lasted 3 months when blinding was lost.
- Controls offered Buteyko therapy after trial.

Results after 12 Weeks

1. Medication used

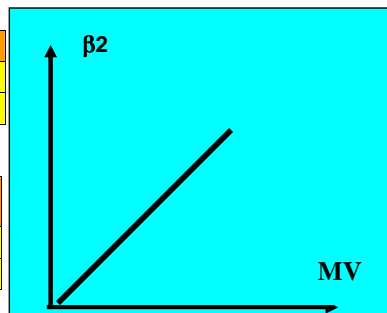
- Bronchodilators reduced by 96%
- Steroids reduced by 49%



2. Minute Volume and ETCO₂

ETCO ₂	Buteyko	Control	Normal
Before	33	32	41
After	35	33	

MV	Buteyko	Control	Normal
Before	14.0	14.2	11.9
After	9.6	13.3	



- Asthmatics have significantly lower ETCO₂ than normals
- Minute volume significantly reduced in Buteyko group
- Increase in ETCO₂ in Buteyko group statistically NOT significant
- Reduction in medication use found to be proportional to reduction in minute volume

3. Quality of Life and Symptom Score⁹

- Improvement in Quality of Life
- Improvement in Symptom Score by 71%

QOL	0 - 10
Buteyko	Control
Up 1.4	Up 0.4

Symptom Score ⁸		
	Buteyko	Control
Improvement	71%	14%

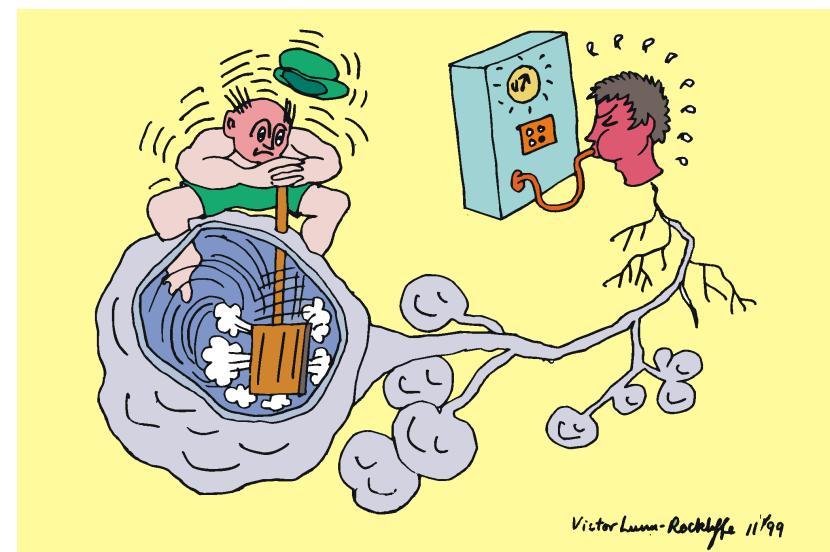
4. Lung Function Testing

No statistically significant improvement in Lung function noted. **See § 9.**

9. Lung Function Test

At this stage the sole impediment to acceptance of the Buteyko method for dealing with asthma appears to be the lack of improvement in lung function. But this argument is flawed on 3 levels.

1. There was no reduction in lung function notwithstanding the significant reduction in medication.
2. According to Buteyko's hyperventilation theory, bronchospasm is not a disease, but a natural reaction by the body to hyperventilation. It just so happens that asthmatics have lungs that perform this function particularly well.
3. The test itself affects the variable being measured by constricting the bronchioles during the hyperventilation manoeuvre.^{5,31,8} Measurement science invalidates this type of testing.



References:

1. Bass C, "The hyperventilation syndrome", *Respiratory Diseases in Practice*, Oct/Nov 1990, 13-16
2. Bowler S, Green A, Mitchell C, "Buteyko breathing and asthma: a controlled trial", *Medical J. of Australia*, VOL 169, December 1998, 575-578
3. Brasher RE, "Hyperventilation Syndrome", *Lung*, VOL 161, 1983, 257-273
4. Buteyko, "Interview with Dr. Buteyko", Available from http://www.members.westnet.com.au/pkolb/but_intv.pdf
5. Cluff RA, "Chronic Hyperventilation and its treatment by physiotherapy: discussion paper", *J of the Royal Society of Medicine*, VOL 77, September 1984, 855-861
6. Cooper S, Osborne J, Newton S, Harrison V, Thompson-Coon J, Lewis S, Tattersfield A, "Effect of two breathing exercises (Buteyko and Pranayama) in asthma: a randomized controlled trial.", *Thorax*, VOL 58, 2003, 674-679
7. Demeter SL, Cordasco EM, "Hyperventilation syndrome and asthma", *The American Journal of Medicine*, VOL 81, December 1986, 989-994
8. Gayraud P, Orhek J, Grimaud C, Charpin J, "Bronchoconstrictor effects of deep inspiration in patients with asthma", *Am Rev Respir Dis*, VOL 111, 1975, 433-439
9. Graham T, "Self Management of Asthma through Normalization of Breathing: The Role of Breathing Therapy", *National Asthma Conference*, Brisbane, October 1996,
10. Guyton AC, Hall JE, "Textbook of medical physiology", Chemical control of respiration, PUBLISHER: WB Saunders; ISBN:0-7216-5944-6; 1996; EDITION: 9; PAGES: 527-528.
11. Guyton (as above). *Smooth Muscle Contraction*, PAGE 98
12. Hibbert GA, Pilsbury DJ, "Demonstration and Treatment of Hyperventilation Causing Asthma", *British J. of Psychiatry*, VOL 153, 1988, 687-689
13. Hormbrey J, Jacobi M, Patil C, Saunders K, "CO₂ response and patterns of breathing in patients with symptomatic hyperventilation compared to asthmatic & normal subjects", *European Respiratory Journal*, VOL 1, 1989, 846-852
14. Kazarinov VA, "Buteyko Method: The experience of implementation in medical practice", The biochemical basis of KP Buteyko's theory of the diseases of deep respiration, EDITOR: Buteyko KP; PUBLISHER: Patriot Press Moscow; 1990; PAGES: 198-218. Translation available from <http://www.members.westnet.com.au/pkolb/biochem.htm>
15. Lapa NA, "Buteyko Method: The experience of implementation in medical practice", Some features of using DVBM for Children, EDITOR: Buteyko KP; PUBLISHER: Patriot Press Moscow; 1990; Available from <http://www.members.westnet.com.au/pkolb/Lapa.htm>
16. Lum LC, "Hyperventilation: The tip and the iceberg", *J Psychosom Res*, VOL 19, 1975, 375-383. Available from <http://www.members.westnet.com.au/pkolb/Lum.htm>
17. Magarian GJ, "Hyperventilation syndrome: infrequently recognized common expressions of anxiety and stress.", *Medicine*, VOL 61, 1982, 219-36
18. Magarian GJ, Middaugh DA, Linz DH, "Hyperventilation Syndrome: a diagnosis begging for recognition", *West J Med*, VOL 138, 1983, 733-736. Available from <http://www.members.westnet.com.au/pkolb/Magarian.htm>
19. McGowan J, "Health Education: Does the Buteyko Institute Method make a difference?", *Thorax*, VOL 58/Sup3, December 2003, 28
20. McHugh P, Aitchison F, Duncan B, Houghton F, "Buteyko Breathing Technique for Asthma: an effective intervention.", *The Medical Journal of New Zealand*, VOL 116, 12 December 2003.

21. McHugh P, Duncan B, Houghton F, "Buteyko breathing technique and asthma in children: a case series.", *The New Zealand Medical Journal*, VOL 119 No1234, May 2006.
22. Morgan WP, "Hyperventilation Syndrome: a review", *Am Ind Hyg Assoc J*, VOL 44:9, 1983, 685-689
23. Neill WA, Hattenhauer M, "Impairment of Myocardial O₂ supply due to Hyperventilation", *Circulation*, VOL 52, November 1975, 854-858
24. Nixon PGF, "Hyperventilation and cardiac symptoms", *Internal Medicine*, VOL 10:12, December 1989, 67-84
25. Opat AJ, Cohen MM, Bailey MJ, Abramson MJ, "A Clinical Trial of the Buteyko Breathing Technique in Asthma as Taught by Video", *Journal of Asthma*, VOL 37(7), 2000, 557-564
26. Perera J, "The hazards of heavy breathing", *New Scientist*, VOL , December 1988,
27. Pfeffer JM, "The etiology of the hyperventilation syndrome", *Psychother Psychosom*, VOL 30, 1978, 47-55
28. Pfeffer JM, "Hyperventilation and the hyperventilation syndrome", *Postgrad Med*, VOL 60(Sup.2), 1984, 12-15
29. Sher TH, "Recurrent chest tightness in a 28-year-old woman", *Annals of allergy*, VOL 67, September 1991, 310-314
30. Tavel ME, "Hyperventilation syndrome - Hiding behind pseudonyms?", *Chest*, VOL 97, 1990, 1285-1288
31. Waites TF, "Hyperventilation - chronic and acute", *Arch Intern Med*, VOL 138, 1978, 1700-1701
32. Wheatley CE, "Hyperventilation syndrome: A frequent cause of chest pain", *Chest*, VOL 68:2, August 1975, 195-199
33. Cowie RL, Conley DP, Underwood MF, Reader PG. A randomised controlled trial of the Buteyko technique as an adjunct to conventional management of asthma. *Respiratory Medicine*. 102(5):726-32, 2008 May. UI: 18249107

Clinical Trials

See Ref.: 2, 6, 19, 20, 21, 25, 33

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