Manual and Rehabilitation Strategies for Thoracic and Respiratory Dysfunctions

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HVS & BPD defined

HVS (hyperventilation syndrome) occurs when the rate of breathing exceeds metabolic demands, resulting in hemodynamic and chemical changes that produce characteristic symptoms.

BPD (breathing pattern disorders) include all modifications of 'normal' breathing, with HVS as the extreme of this.

Respiratory alkalosis is one of the first changes to manifest with arterial pH rising further into the alkaline range (normal is ±7.4) .

Two Additional Key Definitions

hypocapnia
Deficiency of carbon dioxide in the blood, resulting from hyperventilation and eventually leading to respiratory alkalosis.

hypoxia
Reduction of oxygen supply to tissue below physiological levels despite adequate perfusion of the tissue by blood. (cf. Anoxia).

How widespread is HVS/BPD?

Acute hyperventilation represents only approximately 1% of all cases of hyperventilation, well outnumbered by chronic hyperventilation.
Chronic HVS can present with a myriad of respiratory, cardiac, neurologic, or GI symptoms, without any clinically apparent overbreathing by the patient. In the US as many as 10% of patients in a general internal medicine practice are reported to have HVS as their primary diagnosis.

•Lum L 1987 Hyperventilation syndromes in medicine and psychiatry J. Royal Society of Medicine 229-231
•Newton E 2001 Hyperventilation Syndrome http://www.emedicine.com/

HVS/BPD and Gender

HVS/BPD is female dominated, ranging from a ratio of 2 :1 to 7 :1
Women may be more at risk because of hormonal influences, since progesterone stimulates respiratory rate, and in the luteal (post ovulation/pre-menstrual) phase, CO2 levels drop on average 25%. Additional stress can then, "increase ventilation at a time when carbon dioxide levels are already low."

Damas-Mora J, Davies L, Taylor W, Jenner F A. 1980 Menstrual Respiratory Changes and Symptoms. British Journal of Psychiatry. 136, 492-497

Symptoms of HVS/BPD

"HVS patients are often pursued relentlessly with every investigative device known to modern science, and end up with the label of "anxiety state" and the implication that they are inadequate or in some way inferior. Symptoms may be resulting from a deficiency of carbon dioxide, bicarbonate, oxygen, and calcium ions:, to name but a few of the well-known biochemical disturbances which accompany acute hypocapnia."

HVS Symptoms

CARDIOVASCULAR: palpitations, tachycardia, precordial pain, Raynaud's phenomenon
NEUROLOGICAL: Central: dizziness, disturbed consciousness/vision.
PERIPHERAL: Paraesthesia, tetany (rare)
RESPIRATORY: Shortness of breath, "asthma", chest pain
GASTROINTESTINAL: Globus, dysphagia, epigastric pain
MUSCULOSKELETAL: Muscle pains (particularly thorax), tremors, tetany
PSYCHIC: Tension, anxiety
GENERAL: Fatigability, weakness, exhaustion, sleep disturbance, nightmares

Lum L.C. 1988 Hyperventilation : The tip and the iceberg. Applied Respiratory Psychophysiology.

Understanding Anxiety

Despite advances in the understanding of the nature of anxiety-related responding during periods of elevated bodily arousal, it is not evident by what psychological mechanisms anxiety is produced and maintained. To address this issue researchers have increasingly employed biological challenge procedures to examine how psychological factors affect anxious responding, during elevated bodily arousal. Of the challenging procedures, hyperventilation and inhalations of carbon dioxide-enriched air have been among the most frequently employed, and a relatively large body of literature using these procedures has now accumulated. Overall, we conclude challenge research is a promising paradigm to examine the influence of psychological variables in anxious responding, and that such work will likely be enhanced with greater attention to psychological process issues

Zvolensky M Eifert G 2001 A review of psychological factors/ processes affecting anxious responding during voluntary hyperventilation and inhalations of carbon dioxide-enriched air Clinical Psychology Review 21(3) 375-400

BPD effects on deconditioned individuals

Nixon & Andrews (1996) have summarized the emerging symptoms resulting from hypercapnoea in a deconditioned individual, as follows ::
"Muscular aching at low levels of effort; restlessness and heightened sympathetic activity; increased neuronal sensitivity; and, constriction of smooth-muscle tubes (e.g. the vascular, respiratory and gastric-intestinal) can accompany the basic symptom of inability to make and sustain normal levels of effort."

Nixon P Andrews J 1996 A study of anaerobic threshold in chronic fatigue syndrome (CFS) Biological Psychology 43(3):264

Habitual BPD - breaking bad habits

Lum (1984) discussed the reasons for people becoming hyperventilators

"Neurological considerations can leave little doubt that the *habitually* unstable breathing is the prime cause of symptoms. Why they breathe in this way must be a matter for speculation, but manifestly the salient characteristics *are pure habit."*

Is breathing retraining an answer ?

Breathing retraining has been used to correct hyperventilation. Lum reported that more than 1000 anxious and phobic patients were treated using breathing retraining, physical therapy and relaxation.

Symptoms were usually abolished in one to six months with some younger patients requiring only a few weeks.

At 12 months 75% were free of all symptoms, 20% had only mild symptoms and about one patient in twenty had intractable symptoms.

Lum L 1984 Editorial : Hyperventilation and anxiety state. Journal Royal Society of Medicine January p1-4

O2-CO2 balance

"Maintaining O2 and CO2 within balanced limits is a complex task for the body, because the supply of each gas fluctuates with each breath. This tidal oscillation must be smoothed out so that the brain and bodily tissues receive a steady supply of O2, and also so that CO2 in the body remains at a stable level………We live in a narrow zone of homeostasis. bordered on both sides by physiological disaster.

Much of what goes wrong with breathing involves attempts to avoid this disaster."

Gilbert C. in Chaitow, Bradley & Gilbert, 2002, Multidisciplinary Approaches to Breathing Pattern Disorders. Churchill Livingstone, Edinburgh

Just one sigh…

Careful inquiries as to the precipitating causes of episodes of HVS helps both with the diagnosis and focusing on choice of treatment.

Nixon (1993) suggests that there are often attacks where there is no preceding stressful event.

In chronic hyper-ventilators the respiratory centre may have been reset to tolerate lower than normal partial pressure of arterial carbon dioxide (PaCO2).

In such patients a single sigh, or one deep breath, may reduce the PaCO2 enough to trigger symptoms.

Nixon P G F .1993. The grey area of effort syndrome and hyperventilation : from Thomas Lewis to today. Journal of the Royal College of Physicians of London. Vol 27: no 4:377-383

Respiratory alkalosis

The result of increased ventilation, during which the rate of CO_2 exhalation exceeds the rate of its accumulation in the tissues, is respiratory alkalosis, characterized by the decrease in CO_2 and an increase in pH.

This induces vascular constriction, decreased blood flow as well as inhibition of oxygen transfer from haemoglobin to tissue cells (due to the Bohr effect). (Pryor & Prasad 2002)

This leads to an accumulation of incompletely oxidised products of metabolism due to the activation of anaerobic energy pathways. The products of the anaerobic pathway are acids (lactic acid, pyruvic acid). (Fried 1987)

•Fried R 1987 Hyperventilation Syndrome John Hopkins University Press
•Pryor J Prasad S 2002 Physiotherapy for respiratory and cardiac problems (3rd edition) Churchill Livingstone Edinburgh

Fluctuating Alkalosis

Lum notes, "Alkalosis alone cannot fully explain the symptoms. Altitude adaptation allows residents of high altitudes to remain well, despite chronic respiratory alkalosis. In symptomatic hyperventilation however, the PCO_2 fluctuates, often wildly, *causing constantly changing pH in nerve cells and tissue fluid to which no adaptation is possible*….Significant amounts of CO_2 can be lost in a few minutes of overbreathing, immediately causing respiratory alkalosis. Compensation, by excretion of bicarbonate, is relatively slow and may take hours or days."

Lum L 1994 Hyperventilation Syndromes In : Timmons B Ley R. (eds) Behavioral and Psychological Approaches to Breathing Disorders. Plenum Press New York

Bohr effect

The Bohr effect states that an increase in alkalinity (decrease in CO2) increases the affinity of Hemoglobin for O2, (Note : the lungs are more alkaline than the rest of the body - enhancing O2 uptake). The O2 molecule is therefore less likely to release its oxygen in an alkaline environment

Increased 02-Hemoglobin affinity also leads to changes in serum calcium & red cell phosphate levels (Levitsky 1995, George 1964)

The resulting hypoxia shifts the system from oxidative to anaerobic metabolism, resulting in increased lactic acid.

Muscles become prone to fatigue, dysfunction (e.g. cramp), and trigger point evolution.

Loss of intra-cellular Mg occurs as part of the renal compensation mechanism for correcting alkalosis.

Supplementary magnesium can correct a tendency to hyperventilation. (Pereira 1988)

•George S 1964 Changes in serum calcium, serum phosphate and red cell phosphate during hyperventilation. New Engl J Med, 1964; 270:726-728

•Pereira O 1988 The Hazards of Heavy Breathing, New Scientist, Dec: 46-48

•Levitsky 1995 L Pulmonary Physiology, McGraw Hill, 4th Edition.

Physiological responses to Bohr effect

- **Bicarbonate is excreted to balance pH, depleting plasma buffer capacity.**
- **A shift occurs in the electrolytic makeup of the extracellular fluid, involving loss of cations Ca, K, Mg.**
- **As bicarbonate levels in the plasma changes, there is disruption of the formation of proteins, nucleic acids, lipids & carbohydrates, and a change in the carboxylation intensity.**
- **As the Bohr effect comes into operation, ischemia increases, oxygenation decreases, as does the formation of ATP.**
- **Smooth muscle constriction occurs**

Courtney R 2002 The Buteyko Method, an osteopathic approach to asthma. Osteopathy Today July 2002 pp14-19

Physiology of smooth muscle constriction

"Sympathetic activity resulting in catecholamine release is termed adrenergic stimulation…. In general alpha-adrenergic receptors are found in *smooth-muscle* (gut, blood vessel walls etc) and stimulation of those receptors produces constriction of the smooth muscle. In the blood vessels this means they get narrower, and blood flow is restrained. Beta-adrenergic receptors are found in some blood vessel smooth muscle (and in heart muscle), in those cases, adrenergic stimulation will inhibit muscle constriction, allowing dilation…and less restrained blood flow" (Naifeh 1994)

Naifeh K 1994 Basic Anatomy and Physiology of the Respiratory System, In : Timmons B Ley R. (eds) Behavioral and Psychological Approaches to Breathing Disorders. Plenum Press New York

Colonic spasm

Symptoms attributable to hyperventilation are common among patients with the irritable bowel syndrome. A study was conducted to assess the effects of hyperventilation on colonic tone and motility and to discover if hypocapnia was critical to elicit the response.

Hypocapnic hyperventilation (low CO2 blood levels) unlike eucapnic hyperventilation (normal CO2 blood levels) produces an increase in colonic tone and phasic contractility in the transverse and sigmoid regions.

The findings are consistent with inhibition of sympathetic innervation to the colon, or direct effects of hypocapnia on colonic smooth muscle, or both. These physiological gut responses suggest that some of the changes in colonic function are caused by altered brain or autonomic control mechanisms.

Ford MJ, Camilleri MJ, Hanson RB, 1995
Hyperventilation, central autonomic control, and colonic tone in humans Gut 37:499-504

Pseudo coronaries and HVS

A study evaluated a series of 45 patients with chest pain, who had normal coronary arteries on angiography, and who were ultimately diagnosed with HVS/BPD.

Over a 3.5 year average follow-up 67% had made subsequent emergency visits for chest pain, and 40% had been re-admitted to rule out myocardial infarction. (Newton 2000)

The implication is that many individuals with HVS/BPD experience severe and genuinely distressing symptoms, and represent a considerable medical expense in excluding more serious pathology

Newton E 2001 Hyperventilation Syndrome http://www.emedicine.com/

Smooth Muscle Cells (SMC) & fascial contraction

•Staubesand & Li (1996, 1997) studied fascia in humans with electron photomicroscopy and found smooth muscle cells widely embedded within the collagen fibres. They describe a rich intrafascial supply of capillaries, autonomic nerves and sensory nerve endings and concluded that these intrafascial smooth muscle cells enable the autonomic nervous system to regulate a fascial pre-tension, independently of muscular tonus.
•They suggest that this understanding of fascia as an actively adapting organ may have far reaching clinical implications.
•Schleip (2002) notes that elevated pH (alkalinity), resulting from hyperventilation, would produce smooth muscle contraction and even spasm in fascial tissues

•Schleip R 2003 Fascial plasticity - a new neurobiological explanation Journal of Bodywork and Movement Therapies 7(1):11-19
•Staubesand J, Li Y 1996 Zum Feinbau der Fascia cruris mit besonderer Berücksichtigung epi- und intrafaszialer Nerven. Manuelle Medizin 34:196-200
•Staubesand J, Li Y 1997 Begriff und Substrat der Faziensklerose bei chronisch-venöser Insuffizienz. Phlebologie 26: 72-79

Other SMC sites in connective tissue

There is increasing interest on the possible effects that active SMC contractility may have in the many fascial/connective tissue sites in which their presence has now been identified, including cartilage, ligaments , spinal discs and the lumbodorsal fascia.

•Ahluwalia S 2001 Distribution of smooth muscle actin-containing cells in the human meniscus Journal of Orthopaedic Research 19(4)659-664
•Hastreite D et al 2001 Regional variations in cellular characteristics in human lumbar intervertebral discs, including the presence of -smooth muscle actin. Journal of Orthopaedic Research 19(4):597-604
•Meiss RA 1993 Persistent mechanical effects of decreasing length during isometric contraction of ovarian ligament smooth muscle. J Muscle Res Cell Motil 14(2): 205-18
•Murray, M Spector, M 1999 Fibroblast distribution in the anteromedial bundle of the human anterior cruciate ligament: the presence of alpha-smooth muscle actin-positive cells Journal Of Orthopaedic Research 17(1):18-27
•Yahia L, Pigeon P DesRosiers E 1993 Viscoelastic properties of the human lumbodorsal fascia Journal of Biomedical Engineering 15:425-429

Assessing HVS/BPD : Breath holding tests

1. While no standardised test yet exists breath-hold times are recorded by many clinicians as a part of HVS/BPD assessment. Failure to hold an inhaled breath beyond 30 seconds is considered to be a positive diagnostic sign of chronic hyperventilation. (Gardner 1996) In practice chronic hyperventilators seldom hold beyond 10-12 seconds before gasping.
2. Control pause: a normal exhalation is held until a distinct sensation of slight lack of air is experienced, at which time breathing recommences, *without loss of control of the shallow rhythm* (i.e. the control pause is not followed by a deep breath). 'Normal' is thought to be between 25 to 30 seconds. Under 15 is thought to represent a low tolerance of CO2. In the Russian Buteyko system (1990) the control pause is practised a number of times daily to encourage an increase in CO2 tolerance.

Gardner W N 1996 The Pathophysiology of Hyperventilation Disorders. Chest Vol. 109. p. 516-534
Buteyko K 1990 Buteyko Method : Experience of application in Medical Practice Patriot, Moscow

The Nijmegen Questionnaire

The Nijmegen questionnaire provides a non-invasive test of high sensitivity (up to 91%) and specificity (up to 95%) (Van Dixhoorn et al 1985 p. 199-206). This easily administered, internationally validated (Vansteenkiste et al 1991 p.393-99), diagnostic questionnaire is the simplest, kindest and to date most accurate indicator of acute and chronic hyperventilation. The questions enquire as to the following symptoms, and their intensity:

Feelings of constriction in the chest, shortness of breath, accelerated or deepened breathing, inability to breathe deeply, feeling tense (the questionnaire avoids the use of the work anxiety), tightness around the mouth, stiffness in the fingers or arms, cold hands or feet, tingling fingers, bloated abdominal sensation, dizzy spells, blurred vision, feeling of confusion or losing touch with environment.

•Van Dixhoorn J, Duivenvoorden HJ .1985. Efficacy of Nijmegen questionnaire in recognition of the hyperventilation syndrome. *Journal of Psychosomatic Research.* 29:199-206.
•Vansteenkiste J, Rochette F, Demedts M. 1991.Diagnostic tests of hyperventilation syndrome. *European Respiratory Journal* 4:393-399

Nijmegen Questionnaire	Never 0	Rare 1	Sometimes 2	Often 3	Very Often 4
Chest Pain					
Feeling tense					
Blurred vision					
Dizzy spells					
Feeling confused					
Faster or deeper breathing					
Short of breath					
Tight feeling in chest					
Bloated feeling in stomach					
Tingling fingers					
Unable to breathe deeply					
Stiff fingers or arms					
Tight feeling around mouth					
Cold hands or feet					
Palpitations					
Feelings of anxiety					

Total: /64*

Patients mark with a tick how often they suffer from the symptoms listed. A score of 23/64 is diagnostic of hyperventilation syndrome

Normal and abnormal respiration

X

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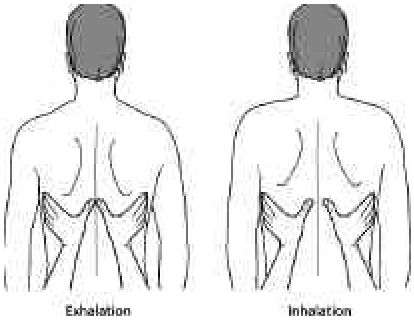
V

V

Lateral expansion assessment



In some individuals a normal abdominal excursion is seen with minimal lateral expansion

Hi-Lo test

X

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are needed to see this picture.

Paradoxical breathing in which upper chest moves cephalad and the abdomen retracts on inhalation

Elevation of clavicles with upper chest breathing

QuickTime™ and a
Photo - JPEG decompressor
are needed to see this picture.

<u>Shortness of *scalenes, SCM, pectorals and upper trapezius*</u> are likely with this pattern of breathing, together with inhibition of their antagonists, and the evolution of trigger points

Breathing retraining efficacy

Breathing therapy was evaluated in patients with HVS.
The diagnosis was based on the presence of several stress related complaints, reproduced by voluntary hyperventilation.
Patients with organic diseases were excluded.
Most patients met the criteria for an anxiety disorder.
Therapy was conducted in the following sequence:

- **brief, voluntary hyperventilation to reproduce the complaints in daily life**
- **reattribution of the cause of the symptoms to hyperventilation**
- **explaining the rationale of therapy–reduction of hyperventilation by acquiring an abdominal breathing pattern, with slowing down of expiration**
- **breathing retraining for 2 to 3 months by a physiotherapist.**

After breathing therapy, the sum scores of the Nijmegen Questionnaire were markedly reduced. A canonical correlation analysis relating the changes of the various complaints to the modifications of breathing variables showed that the improvement of the complaints was correlated mainly with the slowing down of breathing frequency

Han J, Stegen K, De Valck C et al 1996 Influence of breathing therapy on complaints, anxiety and breathing pattern in patients with hyperventilation syndrome and anxiety disorders Journal of Psychosomatic Research 41(5):481-493

Enhanced postural control following breathing training

Aust and Fischer, investigated whether psychophysical breath work influenced postural contrtol
There were 3 groups of test subjects, each with 17 healthy people as follows: Group 1: advanced in breath training; Group 2: beginners in breath training; Group 3: no experience in breath work at all.
Results: Compared to the subjects without breath work experience (Group 3), Groups 1 and 2 had significantly better results in posturo-graphic test with visual feedback. Additionally, the posturo-graphic results immediately following one hour of breath work demonstrated clear improvements in body equilibrium.
Conclusions: Breath work leads to a general improvement of the body equilibrium which remains stable over time.

Aust G Fischer K. 1997 Changes in body equilibrium response caused by breathing. A posturographic study with visual feedback. *Laryngorhinootologie* 76(10): 577-82. Oct 1997

Retraining essentials

Breathing retraining requires a combination of elements that also seem to operate in postural retraining (such as Alexander technique):

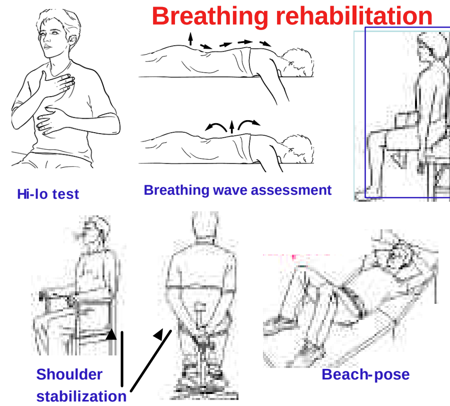
- ***Understanding* the processes … a cognitive, intellectual, awareness of the mechanisms and issues involved in breathing pattern disorders**
- **Retraining exercises that include aspects that operate *subcortically*, allowing replacement of currently habituated patterns with more appropriate ones**
- **Biomechanical *structural modifications* that remove obstacles to desirable and necessary functional changes**
- ***Time* for these elements to merge and become incorporated into moment-to-moment use patterns**

Inhibiting Shoulder Rise

When applying breathing retraining it is important to teach tactics that restrict over activity of accessory breathing muscles, in order to reduce 'shoulder rising' on inhalation. The methods might include:

- **Pushing elbows/forearms onto arms of chair, on inhalation**
- **Arms behind back, grasping wrist with other hand and pulling down, on inhalation**
- **Reclining with hands behind head ('beach pose') to open chest and reduce shoulder movement**
- **Interlocking hands on lap and applying finger-pad pressure to dorsum of hands, on inhalation, to inhibit shoulder movement**
- **Adopt Brugger's relief position**

Breathing rehabilitation

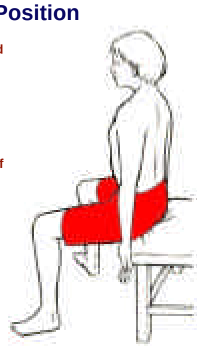


Brugger's Relief Position
Perch on chair edge, arms hanging down, feet below knees & slightly apart & turned outward. Roll pelvis forward to produce slight low back arching. Ease sternum slightly forward and up. Turn arms outward, palms facing forward, until thumbs face slightly back. Tuck chin in. Practice slow, pursed lip, antiarousal breathing.

Brugger's Relief Position

Brügger's relief position facilitates muscles which tend to inhibition, and reciprocally inhibits muscles which tend to shortening.

- **Sit close to the edge of chair('perch'), arms hanging down**
- **Place feet directly below knees - then move them slightly more apart, and turn them slightly outward**
- **Roll pelvis slightly forward to produce small degree of arching of low back**
- **Ease your sternum slightly forward and up**
- **Turn arms outward , so that palms face forward**
- **Separate fingers until thumbs face slightly backward**
- **Tuck chin in**
- **Maintain this posture while practicing 4 or 5 cycles of 'anti-arousal breathing'**
- **Repeat whenever you sense muscle tension during sitting, or if you feel the need for deeper breathing.**
- **This 'relief' posture ensures that the chest is as free and open as possible ,and reverses many of the stresses caused by long periods of sitting**



Pursed lip breathing

Pursed lip breathing, combined with diaphragmatic breathing, enhances pulmonary efficiency.

Patient is seated or supine with dominant hand on the abdomen and the other hand on the chest

The patient is asked to breathe in through the nose and out through the mouth, with pursed lips, ensuring diaphragmatic involvement by means of movement of the abdomen against the hand on inhalation.

Exhalation through the pursed lips is performed slowly, and has been shown to relieve dyspnoea, slow the respiratory rate, increase tidal volume, and to help restore diaphragmatic function (Tisp 1986, Faling 1995)

- **Faling L 1995 Controlled breathing techniques and chest physical therapy in chronic obstructive pulmonary disease. In Casabur R. ed Principles and Practices of pulmonary Therapy WB Saunders Philadelphia**
- **Tisp B, Burns M, Kro D, Kao D, Madison R, Herrera J. 1986 Pursed lip breathing using ear oximetry Chest 90:218-221**

Antiarousal Breathing exercise

- Sit or recline comfortably, and exhale slowly and fully *through pursed lips*.
- Imagine a candle flame about 6 inches from your mouth and blow a thin stream of air at it
- As you exhale count silently to establish the length of the outbreath
- When you have exhaled fully, without strain, pause for a count of 'one', then inhale through the nose
- Full exhalation creates a 'coiled spring', making inhalation easier
- Count to yourself to establish how long your in-breath lasts.
- Without pausing to hold the breath, exhale slowly and fully, through pursed lips, blowing the air in a thin stream, and pause for a count of one.
- Repeat the inhalation and exhalation for not less than 30 cycles
- After some weeks of daily practise you should achieve an inhalation phase which lasts 2 to 3 seconds, and an exhalation phase of 6 to 7 seconds - without strain
- Exhalation should always be slow and continuous, there is little value in breathing the air out in 2 seconds and then simply waiting until the count reaches 8 before inhaling again!
- Feelings of anxiety and pain should reduce with this exercise
- Practise twice daily, and repeat the exercise for a few minutes (6 cycles takes about a minute) every hour if anxious, or when stress increases
- Practise on waking, and before bedtime, and if at all possible before meals

Cappo B Holmes D 1984 Utility of prolonged respiratory exhalation for reducing physiological and psychological arousal in non-threatening and threatening situations J Psychosomatic Research 28(4)pp265-273
Grossman P et a l 1985 A Controlled study of breathing therapy for treatment of hyperventilation syndrome J Psychosomatic Research 29(1)pp49-58

Suggested manual treatment sequence for HVS/BPD

Treatment & retraining commonly involves 12 weekly sessions, followed by treatment sessions every 2 to 3 weeks, to approximately 6 months.
An educational component should be included at each session.

First 2 sessions (not less than weekly)

- **Upper fixators/accessory breathing muscle (upper traps, levator, scalenes/SCS,pecs, lats) release/stretch + attention to trigger points**
- **Diaphragm area (anterior intercostals, sternum, abdominal attachments costal margin, QL/psoas) release/stretch + attention to trigger points**
- **Retraining : pursed lip breathing/control pause/restricting tendency for shoulder rise with upper chest pattern**

Sessions (weeks) 3 & 4

- **As above + mobilization of thoracic spine and rib articulations (+ lymphatic pump)**
- **Address fascial and osseous links (cranial, Pelvic, lower extremity)**
- **Retraining : antiarousal breathing pattern, plus specific relaxation methods (autogenics, visualisation, meditation etc), stress management**

Sessions (weeks) 5 to 12

- **As above + other body influences (ergonomics, posture)**
- **Retraining: additional exercises as appropriate**

Weeks 13 to 26

- **Review and treat residual dysfunctional patterns/tissues**

Plus, as indicated : nutrition, counselling, stress management
Adjunctive methods : hydrotherapy, tai chi, yoga, Pilates, massage, acupuncture......................etc

Elevated first rib assessment

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When the first rib is elevated it will be sensitive to light pressure, and fails to return to its neutral position on exhalation. Shortness of associated ***scalene*** muscles is probable, together with trigger point activity. Right side elevated 1st rib is commonest.

Ribs 2-12 assessment and MET treatment positions

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Ribs 2-10

Ribs 11,12

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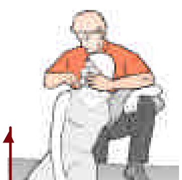
Assessing rib movement, supine and prone

Muscle energy technique treatment of 1st rib, elevated and depressed upper ribs

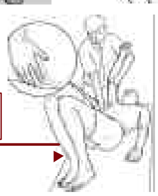
Osteopathic lower rib mobilisation methods

Positional Release rib techniques



PRT Elevated 1st rib

PRT depressed ribs 2-12



PRT elevated ribs 2-12

Note : ideal leg, head, arm positions vary, considerably these are examples only

Evaluating & mobilizing thoracic restrictions

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Muscle Energy Techniques:

Engage restriction barriers - patient introduces mild isometric contraction against resistance - practitioner engages the new barrier - process is repeated

Functional Assessments for Postural Muscle Overactivity/Shortness

Assessing :

Upper trapezius/Lev. Scapula over-activity

A= Normal psoas

B =Psoas shortness

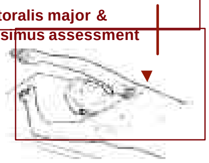
Quadratus lumborum Over-activity

Assessing shortness of additional postural muscles associated with breathing

For *QL, psoas, upper trapezius, levator scapula* overactivity +/or shortness, see previous slide : Functional Assessments and also 'Hi-lo' test

NOTE: Overactive postural muscles automatically shorten

Pectoralis major & latissimus assessment



A

B

Cervical flexion test for shortness of SCM

A= normal B= chin 'pokes' with shortened SCM

For shortness of *scalenes & SCM* see also elevated 1st rib and clavicular assessments

Muscle Energy Techniques for Accessory Breathing Muscles

MET treatment of posterior, medial and anterior Scalenes

MET treatment of sternocleidomastoid

MET assessment and treatment of levator scapula

MET treatment of posterior, medial and anterior upper trapezius

Muscle Energy Techniques for Accessory Breathing Muscles #2

MET treatment of latissimus dorsi & quadratus lumborum

MET treatment of psoas

NOTE :
Both QL and psoas fibres merge with the diaphragm and can profoundly influence respiratory functions when short.

MET treatment of pectoral muscles

Ave Maria, Yoga Mantra, as modulating methods for breathing

The respiratory (and cardiovascular) effects of rosary prayer ('Ave Maria' in Latin) and recitation of a yoga mantra were assessed.

Results were similar, showing a slowing of respiration to approximately 6cpm, and synchronization of all cardio-vascular rhythms (Traube-Hering-Meyer/THM) oscillations, representing blood pressure, heart rate, cardiac contractility, pulmonary blood flow, cerebral blood flow and movement of CFS).

This influence on autonomic activity, represented by THM oscillations, may offer great benefits to health.

Bernardi L Sleight P et al 2001 Effect of Rosary Prayer and Yoga Mantras on Autonomic Cardiovascular Rhythms. British Medical Journal 323:1446-1449

Take it as red: white wine does you good

(London *Times* May 21 2002)

Mark Henderson - Science Correspondent

Researchers found that people who drink white wine on a regular basis have healthier lungs than those who never touch it. The results of the study were presented (20 May 2002) at The American Thoracic Society's conference in Atlanta, Georgia.

Holger Schunemann, the study's leader, said: "This finding may indicate that nutrients in wine are responsible for the positive effect of alcoholic beverages on lung function. Red wine in moderation has been shown to be beneficial for the heart, *but in this case the relationship was stronger for white wine*."

- **1,555 volunteers completed questionnaires that assessed alcohol consumption and other aspects of their lifestyles.**
- **They then took two standard lung-function tests - forced vital capacity (FVC) — and the volume that can be expelled in one second (FEV1).**
- **Both a recent and a lifetime history of moderate wine drinking, particularly with white wine, were associated with high readings for FVC and FEV1 lung capacity.**

The benefits possibly come from compounds such as phenols and flavonoids, abundant in wine, which reduce oxidative stress.