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Breathing Patterns, Connective Tissue and Soft-Shelled Eggs

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If the title of this article stirs your curiosity, hopefully by the end all should be clear, and you will be able to explain to a colleague just how increased levels of pain, soft-shelled eggs, and how you breathe are linked.

With implications ranging from increased fascial tone to colonic spasms, menstrual distress, pseudo-angina attacks, epileptic seizures, profound fatigue, muscle cramps, brain-fog, lowered pain thresholds, sympathetic arousal, increased sensitivity to light and sound, and feelings of extreme anxiety - I hope you will see I am not exaggerating when I say this is a topic worth understanding![22] This is a topic likely to be particularly relevant to your work with vulnerable, chronically painful and fatigued patients.

Why Me?

Before making these connections, though, I need to offer a brief summary of a personal health episode. I have shared this information with various audiences before (e.g., AMTA Conference, Nashville, October 2004), when attempting to highlight just how powerful and immediate the effects of respiratory alkalosis can be.

Back in 1998, I had flown from London to Edinburgh to make a video for my publishers to accompany my book on muscle energy techniques. It was a long day in a hot studio, accompanied by time pressures relating to the need to complete the shoot on time, and I had a plane to catch. I had skipped breakfast, consumed more coffee than usual, and had forgotten to drink enough water. These details are all relevant to what followed, as will become clear. Around mid-afternoon, I felt a strange sensation in my left leg. A mild tingle was passing down toward the foot, before fading away. This repeated itself a number of times over a period of an hour or so, but I paid little attention and focused on the details of the video shoot. The next day, safely back in London, the same mild symptom became more insistent and frequent, and then started to affect my left arm as well. Within an hour or so, it was accompanied by a strong spasm of the left leg and arm

muscles, and finally of the whole left side of my body, including my face. This tetanic seizure convinced me I was having a stroke, and so I headed rapidly to the emergency room of my local hospital.

To cut a long story short, I was admitted to a neurological ward, spent a week being prodded, poked, observed and investigated - including a battery of neurological tests, cardiac investigations, blood tests and MRI scans. Nothing was found to be abnormal (not bad for a 60-year-old!). Finally, an enlightened neurologist had me wired up to an ECG machine, and asked me to breathe rapidly for two minutes. Within 30 seconds, all of my symptoms came back, with a severe contracture affecting my left side from face to foot.

"Ah," said this gifted physician (him, not me). "Your problem is hyperventilation. Go away and learn how to breathe." I did.

This life-changing experience turned out to be a turning point in my life and career focus. As a moderately successful osteopath and naturopath, I had long been aware of the importance of balanced breathing and had written about it in relation to stress management. But now, following this episode (which has never recurred), the topic became a virtual obsession. As mentioned in a previous article in *Massage Today* (April 2005), when I feel I need to study a subject deeply, I write a book about it. The end result of this experience was a text co-authored with physical therapist Dina Bradley and psychologist Chris Gilbert.[6]

I have spent the past seven or eight years with breathing pattern disorders as a top priority (for myself and my patients), and have studied as many aspects of breathing dysfunction and rehabilitation as I could. I am convinced this should be among the most important aspects of the work of all those engaged in health care, particularly manual and massage therapists.

Alkalosis

So, what actually happens when we overbreathe? I will try to summarize a complicated sequence: As we exhale, we eliminate carbon-dioxide (CO_2). This is recruited from carbonic acid that circulates in the blood. If breathing is more rapid than is ideal for the current needs of the body, we lose too much CO_2 (and therefore carbonic acid), and the blood becomes more alkaline than normal.[16] This creates a state of *respiratory alkalosis*: the blood's pH moves from a normal of around 7.4 to perhaps as much as 7.5.[16] Not much change, you might say, but what a difference it makes! The effects are dramatic. Anxiety appears (and therefore, so does even faster breathing) - aggravating the feelings of anxiety or even panic.[10,13] Smooth

muscles constrict. And since these surround all of the "tubes" of the body, this creates a narrowing of blood vessels and interferes with normal digestion and bladder function.[9] A process known as the Bohr effect starts, causing the red blood cells to bind more tightly to the oxygen molecules they carry. This means not only less blood gets to the brain and muscles, but also less oxygen is released by the blood that does get through, creating profound fatigue and a lack of mental clarity or "brain-fog."[22] Sympathetic arousal occurs, creating altered neural function - more rapid reflex functions, lowered pain threshold, and sensitivity to all stimuli.[23] Balance is disturbed.[2] The kidneys try to rebalance the increased alkalinity by excreting bicarbonates, and a generalized imbalance occurs in the calcium and magnesium levels in the body, causing even more neurological mayhem, with cramps and spasms becoming more likely, accompanied by numbness, pins and needles and possibly pain.[12] These changes provide a superb environment for the evolution of myofascial trigger points, as these are known to evolve in ischemic tissues where oxygen levels are low.[18] All this is pretty terrifying, and does little to calm the breathing rate!

Chronic fatigue and chronic pain problems (such as fibromyalgia) are characterized by just such breathing patterns, as are a host of other health problems, most of which can at the very least be improved by better breathing, while many can be completely eliminated.[4,20] All of these symptoms are more likely in deconditioned individuals, because of the way their cells produce ATP (energy) in an anaerobic environment, creating acid wastes that then further stimulate the breathing rate.[16]

How Widespread Are BPDs?

Breathing pattern disorders or BPDs (about which the notes above offer a description) are up to seven times more common in women and are more likely during the post-ovulation/premenstrual period because of increased progesterone levels.[7] And they are much more likely to manifest when blood sugar levels are low. Recall my lack of breakfast, my coffee intake and dehydration.[3] It has been estimated that the symptoms of at least 10 percent of all people seeking medical advice in the U.S. are the result of a BPD.[13,15,16]

Habit

Why do so many people breathe in an upper-chest, rapid pattern? There are many reasons for feeling anxious and stressed, or holding an "image" posture with a protruding chest and flat stomach, or of having mild asthmatic tendencies. But according to experts who have spent their professional lives studying breathing pattern disorders in general and hyperventilation in particular, whatever the background or original trigger, the main cause is pure habit.[15]

As a person becomes habituated to shallow breathing, the body learns to tolerate very low levels of CO_2 in the blood and this becomes the "normal" for that person. In order to maintain this low CO_2 level, rapid upper chest breathing is necessary. Relearning to tolerate higher levels of CO_2 is a useful part of breathing retraining, achieved by focus on a slow exhalation and sometimes by specialized breath holding exercises based on the Russian Buteyko system.[5,8]

It's useful when thinking about the "habit" of upper chest breathing to think of another common habit: poor posture. The slouched, round-shouldered, chin-poked, belly-sagging posture of so many people is something of which we as bodyworkers are all too aware.[22] How do you change poor posture into better posture? By retraining (such as the Alexander technique), combined with appropriate therapeutic interventions to stretch tight muscles and tone weakened ones, often aided by home-work such as Pilates-type exercises. Slowly, over a period of months, it often is possible to turn poor posture into better, or even good, posture.

Exactly the same applies to breathing pattern disorders. Manual therapy/massage methods are helpful in preparing the structures for better breathing and the person needs to do homework to re-establish a better pattern. This has, in many studies often involved severely anxious hyperventilators or people with severe balance disorders, taken up to six months to normalize, with some people improving within a few weeks.[10,19]

Asthma[14]

Mild forms of asthma and hyperventilation are almost identical, and the diagnosis given depends on the particular training of the doctor making the call. This can be pretty important because mild hyperventilation is curable, while a diagnosis of asthma often is a sentence to a lifetime of medication.

The Fascial Connection

As mentioned earlier, contractile smooth muscle cells have been found to be present in enormous numbers in most connective tissue. Their main function appears to be that, following injury, proliferation occurs allowing them to act as architectural supports to the damaged tissue as it heals.[21] The cells in connective tissue, like other contractile smooth muscle cells, are affected by changes in pH[21] (as in respiratory alkalosis), suggesting that a generalized increase in fascial tone occurs as pH rises, making all muscles feel more tense and impacting directly on musculoskeletal integrity. Just how much effect pH changes have on these cells remains a matter of ongoing research, and I hope to report to you on this when results

emerge.[1,11,24]

A Fowl Story[17]

During the 1980s, a commercial egg farmer noticed his hens were laying soft-shelled eggs. The birds were being housed in very crowded and hot conditions, and the option of making them free range or installing air-conditioning was not economically possible. Veterinary experts decided that, as the birds were obviously hyperventilating, their calcium metabolism was disturbed, leading to the egg problem. They provided the hens with carbonated water (CO_2 dissolved in water), and shortly after that, the egg quality returned to normal.

What we can learn from this is that the symptoms of hyperventilation (calcium disturbance in this instance) can be modified by biochemical interventions. The farmer's problem was solved, but the stress of the chickens was untouched. Other choices might have been tried - for example calming music, soothing aromas, massage, craniosacral therapy or even reflexology - any or all of which might well have had a calming effect, resulting in slower breathing. But what would have really helped the chickens was unavailable (free range life, air conditioning, etc).

Now consider your stressed, highly pressured patients, with multiple minor symptoms. Through massage and/or reflexology and/or aromatherapy you probably offer such complex, highly stressed individuals safe, symptomatic relief and moments of calm. This helps them cope with their own version of the hell the chickens were enduring. But what would help them most would probably be a cash infusion, a new job, a new hip, possibly a new relationship/spouse or some other life-changing event you are quite unable to provide. But you can teach them to respond to the stress/pain/fatigue differently; and you can efficiently and gently soften and mobilize their tense tissues. And above all, you can learn how to teach them to breathe differently.

Please let the editor of *Massage Today* and/or me know if you would like this particular article to be followed up with more detail on breathing rehabilitation from the perspective of a bodyworker.[2,6,8]

References

1. Ahluwalia S, 2001. Distribution of smooth muscle actin-containing cells in the human meniscus *Jnl. Orthopaedic Research*;19(4)659-664.

2. Aust G Fischer K, 1997. Changes in body equilibrium response caused by breathing. A posturographic study with visual feedback. *Laryngorhinootologie* 76(10):577-582.
3. Brostoff J, 1992. *Complete Guide to Food Allergy*. Bloomsbury, London.
4. Brucini M, et al., 1982. Pain thresholds and EMG features of periarticular muscles in patients with osteoarthritis of the knee. *Pain*;10:57-66.
5. Buteyko K, 1990. *Buteyko Method: Experience of Application in Medical Practice Patriot,* Moscow.
6. Chaitow L, Bradley D Gilbert C, 2002. *Multidisciplinary Approaches to Breathing Pattern Disorders*. Churchill Livingstone, Edinburgh.
7. Damas-Mora J, et al., 1980. Menstrual respiratory changes and symptoms. *British Journal of Psychiatry*;136:492-497.
8. Faling L, 1995. Controlled Breathing Techniques and Chest Physical Therapy in Chronic Obstructive Pulmonary Disease. In: Casabur R. editor. *Principles and Practices of Pulmonary Therapy*. WB Saunders, Philadelphia.
9. Ford MJ, Camilleri MJ, Hanson RB, 1995. Hyperventilation, central autonomic control and colonic tone in humans. *Gut*;37:499-504.
10. Han J, Stegen K, De Valck C, et al., 1996 Influence of breathing therapy on complaints, anxiety and breathing pattern in patients with HVS and anxiety disorders. *Journal of Psychosomatic Research*;41(5):481-493.
11. Hastreite D, et al., 2001. Regional variations in cellular characteristic in human lumbar intervertebral discs, including the presence of smooth muscle actin. *J Orthopaedic Res*;19(4):597-604.
12. Macefield G, Burke D, 1991 Parasthesia & tetany induced by voluntary hyperventilation. *Brain*;114:527-540.
13. Lum L, 1984. Editorial: Hyperventilation and anxiety state. *Journal Royal Society Medicine*;January:1-4.
14. Lum C, 1996. Hyperventilation and asthma: the grey area. *Biological Psychology*;43(3):262.
15. Lum L, 1994. Hyperventilation Syndromes. In: Timmons B, Ley R (eds). *Behavioral and Psychological Approaches to Breathing Disorders*. Plenum Press, New York.
16. Nixon P, Andrews J, 1996. A study of anaerobic threshold in chronic fatigue syndrome (CFS) *Biological Psychology*;43(3):264.
17. Odom TW, et al., 1985. The effects of drinking carbonated water on the egg shell quality of single comb white leghorn hens exposed to high environmental temperature. *Poultry Science*;64:594-596.

18. Perri M, Halford E, 2004. Pain and faulty breathing - a pilot study. *Journal Bodywork & Movement Therapies*;8(4):237-312.
19. Pryor J, Prasad S, 2002. Physiotherapy for respiratory and cardiac problems (3rd edition). Churchill Livingstone, Edinburgh.
20. Sachse J, 1995. The Thoracic Region's Pathogenetic Relations and Increased Muscle Tension. *Manuelle Medizin*;33:163-172.
21. Spector M, 2000. *Connective Tissue Cells With Muscle: Expression of Muscle Action in and Contraction of Fibroblasts, Chondrocytes, and Osteoblasts*.
22. Timmons B, Ley R (eds), 1994. *Behavioural and Psychological Approaches to Breathing Disorders*. Plenum Press, New York, pp118-9.
23. Winters J, Crago P (eds), 2000. *Biomechanics of Neural Control of Posture & Movement*. Springer, NY.
24. Yahia L, Pigeon P. et al., 1993. Viscoelastic properties of the human lumbodorsal fascia. *Journal Biomedical Engineering*;15:425-429.

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