

Breathing and body-mind balance – new evidence

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A few years back (2002) I co-authored a book on breathing - *Multidisciplinary Approaches to Breathing pattern Disorders*. My co-authors (a physical therapist and a psychologist specializing in pain management) and I gathered together a great deal of information, in order to describe how clinical management of a vast range of conditions (from anxiety, to irritable bowel, head and neck ache, low back pain, pelvic floor dysfunction, fatigue and lowered pain thresholds....to name just some) could be assisted by recognition and rehabilitation of breathing pattern disorders.

Naively, I had imagined that the excitement I felt for the topic would translate into manual and movement therapists, of all schools, rapidly acquiring the information, and then using this for the benefit of their patients/clients. Sadly however, the annual sales of the breathing pattern book have remained modest (if steady). However my excitement over the topic remains as heightened as ever, and this week a new piece of research has got me going again!

A recently published paper by Zieman and colleagues (2009), entitled *The Amygdala Is a Chemosensor that Detects Carbon Dioxide and Acidosis to Elicit Fear Behavior* - offers glimpses of some of the gaps in our knowledge on this fascinating topic.

This research group from the University of Iowa, have explained the mechanism whereby the brain (the amygdala to be precise) is sensitive to increasing acidity, triggering a fear/panic response.

They explain that they have identified that the amygdala is: “*an important chemosensor that detects hypercarbia and acidosis and initiates behavioral responses.*”

They have offered a molecular explanation for how rising CO₂ concentrations triggers intense fear, and provides a foundation understanding one cause of anxiety and panic disorders.

Hypercarbia refers to the physical condition of having the presence of an abnormally high level of carbon dioxide in the circulating blood.

This can occur as a result of poor breathing patterns – literally *hypoventilation* (the exact opposite of over-breathing - *hyperventilation*). Hypoventilation leads to higher levels of CO₂ than is normal in the blood, and respiratory acidosis results.

To clarify my excitement over these findings I need to start somewhere else altogether – with respiratory alkalosis.

When someone over-breathes – an upper chest pattern for example, with the extreme being hyperventilation – levels of CO₂ drop below what is normal – and

alkalosis results.

And when this happens, one of the first symptoms is for the individual to experience apprehension, anxiety, fear.....just as they do with under-breathing and retention of CO₂, as described above.

It seems that high pH (*respiratory alkalosis*) follows on from a period of over-breathing - which can be triggered by the *acidosis* influence on the amygdala, as described in this article. The over-breathing can therefore be seen as a homeostatic response to excess CO₂/acidosis.

Whether acidosis is due to pathology (liver or kidney disease for example) or due to pregnancy or physical exertion, or dietary imbalances – there is clearly an attempt on the part of the body to lower carbonic acid levels via CO₂ elimination in rapid breathing.

If, however this pattern of breathing becomes excessive – as in someone who is a chronic upper-chest breather due to habit - we get to *alkalosis*....and a chain of symptoms, including increased apprehension and anxiety.

So the fear/anxiety outcome appears with both alkalosis and acidosis.

My understanding has always been that the effects of alkalosis are triggered by the respiratory centre, in the posterior aspect of the medulla, below the fourth ventricle.

The really beautiful aspect of all this is the sense of balance - and when we have a lack of that, not only are there physiological consequences, but emotional ones too.

And of course all this works the other way around: fear and anxiety may result from a variety of life-events/circumstances. This will automatically trigger either rapid breathing, or a shut-down/underbreathing response.....

The chicken and egg scenario

How would you as a therapist recognize the possibility of either over- or under-breathing? The symptoms would tell you a lot, as would the observed behaviour of the person sitting in front of you as you take their case details.

Rapid breathing perhaps? Air-hunger –attempts to inhale - like a fish out of water? Speaking quickly, with irregular stops to grab a breath of air?...and a list of symptoms as outlined earlier in this article .

Now that describes the hyperventilation end of the spectrum. At the other end you may have the virtually frozen breathing pattern – very superficial, with breath-holding a feature.

In either case, breathing rehabilitation is called for – and this involves both manual work to free-up the thoracic cage, diaphragm etc – as well as gentle exercises for home use.because without regular home application of retraining, there is no real chance of recovery.

I recommend the breathing pattern book (available new or second hand on Amazon!) - or any other book that describes the process of retraining breathing.

REFERENCES

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