pH of soul: how does acid-base balance affect our cognition?
Alireza Farnam*
Clinical Psychiatry Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

**Summary**
Respiratory Alkalosis due to changes in sympathetic hyperarousal during pathological emotional states can change our cognitive abilities. This occurs through the effects of Alkalosis upon cerebral vasoconstriction and the amount of ionized calcium in the serum. The effects on our cognition and “sense of self” could be considerable.

Arousal is the physiological and psychological state at being awake or reactive to stimuli. It involves the activation of “reticular activating system” in the brain, the autonomic nervous system and the endocrine system, leading to a fight and flight response and a condition of sensory alertness, mobility and readiness to response. Actually any state we experience inside ourselves, whether thought, imagination, memory, emotion, etc., if it would be stimulating enough, can elevate our arousal level. In higher arousal level, the body demands more oxygen and then excretes more CO₂. When arousal passes the optimal level, hypocapnia shows its undesirable effects through producing alkalis.

Alkalosis paves the way for two main events;
1. Diminishing the amount of ionized calcium
2. Constricting the brain’s blood vessels

Diminished ionized calcium keeps the neurons and muscles in an irritable state; hence numbness or paresthesia ensues especially in hands, around mouth and lips. The spasm also occurs in muscles. Brain vasoconstriction, on the other hand, diminishes the availability of blood to the brain and correspondingly results in symptoms such as dizziness and lightheadedness. Both groups of symptoms can change the person’s sensations of internal milieu. As we know, human’s self-awareness not only perceive outer environment, but also has a kind of intuitional awareness of internal events.

In other words, self-awareness lies between inner and outer world and strong forces from inside put pressure on the self-awareness especially if these forces last for a long period, as it occurs in chronic anxiety disorders, irritability, or in severe and lasting emotions such as irritability.
love, dependence, disgust, grief or irritating memories or thoughts (as in obsessional states). According to Freud’s “nirvana principle,” the dominant tendency of psychic apparatus is to reduce, keep constant, or remove the internal tension due to stimulus excitation to a minimum, though nowadays the concept has been revised and substituted by the concept of keeping the excitation and arousal at the optimal level.

A very old Japanese haiku says; “If you’d like to see the moon's reflection precisely in the pond, it should be still! Otherwise, the reflection would be distorted.” Zen interpreters interpret this haiku as an indication of necessity of emotional calmness and optimality of arousal for correct and precise perceiving of environment. The higher the level of arousal is, the higher the turbulence is and then the more distorted representation of world in the mind. But how this happens?

One explanation could be the occurrence of alkalosis following the hyperpnoea which follows the excitement. Alkalosis in turn causes brain vasoconstriction, and then the processing capability of brain probably diminishes which gives way to misperceiving and misunderstanding. It seems in chronic hyperexcited states such as anxiety disorders, irritability, agitated depression (as a kind of grief reaction in which the behavioral arousal is in the service of searching for the lost object) and even the severe love and longing for an object which is hard to obtain, respiratory alkalosis could be one of the main causing factors of confusion and perplexity. Then one can conclude that respiratory regulation can have a vital role in decision making times, as through the modulation of blood pH, perplexity could be removed, and the person is allowed to see the situation as close to the reality as possible. Great emphasis of ancient Gnostic traditions on respiratory regulation in reaching to clairvoyance could be an indicator that our ancestors had been implicitly aware of the importance of keeping the blood pH in control for the optimal function of our cognition. One practical conclusion of this could be the emphasis upon learning and implementing the “respiratory control techniques” in critical situations such as important decision makings, demanding our higher clear-sightedness.

In this manner, another noteworthy point is the long term effect of respiratory alkalosis on chronic high arousal psychiatric conditions (e.g., anxiety disorders, agitated depression or hypomania) in the “sense of self” of the person. Chronic feeling of trembling tenseness (due to low ionized Calcium level) or dizziness and lightheadedness (due to cerebral vasoconstriction) can influence the afflicted person’s “sense of self” and in turn alter his/her approach towards the world and the immediate environment and its ever changing nature with unpredictable stresses. Our body is the main base and platform for our awareness in the world and any lasting change in this platform, according to Maurice Merleau-Ponti,1 can affect its awareness, approaches to and plans for the events and problems of our environment. Thus it seems that we should regard the blood pH and respiratory patterns in a new light because of their important role in both serious decision makings and chronic psychiatric conditions.

Ethical issues
There is none to be declared.

Competing interests
The author declares no competing interests.

References
1. Sadock BJ, Sadock VA, Ruiz P. Kaplan & Sadock’s Comprehensive Textbook of Psychiatry. 9th Edition. Philadelphia:LWW;2009.
2. Freud S. The Standard Edition of the Complete Psychological Works of Sigmund Freud. 24 vols. London: Hogarth Press; 1953–1974.
3. Merleau-Ponty M. Phenomenology of Perception. London: Routledge; 2002.