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**Psychophysiological States: The Ultradian Dynamics of Mind-Body Interactions**

*by David S. Shannahoff-Khalsa. In book series: International Review of Neurobiology, vol 80. Academic Press/Elsevier, San Diego, CA, 2008, 249 pages, \$149.95.*

Visitors' eyes widen momentarily while scanning this book's cover as the book waits on my credenza, still challenging me for a thoughtful review. None initially reach out for the book, but it leaps to life when conversations turn to periodic changes in the functions of the brain, or to the rich potential of relationships between autonomic functions and mood, cognition, and behavior. This book reveals the importance of alternating dominance of the hemispheres during both waking hours and sleep, and then proposes manipulations using yogic exercises that take advantage of alternating functional dominance. Aspects of the mind-body interface are described, covering a century of contributions that address endogenous ultradian (roughly measured in hours) rhythms of nasal lateralization of air flow and its strong correlation with laterality of brain function. After painstakingly piecing together data from many multimodal western scientific studies

related to physiologic rhythms, the author shows that ancient eastern breathing exercises can influence these rhythms and enhance hemispheric function. He presents, elegantly, considerable evidence that mental states and brain activities are influenced by the autonomic nervous system through distributed links, mainly in the hypothalamus. This principle is emphasized throughout the text. The studies documenting this influence of yogic unilateral forced nasal breathing (UFNB) on brain activity are followed by a brief description of potential benefits for somatic and mental illnesses. His lining notes summarize: "These neural rhythms are a unique step in the evolution of the nervous system that have mostly been ignored or missed in our understanding of physiology, mental activities, brain rhythms, and in the treatment of psychiatric disorders."

A major focus of this book is on the rhythmic mechanisms that may explain these dynamic brain-body relationships, as realizable through UFNB. Unilateral forced nasal breathing may offer a natural approach, analogous in its effects to vagal nerve stimulation or reflex point stimulation. There is sufficient concurrence of putative mechanistic evidence to support a presence and concrete modeling of neural networks underlying the effects of these exercises and stimulations. The coupling of hemispheric alternations to rapid eye movement during sleep is shown by polysomnography. A variety of different and highly structured yogic breathing techniques are formally described. Asymmetric nasal congestion influences on central physiologic laterality have been documented with a variety of techniques, especially the electroencephalogram (EEG). Analyses of the EEG frequency spectrum are explained in terms accessible to the lay reader, while remaining technically accurate and complete. Results using magnetoencephalography (MEG) are also described. Peripheral and neurobehavioral effects of UFNB are documented with studies using multiple measures, including skin conductance, blood pressure, blood glucose, eye blink rates, intraocular pressure, and angina reports ... still an incomplete list of the stack of evidence presented. Globally, it is becoming increasingly irrefutable that rhythmic autonomic mechanisms control our beings.

Western demands for validations of yogic and meditative practices stem, in part, from a duty of science to protect society from false claims. Therefore, scientists are strongly motivated to delve further into studies of phenomena and claims previously recognized as true. There is also a duty to move society forward with alternative (even if not new) solutions to shared problems. Unfortunately, research funding tends to follow the first principle. Here, the author steps outside the safety of common lore, exploring what might seem to be a weak signal. He clearly shows, in a highly scholarly effort, that the scientifically valid evidence from his own published studies and also the work of many others supports further research. Convincing evidence supports an influence of laterality of nasal breathing on laterality of brain function and the existence of ultradian rhythms that govern both. Since UFNB can influence brain laterality and has no adverse effects, it is attractive to test it for benefits in psychopathology. Studies

in normal subjects have shown cognitive benefits with as little as 5 minutes of breathing exercises, with mixed findings in other similar studies. A 1-year open trial of UFNB in 8 patients with obsessive-compulsive disorder (OCD) is described. Details from cited papers recount that 5 of 8 completed the trial, with a greater than 50% reduction in symptoms on the Yale-Brown Obsessive Compulsive Scale (Y-BOCS). A follow-up randomized study was conducted using a unique left nostril pattern of UFNB in half of the sample and comparator standard meditation exercise for the other half. UFNB gave a 38% improvement in Y-BOCS scores after 3 months, while the standard meditation showed no significant change. At 15 months, the Y-BOCS improvement averaged 70%, with a mean group endpoint of 6.6.<sup>1</sup> This would be a stellar outcome for any behavioral or medication trial, and it merits additional sham-controlled trials.

The format of the book follows a logical outline, first showing evidence of spontaneous lateralized rhythms, then discussing their implications for adaptation, homeostasis, and also for psychopathology. Unilateral forced nasal breathing is then introduced as a way of altering or stimulating the lateralized rhythms to enhance function or, potentially, also alleviate symptoms. The print is clear, but layout is sometimes a bit frustrating, especially since the highly informative color plates for the MEG results are at the end of the book.

This volume will serve as a guide for future researchers and will inspire the next generation to move ahead to the dynamic realm—treating the mind through its interactions with the body. These mind-body mechanisms are not confined to UFNB, presented here as a primary model of these interactions. Using this model, patterns of variability in brain and somatic functions are captured, not as static and frozen entities, but as constantly moving networks of coordinated and inseparable parts. From this model, psychiatric practitioners, residents, and students across disciplines can learn about the potential importance of ultradian rhythms in brain function and behavior. This volume will be of great interest to practitioners who already use alternative medicine techniques, presenting detailed instructions for application of breathing exercises for specific patient populations. There may be considerable advantage and certainly no disadvantage to trying these techniques. I feel better already!

#### REFERENCE

1. Shannahoff-Khalsa DS, Ray LE, Levine S, et al. Randomized controlled trial of yogic meditation techniques for patients with obsessive-compulsive disorder. *CNS Spectr* 1999;4(12):34–47.

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