

SCIENTIFIC BASIS OF MAPPING A TECH REVIEW: THE BODY'S TOUCH POINTS TO MEDITATIONAL HEALING

INTRODUCTION

By: the IPHA editorial staff

To evaluate a product that's 3+ years in the market (with countless users both from the public and clinical communities), the reporting team found the best starting point of testing the BrainTap® product should come from its BENEFITS. To do this means defining the body's complex needs and reactive performance to outside influences- hence REVERSE ENGINEERING the device-user relationship. In simpler terms, we need to define the user's physiology where stimulation becomes therapy. We hope to answer questions like:

- What does the body undergo when under meditation?
- How do the healing elements of our body work?
- How can we affect these systems externally?
- How is the body affected by STRESS and ANXIETY?



Confirming the body's interconnected systems (ie. circulatory, cardiovascular, nervous, lymphatic, endocrine etc) and its many touch points for stimulation would offer a more profound understanding about the success of any health-related review. Recognizing the body first provides the basis for identifying Biometrics and the various effects that comprise the device's actual influences on the mind and body.

When tasked to blueprint the approach to analyzing the performance of a health/wellness device (BrainTap®), Drs. Roberta Kline and Lennard Gettz reviewed its marketing content and listed all the developer's claims and proposed functions. It is promoted as "a quick

and easy way to relax, reboot and revitalize by simply optimizing your brain's peak potential—anytime, anywhere." It offers supporting brain health as: a MEDITATIONAL inducer, a BRAIN PERFORMANCE OPTIMIZER and a RELAXER. Aware that these factors would require multiple interest groups meant calling

on various professionals to test drive this product. As IPHA's educational director and science officer, Dr. Kline helped to organize the reporting approach of this review by harnessing her understanding and technical background in energy healing and functional medicine to help in the testing framework of the device.

HEALING, STRESS AND THE PARASYMPATHETIC SYSTEM

Written by: Dr. Roberta Kline



Healing requires proper functioning of all parts of the body, including our hormones, digestive system, immune system, brain, heart-- all the way down to our cells and mitochondria. Stress is part of life, and comes in many forms including physical, emotional, mental and environmental. Foods we eat, unhealthy relationships, difficulties at work, toxins in our environment, even poor posture or lack of sunshine can all create stress on our bodies. But when stress is catastrophic or becomes chronic, it creates imbalances in this functioning that are much more likely to promote disease while at the same time preventing healing from taking place. [1]

With people under record levels of chronic stress, it is no wonder we have an epidemic of people suffering from all sorts of health issues and chronic diseases. Heart disease, diabetes, obesity, pain, anxiety, depression, infertility, cancer, autoimmune diseases such as arthritis, neurodegenerative diseases such as Alzheimer's These are just some of the many health conditions that have been linked to diet and lifestyle including chronic stress. [2, 3]

But how does this work? And is meditation the answer to reversing this trend? Science is revealing some interesting clues.

THE NERVOUS SYSTEM

One big connection is our nervous system. Our nervous system is our superconductor network of information exchange throughout our bodies, and consists of two main parts. The first is the central nervous system (CNS). As it sounds, it's our command center where all data comes to be processed, and is made up of the brain, spinal cord, and nerves. The second is called the peripheral nervous system (PNS) and it connects every part of our body to our CNS through individual nerve cells called neurons and clusters of neurons known as ganglia.

The PNS is further divided into the Somatic Nervous System, also known as the voluntary nervous system, and the Autonomic Nervous System. The Autonomic Nervous System (ANS) manages all bodily functions

that are not under conscious control. This includes heart rate, blood pressure, digestion, respiration, cellular activity, immune system, hormones, brain function, sexual function, and even body temperature.

The ANS is further divided into two parts: the Sympathetic Nervous System (SNS), which regulates our “fight or flight” response, and the Parasympathetic Nervous System (PNS), which controls our “rest and digest” response. They work closely

together in a complex dance, maintaining our bodily functions and ensuring our survival every second of our lives.



Many health issues, including most chronic diseases such as heart disease, autoimmune disease, diabetes, depression and anxiety, and cancer, are related to an **imbalance** of our autonomic nervous system. Most typically, it is too much of the “fight or flight” and not enough of the “rest and digest” that leads us into this imbalance. [4]

FLIGHT OR FLIGHT

The Sympathetic Nervous System is located in the CNS, and in the spinal nerves from T1 (the thoracic region) down to L3 (the lumbar region) out to the neurons in the regions of the body supplied by these nerves. This sympathetic response is designed to keep us safe in the face of immediate danger. It signals the brain to turn up the volume on any physiological function crucial to staying to fight or running away from the source of the danger. Catecholamines such as epinephrine (adrenaline), norepinephrine (noradrenaline) and dopamine are released and a cascade of events happens rapidly – before we are even consciously aware that there is a threat. These include:

- Blood flow diverted to the heart, lungs and skeletal muscle
- Increased heart rate, blood pressure and respiratory rate
- Enlargement of bronchioles (in lungs)
- Dilation of pupils
- Rapid conversion of glycogen to glucose for fuel
- Activation of immune system

All other functions, including digestion, urination, higher level thinking, even sexual function and cellular repair, are temporarily turned off, so that all of our energy and resources go only toward ensuring our immediate survival. If the threat goes on for a longer period of time, a secondary system called the HPA (Hypothalamic – Pituitary – Adrenal) Axis takes over and relies on elevated cortisol and other hormonal changes to continue the high alert state.

But our bodies are not designed to be in this activated high-alert state for long periods of time. Once the immediate threat is gone, we are supposed to go back to our normal state of relaxation. This is the job of the Parasympathetic Nervous System.



REST AND DIGEST

The Parasympathetic Nervous System (PSNS) is located in the brain stem, includes nerves to the eyes and face, vagus and 10th cranial nerves, and sacral nerves (S2-S4). Regulated in large part by the vagus nerve (75%), it impacts a vast array of crucial bodily functions. When the parasympathetic response is triggered, it counteracts the fight or flight response primarily through release of acetylcholine.

Parasympathetic activation results in production of tears, saliva, and constriction of the pupils; lower and more variable heart rate, lower blood pressure and respiratory rate. It enables creative and critical thinking, normal kidney function and urination, improves immune function, enables sleep, sexual arousal and replenishment of fuel stores in organs; plus everything involved in digesting and utilizing our food including elimination and insulin production. Even mood and social bonding and connection are linked.

HOW STRESS IMPACTS HEALTH AND HEALING

Healing requires coordination of a complex array of biological functional and systems. Research is rapidly expanding our understanding of the importance of the parasympathetic response, and how meditation helps to restore balance. While this impacts every biological system, here are some key areas:



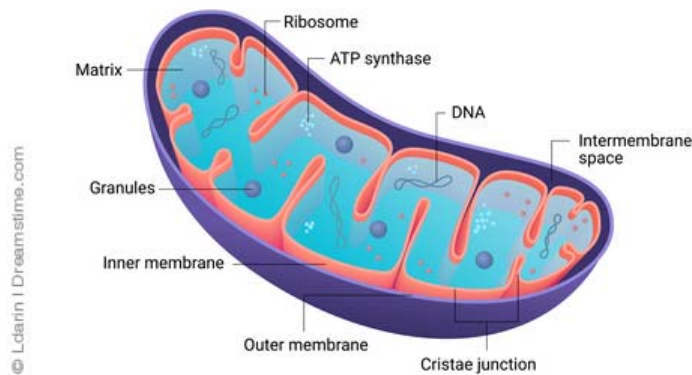
Digestion

Nutrients must be properly digested to extract them from our food and into our cells, where they are critical to every function our bodies must carry out. From vitamins and minerals that are needed in every biochemical reaction, to energy production in our mitochondria, to building blocks of our proteins that form our enzymes, neurotransmitters, hormones, even our DNA - all of our cells need these basic materials to function. Stress shuts down our digestion, and

if it goes on long enough our cells become depleted of the very nutrients needed to function and repair.

Immunity

Approximately 90% of our immune system resides in our gastrointestinal tract. While it is needed to defend us against invaders such as bacteria and viruses, it can also go awry if unchecked. This “runaway” inflammation is linked to most chronic diseases, and paradoxically also reduces the ability to respond to infections. Our immune system has other functions, including being a cleaning crew. It removes debris left over from battling invaders. It also removes our own dead or badly damaged cells, and signals new and healthy ones to replace them. Stress results in an imbalanced immune system, making us vulnerable to infections as well as chronic disease.



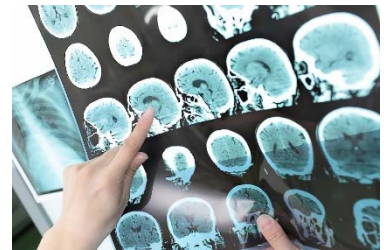
Mitochondria

These tiny structures exist within every cell in the body, and as the “power plants” of the cell they are responsible for producing all of the energy needed for every single function. This energy is produced as ATP and to make it requires key nutrients from food to be digested and absorbed from the gut. But producing this energy also creates toxic molecules, which are neutralized by

antioxidants which also come from our diet. If the demand for energy is too great for too long, the mitochondria – and its cell – become damaged. Without healthy mitochondria, cells become damaged, dysfunctional and even die.

Brain

The brain normally utilizes about 20% of our energy supplies, primarily in the form of glucose or ketones. This requires good digestion and healthy mitochondria to keep the brain supplied with fuel to function.



Acetylcholine is a major neuro-transmitter in the brain and in nerve endings through the peripheral nervous system; it is also anti-inflammatory. It is made in the mitochondria using some of the same ingredients needed for ATP production.

Serotonin, a major neurotransmitter impacting mood, is mostly produced in the gut. When the stress response is prolonged, this depletes the brain’s capacity for creative and critical thinking and mood regulation, often further impairing the ability to deal with stress.



MEDITATION AND HEALTH

While meditation has been practiced in various forms for centuries, and has long been associated with many parameters of improved health and well-being, science is only recently starting to understand the mechanisms by which it works. Studies are demonstrating the positive impact of meditation practices on various disease conditions, and the potential power for it to change the trajectory of this epidemic of chronic disease. Research findings on HOW it works are not all consistent though, as

ways of meditating can be quite varied and this seems to impact the results. However, some common threads are emerging; two main mechanisms are outlined below.

Default Mode Network

One mechanism by which meditation works is by altering connectivity in the brain – the so-called Default Mode Network, or DMN. This is a network of brain regions that is active when the brain is restful but awake. Meditation seems to decrease this DMN activity, leading to increased cortical connectivity [5] - in other words, there is activity connecting areas of the brain that aren't normally part of this network that enables us to take a different, more detached perspective on things in our life. When we aren't so attached to events, the sympathetic response is less likely to be triggered, or if it is triggered it is to a lower extent that is easier to recover from.

Vagal Nerve

Meditation also activates the parasympathetic response, in large part through the vagal nerve. This not only impacts heart rate and other vascular parameters, it also connects our gastrointestinal tract to our brain. There is now a growing body of evidence that this bidirectional communication through the “brain-gut axis” is a complex system that is key to our health, and when it is out of balance is linked to many health issues. [6]

Meditation has been shown to increase vagal nerve activity, or tone, and restore normal functioning of these many systems including digestion, immune response, and brain neuroplasticity/resilience. [6] It is thought that one way this occurs is through deep breathing, although there may be other mechanisms in play. As we learn more about how meditation works and how it influences our biology, we can develop more targeted and personalized approaches to maximize its potential – while making it easy and accessible for people to integrate into their daily lives.



EPILOGUE

Approaching a product ‘test drive’ starts with a primary consideration for USER SAFETY. Especially a product marketed to “tap into the brain” could bring understandable pause or concern to any testing team. Dr. Kline and her colleagues took on the task of assessing its ‘active ingredients’- binaural beats, isochronic tones, holographic music and blue/red light. It is found that these neurosensory applications have had a long history in other devices also supporting the science and wellness communities for their reactive properties. Having collected the vast majority of user testimonials online, and clinical reports from fellow team mate, Dr. Leslie Valle (Santa Barbara, CA) who had already spent the better part of 3 years with the device on her patients, these reviews added greatly to our peace of mind about consumer safety.

Conducting a performance breakdown of the effects of such a device starts with identifying its functional properties. We reviewed the company’s 71 pg. document called ‘PRIMARY RESEARCH OUTCOMES’ where the developers drafted their theories, concepts and research (with ample scientific references) enacted through a pilot clinical trial and randomized study and their outcomes. Reports were acquired from Quantitative EEG evaluations of brainwave activity in varying situations, metabolic scoring studies and Cognitive/Emotional Checklist Assessment. Evidence of well-reported neuroscience and efficacy

valuation appears to follow a responsible and thorough process, leading to its extensive list of targeting of biometric healing claims.

Academically, the appeal in assessing this specific product is partly due to the diverse and multiple points of wellness that the device was designed to target. A wide range of brain and mental health-related specialists alike may truly enjoy conducting their own independent case study of this device, each using their specific level of science to assess its array of claimed benefits. Areas like the parasympathetic nervous system, brain optimizing and stress & anxiety are just some of the key points of interest worth exploring. If the device in fact aligns and supports Dr. Kline's multi-layered physiological roadmap to wellness and the user's reaction(s) in the meditation state, a fair and comprehensive tech review of this device should be best achieved under multiple streams of evaluators. Reporting on its assessed benefits would then be a matter of the collective team trading notes for all areas of common ground.



Dr. ROBERTA KLINE (Educational Dir. /Women's Diagnostic Group) is a volunteer medical advisor and academic researcher for projects under the HEALTH TECH REPORTER/MEDTECH REVIEWS program. She is also called upon to provide her valuable insight in the planning and editing processes. Dr. Kline is a board-certified ObGyn physician, Integrative Personalized Medicine expert, consultant, author, and educator whose mission is to change how we approach health and deliver healthcare. She helped to create the Integrative & Functional Medicine program for a family practice residency, has consulted with Sodexo to implement the first personalized nutrition menu for healthcare facilities, and serves as Education Director for several organizations including the Women's Diagnostic Health Network, Mommies on a Mission. Learn more at <https://robertaklinemd.com/>

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Additional Resources:

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