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"It is probably true that, in general, the most fertile developments in the history of human thought are born at the intersection of two currents of ideas. The currents may originate in the midst of totally different cultural conditions, in diverse epochs and places."

Heisenberg, physicist

Global Medicine Technology

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Abstract

In little more than a decade, linkages between health care technologies of different cultures and continents have merged, resulting in global medicine technology. The next generation of young scientists and clinicians from both the research and clinical communities are merging established ancient technologies from outside the U.S. with modern medical technology and forging new ground in an increasingly challenging health care climate. Presently researchers, clinicians and communities are active in finding ways of using global medical technology to attack our most difficult and chronic (therefore expensive) health care problems. Using recent inventions, such as the fMRI, researchers and clinicians are understanding how and why they work. This chapter briefly discusses key ideas in the movement towards global medical technology: healthcare culture, mind-brain-body dialogue, and self-care. There is also a self care exercise for the spine.

1. Introduction

American healthcare continues to evolve, sometimes painfully, inventing technologies that expand our ability to provide care.[1],[2],[3]. Artificial Intelligence plays a significant role in future healthcare technology[4][5]. However, the fact of the matter is that the intelligence of future healthcare must come both from artificial and natural forms. Historically in healthcare, the west has had good fortune in developing science and technologies for healthcare, such as antibiotics and artificial intelligence,

while the east has profited from *soft technologies* for healthcare based on mind ^[1] training that have evolved over thousands of years. For the first time in history, scientists can now shine a light on the mind, permitting investigation into how and why soft technologies work. The future of intelligence in our healthcare environments will include not just computational methods of intelligence as developed in the west but also from the natural intelligence that results from persistent mind training as developed in the east. This observation has profound implications for reducing healthcare costs while broadening accessibility and reducing dependence on healthcare providers. This view of health encompasses the notion that the source of health comes not only from without (the healthcare provider, healthcare system) but also from within (the individual, the self). To be aware of a single shortcoming within oneself is more useful than to be aware of a thousand in somebody else [6].

A recent turn in the development of modern medicine is what is referred to as *global medicine*^[2], where ancient ways of health and healing still taught outside of western culture are being integrated with cutting-edge western medicine. Much like global telecommunications and global markets, global medicine is medicine that benefits from the break down of cultural and physical boundaries. At Stanford University Hospital, stem cell transplant patients receiving daily Japanese acupressure sessions shaved up to 21 days of hospital time from what insurers typically expect to be a 40 day hospital stay[7]. Meditation training from India, China, Tibet and other cultures has become common as a means of working with medical complaints including pain, high blood pressure and stress [8],[9],[10],[11][12][38]. Acupuncture, once viewed with skepticism, is now used in hospital surgery rooms to reduce the amount of anesthesia required and minimize side effects of surgical and other procedures [13]. At Columbia University, pioneering heart surgeons are investigating the impact of various alternative healing practices that can be combined with heart surgery to improve patient outcome[14].

At the same time that these unfamiliar healthcare philosophies and methods have found their way into our lives and medicine cabinets, unanswered questions must be answered regarding how, why, and when they work in order to preserve standards of care. Clinical trials using western scientific method are underway for some but not all of the techniques that constitute global medicine technology at the National Institute of Health [15]. Western scientists are attempting to uncover the effects of practices such as meditation and acupuncture on the mind and body at a number of governmental funded research institutions using detailed brain images with western technologies such as fMRI [16],[17],[18],[19]. Mind training methods potentially fill a gap in our present healthcare system, addressing unmet needs of chronically ill, uninsured, and aging American public. The practices also cultivate an attitude of self-care, reducing dependency on present healthcare providers, and potentially could be of service in the call for more broadly accessible care.

In this article we briefly discuss some key ideas in eastern mind training technologies and point to some of the ongoing activities in both clinical and research settings. Most of the ideas presented here embrace the notion that there is a relation, in fact a dialogue, between mind, brain and body. Concepts like self-awareness, mindfulness, forgiveness, and honesty, are also big players in the ancient technology of healing and the mind. Also included in this new health landscape are the ideas that mind, brain and heart are not separate organ systems, and that mind and body refer to the same concept. Mind training technologies were not developed in a laboratory nor do they rely on silicon chips or pharmaceuticals, rather, they were developed and passed down by "gurus" or teachers, sometimes religious leaders, who have developed deep insight into human nature and human behavior. Culture has preserved the teachings. Clinical success has kept them alive. They do not replace nor compete with western technology but are a marriage made in heaven for an ailing healthcare system, where patients feel alienated, hospitals are going broke, and doctors yearn for a system in which they, too, can slow down and provide compassion. In the article we discuss the role of healthcare culture in global medicine in the United States, examine mind-body-brain dialogue and its relation to health in practitioners and patients, and discuss directions and clinical work in self-care education. At the end of the chapter there is an example of global medical technology from Japan, an exercise in self-care for the interested reader.

2. The Culture of Healthcare

There is a significant cultural aspect to the integration of externally developed healthcare and practices in both caregivers and patients. While Americans often wait until they are sick to think about health, most ancient technologies encourage daily practices and habits that encourage self-study, self-awareness and self-discipline as core ideas in preserving and maintaining health. The integration of these ideas into our healthcare system requires no less than a transformation in healthcare culture where self-care and health education become not only a priority but also a way of life. Behavioral changes resulting from self-knowledge and self-care play a major role in defining how we heal, how we age, and our quality of life. The integration of self-care practices like mindfulness meditation, yoga and qigong, into our own medicine cabinets carries the potential of real advances in our present system of care.

A revolution in western medicine, like in physics, will come from realizing that our method of questioning is limiting our solutions. The need to separate mind from body in order to describe and explain them fails to capture the interplay between mind and body. This interplay now appears to be fundamental in theories of healing and disease formation. Without realizing this interplay we will fail to utilize our full capacity to address not only clinical and financial healthcare issues but administrative ones as well. The fMRI diagnostic technique provides much needed evidence for western cultures to understand why and how some of these ancient medical teachings work - not only how they awaken, regulate, and influence the body's own healing mechanisms but how they work together with western medicine. Such evidence provides the key to our ability to integrate these methods successfully and transform an ailing healthcare system and restore the level of standards and scrutiny we have grown to expect from western medicine.

3. Mind-Brain-Body Dialogue

More than 35 years ago, researchers at Harvard were studying the origins and effects of stress and the cultivation of a relaxation response via meditation[20],[21],[22]. Recent research in brain and cognitive sciences using fMRI, SQUID, and enhanced EEG show remarkable and highly positive changes occur in brain function as a result of prolonged meditation practice[27]. So with these scientific mind and body, mind and brain studies, we begin to see a picture of interaction between mind, brain and body. What we in the west are now referring to as the mind-brain-body dialogue is at the heart of traditional ancient healing and mind training practices such as Theravadan, Zen, and Tibetan Buddhist meditation. Other meditation practices involve repetitive slow body movements or repetitive thought exercises. These practices include yoga, tai chi, chi gong, chanting, prayer, and repetitive exercise.

Clinical studies of these practices, along with positive clinical results of acupuncture and acupressure, and studies of the mind during these practices, indicate there are a number of effects occurring in the mind/body as we engage in these ancient "technologies". The invention of the fMRI provides details of the brain "in action" in a way previously imagined impossible. As shown in Figure 1, the fMRI does not require an IV, thus it is less invasive than PET scans (for an introduction to fMRI, see [27],[28]). It also requires fewer brain images to capture brain activity. General information about fMRI and fMRI studies can be found at websites for a variety of places with on-going programs

involving fMRI [23][24][25][26].

Figure 1. Functional MRI pictured below. The man is getting his head examined. Photo source: Radiology Info[25].



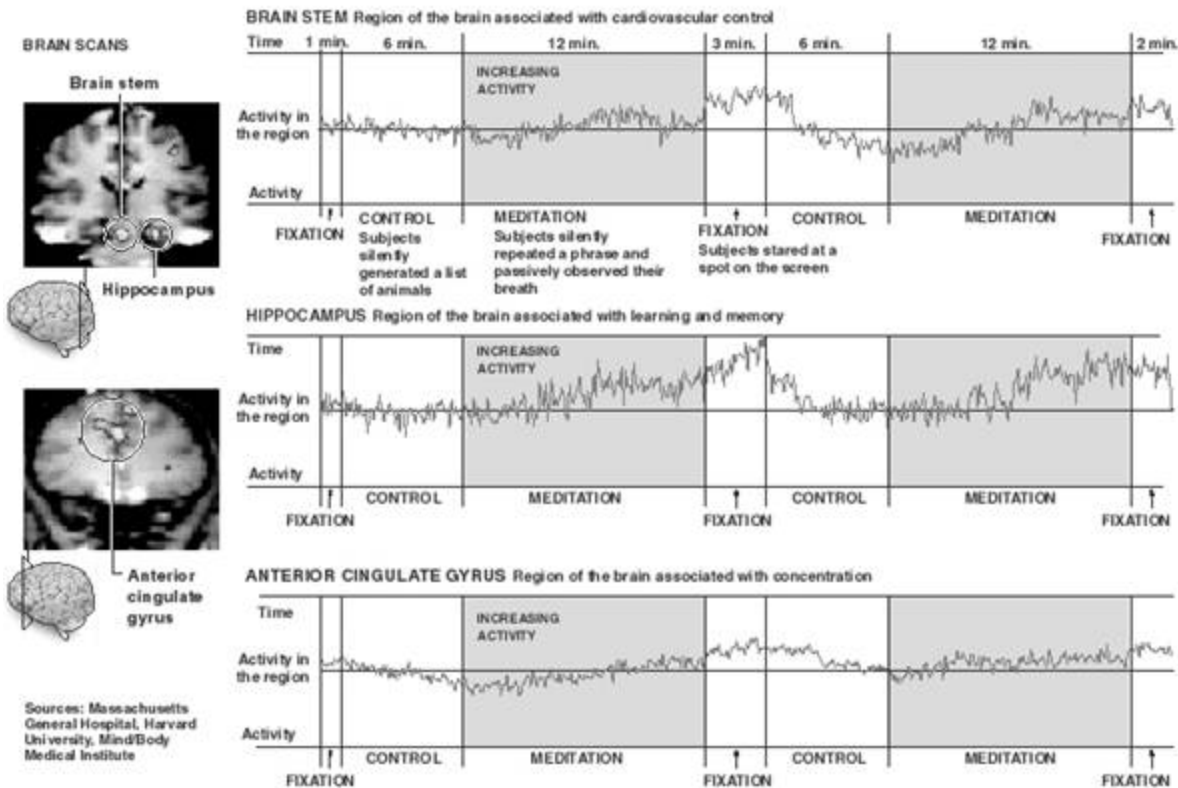
Figure 2 shows fMRI and EEG images that demonstrate the influential relationship between meditation and brain activity. This study was performed at the Gollub Neuroimaging Lab at Harvard University[27]. The figure gives fMRI photos along with EEG records for regions of the brain including the brain stem (associated with cardiovascular control), hippocampus(associated with memory and learning), and anterior cingulated gurus, a region of the brain associated with concentration. While there are possibly more unanswered questions about mind-brain-body dialogue than there are questions about space exploration, these studies have profound implications for the use of natural intelligence and cognitive skills in our own healing. The study from which this image was taken demonstrated physiological effects of meditation including changes in activity of the brain involving emotion and breathing. A core idea in many health cultures is that the link between mind,

brain, and body is the breath, also known as prana, and qi. [\[3\]](#) Most if not all meditation instruction calls the student to develop practices involving the breath. Concentration practices and mindfulness practice are systems of mind training practices with core teachings relating to the breath, attention, and self-awareness. For information on fMRI studies on mindfulness meditation the interested reader may wish to examine this and other Gollub Neuroimaging Lab projects[17], or the recently studies on Tibetan meditation practices at the University of Wisconsin[30].

Figure 2. Physiological effects of meditation. Functional MRI images on the left, EEG on the right. Source: Gollub Neuroimaging Lab, Harvard University[27].

Giving the Brain a Light Workout

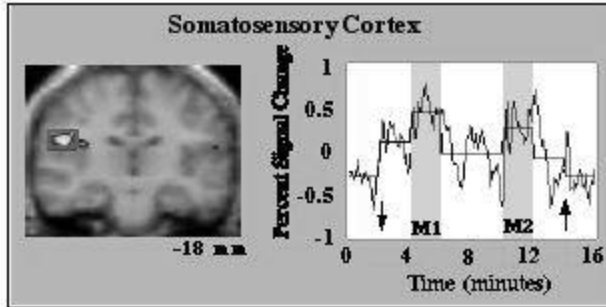
In a study of the physiological effects of meditation, scientists found consistent patterns of brain activity in regions that process emotion and influence breathing.



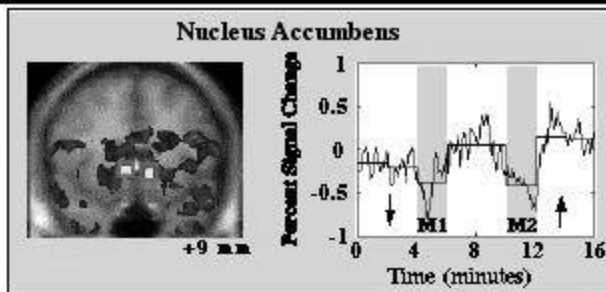
The next set of fMRI images in Figure 3, also from Gollub Neuroimaging Lab[27], shows the influence from body to brain, as an acupuncture needle insertion causes changes in the brain. The figure below illustrates the multiple effects of using acupuncture to needle an area of the body known as the Hoku point, Hegu point, or Large Intestine-4 (LI-4), located on the top side of the hand, in the highest place on the mound of tissue between thumb and index finger (think about the area where children draw faces on their hands and animate them, the inside corner of the mouth on that face points to LI-4). The area is one of the more well known acupuncture/acupressure locations and is commonly associated with pain relief but has multiple uses. The preliminary results of the study suggest that acupuncture needle manipulation on either hand relates to activity in the limbic system and subcortical structures. For more details on this project see [37].

Figure 3. Physiological effects in brain from needle manipulation of the hand area known as Hoku or Large Intestine 4 (LI-4) point. Source: Gollub Neuroimaging Lab, Harvard University[27].

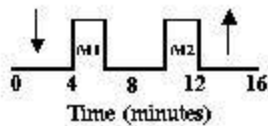
**Acupuncture
Increases
fMRI Signals
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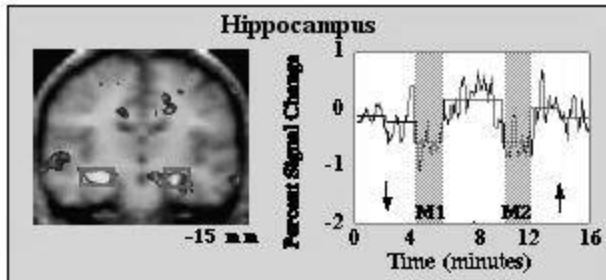
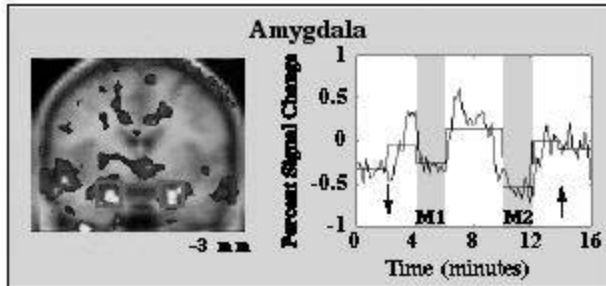
**Acupuncture
Decreases
fMRI Signals
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LI 4



10^{-6} 10^{-4}



In summary, we are now in a position never before experienced to understand how the mind creates changes in brain function over time, to watch the ways our mental and emotional lives affect our brain function, and to see the body's relationship to the brain. It is now possible to watch how persistent mind training produces enduring changes in the brain, beneficial for physical, emotional, cognitive and behavioral health. They are not separate but are in relation and in dialogue. Because many of the mind-body-brain technologies are relatively inexpensive, these studies have positive implications for medical practitioners and a medical system pushed to its limits to find economical ways to help

patients find solutions

4. Transformation of a Medical Practice

To become a practitioner who works with prana, or qi, one of the more important aspects of training is to develop your own meditation practice. The strength of your practice and the quality of the teachers you encounter are central to the quality of care you will ultimately provide as a practitioner who works with qi or prana. Knowledge about meditation practices is passed down through oral teachings. As a result, the lineage of the teacher as well as access to the teacher is important. The path to health prescribed by lineage teachings includes systemic mind training such as meditation and spiritual practices as well as certain types of body meditation including yoga, qigong, tai qi, which work with the mind-brain-body dialogue using movement and breath together. Body meditation practices release tension in the body, freeing the breath, and uses postures and movements that open the spine, joints, and limbs, encouraging body fluids to move, at the same time relax the mind.

What type of meditation practices work for an individual is not a one-size-fits-all prescription. Generally, styles of meditation are a result of recommendations by friends or a result of personal inquiry. Often more than one type of meditation is explored before finding something satisfying, as there are many aspects to showing up for such teachings on a regular basis including location, availability of a teacher we feel comfortable with, the surroundings and social support offered in meditation community, family support in allowing time and space to develop the practice. Often there are weekend retreats and cost is still sometimes a factor when housing or travel is involved. Many hospital facilities and HMOs are beginning to offer education and support for these activities as a means of addressing patient needs. Stanford University, like many other hospitals, has recently begun a series of programs launching a new era in healthcare encompassing not only mind training but an emphasis on diet, exercise, social support and compassion [31].

The idea that meditation and mind training can influence health is not new. As long ago as 1975, Dr. Herbert Benson studied meditation and the development of a practice for cultivating the "relaxation response" as a means for combating hypertension[10]. What is new is the invention of technologies that allow us to see changes in brain activity as a result of such mind training practices. Recently Tibetan meditation has drawn the attention of neuroscientists and is the focus of studies at the University of Wisconsin[30]. Tibetan practices in meditation and healing are of considerable interest to American scientists for at least two reasons 1) the possibility that non-violent behavior and mediation may be linked - Tibetan culture, rich with meditation practitioners and a way of life conducive to meditation, enjoyed the status of a non-violence society for more than 2,000 years, and 2) the lineage of Tibetan mediation instructors has been rigorously preserved for as many years.

5. Self Care

An important aspect of the soft technologies is that of self-care. Many lineages encourage individuals not to become dependent upon a healthcare practitioner but to learn self-care methods. While these techniques are not in fact a substitute for seeing a practitioner, they are useful until that can be arranged, and help extend the benefits of other medical treatments. It is interesting to note that many individuals report being naturally drawn to taking better care of themselves as a result of their meditation practices, gaining the courage to make changes in habitual behaviors, increasing personal happiness that seems to spill over into every aspect of their life including their health.

Destructive behavior is at the root of many health problems, ranging from obesity and diabetes to domestic violence. The relation between emotional and physical health is most obvious among patients with heart problems [32] which are rated as the leading cause of death in this country. Although it is common sense to many of us reading this paper, there is now considerable scientific evidence that letting go of anger and resentment can reduce the severity of heart disease. In some cases, the release of anger has been shown to prolong the lives of cancer patients. Considering the relation between stress and the immune system, or stress and the adrenal response, the results of such studies are not surprising. Technological advances in surgical instruments, anesthesia, artificial hearts and heart valve materials may help patients manage symptoms of heart disease, but without fundamental changes in habitual responses, including emotional health, in a manner of speaking, we are pissing in the wind.

Destructive emotional lives have a price not only on health, but on social structures. Families, workplaces, and schools all feel the price of violence, suicides and bullying that accompany emotional disharmony. Public institutions and school systems that cope with these problems are pressed to their limits to understand and prevent them (e.g. Columbine High School, International House at U.C. Berkeley). Meditation practices, mental or physical, increase awareness of feelings that may underlie such behaviors. Watching patterns of feelings in this way gives rise to self awareness, and the opportunity to interrupt destructive habitual responses before they occur.

In an unusual example of global medicine, patients at Stanford University Hospital, Lucille Salter Packard Children's Hospital, Kaiser Permanente of Redwood City, Mills Peninsula, California Cancer Center of Marin, and other hospitals in the San Francisco Bay Area, are using the Japanese art of self-care known as Jin Shin Jyutsu physio-philosophy, to help manage side effects and emotional upheavals that adversely affect patients during major health projects, such as chemo, heart surgery, or transplants, and the treatments they involve [33],[34],[35],[36]. Used in support of whatever treatment regime the patient is undergoing, patients subjectively report less fear, worry, and depression. During sessions with practitioners, individuals learn to monitor feelings and use simple recipes on themselves involving gentle touch to harmonize difficult moods, attitudes, or symptoms. These self-care methods can be used by even the sickest patients throughout the day and evening or when other treatments are unavailable to help with nausea, sleeplessness, pain, and anxiety, and other signs and symptoms. Practitioners quietly inspire a philosophical focus on reducing dependence on care providers by self-care training/instruction that guides individuals to use self-care exercises based on how they are feeling - physically, emotionally, mentally, and spiritually [36]. Interested readers are encouraged to try the Japanese exercises in self-care found at the end of the chapter. There is also an exercise that supports harmony of the spine and related functions. Jin Shin Jyutsu self-care is taught around the world by self-care instructors [36] and can be found on CD-ROM [33]. University of Wisconsin's Health Emotions Research Institute is using fMRI and other means to scientifically determine how positive emotions influence our health. Self-awareness, self-study, and self-care methods that work with emotions potentially can provide an economic and effective resource for the prevention of problems relating to individual health in schools, workplaces, and homes.

6. Conclusions

Future progress in solving some of the most pressing issues in healthcare will come by innovation and

adaptation of ideas and methods that work. Healthcare access (especially preventative care) for a large number of uninsured, shortage of nurses, and the rising cost of healthcare in an aging population explosion are among just a few of the reasons to consider using global medical technology along side high-technology. Self-care education and meditation training are comparatively cheap ways of reducing the current pressures on our medical systems in the United States. By appropriate and thorough examination of the ways ancient soft technology works, we can maintain levels of standards in care in a cost-conscious healthcare environment. The addition of practices such as mindfulness meditation and self-care acupressure to our medicine cabinets is working to reduce numbers of hospital days, side effects and improve quality of life. Awareness of healthcare culture, confidence in the methods through scientific scrutiny and an openness to what works may not only work to save our healthcare system but the same methods for self-awareness for health also promise to reduce violence in schools, homes, workplaces, and public spaces.

It is likely that not long after this paper has been published or read, there have been many more advances in this area. It is even likely there will be a prosthetic mind or model of mind that can help those with limited mental capabilities as a result of our inquiries into this area. That is possibly the next step in the intersection of east and west.

APPENDIX A

JIN SHIN JYUTSU SELF-CARE EXERCISE

Figure 4 illustrates a self-care exercise called the "Main Central" for harmonizing spine functions as perceived in the Japanese healing art known as Jin Shin Jyutsu physio philosophy[36]. As prevention or maintenance, this exercise may be done upon waking, and/or before retiring at night. Use pillows as necessary for comfort. It may also be used as needed when working with health projects. It usually takes about 20 minutes when done properly, but may be interrupted and resumed without difficulty or loss of benefit. As this exercise proceeds, it is useful to visualize the breath coming up the back as you inhale, and down the front as you exhale. Figure 4a shows the physical locations for hands. Figure 4b gives directions for six hand positions referenced in Figure 4a. Fingertips are often used, but palms, back of hands, or entire hand can also be used. It is important to be comfortable during the application of the exercise, avoiding noise, drafts, etc. Quiet music may be useful if you have trouble relaxing.

Figure 4a Diagram shows hand positions used to administer self care described in Figure 4b. R1 refers to Right Hand position in Step1. L1 is the Left Hand position in Step 1, L2 is the Left Hand position in Step 2, and so on. Source: Jin Shin Jyutsu Insitute [36].

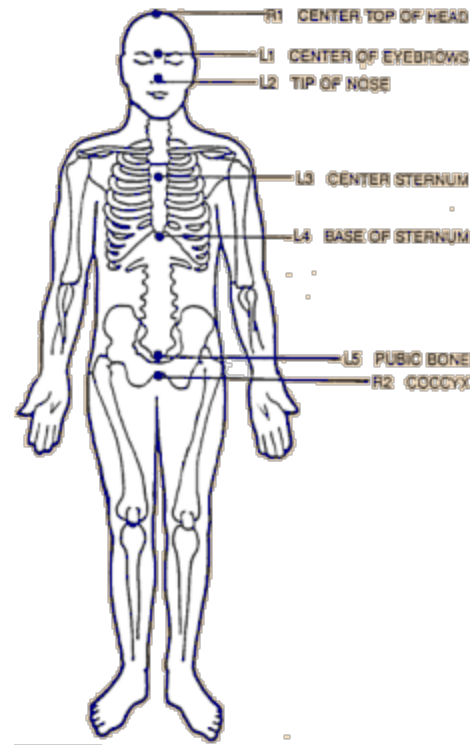


Figure 4b. gives the directions for a self care "recipe". There are six steps that move the hands according to descriptions below and follow the illustration in Figure 4a.

Step 1: Place the fingers of the right hand on the top of the head (where they will remain until step 6). Place the fingers of the left hand on your forehead between your eyebrows. Hold for 2 to 5 minutes or until the pulses you feel at your fingertips synchronize with each other.

Step 2: Now move the left fingertips to the tip of the nose. Hold them there for 2 to 5 minutes, or until the pulses synchronize.

Step 3: Move the left fingertips to your sternum (center of your chest between your breasts). Stay there for 2 to 5 minutes, or until the pulses synchronize.

Step 4: Move your fingers to the base of your sternum (center of where your ribs start, above the stomach). Hold them there for 2 to 5 minutes, or until the pulses synchronize.

Step 5: Move your fingers to the top of your pubic bone (above the genitals, center). Stay there for 2 to 5 minutes, or until the pulses synchronize.

Step 6: Keep your left fingertips in place and move your right fingertips to cover your coccyx (tailbone). Hold for 2 to 5 minutes or until the pulses you feel at your fingertips synchronize with each other.

Notes: The right hand remains on the top of the head while the left hand moves down the body until the final step. The practice is typically performed while lying flat, using pillows as necessary to maintain comfort. General

instruction regarding the breath during the self care practice is to envision the breath inhaling up the back of the spine/body and exhaling down the front of the spine/body.

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[1] The word mind, as used here, refers to mind and body. The brain and heart are also considered inseparable.

[2] A term coined by Dr. Mehmet Oz, heart surgeon at Columbia University.

[3] Qi (also called CHI, or KI) and prana are concepts that occur in most medical systems outside the west but appear to be difficult concepts in translation due to the differences between eastern and western thinking.