The Most Profound Medicine

The Supreme Essence Of Traditional Asian Systems Of Medicine: Qigong And Yoga/Pranayama

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PART I

QIGONG -- AWAKENING AND MASTERING THE PROFOUND MEDICINE THAT LIES WITHIN

In the 1600's the social, scientific and philosophical history of western culture experienced a radical shift. The work of Newton and Galileo revised our world. For thousands of years, humans were locked in the stagnation of the Dark Ages, with little advance since fire, the wheel and the sword. Then, in less than the life span of an oak tree, tremendous and sudden evolution occurred with the rapid development of engineering, the automobile and antibiotics.

Western culture is poised at the edge of another profound and dramatic transformation. For the last 400 years we have understood that the world was a dynamic interrelationship of substances, particles and bodies. Now, through the most refined scientific inquiry, it has become clear that there is no substance. What we thought was substance has been revealed as a dynamic interrelationship of energies. Physics is redefining time and space and generating new sciences of resonance and energy fields. There is even emerging agreement on a theory that suggests that there are more than three dimensions of space and one of time.

Asian philosophies and the ancient personal transformation traditions of the pre-colonial, original cultures have always held that the world we experience through our senses is but a fragment of *what is*. An individual's energy field is proposed to be the essence of one's being, rather than a physical body. As western science frees itself from its "seeing is believing" position, what occurs is a validation of ideas and traditions that were called "mysterious", "savage", "unscientific", and "primitive" as little as a decade ago. As we now use science to explain the "why" and the "how" of the mysterious, unusual arts and disciplines are revealed as practical and meaningful.

The medicine of the Asian cultures, which once seemed so unsophisticated by our scientific standards, is now licensed as primary medical care in a number of states and is a solid component in an emerging "new medicine". Traditional Chinese Medicine is completely consistent with the supposed "new" idea in rational science that a person is more of a resonating field than a substance. The Chinese, however, never demanded the scientific proof that is now emerging; they just followed what they knew, from generations of experience, to be effective and real. Acupuncture has helped to needle science into the exploration and confirmation of important new information on the bioelectrical aspect of the human. It has played a significant role in the exciting and rapidly developing frontier of neurotransmitter biochemistry and is a central aspect of a revolutionary new treatment for addictions.

Acupuncture, however, is really just a modality, a tool used by doctors of Traditional Chinese Medicine to help the patient. Like surgery, though much less invasive or like medication though less likely to cause side effects, acupuncture has startling implications for the future of medicine. The aspect of Traditional Chinese Medicine that has the potential to truly rock the western world is Qigong. Healing patients without touching them and with no medication, causing anesthesia by just pointing a finger and generating acupuncture like response without needles are well documented effects of Qigong. Many observers have seen Qigong masters light fluorescent tubes with their hands, break massive stones and thick steel bars with their hands and feet and start fires by projecting the Qi. (5,6,7,11,16,22) The implications for the transformational impact of Qigong on western science are profound.

Qigong has captured the imagination and the scientific attention of the world. In China there is a multitude of Qigong research institutes. The need for research in the rigorous scientific method of the West, with control groups and ample statistical methodologies has shifted Qigong research out of the traditional empirical model of the Asian sciences. A flurry of research was presented at the historic First World Conference for the Academic Exchange of Medical Qigong, which was attended by representatives from seventeen countries. In the United States Qigong associations and institutes are proliferating rapidly.

The American Foundation of Traditional Chinese Medicine is working with Professor William Tiller of Stanford University, in Palo Alto, California, on a collaborative research project exploring bioluminescence, expression of photons from the Qigong practitioner. The Qigong Institute of the East West Academy of the Healing Arts has a research team and a monthly scientific forum. In southern California Qigong Universal is actively supporting the spread of Qigong teachings and the World Research Foundation is collecting Qigong information on its world wide scientific database and in its library. There is even a Qigong Association in Alabama, Chinese National Chi Kung Association, which has an extensive written and video training course and has begun to publish a magazine in collaboration with China Sports Magazine of China that has a major percentage of its content devoted to Qigong.

WHAT IS QIGONG?

Qigong is one of the great mysteries of the Asia. It is the most profound of the aspects of Asian medicine. It is the root of self-care, in the Chinese health care system. It is the essence of the how "physician heal thy self" operates in China. Qigong is the grand overriding structure of the martial arts and is the central practice of the "internal arts". It is the current link to the ancient source of Asian shamanism and magic. And yet, with all of these qualities of the unusual and the esoteric, Qigong has a very practical role in the maintenance of health and the healing of disease.

CULTIVATING THE HUMAN BIOELECTRICAL FIELD

The Chinese character that gives us the word Qi means the human vitality or essential functional energy of life. It also means breath. Bioelectrical breath, resonating bioelectrical field and human biomagnetic field, are other translation attempts that give a rich and graphic image for the Qi. It is the Qi or life force that maintains the healthy and harmonious function of the human body's self regulating systems. The doctor of Traditional Chinese Medicine manipulates the Qi with acupuncture. Qi binds the planets into a solar system, holds the electrons in their orbital shells around the nucleus of the atom and drives the sprout upward, against 14.7 pounds per square inch of gravity, to reach for the sun.

The character that gives us the word Gong means, "to cultivate" or "engage in". In every Asian community there is a wonderful place called the cultural hall or institute of culture. Sometimes it is called the school of physical culture. This idea of culture derives from the act of cultivation, which requires time, discipline and intention. Gong means to practice, train, enhance and refine but it also implies enjoyment, devotion and commitment. If some one loves to cook, garden or meditate and if they are devoted to practice and refinement, then, one's engagement in these practices is Gong. Because one of the all time favorite pastimes in China is gong fu, which in many historical periods has meant fighting or boxing, the idea of gong is often associated with the martial arts. In fact, however, gong is applicable to any practice, discipline or developmental art in which a person is deeply involved.

Qigong, simply stated, is the cultivation of Qi or vital life energy. Stated in a more modern and scientific language, Qigong is the practice of activating, refining and circulating the human bioelectrical field. Because the bioelectrical field maintains and supports the function of the organs and tissues, Qigong can have a profound effect on health. Beyond this Qigong expands into a discipline of mental and spiritual development. There are many systems and traditions of Qigong ranging from simple calisthenics type movements with breath coordination to complex auto regulatory type exercises where the practitioner alters brain wave frequency, heart rate and other organ functions intentionally. In extremely advanced levels of practice the Qigong practitioner can transmit Qi or energy across distances and through substances. There are cases where the practitioner can manipulate the limbs of a subject from a distance and diagnose physiological disturbances without conversation or palpation. (5,6,7,22)

HISTORY AND TRADITION: THE ROOTS OF CHINESE LIGHT ALCHEMY

There is a growing literature on the history, tradition, science and practice of Qigong. (1-24) Its origin is shrouded in the mystery of ancient China. There are stories of special techniques of breath practice that lead to immortality, healing powers, and special abilities. During the ancient Shang dynasty (1766-1154 BC) there is evidence of a system to stimulate, what are now called acupuncture reflexes, which help to resolve disturbances of the Qi.

During the Chou dynasty and the Warring States periods (1100-221 BC) records appeared on bamboo and on bronze that refer to breath practice. A number of Lao Tze's greatly revered verses suggest breath practice and the benefits of merging with the forces and elements of nature. A famous prescription of the period is frequently referred to and because of the wide variation of possible meanings for early Chinese ideograms it has many various translations.

The following translation is from Helmut Wilhelm, the son of Richard Wilhelm who translated the *I Ching* and *Secret of the Golden Flower*.

> With breathing proceed as follows: The breath should be held and it will be gathered. If it is gathered, it becomes magic. If it becomes magic, it descends. If it descends, it quiets down. If it quiets down, it solidifies. If it is solidified, then it germinates. If it germinates, it grows. If it grows, it is attracted upward. If it is attracted upward, it reaches toward the heaven. In heaven, it ascends upward still. At the lower end, it descends still. Those who follow this will live, those who act contrary will die. (22)

The great Taoist poet/philosopher Chuang Tzu stated, in 300 BC, "the ancients breathed down to their heels". This suggests that the breath, in the form of the Qi, is projected and circulated throughout the body. In 1973 an archeological excavation of a Han dynasty (220 BC-220 AD) tomb in Hunan Province revealed a series of over 40 figures painted onto a silk scroll doing various Qigong movements. (22) It is reported that while many of the inscriptions have become unreadable one is clear which says, "Look skyward and exhale". (22) In this same period one of the first great acupuncture and herbal medicine practitioners, Bien Chieuh, taught breath practice to enhance the circulation of the Qi. (15)

It is a strong tradition in Chinese medicine to teach a person to maintain health and many famous physicians developed systems of self-care. In the third century AD, Hua To, whose place in the history of Traditional Chinese Medicine is so illustrious that a series of important acupuncture points bear his name, developed a series of Qigong exercises called the "five animal forms". In the sixth century, Da Mo, a monk in the tradition of Mahayana Buddhism, also known as Bodhidarma, came from India and found the monks of Shaolin Temple weakly and undisciplined. He introduced a combination of movement forms with Buddhist meditation that invigorated the monks and increased their power. This was the beginning of the tradition of the superior martial artists of the Shaolin Temple.

Many lineages of Qigong have developed over the centuries. The martial Gong enhances the strength, endurance and spirit of the warrior. The medical Gong can be used to heal diseases. Confucian Qigong is focused on self-cultivation, ethical development and refinement of personal temperament. The Taoist Gong is aimed at alchemical transmutation, merging with nature, longevity and immortality. The Buddhist Gong seeks refinement of mind, transcending the world of illusion and salvation of all living things.

In the "New China" following the revolution in the 1940's Qigong briefly disappeared. One elder practitioner reported through a 1986 Los Angeles Times article "At that time it (Qigong) was witchcraft, so I chanted Maoist slogans like everyone else." The article continues, "since then Qigong has qualified for official patronage and a national society has been formed to classify and describe the Qi". In the 1970's and 1980's, numerous institutes for the study of Qigong have sprung up in China. Many hospitals now have Qigong doctors on staff and Qigong classes as regular allied treatment with acupuncture, herbs and western medical modalities. There is a genuine renaissance of Qigong occurring in China. The western world, with its tremendous breakthrough of quantum physics, has taken up a sincere fascination with the bioenergetics of Qigong. (7,11)

CHINESE PHYSIOLOGY OF QI PRODUCTION AND CIRCULATION

Qi (life force, vital energy) supports optimal function of the self-regulating physiological and energetic mechanisms. The Qi administers to every organ, gland and tissue. The function of the organ systems and the circulation of blood, lymph and neurological impulses depend on the dynamic state of the Qi. If the Qi is stagnant, accumulated, excessive or deficient function is not normal. Two primary questions arise once it is tentatively agreed that the Qi of the Chinese ancients is the same as, or related to, what biophysicists would call the bioelectrical field:

1) Where and how is the Qi created?
2) How does it get to the body parts?

In the traditional theoretical principles of acupuncture and Traditional Chinese Medicine "the cycle of the transformation of the Qi" and the "hierarchy of the circulation of the Qi in the channels" are absolute foundation pieces that answer these questions.

THE CYCLE OF THE TRANSFORMATION OF THE QI

In Chinese medical theory the issue of Qi is very elusive as there are many designations of Qi. It can, however, be categorized and dealt with in an orderly fashion. (25,26) There are two types of primary or original Qi. The first, called the Congenital, pre-birth or heavenly Qi, is that which comes to the system (person) from the parents and other pre-birth factors. From the parents come the DNA configuration (genetically inherited factors), in-utero nutrition, other blood chemistry and certain psycho-physiological effects. Other pre-birth factors that are named in some literature sources are planetary influences and possible former life phenomena.

These pre-birth aspects are considered to make up a certain core of Qi (life energy) that the person draws upon to sustain life. Traditionally it is thought that overwork, unhealthy habits, eating improperly, emotional unrest, and excessive sexuality deplete the congenital Qi. This essence energy, given from the parents is the energetic or "yang" foundation of life and its "fire" resides in the body at the "gate of life" (Ming Men, GV-4). This factor is the catalyst for the functional activity of life maintenance through digestion, metabolism and action. It is conserved by appropriate diet,

special breath and movement exercises, meditation techniques, specific sexual practices, self-massage, tonic herbal formulas and strength of purpose. It is balanced and held stable by the "yin" which is manifest as the blood, fluids, tissue and other "substantial" aspects that make up a person. Yin is the tissue of the brain; Yang is thought. Yin is the heart muscle; Yang is the heart's beat.

The second primary Qi, the Acquired Qi (post-birth, after heaven Qi), if generated and circulated efficiently, conserves the Congenital Qi, and the Ming Men "fire" does not burn out. The person then has longevity and personal power. The Acquired Qi comes into the human system from food and air and is transformed by the energetic/metabolic system of the individual. The Qi of food (Gu Qi or grain Qi) is the essence of food, not the nutritional elements, but the energy or life force of food. It is extracted from the food by the energy of the spleen. The essence of air (Qing Qi (25) Kong Qi (26)) is extracted by the functional energy of the lungs. The essence of air and the essence of food mix in the "upper burner" (chest cavity) to become the True Qi (Zhen Qi).

The True Qi is that which administers to the organs and tissues. It is actually divided into two categories of function. The first is the Nutrient Qi (Ying Qi), which travels in the channels to all the body parts and nourishes organ function. The second is the Protective Qi (Wei Qi), which creates a protective energy shield against external pathological influences. The Nutrient Qi is conducted in bioelectrical circuits deep inside the body and is involved with the functional activity of metabolism and growth. The Protective Qi is conducted in channels at the surface of the body. It operates the pores, supports the immune defense and regulates body temperature.

The "cycle of the transformation of the Qi" is important in relation to the Qigong exercises because it is the vital biotechnology for transforming the Qi of the world into the Qi of the person. Average sedentary breathing, done by a person sitting or standing in a collapsed posture, utilizes 1/10th or less of lung volume. It is not as vitalizing as the deep, rhythmic, intentful breathing of Qigong. The deficient food value of the average diet allows for minimal entry of food essence into the system. Without the optimal breathing of Qigong and proper food resources the entire cycle of the transformation of the Qi is diminished. This decreases the nature and amount of Nutrient (Ying) Qi and Protective (Wei) Qi with an accompanying lack of optimal function.

Breath practice and the movements in Qigong circulate the Qi. The "circulation of the Qi" is how each organ and tissue is nourished to maintain optimal function. With maximal generation of the Qi through proper breath, diet, movement and life-style there is ample bioelectrical resource to circulate. The core of Traditional Chinese Medicine is practical and based on the principles of right diet, right breath, right exercise (movement), right intention, right rest and right lifestyle. These factors generate, circulate and conserve the Qi. Acupuncture, body therapy and herbs can also help to create, enhance and circulate the Qi. These modalities can only optimally assist an individual toward health if they are participating by doing their part through self-care.

BASIC BIODYNAMICS OF QIGONG PRACTICE

There is a specific physiology, in Traditional Chinese Medicine, of Qigong practice. The breath is taken in through the nose. While the air goes into the lungs the essence of air or Qi goes into the area beneath the umbilicus. This is called the Sea of Energy (Qi Hai or Tan Tien) and is an important acupuncture point, conception vessel #6 (CV 6), is located here. This is also the center that is referred to in the command to "get centered" or to "lower the center" in the martial arts. It is, as well, the "hara" of the Japanese and is thought of as the seat of the soul. Samurai warriors commit "hari-kari" by actually cutting this area out of the body with an encircling sweep of the knife blade.

The Qi, on inhalation, collects in this powerful area of the body. Almost every culture has a special feeling about this aspect of the body. On exhalation the Qi leaves the Sea of Energy and circulates down to the "sperm palace" (or ovarian palace) (CV2). It passes the very bottom of the torso (CV1, GV1) and moves to the tip of the spine.

From here it climbs climbs the back in the Governing Vessel to Governing Vessel #4, Ming Men, (GV4). Here the Qi nurtures and supports the function of Ming Men (the life fire) and helps to conserve the Congenital aspect of the Qi by feeding it from the Acquired Qi. The Qi circulates upward to the top of the head where it passes through "the point of 100 gatherings" (Baihui, GV 20). This is the point at the cranial fontanel (soft spot) and is equivalent to the "1000-petalled lotus" or crown chakra of the Hindus and Buddhists. From here it goes to the tip of the nose and upper lip and crosses by way of the tongue tip that is held against the roof of the mouth and back to the Conception Vessel.

It is important to remember that this flow is happening all the time a person is alive, whether they do Qigong or not. With the Qigong this flow is enhanced. Qi flows down to the Sea of Energy whether one is focusing on the breath or not. This visualization, down the front with the inhalation and up the back with the exhalation is a way of enhancing the actual circulation with intention. It is said that energy awareness stimulates the Qi and that energy follows thought.

The energy from the "cycle of the generation of the Qi" accumulates in the Qi Hai/Tan Tien center on the inhalation and then is dispersed out into the channels on the exhalation. The inhalation does not pull energy from the channels into the center. Visualizing the Qi collecting in the Tan Tien on the inhalation is an intentional tool to enhance the circulation of the bioelectrical field. As the Qi circulates increasingly the energy gets more refined and more plentiful. It fills the areas that are deficient and can break through to areas where Qi and blood are stagnant. When the circulation is maximal it moves up the Central (Thrusting, Chong) Channel, which runs through the core of the body along the spine. The Qi in the Thrusting Channel holds the individual upright, holds the organs in place and is the primary life force that leaps upward like a sprout against the force of gravity.

The Thrusting Vessel is equivalent to the Kundalini path in the Yoga system of India. The circulation of the light (circulation of the bioelectrical field) is done with the breath to an extent that increases the power of the flow as well as the volume of vital force. The energy moves up the Thrusting Channel like a fountain of light or a charge of bioelectrical force and warmth. The energy flows up and nourishes the brain and the spirit. It is likely that this energy goes to the area that many cultures have called the "third eye". In the esoteric alchemy of China this area is called the "cinnabar field". Even in the perspective of the West it lies between the lateral "temples" of the skull, which alludes to its spiritual quality. This assembly of important physiological structures is considered in all cultures to be an important area.

The energy moves from these three, core level energy circuits, Governor Channel, Conception Channel and Thrusting channel (Du, Ren and Chong), to the five reservoir circuits (2 Yang Chao channels, 2 Yin Chao channels and 1 Dai or Belt channel). Together these eight circuits known as the "Eight Extra Meridians", (the Extraordinary Vessels, the Curious Meridians, the Strange Flow Currents, or the Psychic Channels) transmit the Qi to the organ channels, tendon channels and connecting channels which carry the Qi to every organ and body tissue. When an excess of energy exists the extra channels absorb and store it. When extra Qi is needed to sustain function the extra channels supply it. In this context, with the breath practice of Qigong, every part of the body and every function are nourished with the life sustaining bioelectrical force of life.

BIOENERGETIC CIRCUITRY NETWORK OF THE QI IN THE CHANNELS

The Qi circulates in the energy channels by virtue of the breathing, the movement and the visualization of Qigong. There is an intricate network of bioelectrical circuits (71 named channels) and an endless number of minor channels that administer the Qi to every organ, tissue and cell of the body. In relation to the Qigong exercises the eight Extra Channels are primary. Their role is to store energy overflow and to transmit the core energy to the organ system circuits. The activity of Qigong practice is called "to circulate the light" and "to activate the micro-cosmic orbiting of the Qi". The energy is translated sometimes as light or bioluminescence. The ancient Chinese were very attuned to nature and saw the human being as a microcosmic analog (a small heaven) of the macrocosmic (large) universe. When doing Qigong the individual is the most nearly aligned with this cosmic or heavenly state.

QIGONG AND PRANAYAMA

North of the Himalayan Mountains the cultivation of the Qi is called Qigong. South of the Himalayan Mountains energy cultivation is called Pranayama, an aspect of Yoga. Both systems are tightly woven into the pursuit of health, as well as, the refinement of spiritual practice. Both systems focus on the generation of vital force or bioelectrical energy. In both systems the energy flows in a circuitry of energy channels. In the yoga system of India the channels are called Nadis.

As in the Chinese tradition, there are three primary channels. The central channel, known as Sushumna or kundalini path, is the same as the Chinese Chong Mo. An interesting difference is that the second and third Indian circuits do not cycle in an orbit, as do the Ren and Du, down the front and up the back. The Indian circuits, Ida and Pingala, descend, alternating from side to side, like the twin serpents that entangle the staff of medicine called the Caduceus. (14) There is strong evidence that these channels have a direct relationship to the right/left brain hemispheres, as well as, the function of the sympathetic and parasympathetic activities of the autonomic nervous system. (16) The alternate nostril breath used in yoga and Qigong may have an effect on the autonomic function. Doing this particular breath practice may bring homeostasis to the autonomic nervous system and therefore balance organ and gland function. (16)

THE KINDS OF QIGONG

Chinese culture is very ancient and Asia, geographically, is very large. As a result there are many differing systems in all disciplines and professions: art, cooking, medicine, as well as exercise and breath practice. While there are incredible variables, exercise and breath practice are generally divided into several categories:

- Still or moving
- Fast or slow
- Lying, sitting, standing or walking
- Internal focus or external focus

A moving, fast exercise with external focus would most likely be called Gong Fu, boxing or martial arts. This includes all of the martial and confrontative styles like Tiger, Mantis and Crane along with weapons practice. Still, slow moving or sitting exercise that has an internal focus is Qigong. The former, faster approach is currently called Wu Shu or National Sport Art in China and is a very beautiful flourish of circular movements done either with an opponent or alone (shadow boxing).

Qigong is slow, soft and often still. While there is often movement, the breath and Qi development are the primary focus. Most exercise systems that are slow or still with focused breathing are called Qigong in China. Nei Gong, internal cultivation and Wai Dan are other names for internal development arts. The goal is to generate and then to circulate the Qi (life force). It is through the balanced circulation of the Qi that the blood circulates, the lymph circulates, and the neurological impulses maintain optimal function. It is through supremely coordinated control of the Qi that the extraordinary human capabilities, that are often associated with Qigong, are possible to achieve.

Qigong is an all-encompassing superstructure under which all of the Chinese movement and self-development arts can be gathered. Even the gestures of circus acrobats and Chinese opera players look similar to the gestures of the martial arts. Fighters, acrobats and opera members draw their skills and energy development

from the ancient tradition of the Chinese movement arts. Taiji (Tai Chi Chuan), the famous Chinese exercise for health maintenance, when done with the intention to cultivate the Qi is Qigong. Qigong is the common practice that all of the arts gather under and draw upon. All of these disciplines have breath and intention in common.

Qigong that is done lying still is very subtle because the practitioner seems to be asleep. However, the enhancement and circulation of the Qi requires only breath, intention and visualization. Lying still requires the least activity and concentration and has the least potential for distraction. It is therefore a particularly profound approach to Qigong. It is usual to find in Chinese philosophers, Lao Tzu and Chuang Tzu, reference to the profound outcome of "not doing". One of the most famous Qigong exercises is the "bone and marrow washing" which can be done while lying completely still.

Sitting Gong can be done with or with out movement, the focus is the internal exercise that enhances and circulates the Qi. Standing Qigong without movement is a further example of reaching for the intended result with little action outside of breath, intention and visualization. The most highly refined systems of personal empowerment and illumination have quiet waiting with intention as a central practice. In these self-development arts the battle is with the mind that wants to chatter endlessly about ten thousand things.

The sitting and standing forms also can be done with movement. In these the practitioner moves the arms and sometimes legs, as additional elements, to stir and stimulate the movement of the Qi, blood and fluids (cerebrospinal and lymph). Finally, there is the walking Qigong, which is very beautiful and graceful. There are literally thousands of various sets of movements or forms. Even in the walking forms the central purpose is to cultivate the Qi with breath, intention and visualization as the primary activities.

MYRIAD OF APPLICATIONS: ONE COHERENT SYSTEM

There is a broad spectrum of reasons for the practice of Qigong. At one end of the spectrum is a person who is in ill health who does daily Qigong to rehabilitate from disease. In the middle of the spectrum is a medical practitioner who maintains a high level of personal health with daily practice and teaches Qigong to patients for self-care. At the other end of the spectrum is the Taoist practitioner of Qigong that has merged with the essence of the cosmos by "refining the body of pure energy". In Qigong many meaningful but differing goals may be achieved by following the one path.

One of fascinating features of Qigong is that it evolves from the simple and practical self-applied health maintenance system to the refined level of spiritual practice in a set of connected steps. In western culture the development of the body, mind and spirit are separate departments. In the Chinese tradition through the path of Qigong the development of the body, mind and spirit all spring from the evolution of one practice.

In Qigong it is said, "the way to person's enlightenment is through their stomach ache (or other physical problem)". One's disease can lead to new knowledge. For example, an average person may come into the acupuncture and Traditional Chinese Medicine clinic complaining of stomachache. Acupuncture, oriental physiotherapy and herbal formulas are administered as the therapeutic modalities. In addition to these, which are done to the person by a doctor or practitioner, simple Qigong exercises are taught to support and consolidate the treatment. The patient improves with the treatment and the exercises and says finally, "What is that tingling feeling that I get after doing the Qigong, is it the Qi"?

The practitioner then teaches the person the opening of the points or gates, the guided use of the breath to move the Qi in the front and back channels, the circulation of the light in the microcosmic orbit and the visualization of Qi flow to the organs and glands. The person, now well from their stomach disorder, returns and reports a heat in the lower abdomen. The doctor teaches this interested person to project the Qi to the feet and hands. Eventually the person studies the importance of food, conservation of energy, sexual discipline, and self-massage, tonic herbs in addition to breath practice. Raw external resources, like food and air, along with Qigong practice generate and enhance the body Qi. Further exploration leads to a study of the nature of the energies of Heaven/Yang and Earth/Yin and how they are drawn toward each other and mixed together in the human body. Finally the individual, transformed through the Qigong process, has taken many developmental steps to gain the ability to regulate the body/mind toward peak health. In addition, this exemplary person may have learned to assess the energy body of others and help them through Qigong healing techniques. In this way the knowledge and tradition is kept intact and is passed to future generations.

The point in this example is that one step, in Qigong practice, can lead to the next for anyone who is interested. It is an evolving, coherent and autonomous system of personal development. Many Chinese Qigong practitioners are individuals who became well through Chinese medicine and Qigong practice. In some cases they become physicians who then help others and pass on the Qigong tradition. Most practitioners have followed the evolutionary process from the simple level of daily breathing and calisthenics exercises to a most highly refined level of personal development and an incredibly subtle and powerful form of health care and medicine.

THE PATHS OF QIGONG

There are myriad approaches to Qigong, with broad applications for:

- The healthy individual seeking peak performance
- The unwell individual seeking health
- The martial artist seeking ultimate power
- The doctor seeking healing methods for service to others
- The extraordinary individual seeking the maintenance of mysterious abilities
- The spiritual student seeking enlightenment

There are others as well as combinations of these. One might, as we noted above start as a health seeker and progress to a spiritual seeker or start as a health seeker and just perfect the ability to remain well. Many Qigong practitioners bring a bit of each of these profiles to their practice.

PEAK PERFORMANCE: QIGONG AND THE HEALTHY INDIVIDUAL

Qigong practice activates a number of the body's self regulating systems which are responsible for the balanced function of the tissues, organs and glands. The uptake of oxygen, as well as, oxygen metabolism is tremendously enhanced by Qigong practice. The positive impact of oxygen metabolism alone has powerful implications for both physical and brain activity. In the area of sports, peak levels of performance can be cultivated through Qigong in addition to normal training.

In the work of individuals who have physically demanding jobs the refinement of function that comes with Qigong practice adds to strength, stamina and endurance. Executives, whose work is more mental, derive more endurance, but concentration, creativity and intuition, as well. The tremendous health risk factors of tension and stress are profoundly neutralized by the common effects of Qigong: enhanced oxygen metabolism, balancing of the autonomic nervous system, pumping of the lymph, enhancement of the bio-electrical field, etc.

Qigong is the medicine for the healer. When the directive is "physician heal thyself". The prescription, in China, is Qigong. Qigong is referred to as acupuncture without needles. Elmer Green, Ph.D., author of *Beyond Biofeedback* and one of the great researcher/thinkers of the western world has said "We have concluded from our work with hundreds of patients that anything you can accomplish with an acupuncture needle you can do with your mind". (27) The Qigong tradition in China is the discipline through which "heal thy self" (healthy self) is accomplished. Breath, motion, intention and visualization when activated together through the Qigong system are the great preventive medicine that lies within.

PROFOUND MEDICINE: QIGONG AND THE UNWELL

In Traditional Chinese Medicine, it is said that disease is the physiological expression of a disharmony of the energy system of the body. Acupuncture and herbal formulas, among other modalities, are administered to rehabilitate the individual back to a state of balance and health. In a similar fashion to western medicine, these are procedures that are "done to" the patient. While these modalities are more natural and health enhancing than surgery and medications they are still done to the patient who is often a passive recipient of services. This dynamic is a betrayal of the essence of Traditional Chinese Medicine as revealed in one of its great precepts "teach rather than treat". In the *Nei Ching* it says, "The inferior physician treats diseases, the superior physician teaches the well to remain well". (19) We can see clearly the consequences of not honoring this law in the modern world: people dependent on experts outside themselves to "cure" them and a resulting health costs crisis.

Qigong captures the essence of Traditional Chinese Medicine in a personal practice, which includes all the necessary tools for self-healing. Qigong is profound medicine, it is easily learned, it is medicine that is always with the person, it has no cost, requires no memberships or special equipment, the individual does not need a doctor's order, permission, diagnosis or prescription, it is not necessary to go to an clinic, hospital or pharmacy to get it. The medicine is in the person and needs only to be activated.

In the 1950's, the Chinese government mandated exploring its traditional medicine as well as the technological medicine of the west for the most efficient combination of clinical strategies. A group of gastrointestinal cancer patients was divided into several experimental groups. (13) One group received radiological and chemo-therapeutic modalities, one group received radiological, chemo-therapeutic and breath physiotherapy (Qigong) and one group received radiological, chemotherapy, Qigong and Fu Zheng (immune enhancing tonic herbs). The results showed significantly longer survival rates for the groups that had treatments from both Western medicine and Chinese medicine together. Unfortunately, the Chinese were so enraptured with the Western techniques that they did not have a group that used just Qigong and herbal formulas so we can only speculate that such a group would have had better survival rates as well.

It is startling that this simple therapeutic tool should be so available and not have created a revolution in health care. In 1896 in the United States a small book was written on the powerful potential of breath practice, *Nature's Cure For Chronic Diseases: The Greatest Health Discovery of the Age* by H. C. Borger. (28) This book, with no reference to any Asian sources describes healing through breathing exercises. Its rationale is focused primarily on oxygen metabolism and circulation. It is clear that experts, not only in the mysterious orient but also in the western world, have found the cultivation of the breath to be a profound therapeutic agent. Why then is breath practice not a common therapeutic tool?

One especially important characteristic of this type of therapeutic strategy is that elders and patients restricted to wheelchairs and bed rest can do it. In fact, individuals suffering from paralysis can do this exercise. The lying down Qigong that seems as if nothing is happening is a perfect exercise for people with paralysis. In Illinois a martial arts instructor named Cha Kyo Han uses Qigong-like breathing exercises with progressive resistance isometric exercises to help people with multiple sclerosis, stroke, degenerative disease and handicaps to improve their health. One of his MS patients has had dramatic improvement and is walking and teaching the method to others. The potential in Qigong for healing as well as health cost containment is very timely and needed.

QIGONG DOCTOR: QI PROJECTION

Patient empowerment and self-care, as well as, medical cost reduction possibilities have a special potential to transform medicine as it is practiced in the western world. However, the aspect of Qigong that has greatest potential to restructure medicine, as we know it, is the amazing technique of "external" Qigong. In external Qigong the

practitioner or Qigong doctor does non-touch energy assessment of the patient and actually projects or conducts Qi, in a treatment mode, to the patient.

In assessment, rather than asking questions, taking pulses, observing the tongue, palpating reflexes and ordering lab tests, the practitioner uses concentration, intuition, and reading of the Qi with off the body diagnostic scanning. In treatment, the practitioner actually projects the Qi to another to have a clinical effect. Both of these techniques seem impossible and fantastic. However, research is revealing that there may be authentic, explainable and demonstrable natural laws and mechanisms in operation during these events. (7) Therapeutic Touch, an assessing and healing technique, which uses an "off the body" technique called "unruffling the field", has experienced a tremendous swell of interest in the nursing community. The research of developer Delores Krieger, RN, demonstrated that in-vivo hemoglobin values were significantly affected by the administration of this energy based technique. (29)

A unique aspect of the work of China's Qigong doctors is that a number of them have developed the ability to manipulate the limbs of patients and research participants from a distance, effect changes in the physical or chemical properties of research materials with intention, and cause anesthesia by pointing at certain acupuncture points. (7) Dr. Zhang Yu of the Beijing College of Traditional Chinese Medicine and Xi Yuan Hospital has amazed groups of American observers with his external conductance ability. It seems that participants may be hypnotized or faking, however, studies with animal subjects show similar reactions. An October 1986 article in the LA Times tells the story of the Bejing practice of Master Xun Yunkun who treats medical cases including terminal cancer and paralysis following stroke with Qi projection. Another article describes "harnessing electrical energy and projecting it across a distance to assist patients with Parkinson's disease, arthritis and other crippling diseases.

There is a tremendous wave of interest in this aspect of Qigong in the western world and a number of very respectable research organizations are currently expending substantial budgets on Qigong related projects. There is a tremendous amount of research attempting to explain this phenomenon. The American Foundation of Traditional Chinese Medicine, Dr. Zheng, Rong Rong and Stanford physicist Professor William Tiller are doing a collaborative research project on Bioluminescence and Qigong with a focus on satisfying the rational research model. One hundred and twenty eight research papers were presented at the First World Conference for the Academic Exchange of Medical Qigong in 1988, which was sponsored by the China Medical Association, Chinese Ministry of Health, China Qigong Research Institutes and the Beijing College of Traditional Chinese Medicine and attended by representatives from 17 countries.

On one hand it is wonderful that there may be Qigong doctors with such special abilities. It would be a shame, however, if interest in such phenomena overshadowed the tremendous potential for all health seekers to move toward freedom from dependence upon health experts outside of themselves through self applied Qigong techniques.

QIGONG IN THE MARTIAL ARTS: THE IRON SHIRT AND DRAGON FLYING

The martial arts in China are like baseball in America, a national pastime. The roots of the martial arts are not particularly martial. Early systematized exercise traditions were developed in the monastic communities as techniques for the cultivation of health and personal development, often with the goal of longevity or immortality. The great styles of the movement or exercise arts emerged from natural philosophy and spiritual pursuit. Pa Qua and Hsing-I are steeped in spirituality and the animal forms honor and mirror animal gestures as a pathway to harmony and balance with the forces of nature. All of these styles and forms lend themselves to martial application and during certain periods of China's history, especially the Boxer Rebellion, the arts of personal cultivation tended to become primarily martial. (22)

It is Qigong in the martial arts that supplies the abundance of Qi that makes the practitioner seem to fly, absorb tremendous blows and knock down opponents with what look like minor punches. Qigong in the martial arts is the source of what is called the "soft styles and inner strength". Qigong in the martial arts engenders the strategy where in the great the small defeats. Qigong in the martial arts suggests that through supreme development of the Qi the victor is a warrior who overcomes without needing to strike. This is the greatest, most subtle victory where the opponent's force is neutralized by a natural, nonviolent resolution that occurs through an ultimate understanding of the Qi.

Through Qigong practice the martial arts practitioner develops the Wei Qi protective energy and the surface tissue of the body into an "iron shirt" which is impenetrable and can absorb the opponent's attack. With a special understanding of the Qi the practitioner can combine a state of extreme lightness with extreme flexibility to achieve extraordinary leaping ability that has earned some of the great practitioners nicknames like "leaping butterfly master" and "dancing dragon flying".

QIGONG IN EXTRAORDINARY HUMAN FACULTIES

Tales of extraordinary human feats have always been associated with Qigong. The phenomenon of "exceptional human function" (EHF) has created quite a bit of interest in the world's scientific communities. (5,6) It would be irresponsible to claim that EHF is fully proven to the satisfaction of western rational research science. Much of the research done in China does not meet the extreme and rigorous parameters of the scientific method. However, many research institutes in China are enthusiastically exploring EHF and Qigong. (5,6)

EHF has manifested in a large number of cases where children have had unusual and extraordinary abilities. These are the famous psychic children of China, who have been documented as being able to read messages that are inside of locked vaults and see through objects. In his book, *Encounters With Qi* , (6) David Eisenberg a Harvard trained physician reveals his experience of two sisters who live near Beijing with "exceptional human function". These young girls were able, repeatedly, to tell what a group of researchers had written on papers that they could not have seen. Dr.

Eisenberg also tells of his experience at the Qigong Research laboratories of the Shanghai Institute of Traditional Chinese Medicine. A Qigong master named Lin Ho-sheng caused the movement of an object from a distance of several feet in an environment where no other force could have affected the object. (6)

It has been found that EHF is maintained and perpetuated by the practice of Qigong. (5) Qigong has been found to support the development of EHF in certain practitioners who were not born with the skill. In children whose EHF abilities were slipping away with age it was found that the abilities could be regenerated or induced with Qigong exercises.

QIGONG AND TRANSCENDENCE: REFINING THE LIGHT BODY OF PURE ENERGY

In the spiritual traditions of China, Taoism, Confucianism and Buddhism, practices and disciplines for refinement of the spirit are common. Qigong is a primary system for spiritual attainment. The practice of Qigong, in this context, is aimed at the evolution and development of the inner being. The body is seen as a local representative of the entire universe. As in the hologram of modern science, the individual is, in a special sort of way, the whole cosmos.

One description of Qigong is as a discipline to "refine the body of pure energy". The acupuncture centers on the front and back primary channels of the "microcosmic orbit" are like energy gates. When the gates are open the Qi develops and circulates. It spills out into all of the channels and circuits. This is called the circulation of the light. When the light is circulating to all of the organs, glands, limbs, and tissues and cells the practitioner is filled with, acknowledges and celebrates the light. As the practitioner's attention is fixed on the body of light the dense body of substance becomes secondary. Rather than a physical body with a resonating energy field the individual, from this perspective, is an energy field that has a small dense body of flesh at its center.

Thousands of years ago Chuang Tzu asked, "Is it Chuang Tzu asleep dreaming he is a butterfly? Or is it the butterfly dreaming he is Chuang Tzu." In the Qigong of transcendence it is asked, "Is the practitioner in the deep Qigong state a person in a moment of transcendent energetic experience, or is manifestation in a physical body actually a brief exploration into substance by an entity whose normal state is one of highly refined, resonating light energy". The post Einsteinian physics of the unified field has revealed that our world is composed of dynamic relationships of energy. Therefore, it is not that strange that the practice of transcendence should be as much a part of the Qigong tradition as calisthenics and breathing exercises that lower blood pressure.

Richard Wilhelm's translation of *The Secret of the Golden Flower*, a beautiful Chinese classic of transcendence, focuses on the "circulation of the light and the backward flowing breath". "Compared to the great Way, heaven and earth are like a bubble and a shadow. Only the primal spirit and the true nature overcome time and space. The energy of the seed, like heaven and earth, is transitory, but the primal spirit is beyond

polar differences. Here is the place where heaven and earth derive their being. When students understand how to grasp to the primal spirit they overcome the polar opposites of light and darkness and tarry no longer in the three worlds. Only the seeker who has envisioned human nature's original face is able to do this."(21)

QIGONG AS REMEMBRANCE

We cannot yet say that Qigong has caused a revolution in Western science and medicine. It is, however, a very primary player in a far reaching, cross-disciplinary transformation that is taking place. Western rational science and the culture that it has created is perhaps the only cultural system that has completely forgotten its energy cultivation tradition. As we begin to remember our birthright to simplicity and limit ourselves to appropriate levels of technology we can return to those "tried and true" systems of ancient cultures and recover the daily practice of profound self medication from the energetic source that is contained within our being. Cultivating one's own life force has no cost, it requires no prescription, it is always with you, you need no membership, special equipment or particular attire, it is extremely low impact but can be completely aerobic, you do not need a diagnosis and doing it for fun during health is preferable to doing it after one is sick to cure a health problem.

In 2004, we spent over $1.9 trillion or $6280 on health care per person in the United States. It is startling that we could have the most profound medicine within us, and somehow forget to use it. As we begin to turn to Qigong, or some western style, "newly discovered" Qigong analog, there promises to be a dramatic cut our in medical costs. More welcome, even than this, is the potential that lies within remembering the delicate balance of forces and elements that holds a system, any system, in harmony and optimal function. With this remembrance we may also recall that our families, communities and our planetary neighborhood require the careful cultivation of a delicate balance. Through the exploration of Qigong in the west we may coincidentally absorb some of the ancient Chinese qualities from Taoist thought that so vigorously honor nature, the environment and peace of mind.

PART II:

PHYSIOLOGICAL MECHANISMS OPERATING IN THE HUMAN SYSTEM DURING THE PRACTICE OF QIGONG AND YOGA/PRANAYAMA

The most ancient and refined systems of health self care, Qigong and Yoga/Pranayama, originated in China and India. Both systems have similar activities, which include breath practice, postures, motion, self-massage, relaxation, concentration, visualization and meditation. Science is currently recognizing the value of investigating such ancient health care systems. Qigong triggers broad spectrums of physiological and bioenergetic events and Yoga and these mechanisms can be modified and refined by conscious and concentrated practice.

Actual research on Qigong and Yoga in the western world is in its infancy although some work has been done on the physiological parameters that may be influenced by voluntary control of the body's self regulating systems. (1,2,3) There is, however, substantial research from numerous disciplines of western science, (exercise physiology, behavioral medicine, psychoneuroimmunology, neurology, hematology, immunology and lymphology) that explores states or responses that are similar to states or responses initiated by Qigong and Yoga practice.

Techniques such as meditation, progressive relaxation and autogenic training have been found to alter heart rate, blood pressure, brain wave activity (EEG), neurotransmitter profile, peripheral blood volume, skin temperature and muscle control. (EMG). (1,2,3) Exercise that initiates only minimal to moderate body movement has been found to be effective and beneficial. Moderate body movement that occurs within a context of deep relaxation, for example, is common to both Qigong and Yoga. Western research on exercise, relaxed states and other triggers of specific physiological responses are clearly implicated as useful resources that may help to begin to build a body of scientific information on the self applied health maintenance methods of the Asian systems of traditional medicine. Key words such as "breathing exercises", "respiratory muscle training", "respiratory relaxation training", "correction of breathing", "physical training", "exercise therapy", "mild exercise", "dynamic exercise", "relaxation therapy", "autogenic training" and "meditation" lead to useful sources in the literature.

Research from the Asian cultures is more ample, however, much of it remains untranslated. In addition, until recently, the rigors held as essential to research in the western model of scientific inquiry were generally misunderstood in the more empirical model of the Asian sciences. In 1988, The First World Conference on the Academic Exchange of Medical Qigong was held in Beijing, China. The abstracts of 128 papers, many of which are on scientific subjects with necessary controls, have been translated into English. (4) Further, excellent controlled studies on Qigong, from China, and Yoga, from India, have begun to appear on the MedLine database, primarily under "breathing exercises".

A major obstacle in writing on subjects from the traditional Asian systems of medicine and health care is the *Qi* of the Chinese and the *Prana* of the yogic tradition of India. These words are not generally considered to have English equivalents. There is a broad array of possible translations including: bio-electromagnetic energy, bio-energy, subtle energy field, sum of all optimal human function, vital energy, awareness, intention and others. Over half of the scientific research articles from the 1988 conference in Beijing have the word *Qi* in the title. Until Western science has either come to accept *Qi* and *Prana* into the scientific language, or to generate agreeable definitions, research literature using these words will probably remain inadmissible in the west.

Bioenergetic research has a long history in western science. Harold Saxton Burr in 1935 described a system of electrodynamic fields. (5) He worked with the electromagnetic currents in the bodies of salamanders and then in humans which he finally named L-fields (life fields). (6) Robert Becker reconfirmed Burr's work and applied DC current to regenerating salamander tails and healing human bone fractures. In his work with the National Institutes of Health (NIH) Becker clarified that the perineural (nerve sheath) network is highly conductive. (7) B.E.W. Nordenstrom has described the vascular interstitial closed circuit as a system of preferential ion conductance pathways comprising a network of biological circuitry. (8) There is some suggestion that even more subtle energies resonate in the human system and may be projected over substantial distances.

One of the most interesting features of the Qigong tradition is the phenomenon known as "Qi emission" or "external conductance of the Qi". Besides the self applied aspects of Qigong through breath, movement and meditation there is an application of Qigong to others performed by a Qigong master or Qigong doctor over a distance. These same phenomena have a rich history in the west as psychic or mental healing. Healers in the Soviet Union have been observed exchanging energy and heat into patients to help balance their biological function. (9)

This area is of great interest and raises fundamental questions in the interface of biology and physics. Such expert applied techniques are a potential distraction from the possible revolution in health care and medicine that self applied Qigong, Yoga and other forms of self-care could provide. Whether self applied or procured from masters the benefits of Qigong and Yoga/Pranayama, to be embraced by Western science, will have to have a clear physiological basis. Such a physiological foundation may actually comprise the conductive media for the "Qi" and "Prana". In any case an exploration of the physiological mechanisms activated by the practice of Qigong and Yoga/Pranayama is needed. In instances, where it is clear that a particular mechanism is highly probable but not assured through specific research on Qigong or Yoga practitioner subjects, we will refrain from absolute statements and defer to "may", "possibly", "seem", "likely", etc with these words pointing to areas where research is needed to demonstrate the mechanism clearly.

The three major areas of physiological mechanisms initiated and enhanced by Qigong and Yoga/Pranayama practice are:

- Oxygen Metabolism
- Lymphatic System
- Brain and Nervous System

OXYGEN METABOLISM

The human system will begin to disorganize and die after several minutes without oxygen. Thus altering oxygen metabolism might be curative for diseases that have an oxygen deficiency component to their etiology. Both moderate and vigorous body movement and the accompanying muscle work increase oxygen demand in the cells. Evidence from research in exercise physiology demonstrates that muscular activity accelerates the rate of oxygen uptake from the blood (10,11,12,13). It has been shown that training and practice increase ventilitory threshold, anaerobic threshold and mechanical efficiency. (14,15) This suggests that regular body movement with increased breath activity supports adaptation toward increased functional efficiency in the uptake and utilization of oxygen from the blood.

One early source (1896) suggests that just the muscular activity of the breath mechanism itself is enough to increase the uptake of oxygen from the blood. (16) This is not a widely accepted idea. However, most traditional systems of medicine include elaborate methods of breath practice. Some exploration of this mechanism for the absorption and utilization of oxygen is being undertaken. (17) A recent animal study demonstrates that the movement of the breathing apparatus alone may generate oxygen demand (18). Both Qigong and Yoga/Pranayama include breath practices where there is no body movement except of the breathing apparatus itself. Such research suggests that simple breathing techniques alone may increase the amount of oxygen absorbed from the blood. Individuals who are restricted in their movement due to health problems may have access to some of the benefits that have traditionally been reserved for those who do vigorous exercise.

Certain dynamic (active, moving) Qigong and Yoga methods increase the oxygen uptake by virtue of the greater requirement for chemical energy by the cells. Other more quiescent (inactive, still) methods tend to decrease oxygen uptake due to the lowering of metabolic activity. It has been found that some practitioners of these traditional practices have refined their ability to the point where they actually enter into altered states where the physiological need for food, air or sleep have been almost completely suspended. (3)

The Framingham Study on risk factors for cardiac disease, completed in 1970 by the National Heart and Lung Institute, found that decreased vital respiratory capacity (breath volume in relation to tissue uptake) was directly associated with increased mortality. (19) In Australia an extensive 13 year study completed in 1983 which measured similar parameters of long life, demonstrated that respiratory capacity was "a powerful determining variable", more significant in predicting longevity than tobacco use, insulin metabolism or cholesterol levels. (20)

Recently there has been a tremendous amount of activity in both research and clinical practice, which suggests that many deficiency disorders and degenerative

diseases are, at least partially, attributable to oxygen metabolism dysfunction, oxygen deficiency or hypoxia. (21,22,23). This view is supported by many of the great names in research -- Albert Szent-Gyorgi, Otto Warburg, Emmanuel Revici and Linus Pauling. The Asian systems of self applied health maintenance like Qigong and Yoga/Pranayama proposed this view and developed specific methods for application centuries ago.

The practice of Qigong and Yoga increase oxygen availability which potentially:

- Supports energy (ATP, AMP, ADP) generation.
- Generates water as a by product of energy metabolism which contributes a major portion to the lymph supply.
- Enhances immune function.
- Supports the body's ability to neutralize free radicals.

Energy Generation

It has been well established that the energy necessary for cell work and body heat regulation is supplied through the reaction of oxygen and glucose to form high-energy phosphate bonds. (24) There is a direct relationship between oxygen demand, the impulse to breath and the basal metabolic rate (BMR, the rate that the cells in the body consume oxygen and glucose to produce water, carbon dioxide and energy). Hydrolysis of adenosine triphosphate (ATP) is accompanied by the release of chemical energy for cellular and muscular activity.

Preliminary research demonstrates that ATP may be an analog to one aspect of what the Chinese call "Qi" and what the Oriental Indians call "Prana", the vital force or life energy. The aspect of the Qi that is the "basic dynamic force of all vital function" is called Zhen Qi (Genuine Energy). (25) A study presented at the 1988 World Conference on the Academic Exchange of Medical Qigong revealed that blood ATP content increased with exercises, which cultivate the Qi. (26) When the mysterious practice of Qi emission was performed the subject's ATP was found to have decreased.

The simple methods of Qigong practice, movement, breath practice moderated with concentration, relaxation and intention may bring a primary substrate of Qi or Prana production, namely oxygen, into the body's energy metabolism cycle. This chain of events is called the "cycle of the transformation of energy" by the Chinese. (27) It is likely, however, that this is only one of the components of the broad array of possible energetic mechanisms involved in acupuncture, Qigong and other Asian health practices.

In the west we generally characterize ancient medicine as unscientific or even primitive. The Chinese "formula" for the transformation of Qi seems overly simplified. Gu Qi (grain qi), the essence or life force of food, mixes with Kong Qi (28) or Qing Qi (25) (natural air qi), the essence or life force of air to form Zhen Qi (true qi) or the life force of the body. (25,28,29)

Gu Qi	+ Kong (Qing) Qi	=	Zhen Qi
Energy of Food	+ Energy of Air	=	Body Energy

However, it is this same basic formula, disguised in the vocabulary of Western science, that is used in modern physiology.

$6O_2$	+ $C_6H_{12}O_6$	+ (BMR) = Ergs	+ $6CO_2$	+ $6H_2O$
Air	+ Food	+ (BMR) = Energy	+ Carbon Dioxide	+ Water

Oxygen (O_2) plus glucose ($C_6H_{12}O_6$) through BMR yields energy in the form of high energy phosphate bonds (especially ATP) plus water (H_2O), which dissolves carbon dioxide (CO_2) and facilitates the hydrolysis of energy yielding phosphate bonds. It seems that the Chinese knew, without a particularly refined scientific method, that only a portion of the air and food, the essence, was employed in the process: only 20% of air is oxygen and glucose is approximately 60% of food. (24)

The Chinese knew about circulation of the blood approximately 2000 years before William Harvey described it in 1616. (25,28,29) They knew about the energy generating relationship of food and air 2300 years before the elaboration of the Krebs cycle. (25,28,29) The simplicity of the Chinese formula encourages the use of the movement and breath as a health enhancing factor while the complexity of the Western scientific formula tends to mask the importance of the breath and makes the benefits of simple breath practice less accessible to the average health seeker?

Water Production

A second critical benefit of increased oxygen metabolism generated through the practice of moderate body movement and breathing exercises is linked to the lymph system. Besides the production of energy, in the phosphorylization cycle, there is also the generation of pure water as a waste product or by product. (30) This water is dramatically and directly increased when oxygen consumption is increased at the cell. Because this water becomes involved with the internal cleansing performed by the lymph it is a major link between the breath and lymphatic system function.

Immune Function

ATP drives the activity of every cell. Therefore, immune functions as well as the production of immune resources (white blood cells, lymphocytes, t-cells, killer cells, etc) are indirectly dependent on oxygen consumption. These activities become deficient individuals who are unwell. It has been shown that exercise can mobilize the effect of natural killer (NK) cells. (31) In individuals who exercise so vigorously that they exceed the aerobic level and cross the anaerobic threshold immune function is decreased. (32,33) Both suggest that oxygen deficiency leads to decreased immune function and that moderate exercise increases immune function.

In his research, Nobel laureate Otto Warburg found that oxygen deficiency was typical of cancer cells. (34) Numerous studies associate reduced oxygen intake with

increased mortality (19,20) and reduced resistance to disease. In studies with elders immunodeficiency was found to be one of several consequences of reduced oxygen metabolism. (35).

Oxygen's effect on the immune function has been demonstrated through research studies on two nutrients that have been shown to have immunomodulating capability. Germanium, an element that bonds easily with oxygen, is thought to increase the efficiency of the use of oxygen in the mitochondria of the cell. In addition, it may help to decrease free radicals in the blood. In a German study it was found that in elderly, injured, stressed and hospitalized individuals the arterial oxygen content is often reduced from normal levels. (36) Administration of oxygen was found to elevate the arterial oxygen content and increase recovery rates. The experimental addition of germanium to the treatment protocol increased oxygen utilization and further accelerated the healing process. (36)

Blood studies on AIDS patients revealed, in addition to deficient immune capability, low concentrations of Co enzyme Q10, a coenzyme present in all healthy cells. The patients were administered CoQ10 and their symptoms as well as blood immune factors improved. (37) CoQ10 apparently improves the ability of oxygen to produce ATP. Both germanium and CoQ10 enhance the ability of oxygen to support immune function with the implication that increased oxygen through Qigong or Yoga/Pranayama may have a direct impact on immune deficiency states.

Free Radical Balance

There are multiple factors that modify oxygen demand and uptake besides the cell work of body movement and organ function. Such factors include the effects of chemical and environmental stress caused by foods, water and airborne pollution. Emotional, relational or career stresses, the stress of injury and the stress of infection also affect the body's ability to absorb and utilize oxygen. Accumulation of these effects can negatively impact on oxygen metabolism and precipitate functional imbalances in the human system.

The normal activity of energy metabolism creates a certain number of by-products. These molecules are called free radicals. With the impact of the above mentioned stresses greater amounts of free radicals are produced. All normal molecules have paired electrons in their outer electron orbits. Free radicals are unstable molecules with an unpaired electron in their outermost electron orbit. In an effort to return to a stable state these renegade molecules steal electrons from healthy molecules causing tissue damage and aging.

The body produces a number of antioxidant enzymes, superoxide dismutase, catalase, glutathione peroxidase and methione reductase, whose job is to neutralize the free radicals produced in normal energy metabolism. However, in an imbalanced or unwell system demand for antioxidant enzymes is high and natural productivity, due to pathology, may be low.

When slow, deep breathing and moderate body motion is activated there is an increased demand for oxygen molecules which are taken up from the blood. The potential for free radicals to bond with this available oxygen, neutralizing the free radical population, may be greatly accelerated when regular Qigong or Yoga/Pranayama is included in a person's daily health routine.

There are a number of strategies for resolution of oxygen deficiency disease (ODD) including the use of antioxidant nutrients (Vitamins A, C, E and selenium), antioxidant enzymes, coenzyme Q10, germanium and germanium bearing herbs and hyperbaric oxygen. There is, however, nothing more available, inexpensive and obvious than oxygen itself taken in maximum daily doses through moderate exercise and breathing exercises.

THE LYMPHATIC SYSTEM

The lymphatic system has been much neglected in most Western scientific traditions. Contrasted with the heart, for example, the lymph is relatively unexplored. Perhaps, because lymph and lymph vessels are generally translucent they drew little attention in early anatomical study compared to organs, blood vessels, muscles and bones.

Hippocrates and Aristotle referred to "white blood" and "colorless fluid" but in the Middle Ages medical knowledge declined and the lymph was temporarily forgotten. In 1627 Asellius, in Milan, recovered the knowledge of the lymph. (38) The structure and action of the lymph system was still undefined by 1900(39) and the both the immunological function of the lymph and the actual lymphogenic process, are not clearly understood even today.

In general, the lymphatic system is a network of organs, tissues, vessels, nodes and flow potentials. It collects interstitial fluid, infused with the by products of cellular activity, and transports it centrally where it rejoins the blood system. In this role it regulates endogenous metabolites and waste products. (40)

In addition, the lymphatic system is a primary component of the immune system helping to protect the body from a broad range of pathogenic factors. (40) It carries fluids infused with bacteria, virus, and fungus into immunoactive lymph nodes where lymphocytes, reticular cells and macrophages kill or neutralize toxic or enemy cells, substances and organisms. In this role it regulates exogenous disease inducing agents. (40)

The lymphatic system also has a nutritional function wherein it assists in bringing nutritional factors into proximity with the tissues. Asselius noted this in his original discovery of the chyle filled vessels of a recently fed dog. (38) In the 1970's the broad based nutritional (or trophic) function of the lymph system began to get deeper exploration. (41)

Like the early medical explorers in Europe, the founders of Traditional Chinese Medicine also did not specifically note the lymph, except non-specifically as a component of the body fluids. (28,29) However, there is an important difference

between the empirical science of Asia, which did not clearly delineate the lymph, and the deductive science of the West that gave the lymph little recognition.

In Western science, until recently the nearly invisible lymph, received little of the focus it deserves and few if any health generating strategies or modalities were based on its function. In the orient, where science is based on trial and error and the invisible "Qi" is honored, the results of healthy and unhealthy lymphatic function were noted in healthy individuals and contrasted in unhealthy individuals. Even though the lymphatic function itself was unknown and unnamed, its effects were generally ascribed to the proper action of Qi or Prana (energy) and fluids. In Asia an elaborate system for generating and circulating lymph was developed through the self-care practices of Qigong and Yoga/Pranayama.

When we look carefully at these practices in relation to what we now know about lymphatic function and its healing role it appears as if much of Qigong and Yoga/Pranayama practice were developed specifically with the enhancement of lymphatic function in mind. Breath, movement and posture all have specific effects on the production and circulation of the lymph.

In the West we have divided the body fluids (blood, lymph, cerebrospinal fluid, synovial fluid, extracellular fluid, intracellular fluid) into specific categories. From the paradigm of the west it seems the Chinese may have overlooked important information with their broad, non-specific view of "Qi, blood and fluids". However, the lymph fluid is actually part cellular water and part blood plasma. The blood plasma is actually comprised, in part, from lymph fluid. (38) Some of the cerebrospinal fluid finds its way into the lymphatic system. (42) In this way each of the individual fluids really makes up one fluid. Do we miss something by the reduction of integrated systems into a multitude of separate categories and parts? May we learn something by simultaneously embracing or, at least exploring, the more simplified view of the Asian traditions?

Qigong and Yoga/Pranayama practice activate a number of mechanisms associated with the lymphatic system:

- Lymph generation
- Lymph propulsion
- Immune function
- Cerebrospinal fluid circulation
- Nutritive function

Lymph Generation

The actual generation of the lymph has long been attributed to the filtration of blood plasma from the capillaries (40). As recently as 1985 this was recognized as the primary source of the lymph. This idea overlooks a significant detail that is at the essence of the tremendous health benefits of Qigong. The identical physiological process that generates the body's chemical energy produces a major portion of the body's lymph. (68)

To recapitulate oxydative phosphorylation:

$$6O_2 + C_6H_{12}O\ C_6H_{12}O_6 + (BMR) = Ergs + 6CO_2 + 6H_2O$$

Six molecules of water are generated for each six molecules of oxygen that are metabolized in energy production.

In a moderately active 70 Kg human between 2100 and 2800cc of lymph enters the blood stream daily at the sub-clavian vein through the thoracic duct. Through the calculations of the Krebs cycle the cells are producing approximately 950cc (30) of pure interstitial water daily. In a vigorously active person or one engaging in minimally strenuous exercise, such as walking, Qigong or Pranayama up to 1400cc of aerobically generated interstitial water can be produced, circulated and eventually passed into the subclavian vein daily.

Not only is the formula for oxidative phosphoylation the basis of chemical energy production but it is a primary source of lymph fluid production as well. Therefore, Qigong and Yoga practices can increase the amount of lymph, which serves as the fluid carrier for endogenous waste products as well as exogenous pathogenic factors. In this context the metabolizing cells are continually contributing pure H_2O into the interstitial spaces.

This water, then, is the vehicle of transport for metabolic by-products into the lymph vessels. From the tissue spaces it is propelled, as lymph, to the immunopotent nodal treatment sites and finally to the elimination organs via the blood. Increasing body movement and activating the breath potentially accelerate O2 absorption which generates more H2O and increases the volume of lymph fluid which enhances the removal of the by products of metabolism and pathogenic factors.

Lymph Propulsion

The blood circulatory system has the powerful heart muscle to propel its fluid. The lymph, however, under the same 14.7 pounds per square inch of gravitational pressure, has no distinct heart in humans. The quest for a "lymph heart" added little to the traditional ideas of propulsion until the mid 1900's when studies of birds and reptiles revealed specific lymph hearts. (43). In humans, however, assemblies of several mechanisms conduct the propulsion of lymph. The movement of lymph against gravity is accomplished with the help of a system of vessels that are liberally equipped with one way valves. It was known that the lymph was somehow pumped forward and upward enabling the valves to prevent it from flowing back with gravity.

Even as late as 1941 several important aspects of the lymph heart concept in humans remained obscure. (44) By 1949 spontaneous intrinsic pulsatory contraction of the peripheral lymphatic vessels was demonstrated in humans with a rhythm unassociated with either the heart or the breath. (45,46) This intrinsic contractility mechanism of the peripheral lymphatics was seen by many as the long sought after lymph heart. (40)

The subject of the lymph is complex and very much unsettled. The current literature is crowded with a wide range of questions raised by research. What factors might stimulate the intrinsic contractile mechanism, what regulates lymph protein concentration, what effect does passage through the lymph nodes have on the proliferation of immune cells from within the nodes (47) and what is the nutritive role of the lymph (41) are several such questions.

Due to the excitement over the intrinsic pumping mechanism, the effect on the lymph of one of the classic propulsion mechanisms, the activity of the respiratory apparatus, was eclipsed. The breath, through two mechanisms, has a significant effect on the propulsion of the lymph: aerobic production of water, and mechanical pumping of the breath apparatus. These will likely gain recognition as primary components of the multiple features of the lymph heart. Body movement and body posture initiate a number of additional propulsive mechanisms.

Tentative agreement exists on the five mechanisms for the propulsion of the lymph, stimulated by Qigong and Yoga practices. These include:

- Aerobic production
- Intrinsic smooth muscle contraction
- Movement of striated skeletal muscles
- Gravity
- Mechanical shifting of pressure gradients in the body cavities

Aerobic Propulsion

The aerobic production of lymph contributes to lymph propulsion by the cellular production of water as a by-product of oxygen metabolism. The liquid holding capacity of the tissue spaces is naturally limited. As the limit is reached, the presence of additional lymph drives the excess into the smooth muscle vessels of the lymphatic system. (39,40,43,47)

In Qigong this mechanism is triggered by the coordination of the breath with gentle movement, which increases oxygen demand in the cells. In response there is an increased availability of oxygen, which fuels chemical energy productivity and consumption. The resultant contribution of water as a by-product increases tissue fluid volume and drives the overflow into the vessels to become lymph. (42)

Traditional Chinese Medical theory teaches that the "lungs regulate the water passages"(48). To students from the west this seems quite unusual and unfounded. However, we here can see that the lungs and the breath both produce and circulate the water in the body.

Intrinsic Smooth Muscle Contraction: Autonomic Propulsion

The automatic response of the smooth muscle tissue of the peripheral lymphatic vessels is to contract when filled and stretched to a certain tolerance. (46) This

moves the lymph along in the vessel with the assistance of the one way valves in much the same way as the heart moves the blood. (42)

In Qigong and Yoga this mechanism is triggered by the breath's contribution to lymph volume, as well as the elevation of interstitial pressure caused by the postures and the movement of the extremities. In addition, this mechanism may be accelerated or enhanced by the shift of autonomic function in the relaxation state that is a feature of Qigong and Yoga.

Striated Skeletal Muscle: Voluntary Propulsion

Even the slight movement of skeletal muscle in a sedentary individual propels the lymph in the one way vessels. In an active person the lymphatic pumping of the striated skeletal muscles is greatly multiplied. The effect of muscle contraction on lymph is one of the classic explanations for lymph motion. (40,42) In Qigong and Yoga this mechanism is triggered by both the mechanical action of the musculature of the breath apparatus and the action of the skeleton through the relaxation and contraction of the striated muscles in the moving forms of the practice.

Gravitational Propulsion

Because gravity exerts such a substantial force and because lymph has so far to climb to get to the thoracic duct's entry into the sub-clavian vein any inversion of the limbs or even the prone body position allows for a free flow of lymph unencumbered by the effects of gravity. Elevation of the lower limbs is often prescribed for health problems characterized by a pooling of interstitial fluids.

In Qigong and Yoga the thousands of different postures and forms, including lying prone and motionless, often create this mechanical dynamic where the lymph is actually propelled centrally by gravity. In many methods of Qigong there are postures and movements that invert the limbs. In certain walking forms the practitioner is constantly but slowly moving all of the limbs in beautiful circular motions that recurrently activate this mechanism. In Yoga many of the asanas (postures) invert the limbs. In the head and shoulder stands the whole body is inverted.

Breath Apparatus: Mechanical Propulsion

The most powerful of the multiplicity of mechanisms that work together to form the "lymph heart" is the mechanical action of the breathing apparatus itself (43). The concentration of lymphoid tissue just above and just below the diaphragm is many times denser, and contains greater fluid volume, than any of the lymphoid tissue at the periphery, or even in the moderately prolific lymphoid areas of the axilla or groin. (40) Lymph that has been carried from all over the body accumulates centrally and is then propelled by the breath/diaphragm in a final rush through the thoracic lymph duct into the blood at the sub-clavian vein where it leaves behind its identity as lymph and is transformed into blood serum. (49)

Above the diaphragm the thoracic duct of the lymphatic system is a central collecting vessel. Its size is many times that of a peripheral lymph vessel. Below the diaphragm a substantial dilation of the thoracic duct forms a collecting capsule for lymph, called the "cisterna chyli" (cisterna=cavity, receptacle or reservoir). Chyle is a milky fluid infused with nutritional factors absorbed from the small intestine by the lacteals, which is passed into the circulating blood through the thoracic duct. The fluid that fills the cisterna chyli is a mixture of the nutrient rich chyle from the lacteals and the lymph that carries the metabolic by-products from the tissue of the organs, muscles and glands.

When full inspiration of the breath occurs, the diaphragm drops downward, and a tremendous negative pressure is generated in the thoracic cavity. As air rushes into fill this negative pressure the lungs are fully expanded. This compresses the thoracic duct. Due to the one way nature of the valvular system lymph is forced upward into the sub-clavian vein.

Simultaneously, when the diaphragm drops downward on full inspiration it compresses the abdominal and pelvic organs including the cisterna chyli, which empties under the pressure. The contents of the lymphoid reservoirs and vessels are forced by the same one way system of valves upward toward the thoracic duct. In research done by Dr. Jack Shields (49) moving X-ray films were used to study subjects in various actions and breath patterns. It was demonstrated that deep inspiration pumps the lymph at a rate that is dramatically increased over average resting inspiration and other activities.

Immune Function

The immunoactive aspect of the lymphatic system is well represented in the literature. (42,44,47,50) The bone marrow, thymus, spleen and lymph nodes participate in the interaction of the lymph and immunity. The composition of the lymph fluid itself includes a number of immune active agents such as lymphocytes and macrophages. (47)

Lymphocytes that exit with the lymph fluid from the nodes come from three sources: 1) inflowing with lymph from the tissues in the peripheral vessels, 2) exchanged from the blood that enters the node's own vascular system and 3) formed by local proliferation in the node itself. (42) Lymphocytes naturally collect within the node, especially when flow is sluggish. Greater numbers proliferate when lymph flow is greater and the numbers circulated out of the node increase with flow volume as well. (42)

Excellent recent research has clearly delineated, localized and quantified the development of specific antibody forming cells in lymph nodes. (50) In addition, it has been found that there are neurotransmitter receptor sites on lymphocytes where they actually interface with neurotransmitters. (51) This demonstrates an important link between neurochemistry and immunity through the medium of the lymph system.

Cerebrospinal Fluid (CSF)

The cerebrospinal fluid (CSF) system has classically been perceived as a closed system. One view held that CSF was actually in an open system that allowed the fluid to flow through the aracnoid villi and into the venous blood. However, by the 1970's it was generally acknowledged that the CSF travels along the cranial and spinal nerves and into the perineural lymphatics. (52)

Some recent research using the microinjection of tracers has suggested several possible pathways for the passage of both the CSF and the cerebral interstitial fluid (CIF) to exit the aracnoid space. (42) By 1985 the flow of CSF and CIF into the lymphatics was well documented. (42) Consideration has even been given to the effects of pressure and posture on this flow (42), both of which are primary effects that are enhanced in Qigong and Yoga/Pranayama practice.

The presence of CSF in the lymphatic system and the presence of neurotransmitter receptors on immune cells (53) suggest a powerful association between neurotransmitters and immune function in the reticuloendothelial system. While the effect of Qigong and Yoga/Pranayama on this mechanism is not clearly defined, it is likely that it occurs through lymph propulsion as has been discussed. Research to quantify and delineate this aspect of the lymph system and explore the action of lymph and CSF as a transport system for specific neurochemicals is clearly a priority.

Nutritive (Trophic) Function

The importance of a broad availability of nutritional factors to the tissues is fully accepted. However, the role of the lymphatic system in this activity was barely understood before 1972. (41) The original findings of Assellius in dogs revealed the route of absorption of nutrients from the small intestine via the lacteals. (40) The effect of the breath apparatus through the action of the diaphragm, during deep inspiration, on the cysterna chyli and the small intestine may enhance the absorption of nutritional factors and the delivery of the pharmacologic potential of herbal formulas that are commonly used in Chinese and Indian traditional medical systems.

In addition, free extracellular proteins participate in lymph fluid and as plasma proteins in the blood. They carry constituent amino acids that may be utilized by the tissues. These amino acids may become conjugated proteins that carry essential minerals, fats, carbohydrates and enzymes to their respective destinies. (41) The clarification and understanding of the trophic function of the lymph suggests a simple but profound effect of the enhanced lymph volume and flow rate activated by Qigong and Yoga/Pranayama.

NERVOUS SYSTEM

Much of what is described in traditional medical systems as the "balance" of forces, such as Yin and Yang in the Chinese system, can be associated with the dualistic components of the nervous system. In the central nervous system yin is rest and yang is action. Balance is the state between rest and action called dynamic

equilibrium. This is the state that training in Taiji and Qigong seeks to refine. In the autonomic nervous system yin may be associated with the parasympathetic and yang may be associated with the sympathetic. The balance of Yin and Yang is associated with homeostasis.

Because the western worldview has generally had a difficult time understanding and accepting the concepts of Qi (chi), prana or vital force from the Asian systems, there has been a strong trend toward explaining the effects of yoga, Qigong, acupuncture, etc through the mechanisms of the nervous system. (25,54,55) While these practices do have a definite effect upon neurological function, with consequent effects on body systems, the neurological mechanism may actually be an intermediary for a more refined and less quantifiable system of subtle energies. However, a great deal of research has been done that reveals the neurological mechanisms that may be activated in Qigong and Yoga and it is appropriate to explore them here.

There are a number of mechanisms associated with the brain, nervous system and other related systems that Qigong and Yoga/Pranayama practice enhance including:

- Initiation of the "relaxation response" (RR), para-sympathetic aspect of the autonomic nervous system or resting aspect of the basic rest activity cycle (BRAC).
- Shift of the neurotransmitter profile
- Dilation of blood capillaries initiating increased microcirculation in the periphery, brain and organs.
- Support the brain/neurological aspects of immune function.
- Balance right and left brain hemisphere dominance.
- Induction of alpha, and sometimes theta wave forms in EEG.
- Affect neuroreflex mechanisms through the stimulation of acupuncture response points.
- Affect function of the hypothalamus, pituitary, pineal, third ventricle complex within the brain.

Initiation of the Relaxation Response

When the predominance of autonomic nervous system activity is sympathetic the human system is working, expending energy and breaking down tissue. This is associated with the action phase of metabolism, and referred to as catabolic. This is associated, in it's extreme, with the "fight or flight response" with increased heart rate, breath rate and blood pressure. It is also called the stress state and has been associated with adrenal exhaustion and collapse (56).

This state, when overactive and not balanced to homeostasis by ample parasympathetic activity, contributes to the production of positively charged hydrogen ions. As mentioned in an earlier section on free radicals these hydrogen ions bind with oxygen. This can cause a net oxygen deficit and a general acid pH in the internal environment. Biological stress is conducive to the proliferation of a number of diseases or syndromes including hypertension, pain, depression, immune deficiency and inflammation. (57)

The opposite aspect of autonomic activity, parasympathetic, is a phase of rest and tissue regeneration. It is associated with the conservative phase of metabolism, anabolic. In its extreme this state is associated with the "relaxation response" (RR)(57), characterized by decreased heart and breath rate and a lowering of blood pressure. This is also associated with the resting phase of the basic resting activity cycle (BRAC). (58) Conscious deactivation of the sympathetic function with the activation of certain parasympathetic features of autonomic activity can neutralize the negative effects of "fight or flight" overactivity. The primary steps to initiate this state are deep, slow breathing coupled with the intention to relax. (57) These are the identical initiating steps for the practice of Qigong and Yoga. The literature alludes liberally to traditional Asian health maintenance practices as the historic source of techniques for generating the relaxation response (RR) and the typical biofeedback response (3).

With the addition of gentle movement and stretching extra oxygen is demanded from the blood, which may help to reduce the presence of hydrogen ions and initiate a swing toward a more anabolic level of activity. This may help to produce a less acid internal environment and a net greater availability of free oxygen with increased energy productivity and tissue regeneration.

Controlled, deep, slow breathing accompanied with the intention to relax initiates the RR and the resting phase of the BRAC, which are parasympathetic/anabolic/alkaline responses, generally recognized as healing and regenerative. Increased oxygen to hydrogen ion ratio is also recognized as conducive to healing and regeneration.

Shift of Neurotransmitter Profile

Much of the new science of psychoneuroimmunology is founded upon findings in the area of neurohormones, neuropeptides or neurotransmitters. It has already been mentioned that neurotransmitter receptor sites have been found on lymphocytes. A particular profile of neurotransmitters is present in a person who is experiencing pain, anxiety or depression. (59) In contrast joy, comfort or celebration produce unique neurotransmitter profiles as well. (60)

In hypertension, pain and inflammation, which have been associated with the hyperactivity of the sympathetic aspect of the autonomic nervous system, a number of specific neurotransmitters are present in the blood. In patients suffering from pain, increased norepinephrine, reduced cholinesterase and depressed beta endorphine were found to be typical. (59)

When methods are employed that regulate the sympathetic function through the hypothalamus a neurotransmitter profile characterized by decreased norepinephrine, elevated cholinesterase and elevated beta endorphine emerge. (59) The neurotransmitter profile present in the parasympathetic and usually more anabolic (alkaline) environment is recognized as able to reduce pain and depression (59), reduce cravings for addictive substances (61) and promote healing. Chinese research has quantified neurotransmitter activity specific to Qigong exercise. It was found that

the Qigong effect is associated with specific shifts in the monoamine neurotransmitter content of the blood. (62) 5HT and 5HE generally tend to be decreased by Qigong practice. Noradrenaline and dopamine tend to increase. The aspects of Qigong and Yoga that quiet the mind and relax the body induce a neurotransmitter profile that is conducive to healing.

Increased Microcirculation

A classic body response in Qigong and Yoga is the elevation of skin temperature. In the fight or flight state, hyper-sympathetic, the arterioles in the skin, muscles and certain organs constrict. During the systematic deactivation of sympathetic function, typical in Qigong and Yoga/Pranayama, vasodilation occurs with the accompanying warmth of the surface of the skin. This is one of the primary goals in biofeedback training and was found as a typical response when the skin temperature of meditators was evaluated in research. (3)

A number of studies from China explore the microcirculatory mechanism very thoroughly and conclude that this mechanism is a major reason for the continued successful application of such an ancient health maintenance method. (63,64,65,66,67,68) In Traditional Chinese Medicine it is said, "the blood is the sister of the Qi". (28,29) Because Qi and blood are in a direct relationship the inhibition of the circulation of one tends to inhibit the circulation of the other. In addition, the theory suggests that when the blood is optimally circulating in a part of the body that the Qi or vitality is circulating there as well. If the Qi is a bioelectrical, electromagnetic or subtle energy aspect of the human being, the presence of increased blood circulation and its accompanying heat may also signify the presence of increased electromagnetic or other subtle energy potential. This may be a key to explain how Qigong practitioners and mental healers are able to support the healing process in a person from a distance through "Qi emission" or "external conductance of the Qi".

Neurological Aspects of Immune Function

In the classic tradition of Western science it has been thought that the immune system was an autonomous self-regulating system, operating on its own. A tremendous amount of research has demonstrated that this view was incorrect. Mental emotional states have been found to effect resistance to disease and infection. (60) Immune organs including the thymus gland, spleen, lymph nodes and bone marrow are invested with nerve endings. (60) Lymphocytes and macrophages have been shown to have receptors for neurochemicals, including catacholamines, prostaglandins, serotonin and endorphin. (60) There is a definite relationship between brain and nervous system function and immune capability.

In the practice of Qigong and Yoga, as has been discussed, the hypothalamus regulates the autonomic nervous system function toward a lessening of the sympathetic activity, which is associated with the stress response. (3,57) A number of studies have demonstrated that the hypothalamus has an influence over immune function. (60) Meditation, progressive relaxation, deep breathing and slow relaxed

movement all tend to move the practitioner out of the sympathetic state and induce the relaxation response. Research on the effect of relaxation and visualization sheds some light on the effect that the Qigong and Yoga states may have on immune function. Groups of elders who received relaxation training had significant increases in the activity of "natural killer cells" while control groups did not. Chinese research has corroborated the positive effect of Qigong practice on the status of the immune system. (65,69,70,71,72)

Brain Hemisphere Dominance

Thousands of years ago the oriental practitioners of self-care disciplines intuitively developed an awareness of an alternating cycle of the predominance of body activity from the right side of the body to the left side. One particular Qigong practice, Taiji, is founded on a constant, flowing of the limbs in circular motions, alternating from right to left. The side of the body that bears the weight is planted, stable, and associated with the Yin. The side that is free to move and kick is active and associated with the Yang. Constant alternations of right and left side activity are thought to balance the forces of Yin and Yang in the body. Focusing on the right and left sides alternatively activates, and reputedly balances, the right and left motor centers in the brain.

The channels or circuits that conduct the human resonating energy field, according to yogic medicine, are called nadis. Ida nadi and Pingala nadi associate with right and left brain activities. (72,73) In addition this association effects right and left nasal passage activity as well as the physiology of the right and left body. These channels alternate in their predominant activity over a 2-3 hour cycle causing the dominant nostril to be clear and the non-dominant nostril to swell and become congested. (73) This phenomenon was not noted in the Western world until 1889 when the German physician R. Kayser recorded his observation of the "nasal cycle". (74) Much of the research on this phenomenon up through the 1980's was motivated by the quest to develop pharmaceuticals for nasal congestion. (72)

It has been demonstrated that the nasal cycle is coupled with the alternating lateralization of cerebral hemispheric activity. (73) It was found with research subjects, that when a shift occurred in either nasal dominance or brain hemisphere dominance there was an associated shift, within moments, in the other as well. The right nasal cavity, associated with pingala nadi tends to be more open and the left more congested when the left hemisphere of the brain is more active. This is associated with the active phase of the BRAC and increased general sympathetic tone. (72) In contrast the right brain hemisphere is more active when the left nostril is open and dominant and the individual is in the resting phase of the BRAC or the parasympathetic mode.

A number of different physiological states have been found to be associated with the dominance of one or the other nostril.

- Deep sleep is initiated more quickly with left nostril dominance.
- Appetite and digestive ability are enhanced during right nostril dominance.

- Sexual intercourse is most satisfying when the man is dominant in the right nostril and the woman in the left.
- Left nostril, right brain dominance is more conducive to receiving new ideas, while right nostril, left brain dominance is an advantage during discourse.
- It is possible to alter the pattern of "thought waves" by consciously alternating nasal dominance by exercising the congested nostril by forced nostril breathing. (75)

A specific Qigong and Yoga breath technique that has been practiced for centuries is the right and left singular nostril breathing. Dr. Sannahoff-Khalsa of the Salk Institute has done extensive research with this technique, originally prompted by his work with the Kundalini Yoga tradition. The studies done by him and his associates have shown that forcing the breath through the constricted nostril can increase the EEG amplitude of the contralateral hemisphere of the brain. (76) It has been demonstrated that certain psychopathologies are brain hemisphere specific. (77,78) It may be possible, therefore, that the use of single nostril breathing may be applicable as therapy in cases where lateralized dysfunction has been found.

There is a direct correlation between nasal dominance, brain dominance and the lateralized biochemical activity in the peripheral body parts. Recent studies of the nasal cycle comparing plasma catecholamine levels in the venous circulation of the right and left arms found that levels of norepinephrine alternated with the rhythm of sympathetic dominance of the nostrils. (79)

Induction of Alpha and Theta Brain Wave Activity

The intention to relax and deepening of the breath are the classic initiating actions that trigger the relaxation response (RR). Research with practitioners of Yoga (3) and Qigong (4) has shown that during practice brain wave frequency tends toward the alpha range and in certain cases theta frequency brain activity is achieved.

Alpha level brain function is a result of relaxation and is conducive to healing. The slowing of heart rate, reduction of blood pressure and elevation of skin temperature are common physiological features of the alpha state. Theta is a deeper trance like state that has been found in research with individuals with extraordinary capabilities to be associated with paranormal skills like sitting on beds of nails and immediate wound healing without bleeding. (3)

In Qigong and Yoga it is a goal to bring the lowest frequency of brain wave activity to the practice. In the quiescent Qigong, where there is no movement, deep states of consciousness with low frequency brain waves are more easily attained than in the dynamic (moving) Qigong. Similarly, in Yoga, there are methods involving movement and methods that primarily involve stillness. The pure meditation state lends more easily to the theta range of brain activity.

EEG studies from China have concentrated on the quiescent state, meditation with no movement (80,81,82). However, it is very likely that the dynamic or moving methods are most effective if the alpha or theta state can be simultaneously achieved.

In both Qigong and Yoga it is a primary focus to "allow the body and energy to sink and relax" and to "relax into the posture".

Neuroreflex Stimulation

Pressing points, holding reflex areas or thumping and stroking "energy pathways" are all aspects of health maintenance systems of ancient cultures. The usual explanation for the mechanism of these effects involves what were originally called Head's zones named for Dr. Head who originally researched the relationship between sensory areas on the surface of the body to organ function. (83) In a similar and more current approach to a like idea, dermatomal zones are the segments on the surface of the body that are innervated by sensory neurons from specific segments of the spine which also have links to the autonomic ganglia. For example, the dorsal aspect of the foot is innervated from the 5th lumbar spinal nerves and the central areas of both the dorsal and palmar aspect of the hand are innervated by the 7th cervical spinal nerves. The spinal nerves from the 2nd thoracic to the 1st lumbar innervate the dermatomes directly adjacent to their areas of the spine on the front, back and lateral aspects of the chest, abdomen and pelvis. (24)

A stimulus at the dermatome is carried to the spinal segment where it affects, through a reflex arc, neurons from the autonomic ganglia. (84) Surface stimulus may affect organ function through this neuroreflex mechanism. This mechanism has been cited as a rational for how acupuncture works. (54)

In Qigong especially, and to a certain extent in Yoga, there are numerous techniques for massaging, thumping and stroking the surface areas of the body. When twisting to loosen the spine and warm up to do Qigong the practitioner hits the hands against the lumbar space in the back and the lower ribs in the front. This is done to stimulate the function of the kidneys, liver and spleen. One mechanism through which this may occur is the neuroreflex mechanism.

Certain methods of Qigong practice focus totally on techniques of self applied massage or stimulation of channels and reflexes. One method called Mei Yin Jian Shen Gong is comprised primarily of self-massage gestures. In another method the hands stroke near the acupuncture channels: up the inside of the legs, out the inside of the arms, along the outside of the arms and on to the head and finally down the lateral side of the torso and legs to the lateral aspect of the feet. In the western model this would be referred to as reflex stimulation. However, in the oriental energy model this method is referred to as a form of "Qi" circulation.

Interface of Neuroendocrine Structures of the Brain

In both Qigong and Pranayama a primary goal is to circulate the "energy" to the crown of the head. In Qigong this is referred to as the "point of one hundred gatherings" (Bai hui, GV or Du 20). In Yoga/Pranayama this point is the target of the kundalini energy and is known as the Crown Chakra or "thousand petaled lotus". This area has had recognition in the Christian tradition through the halos of angels. In the Jewish tradition this same area is where the men wear the yalmuka.

Science has corroborated the significance of this region with its identification and investigation of several anatomical structures thought to be the primary hierarchy of neurological and endocrine function. These include the pituitary gland, pineal gland, hypothalamus and third ventricle of the cerebrospinal fluid system.

In the ancient traditions it is suggested that these structures function as antennae-like conductors for the electrical, magnetic and subtle energy bio-fields. It may be premature to agree with this theory but it is very clear from the current literature that the hypothalamus and the pituitary are structures that participate in the subtle endocrine modulation of many physiological and emotional processes. (3,60)

Earlier we explored the research that links cerebrospinal fluid (CSF), the lymph and immunity. The CSF has the richest mixture of neurochemicals in the whole body. It interacts directly with the hypothalamus whose lateral walls and floor comprise the third ventricle, an important reservoir for CSF. Research has found over 60 neuropeptides or neurotransmitters. Candace Pert and her team at the National Institutes of Mental Health demonstrated that there are 40 times more neurotransmitter receptor cites in the hypothalamus than in any other location of the brain or nervous system. (85, 86)

Neurotransmitter activity has been found to be in a direct relationship with pain and depression (59) and to have a specific relationship to immune function (51,87). Focusing one's attention on a physiological outcome has been shown to have a potential effect on physiological function. (88) Therefore, it is a strong possibility that the intention to circulate the Qi or Prana to the "crown" has the potential to effect the levels of neurotransmitter and endocrine activity, not only in this section of the brain, but throughout the entire body. In work with voluntary control of biological function it has been found that diminishing or quelling sympathetic function is accomplished by regulating the activity of the hypothalamus. (3) When practitioners of Qigong circulate the Qi in the Ren and Du vessels, "circulate the light in the microcosmic orbit"(89), or when Yoga/Pranayama practitioners bring Prana up along the spinal in the Kundalini channel, the focus of the method is to achieve peace, or in more scientific terms, reduce sympathetic activity and slow brain wave frequency toward the theta range. The anatomical structure that is the target is the anatomical hypothalamus, which is the sympathetic control center.

Chart of the Physiological Mechanisms Triggered by Qigong and Yoga/Pranayama

OXYGEN

Physiological Mechanisms	Structures & Substrates	Qigong or Yoga Activity
Energy Generation	Oxygen Uptake	Movement/Breath
Aerobic Water	Oxygen Uptake	Movement/Breath
Immune Enhancement	Oxygen Uptake	Movement/Breath
Free Radical Neutralization	Oxygen Uptake	Movement/Breath

LYMPH

Physiological Mechanisms	Structures & Substrates	Qigong or Yoga Activity
Aerobic Generation	Oxygen Uptake	Movement/Breath
Propulsion		
a) Aerobic	Oxygen Uptake	Movement/Breath
b) Intrinsic Contraction	Interstitial Fluid	Volume Breath and Relaxation
c) Muscle Pump	Muscle Contraction	Movement
d) Gravitational	Body Position	Postures and Movement
e) Breath Apparatus	Lungs, Diaphragm, Cistern Chyli	Breath
Immune Function	Propulsion (a-e)	Breath, Movement, Posture
Cerebrospinal Fluid Flow	Propulsion (a-e)	Breath, Movement, Posture
Nutritive Function	Propulsion (a-e)	Breath, Movement, Posture

NERVOUS SYSTEM

Physiological Mechanisms	Structures & Substrates	Qigong or Yoga Activity
Autonomic	Neuro-structure& Chemistry	Relaxation and Breath
Nerotransmitter Profile	Hypothalamus	Relaxation/Visualization
Microcirculation	Hypothalamus	Relaxation
Immunity	Immune Cells	Relaxation, Meditation
Brain Hemisphere Control	Brain, Nervous System	Nostril Breath-Move
Brain Wave Frequency	Brain, Nervous System	Meditation
Neuroreflex Stimulation	Neuroreflex System	Rubbing Points
Brain Structures	Hypothalamus, Pituitary, Pineal, 3rd Ventricle	Intention, Meditation & Visualization

CONCLUSION

Physiological mechanisms operating in the practitioner of Qigong or Yoga/Pranayama have significant health enhancement and health maintenance potential. Claims for the efficacy of these techniques from ancient systems of medicine may be founded in the activation of the body's basic self-regulatory mechanisms.

There is a direct interface between the mechanisms explored in this paper and the "Qi" or "Prana" of the Asian systems of medicine. The optimal chemical and structural function of the body creates optimal conductivity of bioelectricity and other subtle energies. "Qi" and "Prana" may be more than bioenergy. They may be the "sum of all self regulating substances and functions operating maximally and in concert".

The simultaneous enhancement of oxygen availability, cellular water production, lymph propulsion, cerebrospinal fluid motion, neurotransmitter profile, the relaxation response, alpha range brain wave frequency, etc coordinated with positive thoughts and visualization of health occur during the practice of Qigong and Yoga/Pranayama. Triggering these self-regulating mechanisms has a profound effect on the capability of the practitioner to maintain health and alleviate disease.

Beyond the physiological realm of these practices lies the area of physics and subtle energies. In both the traditional medicine of China and Ayurvedic medicine of India the energetic or vital aspect of the individual is of primary interest. A major number of the papers presented at the First World Conference on the Academic Exchange of Medical Qigong were explorations of the "emission of Qi" which is the projection of subtle energy across a distance. This phenomenon raises fascinating and confronting questions given the nature of what forms of energy can easily traverse space: light, magnetism, microwaves, etc.

Recent findings demonstrate that the hydrogen bonds in water can be structured in several different configurations, some random others more ordered. Research in the United States with "healers" has shown that conscious intention can restructure water. Is it possible that any individual, through intention, can restructure his or her own body water? Does the additional water created through breath and gentle movements enhance the conductive nature of the body? Does entering the alpha or theta state enhance one's ability to structure their body water?

Many wonderful questions arise once the multifaceted physiology of these practices has been quantified to the satisfaction of Western science. However, just on the merit of the physiology alone it is clear that the self-administered health enhancement systems of the ancient Asian traditions of medicine have profound value. Direct study of the activity of these physiological mechanisms in subjects who are trained to perform Qigong or Yoga/Pranayama is an obvious priority. In light of the crisis in health care costs it is the mandate of the medical and social sciences to remove any boundaries to the immediate and rapid proliferation of these practices.

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