

BACKGROUND

NATIONAL CENTER FOR COMPLEMENTARY AND ALTERNATIVE MEDICINE

Energy Medicine: An Overview

About This Series

“Energy Medicine: An Overview” is one of five background papers on the major areas of complementary and alternative medicine (CAM). The series was prepared as part of the National Center for Complementary and Alternative Medicine’s (NCCAM’s) strategic planning efforts for the years 2005 to 2009. These brief reports should not be viewed as comprehensive or definitive reviews. Rather, they are intended to provide a sense of the overarching research challenges and opportunities in particular CAM approaches. To find out more about topics and resources mentioned in this fact sheet, see “For More Information.”

Introduction

Energy medicine is a domain in CAM that deals with energy fields of two types¹:

- Veritable, which can be measured
- Putative, which have yet to be measured

The **veritable** energies employ mechanical vibrations (such as sound) and electromagnetic forces, including visible light, magnetism, monochromatic radiation (such as laser beams), and rays from other parts of the electromagnetic spectrum. They involve the use of specific, measurable wavelengths and frequencies to treat patients.²

In contrast, **putative** energy fields (also called biofields) have defied measurement to date by reproducible methods. Therapies involving putative energy fields are based on the concept that human beings are infused with a subtle form of energy. This vital energy or life force is known under different names in different cultures, such as qi in traditional Chinese medicine (TCM), ki in the Japanese Kampo system, doshas in Ayurvedic medicine, and elsewhere as prana, etheric energy, fohat, orgone, odic force, mana, and homeopathic resonance.³ Vital energy is believed to flow throughout the material human body, but it has not been unequivocally measured by means of conventional instrumentation. Nonetheless, therapists claim that they can work with this subtle energy, see it with their own eyes, and use it to effect changes in the physical body and influence health.

Practitioners of energy medicine believe that illness results from disturbances of these subtle energies (the biofield). For example, more than 2,000 years ago, Asian practitioners postulated that the flow and balance of life energies are necessary for maintaining health and described tools to restore them. Herbal medicine, acupuncture, acupressure, moxibustion, and cupping, for example, are all believed to act by correcting imbalances in the internal biofield, such as by restoring the flow of qi through meridians to reinstate health. Some therapists are believed to emit or transmit the vital energy (external qi) to a recipient to restore health.⁴

Examples of practices involving putative energy fields include:

- Reiki and Johrei, both of Japanese origin
- Qi gong, a Chinese practice
- Healing touch, in which the therapist is purported to identify imbalances and correct a client's energy by passing his or her hands over the patient
- Intercessory prayer, in which a person intercedes through prayer on behalf of another

In the aggregate, these approaches are among the most controversial of CAM practices because neither the external energy fields nor their therapeutic effects have been demonstrated convincingly by any biophysical means. Yet, energy medicine is gaining popularity in the American marketplace and has become a subject of investigations at some academic medical centers. A recent National Center for Health Statistics survey indicated that approximately 1 percent of the participants had used Reiki, 0.5 percent had used qi gong, and 4.6 percent had used some kind of healing ritual.⁵

Scope of the Research

Veritable Energy Medicine

There are many well-established uses for the application of measurable energy fields to diagnose or treat diseases: electromagnetic fields in magnetic resonance imaging, cardiac pacemakers, radiation therapy, ultraviolet light for psoriasis, laser keratoplasty, and more. There are many other claimed uses as well. The ability to deliver quantifiable amounts of energies across the electromagnetic spectrum is an advantage to studies of their mechanisms and clinical effects. For example, both static and pulsating electromagnetic therapies have been employed.²

Magnetic Therapy

Static magnets have been used for centuries in efforts to relieve pain or to obtain other alleged benefits (e.g., increased energy). Numerous anecdotal reports have indicated that individuals have experienced significant, and at times dramatic, relief of pain after the application of static magnets over a painful area. Although the literature on the biological effects of magnetic fields is growing, there is a paucity of data from well-structured, clinically sound studies. However, there is growing evidence that magnetic fields can influence physiological processes. It has recently been shown that static magnetic fields affect the microvasculature of skeletal muscle.⁶ Microvessels that are initially dilated respond to a magnetic field by constricting, and microvessels that are initially constricted respond by dilating. These results suggest that static

magnetic fields may have a beneficial role in treating edema or ischemic conditions, but there is no proof that they do.

Pulsating electromagnetic therapy has been in use for the past 40 years. A well-recognized and standard use is to enhance the healing of nonunion fractures. It also has been claimed that this therapy is effective in treating osteoarthritis, migraine headaches, multiple sclerosis, and sleep disorders.² Some animal and cell culture studies have been conducted to elucidate the basic mechanism of the pulsating electromagnetic therapy effect, such as cell proliferation and cell-surface binding for growth factors. However, detailed data on the mechanisms of action are still lacking.

Millimeter Wave Therapy

Low-power millimeter wave (MW) irradiation elicits biological effects, and clinicians in Russia and other parts of Eastern Europe have used it in past decades to treat a variety of conditions, ranging from skin diseases and wound healing to various types of cancer, gastrointestinal and cardiovascular diseases, and psychiatric illnesses.⁷ In spite of an increasing number of *in vivo* and *in vitro* studies, the nature of MW action is not well understood. It has been shown, for example, that MW irradiation can augment T-cell mediated immunity *in vitro*.⁸ However, the mechanisms by which MW irradiation enhances T-cell functions are not known. Some studies indicate that pretreating mice with naloxone may block the hypoalgesic and antipruritic effects of MW irradiation, suggesting that endogenous opioids are involved in MW therapy-induced hypoalgesia.⁹ Theoretical and experimental data show that nearly all the MW energy is absorbed in the superficial layers of skin, but it is not clear how the energy absorbed by keratinocytes, the main constituents of epidermis, is transmitted to elicit the therapeutic effect.¹⁰ It is also unclear whether MW yields clinical effects beyond a placebo response.

Sound Energy Therapy

Sound energy therapy, sometimes referred to as vibrational or frequency therapy, includes music therapy as well as wind chime and tuning fork therapy. The presumptive basis of its effect is that specific sound frequencies resonate with specific organs of the body to heal and support the body. Music therapy has been the most studied among these interventions, with studies dating back to the 1920s, when it was reported that music affected blood pressure.¹¹ Other studies have suggested that music can help reduce pain and anxiety. Music and imagery, alone and in combination, have been used to entrain mood states, reduce acute or chronic pain, and alter certain biochemicals, such as plasma beta-endorphin levels.¹² These uses of energy fields truly overlap with the domain of mind-body medicine. (For more information, see NCCAM's backgrounder "Mind-Body Medicine: An Overview.")

Light Therapy

Light therapy is the use of natural or artificial light to treat various ailments, but unproven uses of light extend to lasers, colors, and monochromatic lights. High-intensity light therapy has been documented to be useful for seasonal affective disorder, with less evidence for its usefulness in the treatment of more general forms of depression and sleep disorders.¹³ Hormonal changes have been detected after treatment. Although low-level laser therapy is claimed to be useful for relieving pain, reducing inflammation, and helping to heal wounds, strong scientific proof of these effects is still needed.¹⁴

Energy Medicine Involving Putative Energy Fields

The concept that sickness and disease arise from imbalances in the vital energy field of the body has led to many forms of therapy. In TCM, a series of approaches are taken to rectify the flow of qi, such as herbal medicine, acupuncture (and its various versions), qi gong, diet, and behavior changes.

Acupuncture

Of these approaches, acupuncture is the most prominent therapy to promote qi flow along the meridians. Acupuncture has been extensively studied and has been shown to be effective in treating some conditions, particularly certain forms of pain.¹ However, its mechanism of action remains to be elucidated. The main threads of research on acupuncture have shown regional effects on neurotransmitter expression, but have not validated the existence of an “energy” per se.

Qi Gong

Qi gong, another energy modality that purportedly can restore health, is practiced widely in the clinics and hospitals of China. Most of the reports were published as abstracts in Chinese, which makes accessing the information difficult. But Sancier has collected more than 2,000 records in his qi gong database, which indicates that qi gong has extensive health benefits on conditions ranging from blood pressure to asthma.¹⁵ The reported studies, however, are largely anecdotal case series and not randomized controlled trials. Few studies have been conducted outside China and reported in peer-reviewed journals in English. There have been no large clinical trials.

Whole Medical Systems and Energy Medicine

Although modalities such as acupuncture and qi gong have been studied separately, TCM uses combinations of treatments (e.g., herbs, acupuncture, and qi gong) in practice. Similarly, Ayurvedic medicine uses combinations of herbal medicine, yoga, meditation, and other approaches to restore vital energy, particularly at the chakra energy centers. (For more information on TCM and Ayurvedic medicine, see NCCAM’s backgrounder “Whole Medical Systems: An Overview.”)

Homeopathy

One Western approach with implications for energy medicine is homeopathy. Homeopaths believe that their remedies mobilize the body’s vital force to orchestrate coordinated healing responses throughout the organism. The body translates the information on the vital force into local physical changes that lead to recovery from acute and chronic diseases.¹⁶ Homeopaths use their assessment of the deficits in vital force to guide dose (potency) selection and treatment pace, and to judge the likely clinical course and prognosis. Homeopathic medicine is based on the principle of similars, and remedies are often prescribed in high dilutions. In most cases, the dilution may not contain any molecules of the original agents at all. As a consequence, homeopathic remedies, at least when applied in high dilutions, cannot act by pharmacological means. Theories for a potential mechanism of action invoke the homeopathic solution, therefore, postulating that information is stored in the dilution process by physical means. Other than a study reported by the Benveniste laboratory¹⁷ and other smaller studies, this hypothesis has not been supported by scientific research. There have been numerous

clinical studies of homeopathic approaches, but systematic reviews point out the overall poor quality and inconsistency of these studies.¹⁸

Therapeutic Touch and Related Practices

Numerous other practices have evolved over the years to promote or maintain the balance of vital energy fields in the body. Examples of these modalities include Therapeutic Touch, healing touch, Reiki, Johrei, vortex healing, and polarity therapy.³ All these modalities involve movement of the practitioner's hands over the patient's body to become attuned to the condition of the patient, with the idea that by so doing, the practitioner is able to strengthen and reorient the patient's energies.

Many small studies of Therapeutic Touch have suggested its effectiveness in a wide variety of conditions, including wound healing, osteoarthritis, migraine headaches, and anxiety in burn patients. In a recent meta-analysis of 11 controlled Therapeutic Touch studies, 7 controlled studies had positive outcomes, and 3 showed no effect; in one study, the control group healed faster than the Therapeutic Touch group.¹⁹ Similarly, Reiki and Johrei practitioners claim that the therapies boost the body's immune system, enhance the body's ability to heal itself, and are beneficial for a wide range of problems, such as stress-related conditions, allergies, heart conditions, high blood pressure, and chronic pain.²⁰ However, there has been little rigorous scientific research. Overall, these therapies have impressive anecdotal evidence, but none has been proven scientifically to be effective.

Distant Healing

Proponents of energy field therapies also claim that some of these therapies can act across long distances. For example, the long-distance effects of external qi gong have been studied in China and summarized in the book *Scientific Qigong Exploration*, which has been translated into English.²¹ The studies reported various healing cases and described the nature of qi as bidirectional, multifunctional, adaptable to targets, and capable of effects over long distances. But none of these claims has been independently verified. Another form of distant healing is intercessory prayer, in which a person prays for the healing of another person who is a great distance away, with or without that person's knowledge. Review of eight nonrandomized and nine randomized clinical trials published between 2000 and 2002 showed that the majority of the more rigorous trials do not support the hypothesis that distant intercessory prayer has specific therapeutic effects.²²

Physical Properties of Putative Energy Fields

There has always been an interest in detecting and describing the physical properties of putative energy fields. Kirlian photography, aura imaging, and gas discharge visualization are approaches for which dramatic and unique differences before and after therapeutic energy attunements or treatments have been claimed.²³ However, it is not clear what is being detected or photographed. Early results demonstrated that gamma radiation levels markedly decreased during therapy sessions in 100 percent of subjects and at every body site tested, regardless of which therapist performed the treatment. Recently replicated studies identified statistically significant decreases in gamma rays emitted from patients during alternative healing sessions with trained practitioners.

It has been hypothesized that the body's primary gamma emitter, potassium-40 (K40), represents a "self-regulation" of energy within the body and the surrounding electromagnetic field.²⁴ The body's energy adjustment may result, in part, from the increased electromagnetic fields surrounding the hands of the healers. Furthermore, an extremely sensitive magnetometer called a superconducting quantum interference device (SQUID) has been claimed to measure large frequency-pulsing biomagnetic fields emanating from the hands of Therapeutic Touch practitioners during therapy.²⁵ In one study, a simple magnetometer measured and quantified similar frequency-pulsing biomagnetic fields from the hands of meditators and practitioners of yoga and qi gong. These fields were 1,000 times greater than the strongest human biomagnetic field and were in the same frequency range as those being tested in medical research laboratories for use in speeding the healing process of certain biological tissues.²⁶ This range is low energy and extremely low frequency, spanning from 2 Hz to 50 Hz. However, there are considerable technical problems in such research. For example, SQUID measurement must be conducted under a special shielded environment, and the connection between electromagnetic field increases and observed healing benefits reported in the current literature is missing.

Other studies of putative energies suggested that energy fields from one person can overlap and interact with energy fields of other people. For example, when individuals touch, one person's electrocardiographic signal is registered in the other person's electroencephalogram (EEG) and elsewhere on the other person's body.²⁷ In addition, one individual's cardiac signal can be registered in another's EEG recording when two people sit quietly opposite one another.

Additional Theories

Thus far, electromagnetic energy has been demonstrated and postulated to be the energy between bioenergy healers and patients. However, the exact nature of this energy is not clear. Among the range of ideas emerging in this field is the theory of a Russian researcher who recently hypothesized that "torsion fields" exist and that they can be propagated through space at no less than 10^9 times the speed of light in vacuum; that they convey information without transmitting energy; and that they are not required to obey the superposition principle.²⁸

There are other extraordinary claims and observations recorded in the literature. For example, one report claimed that accomplished meditators were able to imprint their intentions on electrical devices (IIED), which when placed in a room for 3 months, would elicit these intentions, such as changes in pH and temperature, in the room even when the IIED was removed from the room.²⁹ Another claim is that water will crystallize into different forms and appearances under the influence of written intentions or types of music.³⁰

For research, questions remain about which of the above theories and approaches can be and should be addressed using existing technologies, and how.

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