ORIGINAL ARTICLE

Barriers to the Entry of Biofield Healing Into "Mainstream" Healthcare

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ABSTRACT

In this article, we describe barriers to the entry of biofield healing into mainstream contemporary science and clinical practice. We focus on obstacles that arise from the social nature of the scientific enterprise, an aspect of science highlighted by the influential work of Thomas Kuhn (1922-1996), one of the most important—and controversial—philosophers of science in the 20th century. Kuhn analyzed science and its revolutionary changes in terms of the dynamics within scientific communities. Kuhn's approach helps us understand unconventional medical theories and practices such as biofield healing. For many years, these were called "complementary and alternative medicine" (CAM). However, because most people use nonmainstream approaches in conjunction with conventional treatments, the National Institutes of Health and many practitioners now prefer "Complementary and Integrative Medicine" (CIM) where *integrative* implies "bringing conventional and complementary approaches together in a coordinated way."[1] Biofield healing fits the integrative model well, provides a novel approach to therapeutic intervention, and is developing in a manner that can integrate with current medical science in simple ways. Yet, it still remains outside the conventional framework because of its conceptual bases, which contrast sharply with conventional assumptions regarding the nature of reality.

BIOFIELD HEALING AS A NASCENT PARADIGM

Alternate Paths: Assimilation or "Revolution"

Biofield healing is not yet a fully developed paradigm. Rather, it is at the pre-paradigmatic stage that Kuhn said is characterized by a challenging set of interesting observations; the same ground is covered repeatedly, and consequently, new investigators are not at a disadvantage; the field is largely empirical rather than theoretical.[2] These features reflect the lack of internal consensus regarding fundamental characteristics of the pre-paradigmatic stage. This is illustrated by the articles in this issue; we find a variety of definitions even for the term *biofield*. This is typical of a new perspective, from which novel ideas may advance to become full paradigms. Enough paradigmatic features have emerged around biofield healing to stimulate both intense resistance from some in healthcare and yet substantial acceptance and active use by others.

Before an area of research and practice becomes a fully competitive new paradigm, it encounters 2 major possibilities: assimilation or accommodation, a metaphor from biology developed by Jean Piaget (1896-1980) to describe learning as adaptation.[2] In assimilation, an input (an experience or idea) is incorporated into the existing structure, as in digestion. The existing structure is not changed, but the input may be disintegrated and become unrecognizable. If a nascent paradigm is assimilated, it will not become a mature paradigm nor will it be revolutionary, although it may still make substantial contributions to the dominant paradigm. In accommodation, the input is not "digestible," so the preexisting structure must change unless it destroys or permanently resists the challenger. When a nascent paradigm forces accommodation, it retains its essential character and may revolutionize its field. Assimilation is the natural goal of the dominant system because it "feeds" the system and avoids the disintegration of existing structures that have proven adaptive and in which members of the field have substantial investment. In contrast, accommodation of input preserves the integrity of the input while the receiving system is radically changed. Accommodation may be minor or it may be revolutionary, as in ecology when excess nutrients cannot be assimilated by a pond and the pond becomes a marsh.

Biofield healing is developing into a paradigm that implicitly presents the divergent paths of assimilation-vs-accommodation for CIM in general and biofield healing in particular. The assimilation path would facilitate the integration of CIM within conventional medicine by emphasizing possible common mechanisms, as in chiropractic care and much of nutritional healing; on this path, biofield healing practices would become a part of conventional medicine with customary explanations such as measurable energy frequencies or placebo. Accounting for apparently anomalous healing observations, conventional medicine habitually utilizes a standard set of existing medical explanations ranging from suggestion and placebo to fraud. In the former instance, practices may be accepted as basically psychological treatments (a common medical view of spiritual healing/coping); the use of fraud as an explanation invalidates the practice and bars its entry.

The path of accommodation is more inherently in conflict with current medical/scientific thinking and potentially revolutionary. It therefore stimulates resistance, but it also holds out the possibility of retaining

the most striking aspects of biofield healing and revolutionizing medical science.

A primary difference between the assimilation and accommodation paths is that the assimilation/integration path involves attenuating or giving up fundamental principles. This attenuation occurred when chiropractic care achieved greater acceptance through assimilation. It is noteworthy that in order to pursue this path, chiropractic care had to give up its "biofield-like" explanations and resort to more conventionally acceptable neuromuscular explanations, a move that still generates controversy in the field. In contrast, the "paradigm shift" path seeks to retain the novel fundamental views of biofield healing and revolutionize Western medicine. The integration approach has immediate appeal because it reduces conflict and facilitates entry into the healthcare marketplace; the revolutionary idea generates greater resistance but holds the possibility of retaining the fundamentally novel aspects of biofield theory and practice. Of course, the 2 are not mutually exclusive, and we can see both being pursued at present. The evolution of the National Institutes of Health (NIH) Office of "Alternative" Medicine to the National Center for "Complementary and Alternative" Medicine to the most recent National Center for Complementary and "Integrative" Health is a clear example of assimilation taking place. In the integrative model, there is no longer a need for "alternative" or "unconventional" perspectives. This dynamic has important implications for efforts to negotiate the barriers to mainstream entry.

Despite resistance to its potentially revolutionary implications, the market for biofield healing and other CIM practices has grown. Conventional medical clinics and hospitals have made major investments to offer select CIM practices to patients and staff.[3] This development is in part a result of growing research on the effectiveness of a broad range of CIM healing practices. As is often seen with new paradigms, even as the evidence builds, support for the old paradigm and resistance to change increases in some quarters. This phenomenon is especially prevalent in the practice of medicine, which is a conservative enterprise by nature. But medicine is empirical and pragmatic as well as conservative, which is why CIM has penetrated medical practice to a substantial extent as well as stirring controversy and resistance. Consumers are even more empirical and pragmatic with little concern for theoretical consistency, and their interest has been a major driver of CIM in the healthcare marketplace.[4] The preference for clinical results over consistency with current scientific theory is a powerful factor in favor of the continuing advance of those biofield practices that show results.

Healing vs Curing

CIM practices are often jointly referred to as "healing." The word *healing* suggests a process of becoming whole, derived as it is from the ancient Indo-European root *kailo* meaning "whole" and related to the words *wholesome* and *health*, as well as *holy*, *hallowed*, and *halo*. As this etymology shows, *healing* has always had a spiritual connotation. One's return to wholeness may be physical, psychological, spiritual, or all three.[5] In contrast, the contemporary meaning of *curing* is the elimination of (mostly physical) disease. One may be cured of disease but not be returned to wholeness; such is the case when disease and treatment traumatize one psychologically and/or spiritually. Conversely, one may be healed but not cured, transcending sickness and transformed positively even as the body declines or dies. This is the reason the word *healing* is seldom used in medical discourse, except to describe naturally occurring processes of the organism, as in wound healing. The broader meaning of healing also suggests its ancient roots, a time when curing was less likely and healing was a primary goal. From the integrative medicine viewpoint, the healing/curing contrast embodies a large part of the difference between CIM and conventional biomedicine. Nevertheless, this does not mean that biofield healing is an inherently spiritual practice.

A Fundamentally Different Ontology/Lexicon

A lexicon is the set of lexemes (fundamental units of meaning) that comprise a language. Kuhn borrowed this term from conventional linguistics, and it typically refers to natural languages such as English or Spanish. Kuhn used the term to analyze the specialized languages that develop within science. For Kuhn, a lexicon constitutes an object of knowledge and the taxonomies within a lexicon reflect its underlying ontology. The differences between scientific paradigms are found both in different terms, often neologisms (candidate lexemes for the language) and in different meanings for the same terms. *Biofield* is an example of a neologism: it is a word rarely used in conventional science or medicine, and when it is used, it is usually accompanied by the term *putative*, explicitly excluding it from the accepted lexicon.[6-8] The biofield use of the term *energy* illustrates the use of a common scientific term that has specialized meanings in biofield discourse. Overlapping terms between scientific lexicons, *energy*, for example, creates serious problems of understanding between paradigms. This contributes to the incommensurability that Kuhn described existing between competing paradigms.

Much CIM practice implies the role of "subtle energies" in illness and health: that is, energies that are subtle in the sense of being difficult to detect. This is a neologism that implies an unconventional part of the energy spectrum in the biofield taxonomy. *Biofield healing* is a broad contemporary term that aggregates those CIM practices that most explicitly refer to such energies, as indicated by the definition of *biofield* used by the National Center for Complementary and Alternative Medicine (NCCAM) prior to its adoption of the term *integrative* at NIH:

> *putative energy fields* [that] *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.[9]

The NIH definition of *biofield* clearly covers practices such as acupuncture, healing touch (HT), Reiki and external qigong, all of which have become more popular in the United States in recent decades.[7,10] But the exact scope of biofield healing is uncertain because a single practice may be understood as bioenergetic by some proponents and not by others. For example, chiropractic was founded on the idea that a subtle energy called "innate intelligence" flowed into the human body through the nervous system, so healing required the removal of impediments to its flow through the spinal cord (called subluxations of the spine). However, some modern chiropractic practitioners explain chiropractic within a mechanical, musculoskeletal framework.[11] The musculoskeletal view fits easily with the conventional medicine paradigm and facilitates integration within the healthcare system, but it is very different from the founding principles of the field.[12,13] Conversely, the *qi* account of acupuncture harmonizes well with the biofield concept, but explanations of acupuncture as mediated by the nervous system or as placebo do not. The central disputed issue is whether the entities and processes posited by biofield healing are the same, or at least continuous with, the entities and processes currently understood within conventional science.

The most fundamental meaning of *biofield* refers to the energetic properties of and energies generated by living organisms; this includes both forces conventionally recognized by Western science (eg, the electrical signals of the nervous system and the piezoelectric effects of collagen, tendon, bone, and DNA) and such disparate concepts of bioenergy as *qi*, *prana*, or "vital energy," as well as whatever forces may be associated with "intention." But biofield practitioners and researchers do not seek merely to add some new concepts to the existing ideas of science. *Biofield* is intended to integrate much of what is included in both CIM and conventional Western medicine that does not involve a chemical, surgical, or mechanical manipulation or pure psychotherapy, utilizing the concept of the biofield.[14]

There are mixed opinions about the role of subtle energies in many CIM systems. However, for practices such as Reiki or external qigong, currently, it is unlikely there is a foundation for physical causation as classically understood. Reliance on factors that "defy measurement" by current scientific techniques makes therapeutic effects reported for such practices "anomalous" in the sense used by Kuhn. They lie outside the bounds of current scientific knowledge, but more than that, explaining such effects appears to require the acceptance of causal agents and processes long ago rejected by modern science such as "life force" or "spirit." They appear to have a great deal in common with Mesmer's "animal magnetism."[15]

The individual traditions now claimed by biofield proponents were once seen as alien to modern science and, therefore, not subject to scientific investigation. That was the situation for acupuncture in the United States prior to President Nixon's visit to China in 1972. But Chinese efforts to integrate acupuncture and other *qi*-based therapies within a framework of modern medical science and growing evidence of their effectiveness led ultimately to a reassessment and efforts to assimilate acupuncture effects into a Western framework. Because of its breadth, the concept of biofield healing greatly complicates such efforts at straightforward assimilation. It is very difficult to bring the diverse practices of biofield healing ranging from the needling of points on *qi* meridians to intercessory prayer under a coherent explanation using current scientific concepts. That has led critics to use psychological explanations such as suggestion and the placebo response to bring biofield healing into the conventional healing theory/paradigm. Such explanations, however, are inherently contrary to biofield theory. The alternative is to create a new framework that incorporates many current scientific concepts along with the radically novel concepts that have developed with the idea of the "biofield." Such incorporation, however, suggests that the current concepts be understood differently in important ways. As Sharrock and Read make apparent in their analysis of Kuhn's philosophy of science and scientific revolutions, "paradigms are not produced *de novo*, they are in important part constituted out of the prior paradigm. . . . [T]he new paradigm will reconceive the prior paradigm's achievements" in its own terms.[16]

This, the inclusion of conventional science within biofield discourse, is what sets biofield healing apart from the individual older traditions like acupuncture and prayer. And herein lies a major source of resistance and misunderstanding. As Sharrock and Read put it, using a classic example, "Kuhn argues that Newton and Einstein take the universe to be populated by different fundamental entities": eg, mass is not the same thing in Newton's Laws as it is in Einstein's universe, so one cannot translate one paradigm into the other. When a scientific revolution moves the scientific consensus from one paradigm to another "the furniture of the universe changes."[16] The use of the word *energy* in the biofield discourse, as opposed to its standard physical meaning conventionally used in medicine, is the crucial example here. Kuhn argues that such differences in meaning, applied to the same words, is what makes different paradigms incommensurable and leads advocates of competing paradigms not so much to disagree when arguing as to "talk past each other." This is what is meant when we refer to understanding something "in terms of" a particular interpretation. "The furniture of the universe" is a metaphor for ontology, the fundamental basis of a paradigm. In philosophy of science, this is not ontology in the metaphysical sense; rather, as Quine's principal of logical commitment puts it, not "what things exist, but how to determine what things a theory claims exist" shifting from the metaphysical assertion

to an epistemological stance.[17] This kind of contingent view is crucial for the equitable consideration of competing ontologies; conventional medicine and biofield healing are currently engaged in such competition.

The biofield approach, then, finds the energy-referenced ideas of the various healing systems to which it refers to be an advantage. The ancient and crosscultural distribution of these practices cries out for a grand modern theory that can coordinate the disparate practices and theories of the individual traditions, some of them thousands of years old: lost wisdom, wrongly discarded by reductionist science, in need of modern explanation. From the standpoint of modern medicine, these ancient patterns are similar. Nevertheless, diverse interpretations exacerbate the problem, piling anomaly on top of anomaly. It is because of this that biofield healing offers not just a novel idea but the beginning of what may become a radically different paradigm. The nascent theories developing in the biofield discourse reconceive and thereby incorporate and coordinate existing medical knowledge with subtle energy.

PARTICULAR CHARACTERISTICS OF BIOFIELD HEALING THAT STIMULATE RESISTANCE

If we are correct that biofield healing represents a potential revolutionary paradigm in healthcare, we expect that resistance to it would follow from both features internal to biofield discourse and others internal to conventional science and medicine, features that we should find in the ontologies, and therefore the lexicons, of each.

Allegations of Pseudoscience

Subtle energies hold a central and defining place within biofield healing but are absent from the lexicon and ontology of conventional science. The resulting clash of ontologies raises the "demarcation issue," the philosophical effort to clarify the criteria for deciding whether an activity that calls itself science really is science or if it is *pseudoscience*, an important term in the lexicon of conventional science.[2,18]

The assertion that certain ideas and practices are not science—although they claim to be—would be a very strong defense against revolutionary criticism. Under the heading of "pseudoscience," this assertion has been used against CIM in precisely this way. Consider the following quote from an article published in the *British Medical Journal* entitled "UK universities offer degrees in 'pseudoscience,' *Nature* article says."[19] This article quotes pharmacologist David Colquhoun (University College London, Pharmacology) who is involved in an effort to have CAM teaching removed from UK universities: "Most complementary and alternative medicine (CAM) is not science because the vast majority of it is not based on empirical evidence."[20] The use of empirical evidence is a common defining aspect of science, and CIM is often accused of lacking it. Actually, there has been a great deal of empirical research on CIM, much of it with positive results, as documented in other articles in this issue. But definitions of what counts as empirical evidence has proven to be a contentious topic in itself. Within science, the term *empirical* developed highly specialized meanings, becoming what Ryle called an "achievement term" based on the logical positivist understanding of "sense experience."[21] The controversy over whether and how to use subjective report as data is one aspect of the resulting controversy that is especially pertinent to biofield healing.

The anomalous aspects of biofield healing, including distant effects of mind on living systems and the role of healing intention suggest the "paranormal," making a connection to parapsychology. And skeptics have long dismissed parapsychology as a "pseudoscience."[22-24] Many scientists and scholars consider this wholesale dismissal of parapsychology unjustified, and the tactics used against parapsychology over the past 140 years are clear examples of the dynamics that Kuhn delineated regarding the way that conventional science resists revolutionary new findings.[25-30] But the stigma remains. Therefore, this link yields additional barriers to the entry of biofield (and other energetic) healing into the mainstream. But the quantum mechanical observation of nonlocal effects, what appears to be action at a distance, is currently being used advantageously in parapsychology to build a bridge to emerging concepts in the latest conventional science.[31-33] Those concepts may prove central to the understanding of biofield effects and even of consciousness and its potential role in healing. Although parapsychology is still marginalized and stigmatized in conventional scientific discourse, it is growing in its evidential base and acceptance. This connection holds both risk and potential for biofield healing and should be approached cautiously but seriously.

The boundary issue has been a constant source of disagreement among scientists and philosophers for more than a century.[34] The movement of particular ideas back and forth between being accepted as science and being labeled pseudoscience shows that the boundary being sought is a social construction rather than an immutable natural feature. The appropriate response of biofield healing advocates must be to continue doing their empirical work and clarifying their own definition of the boundary of science. If biofield healing does emerge as part of a new medical paradigm, then, presumably, that will bring with it some salutary modifications to the boundaries of scientific medicine.

Popular Support: A Problem?

Acceptance and support of biofield healing and other CIM practices has developed more rapidly in the public than among scientists and physicians.[4,35-38] Popular support was obvious in the 1800s at a time when it was not even clear which medical approach was conventional and which was alternative, as homeopathy, magnetic healing, herbalism and many other health systems flourished. With the reform of the medical schools in the late 19th century and the devel-

opment of medical licensure in the early 20th, the distinctions became clearer. Although biomedicine became dominant, most of the 19th century traditions, from homeopathy to herbalism to religious healing, retained a following through the 20th century. In the latter part of the century, these traditions that were diminished but never died out experienced a renaissance. Empirical findings are sometimes published in popular magazines and books, and support comes from private funding and foundations. The foundation for such publications and funding is the interest and the experience of ordinary people. CIM healing is a grassroots movement, and this is a part of its strength.

Public support led to the study of unconventional cancer treatments by the Congressional Office of Technology Assessment in the 1980s; this was a striking move considering that the NIH already had in place a large and thriving National Cancer Institute (NCI),[39] but public advocates argued that the NCI was too biased to perform an objective evaluation. Then in 1992, Congress established the Office of Alternative Medicine (OAM) at NIH, again responding to public support and the support of some members of Congress with their own positive CAM stories to tell. The following year, Eisenberg and colleagues published the first systematic, national study of CAM use, followed by a second systematic study in 1998. Their findings were surprising to most: overall CAM utilization by Americans was high (34% within the past 12 months) and climbing (up to 42% in the 1998 study).[40] Perhaps more startling, though, was that CAM use was positively associated with education. The stereotype of those who used unconventional healthcare was summed up in a 1994 article in *JAMA* that noted 6 common characteristics of CAM users: recent immigrants, living in ethnic enclaves, don't speak much English, were educated outside the United States, and maintain a "high degree of ethnic identity": that is, the author notes, those who are "less acculturated."[41] But Eisenberg et al found just the opposite: "the highest use reported by nonblack persons from 25 to 49 years of age who had relatively more education and higher incomes."[40] Others have made the same finding.[42,43] The stereotype was obviously wrong. In 1998, OAM was elevated to the status of a national center, NCCAM, again showing the continued level of public support.

The problematic aspect of popular support harkens back to the science/pseudoscience boundary issue. The demarcation of science requires that scientists have expertise formally attained through extensive education. Educational credentials indicate a scientist as much as licensure indicates a true physician. This boundary reflects the assumption that only the properly educated can understand the procedures and the evidential outputs of real science. That being assumed, support by nonscientists coupled with loud resistance by (some) scientific experts appears to support the pseudoscience label, but the finding that better educated patients are more likely to use CAM complicates and undermines this interpretation. The issue at hand is that conventional work has a great advantage in acquiring funding and publishing findings; in fact, everything involving peer review is much harder for unconventional approaches. These obstacles create a Catch 22 for fields that challenge the dominant paradigm: without funding and peer-reviewed publications, the work is assumed not to meet high scientific standards, and meeting those standards is a prerequisite for funding and publication.

The Spirit Problem

The most fundamental barrier separating biofield healing from mainstream science lies in the spiritual associations of many of the healing practices that have been brought under its aegis: biofield healing observations appear anomalous with respect to conventional paradigms because they lack a conventionally recognized biological mechanism, and material biological mechanisms are central to the definition of the modern scientific medical paradigm.[44,45] The power of this obstacle is enormous, and it is magnified by the implicit connection to religion. Although many biofield healing proponents reinterpret religious practices such as "the laying on of hands" and religious meditation in nonreligious ways, the association remains pervasive. Reiki and HT, for example, look a great deal like the religious "laying on of hands." Furthermore, spirituality is a personal orientation to the transcendent, which to almost all humans has meant orientation to the world of spirits: God(s), angels, souls, Jinn, etc.[46] The "world of spirits" obviously is nonmaterial. It is, therefore contrary to materialism and conventional biological mechanisms.

Religion is the institutional aspect of this orientation. Therefore, not all spirituality is religious, but religions are inherently spiritual. Religious beliefs are heavily dependent on faith (belief without empirical evidence). The contemporary consequence of this is the view of spiritual healing as nonrational and therefore, presumably, not scientifically investigable. For example, in 1999 Arnold Relman, MD, the highly respected former editor of the *New England Journal of Medicine*, made the following statement at a conference on CAM at the University of Pennsylvania School of Medicine: "Science denies religion and that is what distresses advocates of CAM because CAM has a spiritual foundation."[5] This is one of the most important underlying sources of barriers to the entry of biofield healing research into the scientific and medical mainstream.

The "Life Force" Problem (Vitalism)

An emphasis on various kinds of energy is almost universal in CIM healing (and definitive for biofield healing), and it is crucial in mediating the concepts of harmony, balance, integration, and wholeness. But the connection (if any) of energy in this sense to energy in the conventional, physical sense as "the capacity to do work" is unclear. In some cases, such as *qi*, the English

word *energy* seems more like a metaphor than a simple translation. This issue becomes stark when we speak of an energy unique to living things: vital energy. Among other things, this is contrary to the conventional view that life processes can be reduced to very complex forms of the same processes found in nonliving things (eg, chemicals, molecules). This element potentially places biofield healing within the tradition that in Western thought has been called *vitalism*:

> *The belief that the activities of living organisms are due to a VITAL FORCE. . .that is different from other physical forces in the universe. Other names have been used for this living force or principle: DEMIURGE; ELAN VITAL; ENTELECHY; NOUS (PLATO); PSYCHE (ARISTOTLE). Vitalism. . .contend(s) that there is an ultimate, radical, and real dichotomy between living (organic) and nonliving (inorganic) phenomena. . . . Usually this force is regarded as being nonphysical, invisible, intangible, and. . . possessing a unity of its own that can exist independently of the physical bodies to which it gives life.*[47]

Vital force has been seen as the power behind emergent evolution, consciousness, self-regulation, and the innate healing capabilities of living creatures. Thus, this concept provides links among a great variety of specific theories of healing and general physical and metaphysical theories. It is also one reason that healing modalities and religious beliefs have such a strong affinity. However, it is also the case that vitalism was explicitly discarded in the development of modern medicine and biology. As philosopher Simon Blackburn states, "The consensus among philosophers and biologists is that it [vitalism] offers no explanatory advantage that the life sciences need."[17]

The perceived obsolescence of vitalism, coupled with vitalism's strong apparent connection with CIM in general and biofield healing in particular, gives biofield healing an archaic look in the eyes of conventional scientists. One response to this contentious issue would be to assume that eventually the energy of living things will be understood in a way that harmonizes with current physical views of energy and assimilated to conventional biology. For some, this is probably comfortable, but for others, it would erode the uniqueness of the biofield and would not address some of the more distinct aspects of biofield healing. If, on the other hand, one argues that the biofield (the energetic aspect of life) is inextricably bound up with the life force, it could be proposed that the generative force for the biofield is the life force itself. Then the biofield might even be proposed as the basic source of life and consciousness. This move would emphasize the uniqueness of the biofield and its effects, and simultaneously, it would establish that the biofield and contemporary biomedicine are definitely incompatible paradigms and unlikely to integrate.

Lack of a Broad Academic Infrastructure in the Biofield Domain

Biofield healing has been marginalized and has not developed the kind of academic infrastructure that has been so fruitful for mainstream science and medicine. History and philosophy of science, bioethics, medical sociology, and anthropology are integral parts of the social foundation of mainstream science and medicine. But while healing researchers often employ concepts and materials from such disciplines, most scholars in those fields have never paid any substantial attention to CIM as a set of important modern practices. These disciplines are expected to provide a critical attitude toward the biases of conventional scientists, but regarding CIM, most have simply replicated the biases of the mainstream.[48-51] This presents a challenge. To counter the negative stereotypes of CIM typically purveyed by scholars currently interested in health matters, biofield healing needs to develop its own solid infrastructure of scholarship in order for theory and practice to grow in a thoughtful manner. The special journal issue that this article sits in is an example of that attempt.

GENERAL CONCEPTS IN SCIENCE FROM WHICH BARRIERS TO BIOFIELD HEALING FLOW

Rationality

A basic problem in the resistance of conventional science to novel findings is the unwillingness to accept that things exist that we cannot currently measure or observe directly. This is often incorrectly attributed to the demands of rationality, but there are many phenomena of scientific interest that are not accessible directly yet are rationally inferred. In astrophysics, "dark matter," invisible to telescopic observation but inferred from its effects on visible matter, is an example.[52] Less exotic but more relevant clinically, pain can only be observed by the one experiencing it, and all quantification and neurophysiological correlates are entirely inferential. The inferences about dark matter and pain, when done correctly, are rational. Rational inferences about the biofield and bioenergetic effects observed through effects on living systems are equally rational. An example of this type of work is that done by Jonas and colleagues who performed a series of studies exploring the relationship of conventional energy to bioenergy. The results indicated that is it possible to investigate this connection and that it is to disentangle the differences through experiments in shielding, distance, and molecular blockers.[53-56]

Unfortunately, in controversial areas of science, those places near the boundary, the use of *rational* to mean "consistent with existing conventional theory" has become a common way of stigmatizing disfavored ideas as "not rational," especially those that do not seem to admit material explanation. This is now standard with regard to any alleged cause that appears not to be material, what Einstein called "spooky action at a distance." The usage of *rational* and *irrational* to characterize ideas themselves, rather than the reasoning that

led to them, is a kind of slang constituting a set of theoretical conclusions with neither explicit argument nor evidence. This is what sociologists call labeling, and it is a major source of inaccurate stereotyping.[57] Because biofield healing appears at present not to operate through ordinary physics, it suffers unfairly from the "not rational" assumption. This attribution is made all the stronger by the nonmaterial and nonrational character assigned to spirituality and the relationship of spiritual healing to biofield healing.

A classic example of the "rationality=materialistic" explanation claim is provided by the notion of prior theoretical plausibility, which has often been used to reject novel CAM findings. For example, on November 10, 1999, at a conference on CAM held at the University of Pennsylvania in Philadelphia, Marcia Angell (then editor of the *New England Journal of Medicine*) participated in a panel that addressed questions of editorial bias against CAM. Disclaiming bias against good scientific studies of CAM, Angell stated that in order to be good science, a study must offer a plausible biological mechanism for effects reported. Otherwise, the study would not be believable.[45] She then gave examples of well-designed CAM studies with sound statistics that produced positive results that "could not be true" (ie, had no plausible biological mechanism) and so should not be believed or published. One of these was a study of moxibustion for breech presentation that had recently been published in *JAMA*.[58] Effects that do not seem to rely on conventionally recognized physical forces, such as biofield healing, obviously are not consistent with a currently understood "plausible biological mechanism," and thus would fail Angell's test.[59]

The theoretical plausibility criterion implies the following:

1. Existing conventional scientific knowledge is an adequate measure of whether an unconventional claim is true. Therefore,
2. if a practice is not plausible on the basis of current theory, there is no reason to think that it may work (ie, it is not rational), and
3. empirical evidence of an event that is not theoretically plausible can be rejected out of hand. It must not have happened, or it cannot have happened as described. There must be (undetected or even undetectable) bias in the observation. So
4. acceptance of theoretically implausible claims would require the abandonment of (be inconsistent with) current scientific knowledge.

Individually and as a group, these ideas support expert paternalism and suggest that a process of free inquiry open to diverse views is unnecessary and counterproductive in science, except within narrow bounds internal to conventional scientific theory. Obviously, this is a defense of the existing paradigm against potentially revolutionary claims; observations that are theoretically implausible are anomalous in terms of the existing paradigm from which the theory at issue comes. In CIM, this suggests that the patient's autonomous right to refuse conventional treatment and to use legal alternatives is merely the right to be wrong.[45]

This reductive doctrine assumes a coherent scientific unity of all valid knowledge, present and future, such that new knowledge claims can be evaluated, prior to collecting new data, on the basis of their prospects for assimilation into contemporary science. That which has the potential to be assimilated may be true, what does not assimilate must be false. This criterion is what philosopher Paul Feyerabend called "the consistency condition," saying it is "unreasonable because it preserves the older theory, not the better theory. . . . It eliminates a theory or a hypothesis not because it disagrees with the facts; it eliminates it because it disagrees with another theory."[60]

Objectivity

Another central criterion of contemporary scientific method, related to rationality, is reliance on observations that are what philosophers call "public." That is, they can be made repeatedly by anyone using the proper technique. The assurance of this public nature in modern science is the availability of mechanical instruments to record the observable facts. So it is assumed that by eliminating the subjective human observer, the machine registry of something is purely objective. Of course, intention and vital energy do not register directly or consistently on available mechanical devices. We may call this "the machine registry" barrier. As described in another article in this issue, biofield scientists have created a number of devices intended to detect aspects of the biofield. Some of these have produced repeatable effects with results that conform to biofield healing expectations: for example, the devices using gas discharge visualization based on the Kirlian effect.[61-64] Nonetheless, the continued rejection of Kirlian photography by conventional science shows how difficult it is to get such novel instruments accepted. This generates another major barrier regarding biofield healing, leading critics to dismiss the topic as purely "subjective."

The machine registry issue is part of the "objective" observation criterion, and this is another central methodological obstacle for biofield healing. It arises from current notions about subjectivity and objectivity. This is a topic on which many healing researchers and practitioners disagree markedly with conventional scientists.[65-67] Interestingly, it is an issue on which many in modern society are changing their views.[66,68] Pure "objectivity" is increasingly being recognized as impossible, and subject/object boundaries are being reconsidered.[69-72] In some ways, this is helpful to healing researchers, but it also substantially raises the guard of conventional thinkers. For many scientists, the interest in the subjective dimension of healing is another indication of the postmodern rejection of objectivity, a trend which they see as threatening rationality altogether. Fortunately for biofield healing,

there are many current avenues developing for reconceiving the matter of objectivity. The role of the observer in quantum effects is one major example, but perhaps more methodologically relevant to biofield healing is the recognition that quantitative methods in research need to be combined with appropriate qualitative methods; "mixed methods" are becoming the state of the art in much research.[73-75] The stimulus for these developments in medicine includes the realization that omission of quality of life (QOL) and poor attention to adequate pain control in medicine have had a negative impact on quality of care. Both QOL and pain are among the medical outcomes where biofield healing has been able to demonstrate clear effects. This should be developed systematically within biofield research.

BARRIERS INTERNAL TO MEDICAL SCIENCE AND PRACTICE

The Materialism of Modern Medicine

Modern medicine emerged in the mid-19th century with the development of bacteriology, anesthesia, and antiseptic practice in surgery and the development of a physical and chemical foundation for medical practice. At this time, medicine began to turn from vitalism as a foundational principal to a mechanistic view rooted in materialism. In the conventional view, these changes allowed modern/allopathic medical science to retain all that was most effective during the ascent from prescientific superstition, making that which did not fit the reductionist biomedical model obsolete and left to folk medicine and quackery.[76-78] Skeptics assert that CIM practices are among these. Their claim benefits from CIM's openness to the possible effectiveness of ancient practices such as acupuncture. Many of the barriers we have described above relate to this obsolescence argument from conventional skeptics. But this view was also applied to botanical healing as recently as the 1970s.[79] Today, pharmaceutical companies scour the world for ancient herbal healing traditions to analyze and evaluate with clinical trials. This makes a powerful analogical argument against the assumption that the healing practices of ancient and non-Western societies were nothing but placebos.

The Guild Interests of Mainstream Science and Medicine

The claims and aspirations of biofield healing are in competition with those already in the mainstream of cultural authority: funding, patients, prestige, and status. They also challenge the deeply held emotional investment of mainstream scientists and doctors, which is most often expressed in terms of commitment to the public good. This personal investment issue always produces strong defenses and resistance to change in mature paradigms. This is also a major source of paternalism. When this investment is challenged, the response is often severe and couched in terms of protecting the public. The development and use of these arguments are a part of the social process of science as Kuhn (1962) demonstrated, and defense of medicine's guild interests always constitutes bias no matter how well founded the defense may be.[2] Despite all efforts to reduce scientific inference to a kind of rational calculus, no observations speak for themselves; interpretation is always required, and interpretation always offers space for differing viewpoints. This becomes severe when a scientific dispute involves contrary paradigms. At this point, the concepts and methods designed to reduce scientific bias and prejudice become powerful tools in the dispute and objectivity can be lost. As Kuhn showed, this does not always even involve valid argument or contradiction; rather, proponents of the clashing paradigms simply talk past each other. In this case, there is no engagement, and the winner is often the most powerful rather than the one with the best evidence.

"Peer" Review

In conventional science, publication, funding, promotion, and tenure are the backbone of the scientific process, and they are governed by peer review. Peer review developed after science became a mature paradigm involving extensive technical training by accredited institutions; with this came the development of increasingly technical language and complex instrumentation. The net result has been that lay persons, the public in general, have less and less true understanding of science and its findings. Peer review, intended to guarantee that decisions in these areas are made by true experts, is a natural response to the increasingly arcane nature of scientific knowledge. Peer review has a natural built-in seniority system wherein theory enhances the expertise of reviewers. This works moderately well in mainstream science, especially with the most conventional work. In newer areas, this process has real inertia because of confirmation bias, and that is a problem.[80] In unconventional areas such as biofield healing, the peer review system is a large obstacle. In the first issue of Prometheus Books' *Scientific Review of Alternative Medicine*, the editor, Wallace Sampson said of preexisting CAM journals that "at least one . . . claims that its articles are peer-reviewed," but they are really devoted to "articles and theories that are outside the borders of science and objective reality."[81] Until the advent of his new journal, Sampson said, "there has been no truly scientific, peer-reviewed journal specializing in [CAM]."[81] Or as he put it in an interview when asked about peer-reviewed work in a CAM publication, "they may be their peers, but they aren't our peers." Many, even rigorously done studies in CIM face difficulties in making it through the peer-review process (or even getting a review) of top mainstream journals, a barrier demonstrated in several studies of the impact of peer review on "acceptance levels" of CIM research.[82-84]

Rhetoric

All professions develop persuasive arguments to justify their practices and defend their authority, what we may call professional rhetoric. Understandably,

much of medicine's rhetoric centers on issues of risk, harm, and benefit. This is an issue of real concern to the public, and the history of medicine is filled with illustrations of the danger of harm by unintended consequences or poorly tested remedies. So the issue is valid and important, but very often, these claims are greatly exaggerated when CIM is under consideration. For example, in 2003, one of the authors (DJH) of this article took part in a debate regarding CIM at the Medical University of South Carolina. His opponent in the debate was Lawrence Schneiderman, MD, a well-known critic of CIM. In 2000 Dr Schneiderman published an article in the *Cambridge Quarterly of Healthcare Ethics*. In the debate, Hufford was able to show that each of Dr Schneiderman's examples of CIM's weakness lacked sound evidence.[85] For example, in dismissing "Lorenzo's oil," an alternative treatment (erucic acid) for adrenoleukodystrophy (ALD) made famous by a movie of the same name, Dr Schneiderman denounced the oil as "fraudulent" and stated that "worse than being merely useless, it was toxic as well," an assertion accompanied by a footnote citing Hugo Moser, MD, an expert on ALD and the physician who cared for Lorenzo when he first began to receive the special oil.[86] But in the year of the debate (2002), Dr Moser had publicly said that if he had a son with ALD, he would put him on Lorenzo's oil, noting that "Things have been publicized as treatments with much less evidence."[87] Regarding Dr Schneiderman's characterization of the oil as "toxic" based on a letter by Dr Moser to the editor of the *New England Journal of Medicine*, Dr Moser had actually said that some patients experienced a reduction in their platelet counts during a clinical trial but that this resulted in "no clinically important bleeding" and their counts returned to normal when the oil was removed from their diet.[88] Remarkably, critics of CIM have asserted that even the use of spiritually oriented CIM therapies used clinically to comfort the desperately ill involve the risk of great harm.[89,90]

The assertion of fraud is related to the assertion of risk. If a practice is fraudulent, then it is by definition ineffective; therefore, the risk:benefit ratio in such an instance is always unfavorable because the risk is always greater than possible benefit. Fraud and harm are also linked historically in the idea of quacks victimizing and harming innocent though gullible people. Angell's comments about claims to have achieved "impossible" results, as quoted above, provide a rationale for attributions of fraud that is the same as Hume offered 250 years ago, "that it is always more likely that people are lying than that natural law is being broken."[91] But this assertion begs the question by concealing its conclusion in its initial premise. The use of such circular reasoning by highly skilled intellectuals shows the depth of the bias involved.

HOW SHOULD HEALING RESEARCHERS RESPOND TO MAINSTREAM BARRIERS?

Solid, systematic research that is scrupulously rigorous is the most important response for biofield healing research to mainstream barriers. But for research to be solid and systematic cannot mean that it must serve the most conservative values of conventional medical research. For example, biofield research should not and could not make solid progress if it were to accept Angell's rule of being explicable by biological mechanisms already accepted by medical science. And finally, it is necessary for the biofield healing research community to be bold and innovative in responding to the current cultural situation in which the public is as enthusiastic for this research as conventional science and medicine are resistant. That background is fraught with both opportunities and risks. Currently, as these topics acquire a certain cachet and a clear economic value because of growing public demand, the field is gaining many new friends, and influential figures are offering themselves as leaders. We should always keep in mind that newfound popularity brings a whole new set of risks to those long accustomed to being unpopular.

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