

Mind-Body Medicine and Cancer

James S. Gordon, MD^{a,b,c,d,*}

^aThe Center for Mind-Body Medicine, 5225 Connecticut Avenue NW, Suite 414, Washington, DC 20015, USA

^bDepartment of Psychiatry, Georgetown University School of Medicine, Georgetown University Medical Center, 4000 Reservoir Road NW, Suite 120, Washington, DC 20007, USA

^cDepartment of Family Medicine, Georgetown University School of Medicine, Georgetown University Medical Center, 4000 Reservoir Road NW, Suite 120, Washington, DC 20007, USA

^dCancerGuides[®] Training Program, 5225 Connecticut Avenue NW, Suite 414, Washington, DC 20015, USA

Ten years ago, two of my students at Georgetown Medical School volunteered to do a presentation on “mind-body medicine and cancer.” It was the last session of a semester-long elective on integrative medicine and one they felt highly qualified to lead. Both were budding scientists and had done summer laboratory research at the National Cancer Institute, and both were, they told us, highly skeptical of the mind-body connection. Therapeutic answers to cancer, they believed, lay in genetics and molecular biology, and in the next generation of precisely targeted chemotherapeutic agents. They would, they promised us, cast a cool, critical eye on these mind-body alternatives that seemed at first glance to be such unlikely therapeutic interventions. I assigned the topic to them and waited with interest to hear what they would say.

As their fellow first-year students made their weekly presentations—on the relationship between stress and chronic illness, nutrition and heart disease, and the principles and practices of Chinese medicine—the two young scientists listened carefully and asked hard, thoughtful questions.

On the last afternoon of class, it was their turn. When the class assembled, they had already covered the board with diagrams of the interactions between the mind, brain, and immune system, and with citations from journal articles. They took us swiftly and skillfully through the physiology and biochemistry and then turned their attention to the clinical research. They handed out sheets of references: Relaxation techniques and guided imagery, they showed us, improved the quality of life for people who had cancer, decreased the nausea and vomiting of chemotherapy and the pain of metastatic disease, and enhanced the numbers and functioning of immune cells. “Much to our surprise,” one of them concluded, “the connections are clear and the hard science is there.”

*The Center for Mind-Body Medicine, 5225 Connecticut Avenue NW, Suite 414, Washington, DC 20015. E-mail address: jgordon@cmbm.org

The evidence tells us that mind-body medicine should be as central to cancer care as chemotherapy and radiation. Every oncologist should know about it. And every patient should have mind-body approaches available as soon as he has been diagnosed.”

The research that has been done in the last 10 years, the papers that have been published, and the experience of hundreds, perhaps thousands, of clinicians and hundreds of thousands of patients now confirm and amplify my skeptical students’ hard-won conclusions. Mind-body medicine, grounded in a respectful, therapeutic partnership, facilitating each patient’s involvement in his or her own treatment, and emphasizing the capacity to positively affect his or her illness, should be a central element in the care of every person diagnosed with cancer.

This article reviews some of the physiologic foundations of mind-body medicine, the introduction of mind-body approaches to cancer care in the 1970s, the specific mind-body approaches that have been used, and the evidence that supports their use. The importance of group support for enhancing the effectiveness of these approaches is discussed, and the article concludes by offering some guidelines for integrating mind-body approaches and perspectives in the care of people who have cancer and in the education of oncologists and other health professionals who work with cancer patients and survivors.

ANCIENT WISDOM, MODERN SCIENCE

Mind-body approaches—chanting, imagery, hypnosis, dance, and relaxed deep breathing—are as old as the first aboriginal healing systems and as widespread as Chinese, Indian, African, and Native American medicine. It is only in the last 30 years, however, that modern Western medicine has begun to give these techniques the kind of importance they had in the first Western system of healing in Hippocratic-era Greece.

Mind-body approaches to healing are based on the understanding that our thoughts and feelings, and our beliefs and attitude, can affect and shape every aspect of our biologic functioning. Mind-body approaches also recognize that everything we do with our physical body—what we eat and how we stand, the ways we stretch our muscles and the tension that constricts them—can modify mental, psychologic, and physical functioning. Finally, mind-body approaches are based on the understanding that the mind and body are, in fact, inseparable, and that the central and peripheral nervous system, the endocrine and immune systems, all the organs of the body, and all the emotional responses we have share a common chemical language [1–3] and are constantly communicating with one another.

Ten years ago my students learned that mind-body therapies can make a difference to people who have cancer. Today, the clinical evidence is significantly stronger. These approaches offer an opportunity for patients who have cancer to participate actively in their own care. As the rapidly growing body of research tells us, these approaches have the promise to significantly reduce stress and enhance immunity, to enhance the quality of the lives of people who have cancer, and, perhaps, to increase the length of their survival.

The scientific frontiers of mind-body medicine were opened in three phases over the last century by pioneering researchers and clinicians who shared a capacity to see and appreciate the power of connections that other investigations had ignored. Walter Bradford Cannon [4], the great physiologist, paved the way for modern mind-body medicine at the beginning of the twentieth century. Cannon, who taught at Harvard, described the dynamic equilibrium, or balance of forces within an organism, as homeostasis (from the Greek *homoios*, meaning “similar,” and *stasis*, meaning “position”). He also described patterns of behavior and physiology that were common to all the animals he studied, from mice to men. Among these was the response he named “fight or flight.”

Cannon observed that all vertebrates had a coherent response to a threat, whether the danger was an oncoming storm or a marauding predator. The response included an increase in heart and respiratory rates, greater tension in large muscle groups, coldness and sweatiness, a decrease in intestinal activity, and a dilation of the pupils.

All these, Cannon noted, were manifestations of activity on the part of the sympathetic nervous system, one of two branches of the autonomic (beyond our control, as opposed to voluntary) nervous system. The sympathetic nervous system, like its complement, the parasympathetic nervous system, is regulated in the brain by the hypothalamus. It communicates not only with centers in the lungs, heart, and arteries but also with the adrenal medulla. There, it provokes the release of epinephrine and norepinephrine, which further stimulate heart and respiratory rates. All of this sympathetic activity, Cannon observed, primes animals—and humans—to flee from a predator or, if necessary, to fight.

The next major contribution to our understanding of the mind-body connection came in the 1920s and 1930s with the work of the Hungarian-born Canadian physician Hans Selye [5]. As a medical student in the 1920s, Selye had observed that people in the hospital all had a certain sick look about them, regardless of the diagnosis. As a researcher, he set himself the task of discovering whether there were consistent anatomic and physiologic changes in all these sick people, regardless of the particular illness each endured.

Selye pinched and poked animals and subjected them to heat and cold and loud noises, electrical shocks, and overcrowding. What he learned was that all animals, regardless of the nature of the noxious stimulus, and in addition to such local manifestations as bruises and burns, showed certain consistent responses. These included an enlargement of the adrenal cortex (which secretes steroid hormones, such as cortisol, that accelerate physiologic functioning and decrease inflammation) and shrinkage of the thymus, spleen, and lymph nodes, the major organs of the immune system. Selye [5] declared that all of these were responses to what he called “stress.” He defined stress as “the non-specific response of the body to any demand” and the physiologic changes as “the general adaptation syndrome”.

By the early 1970s, researchers were beginning to suggest that the fight-or-flight and stress responses might contribute to the onset of various human disease states. According to Cannon’s observations, endangered animals quickly

flee and quickly recover or else die fighting. Some “civilized” humans, however, seemed to later researchers to exist in a perpetual state of fight-or-flight. The angry, time-obsessed, hypertension and heart attack-prone “type A” executive, described by cardiologists Meyer Friedman and Ray Rosenman [6], was the prime example. Feeling unable either to fight or flee (he might lose his job or his status either way), hoping things would get better, toughing it out, the type A person was in a chronic state of anxious readiness. In time, Friedman and Rosenman hypothesized, this state produced physical damage, most significantly in the arteries and heart. Researchers now believe that repressed hostility is the primary culprit [7] in perpetuating the fight-or-flight response and in precipitating damage to the heart, but the basic principle—that prolonged fight-or-flight responses can cause disease—still holds.

Selye’s work also suggested a physiologic basis for correlations that were being observed between early or ongoing emotional trauma—the loss of a parent or a spouse, for example, or chronic tension—and an increased incidence of cancer, depression, and other chronic illnesses. Clinicians and researchers suggested that perhaps people whose immune functioning was compromised by high levels of stress and prolonged secretion of steroids were more likely to exhibit the deficient immune response sometimes observed in cancer and the disordered immune functioning of autoimmune diseases (such as rheumatoid arthritis) and a vulnerability to chronic infections.

By the early 1970s it had occurred to clinicians and researchers that if stressful situations and stressed-out personalities were conducive to heart disease, cancer, and other illnesses, it was entirely plausible that decreasing stress and improving outlook might help prevent these illnesses, and, indeed, contribute to better treatment. This hypothesis would stimulate new studies on stress-related illness and new ways to deal with it. It would give energy and importance to the new fields of stress reduction, mind-body medicine, and psycho-oncology. Over the following 35 years this hypothesis would provide the impetus for millions of people around the world to explore a wide range of mind-body therapies.

At about the same time, other lines of research, initiated by George Solomon [8] at Stanford, Robert Ader and David Felten [9] at the University of Rochester, and Candace Pert and Solomon Snyder [2] at Johns Hopkins, were suggesting a third pathway by which mental attitudes and emotional responses could affect physical functioning and produce illness.

In the 1960s, Solomon, a psychiatrist, followed up on a little-known Soviet study that suggested that hypothalamus is the “headquarters” of immune regulation and the autonomic nervous and endocrine system of functioning. He found that when he destroyed the hypothalamus in rats, they exhibited a marked decline in immune functioning. Ten years later, Ader discovered that the cells of the immune system, which had always been regarded as an autonomous defense network, could in fact be conditioned in much the same way that the Russian physiologist Ivan Pavlov had conditioned dogs to salivate at the sound of a bell. Not long after, Ader’s colleague, Felten, demonstrated

direct connections between the fibers of the sympathetic nervous system and the organs and cells of the immune system. Meanwhile, Pert and Snyder were revealing that similar receptors for peptides exist on the walls of cells in the brain and the immune system.

Solomon pinpointed the central role of the hypothalamus in immunity. Ader [9] showed that the mind, presumably acting once again through the hypothalamus, could affect immune activity. Felten helped describe the physical connections that make this possible. Pert and Snyder [2] were suggesting another kind of connection and another mode of communication—peptide messengers—between the cells of the brain and those of the immune system. Ader [9] named the new field they were mapping psychoneuroimmunology, to emphasize the interconnections among the mind, brain, and immune system.

As this work accumulated, the connections between the mind and the emotions it produces and three of the body's most important regulatory systems—the autonomic nervous, endocrine, and immune systems—became ever clearer. A panoramic picture of the links among social stress and thoughts, feelings, and physical functioning began to emerge. It looked as if the kind of stress we experience, and the ways in which we interpret and deal with it, might be significant factors in the production of many of the diseases from which we suffer, as if stress might well contribute to the onset and course of cancer.

STRESS AS A CAUSE OF CANCER: WHAT DO WE KNOW?

For almost 2000 years, clinicians have observed that people who have cancer are more likely to be depressed or grief-stricken, lonely or overwhelmed, than those who do not have the disease—from the second century AD, when Galen had noted that women who had breast cancer were “melancholic,” to the end of the nineteenth century, when the distinguished United States surgeon, William Parker, observed that grief is especially associated with all forms of cancer [10].

When the psychologist Claus Bahnson [11] reviewed the literature on stress, emotions, and cancer in 1980, he focused on a “particular configuration” in patients who had cancer, one “characterized by denial and depression” and absence or loss of affection in early childhood, “severe loss” in later life, and strong and persistent feelings of hopelessness and helplessness.

Bahnson had several recent studies to draw on: Caroline Thomas's [12] 30-year prospective study of Johns Hopkins medical students, which had revealed a correlation between “lack of closeness to parents and later occurrence of cancer”; Schmale and Spence's [11] observation that women who had suspicious cervical cancer biopsies who had recently suffered loss were more likely to subsequently develop cervical cancer; and Le Shan [13,14] and Worthington's findings that patients who had cancer were significantly more likely than controls to have “suffered loss of an important relationship” before their diagnosis and to “have no ability to express hostile feelings.”

In the past 25 years, researchers have sought to confirm these findings and to use the new understanding of psychoneuroimmunology to correlate them with

changes in immune functioning. It has become clear, for example, that stress of various kinds—from loss of a spouse to upcoming medical school examinations—can decrease immune functioning [15,16], lowering the number of natural killer cells (which seem to be involved in tumor surveillance), and impairing the effectiveness of DNA repair [17]. These findings suggest that stress can make us less capable of defending ourselves against the development of cancer by weakening our defenses against mutations and by rendering immune cells less competent.

More recent studies on personality and cancer have confirmed some, but not all, of the earlier work that Bahnsen cited. It seems that certain kinds of people are somewhat more likely to develop cancer: those who have experienced prolonged stress, particularly stress from which they have been unable to escape [18]; those who have suffered significant losses early in life; and those who have what has been called a “repressive coping” style [19], a pronounced tendency to deny and repress their own feelings, which has been described as a “type C personality” [20].

These studies most emphatically do not mean that all people, or even a significant number of people, who have lost a parent at an early age or been under prolonged stress or are uncomfortable expressing feelings will develop cancer. The association or influence is, as the gifted researcher Bernard Fox has repeatedly pointed out, at best a weak one [21]. There are many other factors—genetic, environmental, and dietary among them—that probably play far larger roles in the development of cancer.

These studies on physiology and psychology do, however, suggest that all clinicians need to pay attention to the stresses in their patients’ lives before and after the diagnosis of cancer. They encourage us to help all of our patients to deal with, rather than deny, the existence of situations in which they feel trapped, to express rather than repress their emotions, and to take action to help themselves rather than wait for others to take charge.

STRESS AFTER THE DIAGNOSIS OF CANCER

Several studies suggest that stress, particularly our attitudes toward it, may have far more impact on people after the diagnosis of cancer than before. For example, many studies show that quality of life [22]—how someone who has cancer feels physically and emotionally, how well he or she functions in the world, and the level of distress from cancer and its treatment—is an important factor in predicting not only how well but also how long someone who has cancer will live. That is, patients who have lung or breast cancer who are generally more optimistic and energetic, more involved in their usual activities, and more hopeful about their future are more likely to continue to feel better and may, indeed, live longer than if they feel less optimistic or less engaged—even if the type of cancer and its stage are identical [23,24].

These observations dovetailed with work of Steven Greer and colleagues [25–27] on stress and cancer survival. In several landmark studies, beginning in 1972, they established a relationship between coping styles and a more

favorable outcome for patients who have cancer. They began by asking whether the psychological stance that patients adopt when they develop cancer can, in some cases, influence the course of their disease. They interviewed a group of women who had breast cancer at the beginning of treatment and 3 months after diagnosis. All of the women had similar diagnoses—a stage II cancer, which had only spread to some of the surrounding breast tissue—and were treated with surgery and, in some cases, radiation.

Greer's study followed these patients for 15 years. The psychological response—the coping style of the patient—was related to the disease outcome at 5 years, 10 years, and 15 years. The conclusions are striking. Recurrence-free survival was significantly more common in patients whose coping style was characterized by “fighting spirit” or “denial” than in patients who showed either “stoic acceptance” or “helplessness and hopelessness.” At the final follow-up, 45% of the women who responded to a diagnosis of breast cancer with a fighting spirit or denial were alive and well with no evidence of recurrence, compared with 17% who exhibited other responses.

Using similar criteria in other studies, other researchers found that a coping style characterized as either stoic acceptance or helpless/hopeless led to faster progression of cancer in patients who had melanoma, cervical cancer, uterine and ovarian cancer, and (in men) the general incidence of cancer. More recently, a study by Greer's collaborators [28] showed that in another group of women who had breast cancer, helpless and hopeless coping styles did have a detrimental effect on survival but fighting spirit did not seem to improve longevity.

Some critics strongly question whether Greer's questionnaire is as valid today as it was in the 1970s, given the vast cultural changes in attitudes that have occurred about illness and cancer. Still, the bulk of these studies suggest that coping style can significantly affect the progression of cancer [20,29].

This work on attitude and coping is bolstered by studies on the effect of stress on the growth and progression of various kinds of tumors probably through dysregulation of the immune system [29,30]. Generally speaking, stress—particularly prolonged and major stress (this includes the stress of significant life events, such as loss of a job or spouse and, most definitely, of coping with the knowledge that one has cancer and with its treatment)—stimulates tumor growth. This effect seems to be mediated in part by higher levels of cortisol and adrenaline, which depress immune functioning and may promote tumor vascularization [31].

This finding makes intuitive sense. Cancer taxes our capacity to maintain physical homeostasis and emotional equilibrium in many significant ways. It may well make us more vulnerable to situations and stressors with which we previously would have dealt more easily.

On the other hand, knowing that all of us are vulnerable to stress and what is stressful to us can help us help our patients deal with it better. This observation is true because, ultimately, stress is a subjective experience. If you believe the job you may lose is the only one you will ever have, your level of stress is

vastly different than if you are open to the possibility that losing this particular job may open the door for you to find another, better one. If people see themselves as helpless victims and cancer as an overwhelming enemy, they experience far more stress than if they believe they can do something to help themselves; if they see cancer as an opportunity to find out what really matters in their lives, if they see it as a challenge rather than simply a disaster, it makes sense that they feel less stress and deal with their disease more effectively [32,33].

The mind-body approach, and the techniques that it makes use of, can be central to transforming the meaning of cancer and to dealing effectively with the stress it inevitably brings. As people who have cancer use the techniques that are included in this approach, they begin to address their psychologic vulnerability to stress and its physiologic consequences. Each time patients practice any of the techniques described—relaxation, meditation, imagery, autogenic training, hypnosis, self-expression, and exercise—they experience specific physiologic benefits: decreases in stress; improvements in sleep, mood, and pain; a decrease in stress hormones; and enhanced immunity. Each time they feel the benefit of the technique they are using they reinforce their sense of control over their own lives and counter whatever feelings of hopelessness and helplessness they may feel.

All of these mind-body techniques are supported by scientific evidence and a physiologic rationale, but no technique is definitely proved “better” than the others. In deciding which technique or which combination of techniques to use, it is important to individualize them according to the needs and preferences of each patient [34]. You can understand the mind-body approach far better, and recommend it to your patients with more authentic authority, if you have experienced and made use of these techniques yourself. Standard therapeutic modalities (surgery, chemotherapy, radiation, and so forth) of course require intervention by a skilled professional. Mind-body approaches are a form of self-care. Knowing the research literature on them is valuable and will, I hope, encourage you to recommend them, but the authority with which you present them is vastly enhanced by your personal and professional experience of their therapeutic power.

MIND-BODY TECHNIQUES

Relaxation

Relaxation is the most basic of mind-body techniques and the precondition for successfully using many of the more complex interventions. It is also our birth-right as humans. People in aboriginal or village cultures devote far more time to relaxation than do hyperactive modern men and women. Relaxation is a natural part of their lives, a long pause between activities, and often the attitude toward all activities they engage in. It is sad but true that most of us in the United States have to make a conscious effort to make relaxation a part of our lives, to remind ourselves of its importance, and to take time for it. When people have cancer they have to make even more of an effort to relax.

They need to accept the fear and apprehension that so often accompany a diagnosis and by doing so, soften its impact. They also have to begin in the face of fear and frustration, by trying to relax.

Physiologically, relaxation means a reduction in the sympathetic nervous system excitation that marks the fight-or-flight response and a decrease in the level of stress. According to almost 40 years of research, much of it done by Herbert Benson [35] and his colleagues at the Mind-Body Medical Institute at Harvard Medical School, relaxation can be powerful medicine: A small quantity can produce significant results. Relaxing 15 or 20 minutes, twice a day, can lower levels of adrenaline and cortisol; decrease blood pressure, heart rate, and respiration; enhance immune functioning; and balance the activity in the right and left hemispheres of the brain.

Regular relaxation has yielded impressive results for people who have cancer: decreased levels of stress and increased immune functioning [36]; decreased pain [37]; fewer side effects from chemotherapy [38]; and decreased anxiety, improved mood, and less suppression of emotions [39]. Generally speaking, brief use of relaxation has only short-term effects, whereas ongoing practice throughout and beyond the course of conventional treatment is likely to produce more lasting benefits [40–42].

In our mind-body skills groups at The Center for Mind-Body Medicine we begin with a simple, slow deep-breathing technique called “soft belly” (Box 1) that you can use yourself and teach to your patients. Soft belly is just one of many forms of relaxation. There is an almost infinite variety of techniques that can be used: the repetition of a religious phrase or an ordinary word that is meaningful to the individual; a prayer or a word, such as “one”; or quiet

Box 1: Soft belly breathing

In our mind-body skills groups at The Center for Mind-Body Medicine we begin with a simple technique, soft belly, that you can use yourself and teach to your patient. Here are the instructions:

- Close your eyes, breathe deeply, in through the nose and out through the mouth.
- Imagine your belly is soft; this deepens the breath and improves the exchange of oxygen, even as it relaxes your muscles.
- Say to yourself “soft” as you breathe in and “belly” as you breathe out.
- We suggest that our group members continue this approach for 5 or 10 minutes. Each day they add another minute or two to it.
- Do this two or three times a day—not right after meals, you may fall asleep—and at bedtime, if you are having trouble sleeping.
- Use a timer (but not at bedtime) so you are not preoccupied with how long you’ve been doing it or how long you have left.
- Soon, you’ll find that in times of stress you can take a few deep breaths and say, “Soft. . . belly,” and relaxation will come.

repetitive activity. Several studies have also shown that relaxation techniques can be successfully paired with and perhaps enhanced by music [43–46]. The technique simply needs to be one that is relaxing for you.

Relaxation also helps people who have cancer to gain perspective on every aspect of their lives and to feel less overwhelmed by the challenges of cancer and its treatment. If people who have cancer can relax during a difficult time, it becomes, by definition, no longer such a powerful stressor to them.

Meditation

Meditation is a combination of relaxation and self-awareness. Although it is normally thought of as synonymous with a particular technique, meditation is, in fact, an attitude and a way of life, a relaxed awareness of all that arises in our lives and in our minds, of our thoughts, feelings, and sensations. Meditation comes from the same Sanskrit word as medicine, a word that means “to take the measure of” and “to care for.” Meditation is a technique for bringing us into the present moment and the experience of living in that moment, free from anxiety about the past or apprehension about the future.

There are three basic kinds of meditation. The first, “concentrative” meditation, focuses on a particular phrase or sound (as in the Sanskrit mantra, or sound, “om”) or a visual image (a candle or picture). The soft belly exercise described previously is a relaxation technique and a form of concentrative meditation.

The second kind is “awareness” or “mindfulness” meditation. Its prototype is a South Asian Buddhist form called Vipassana. In awareness meditation one simply becomes aware of thoughts, feelings, and sensations as they arise. You can do awareness meditation sitting or walking, or bring awareness to any activity: cooking, cleaning, eating, ordinary office tasks, caring for a child, making love, or even experiencing chemotherapy.

The third form is “expressive” meditation. This form includes fast deep breathing, shaking, whirling, and dancing—techniques that move the body and evoke, energize, and release emotions. This is the oldest form of meditation and is still practiced in many tribal societies.

Most of the early research that was done on meditation and cancer focused on concentrative meditations but was usually characterized as relaxation. More recently there have been some impressive studies on the usefulness of mindfulness meditation [47–51]. One follow-up study for patients who had breast and prostate cancer that combined guided imagery and the postures of Hatha yoga in a group setting in which mindfulness was emphasized and practiced produced “altered cortisol and immune patterns... consistent with less stress and mood disturbance” as well as enhanced quality of life and decreased symptoms of stress [52].

There is no research on expressive meditation, although many patients we have worked with at The Center for Mind-Body Medicine have found shaking while standing for several minutes, followed by dancing, both energizing and relaxing. All forms of meditation help patients feel the mind-body connection.

Expressive meditation also offers a pleasurable experience of one's body, which is particularly important during and after treatments that may have brought with them pain, discomfort, and a negatively altered body image.

Imagery

Imagery is almost certainly the mind-body technique most widely and happily used by people who have cancer, with good reason. Imagery is an innate skill that all of us seem to possess. We all know the pleasure of daydreaming or removing ourselves from an unpleasant situation by letting our minds wander and the exhilaration of imagining things exactly as we want. The practice of guided imagery makes use of this human capacity in a directed and powerfully therapeutic way.

Jeanne Achterberg [53], who did some of the first research on the therapeutic effects of imagery with patients who have cancer, defines imagery as “the thought process that evokes and uses the senses. . . [I]t is the communication mechanism between perception, emotion and bodily change”. Imagery includes auditory, kinesthetic, and gustatory images—those of sound and bodily feeling and taste—and visual images. It stimulates specific areas of our brain as effectively as if we were actually seeing, or hearing, or tasting [54,55].

There are two basic kinds of imagery techniques [56]. Receptive imagery is the use of relaxed meditative state to access information from what we sometimes call the unconscious, or our intuition. Active imagery involves actively imagining some desired result. Both have practical uses for people who have cancer.

Active imagery, which is most often used in clinical settings, involves the conscious, directed use of the imagination to activate a healing response. This kind of imagery was first popularized 35 years ago by radiation oncologist Carl Simonton and psychologist Stephanie Matthews Simonton [57]. The Simontons encouraged images of immune cells conquering or obliterating cancer cells as, for example, powerful, handsome knights on white horses slaying creepy-looking, ill-equipped armies of cancer cells. In her early studies of the Simontons' work, Achterberg showed that people who had cancer who spontaneously had these kinds of powerful—even aggressive—images had a better prognosis than those who spontaneously came up with images in which, for example, the cancer cells were overwhelming the white blood cells [53,58].

In the years since then, it has become increasingly clear how individualized imagery is. Not everyone wants to or is served by envisioning a battle in which white blood cells destroy cancer cells. The kinds of images that are most effective vary from person to person. For example, some people prefer anatomically correct images of white blood cells and cancer cells. Others prefer images that are metaphoric, such as a big broom sweeping up cancer cells. Some people feel empowered by the Simontons' warlike images, but others prefer quieter images: cancer cells fading in smoke or packing up and leaving the body.

Most of the published research on imagery has been on various kinds of active imagery. Sometimes, the studies compare guided imagery to relaxation. In

some of them, the combination of guided imagery and relaxation is more effective than relaxation by itself [36,38,39]. The effects of relaxation and guided imagery are often hard to tease apart—even soft belly is an image. What is important from a practical perspective, however, is that the overwhelming majority of studies show that the combination of relaxation and imagery is helpful for pain control [37,59–62], recovery from cancer surgery [63], decreasing the nausea and vomiting of chemotherapy [38,63–65] and the distress of radiation [66,67], facilitating emotional expression and enhancing quality of life [61,68], and increasing the production and functioning of immune cells, including T cells and natural killer cells [65,69,70].

Hypnosis

Hypnosis is defined as a combination of relaxation, suggestion, and focused attention. It can be understood as a specific way of inducing relaxation and directing guided imagery. Some hypnotherapists who work with patients who have cancer, such as Bernauer Newton [71], have emphasized the profound state of relaxation that hypnosis can induce. Newton regards this as the medium in which the body can restore homeostasis. Others focus on the ways in which specific hypnotic suggestions may be used, like images, to focus on decreasing pain or enhancing immune response.

It is difficult and, ultimately, not important to distinguish between hypnosis and imagery. What is important is that hypnosis, like imagery, makes use of the mind's extraordinary power to affect physical functioning.

Research on hypnotic techniques overlaps with, and is at least as impressive as, the research on imagery. As the studies published in peer-reviewed journals have shown, hypnotic techniques can be used in various ways for people who have cancer [72]: to reduce severe pain by 50% or more [73–75], to decrease nausea and vomiting in patients undergoing chemotherapy [76–78], to decrease anxiety and enhance quality of life [72,76,79], and to facilitate pain-free procedures [80].

Hypnosis has been found to be of particular help to children who in general find mind-body approaches extremely easy to learn and use. Studies [75] have repeatedly shown its effectiveness in reducing the pain that accompanies procedures, in decreasing the nausea and vomiting produced by chemotherapy, and in decreasing anxiety.

Biofeedback and Autogenic Training

In 1961, when Neal Miller [81] first suggested that the autonomic nervous system could be as susceptible to training as the voluntary nervous system, that we might learn to control our heart rate and our bowel contractions just as we learned to walk or type or play tennis, his audiences were aghast. He was a respected researcher, director of a laboratory at Yale, but this was a kind of scientific heresy. Everyone knew that the autonomic nervous system was precisely that—autonomic, beyond our control. The fabled feats of Indian yogis—their claimed ability to slow the rate of their heart and their breathing

and to profoundly alter their body temperature—were regarded at that time as a masochist's perversion, a charlatan's tricks, or neurologic accidents.

Miller persisted. He was convinced that the difference between the autonomic and voluntary nervous systems was not so much one of kind but of opportunity. The skeletal system is subject to visible and immediate correction from the environment: seeing the disastrous results of your looping tennis forehand encourages and enables you to shorten your swing. The results of the autonomic nervous system's actions are not immediately apparent. We do not see or feel or hear anything when our blood pressure increases.

Miller believed, and soon proved, that if he simply offered a perceptible recording of autonomic behavior—sounding a high-pitched tone, for example, until elevated blood pressure decreased or cold hands warmed—people would be able to use this information to correct internal functioning. This procedure, which Miller first demonstrated in dogs and in rats, by teaching them to salivate both more and less and to raise and lower their heart rates, is biofeedback.

Biofeedback worked. People learned to use it to lower blood pressure and to increase hand temperature. Soon enough, clinicians began to use it for common and debilitating problems. For example, because the arterial constriction that is prominent in the first phase of migraine headaches also causes cold hands, feedback of information about finger temperature can be used as a form of treatment of migraines: the patient who learns to increase the temperature in his or her hands by relaxing the muscular walls of the blood vessels there is automatically doing the same thing with the blood vessels in the head.

Over the last 30 years, physicians, psychologists, and biofeedback technicians, in tandem with engineers, have developed sensors and procedures that have enabled hundreds of thousands of people to become aware of and to control even the most obscure aspects of their physiologic functioning [82,83]. For example, patients can now use readouts of tension from their urethral and anal sphincters to control urinary and fecal incontinence, conditions that often resist all other medical and surgical interventions. This application can be particularly important for postprostatectomy patients who have incontinence [84]. Biofeedback of various kinds also has wider applications for patients who have cancer, including pain relief [85,86], relieving side effects of chemotherapy [87], and inducing sleep and reducing stress [85,88].

Biofeedback not only produces replicable and powerful changes in physiology and improvement in symptoms but it also gives patients who have cancer a sense of connection to and control over their internal processes. This sense of mastery often generalizes to other aspects of their lives: people who have practiced biofeedback for a specific condition find it far easier to induce a relaxed state when confronted with any kind of stress. In time, many people who use biofeedback monitors learn to effect the same kinds of changes without them, using the power of their minds alone.

Autogenic training, which is sometimes paired with biofeedback, can also be used on its own. Although it is not well known in the United States, autogenic training, which was developed by German neurologist Johannes Schultz in the

1930s, is one of the simplest, most widely used, and best-researched forms of self-hypnosis. Making use of a sequence of seven phrases that describe bodily feelings and encourage parasympathetic nervous system activity (“my arms are warm and heavy,” “my legs are warm and heavy,” and so on) it is sometimes used as a prelude to biofeedback. It is also capable of inducing deep states of relaxation and relieving various physical symptoms, including those associated with cancer and its treatment [89,90].

Self-Expression

Self expression—through words, artwork, and movement—is an important antidote to the feelings of helplessness and hopelessness that beset so many people who have cancer [91].

Psychologist James Pennebaker [92–94] and his colleagues have shown that writing about stressful events—expressing rather than repressing feelings about them—can enhance well-being, reduce emotional stress, decrease frequency of medical visits, and even improve immune functioning. Published studies have demonstrated the effects of this kind of self-expression in people who have suffered emotional trauma and on patients who have rheumatoid arthritis and asthma [95].

In the research studies, people are generally asked to write about traumatic events for 20 minutes or more, on each of three successive days. Cancer and its diagnosis would, of course, qualify as traumatic, and so too would any other events that were or are deeply disturbing: loss of a parent, a spouse, or a relationship; accidents; terrible disappointments at work; and side effects and setbacks in cancer treatment. There are now specific studies on the benefits of verbal expression for people who have cancer [96,97].

Humor is an aspect of self-expression that may be particularly helpful. It provides relief from and gives patients perspective on their ongoing, serious, and often fearful preoccupations with cancer and its treatment. Published studies reviewed by Christie [98] have shown increases in feelings of well-being and enhanced coping and decreases in stress hormones in various healthy and chronically ill populations. One study [99] shows the positive effect of humor on women dealing with the breast cancer diagnosis. Another study [100] of particular relevance to oncology professionals reveals the importance of humor in relieving stress among nurses, house staff, and medical oncologists who work daily with patients who have cancer.

Art Therapy

Drawings and art therapy have long been used as a way for children who have cancer to express and deal more productively with the troubled and fearful thoughts, frightening feelings [101,102], and physical pain [103] that cancer and its treatment may evoke. In recent years, the benefits of this approach have been extended to adults, particularly to women who have breast cancer [104–106]. Although many of these interventions have been undertaken by fully trained art therapists, other clinicians can use simple, easily learned

drawing techniques to encourage self-expression, reduce pain, and promote positive coping strategies.

Exercise

Physical exercise is often hard for patients who have cancer to imagine, let alone do. They may feel exhausted from treatment and more frail than ever before. The bodies that once gave them pleasure may now seem like a burden. They may wonder, too, why their oncologists have not encouraged them to exercise. These can be obstacles, but they are not insurmountable ones.

Exercise (Box 2) should be regarded by oncology professionals and patients who have cancer as a central element of any program of integrative and comprehensive care. At this point, the research literature, which was sparse when my students examined it 10 years ago, is robust [107,108]. Exercise, it seems, can make significant contributions to the reduction of treatment-associated side effects [109–113], to relieving the fatigue that often bedevils patients who have cancer [114,115], and especially to enhancing quality of life and mood [107,108,111,116–121]. Exercise also seems to help prevent the occurrence of cancer [122–127] and may therefore have a role in preventing recurrence. Exercise also helps people who have cancer who experience their bodies as a source of distress and embarrassment to rediscover pleasure and satisfaction in them.

One form of exercise—the postures and breathing techniques of Hatha yoga—has recently received increasing and deserved attention [128–132]. A recent study conducted with a largely African American and Hispanic group of patients who had breast cancer [133] showed significant improvements in quality of life, enhanced emotional and social well-being, and less distracted mood, as these patients practiced regularly.

Yoga is particularly promising because it is often more accessible than other exercise to people who feel debilitated by cancer and its treatment, and because it promotes a more meditative and relaxed attitude toward all the challenges that cancer brings.

Box 2: Summary: these mind-body techniques have significant scientific support for use with people who have cancer

- Relaxation
- Meditation
- Guided imagery
- Hypnosis
- Biofeedback and autogenic training
- Self-expression in words
- Art and music therapy
- Exercise and yoga

SOCIAL SUPPORT

In traditional societies, the official healers—shamans, witch doctors, and wise women—who deal with life-threatening illness understand that these conditions represent an imbalance in the social order and in the body of the affected individual. Healing involves not only the herbs and advice that are the province of the indigenous professional, but also bringing the extended family or the village together in rituals to restore the social balance. These ceremonies purge social dysfunction and re-establish communal connections, the soil that these cultures believe nurtures all other healing.

In recent years we in the industrialized West have slowly begun to recover this wisdom. Increasingly, epidemiologic studies and clinical research have helped us to appreciate the power of human connections and of social context generally, in contributing to, preventing, and treating our most serious illness including, most particularly, cancer. Epidemiologic studies have informed us that mortality rates are consistently higher among the unmarried than the married and that unmarried, socially isolated individuals have higher rates of infectious disease, accidents, and suicides. The landmark multiyear study of residents of Alameda County, California revealed that the mortality rates for the most socially isolated men were 2.3 times as great as for those who had the most social contacts and that for women the differential was even greater [134].

Various factors may contribute to these findings—for example, our understanding that poor diet and less regular general health habits are more common among more isolated people. That much, but by no means all, of the data on people who have cancer (see later discussion) come from studies on women may have some significance also. Perhaps, in our society, women appreciate and thrive on social connections more than men. The trend is clear that isolation makes us more vulnerable to chronic illness, including cancer; human connections help us to heal.

Research, particularly that done by Janice Kiecolt-Glaser and her colleagues [94,135,136], has suggested that isolation depresses immune functioning and that group support mitigates this effect.

The studies on the impact of social support on people who have already been diagnosed with cancer are even more dramatic. These studies indicate that people who have various cancers who have a higher degree of social involvement—more friends and relatives whom they see, greater participation in religious and other community groups—have a better quality of life and may tend to live longer. One of these studies, by the Canadian epidemiologist Elizabeth Maunsell [137], was published in *Cancer* in 1995. Women who had breast cancer (confined to the breast or local lymph nodes) who had no confidants had a 7-year survival rate of 56%, whereas those who had two or more confidants had a survival rate of 76%.

WHAT ABOUT SUPPORT GROUPS?

In the past 20 years the numbers and types of support groups for people who have cancer have grown exponentially. There are groups that provide practical

advice—some that deal with chemotherapy and radiation, colostomies, and ileostomies—and groups that are concerned with spirituality and prayer [138–141]. There are groups that are open to anyone who has cancer and those confined to people who have brain tumors or prostate cancer; groups for adults and for children; large, classroomlike, drop-in groups whose membership fluctuates significantly from session to session, and closed groups with a fixed membership; groups that meet for a specific period of time and groups that may go on for years; groups with professional leaders, and those in which the leadership role may rotate from patient to patient.

Most of the research that has been done is on small, closed, professionally led, time-limited, intimate, and focused groups. Stanford University psychiatrist David Spiegel [142,143] created such a group for women who had metastatic breast cancer in 1976. He defined these groups as “supportive/expressive,” meaning that the women in them had the opportunity to share with one another what they were feeling and thinking. The groups were led by Spiegel and other psychiatrists and met once a week for an hour and a half for a year. The women in them learned some relaxation exercises and self-hypnosis to control pain and discomfort. They were also encouraged to talk about what was going on in their lives, in and out of treatment, and about the possibility of death.

The research Spiegel did was carefully controlled. All 86 women received the best conventional medical treatment at Stanford University Hospital. Fifty of them were in support groups; 36 served as controls. Spiegel found that the women in the groups came to care deeply about one another; they helped each other formulate questions for their doctors and sometimes even accompanied one another to appointments. When a group member died, they mourned together.

Spiegel had organized the groups expecting an improvement in the quality of life for the women who participated in them. Early results after the last session showed that the women were, as predicted, “less anxious and depressed and were coping more effectively with breast cancer” [142]. The study was a success and suggested that support groups were an important tool.

Ten years after the groups ended, Spiegel did a follow-up study. He was astonished to find that the women in the support groups had lived twice as long as the controls. He doubted his own data but the finding held and the landmark study “The Effect of Psychosocial Treatment on Survival of Patients with Metastatic Breast Cancer” was published in *Lancet* in 1989 [143]. This evidence made it clear that participation in a support group might contribute not only to emotional well-being but also to longevity.

Another study done at the University of California at Los Angeles by psychiatrist Fawzy and his colleagues [144] confirmed that support groups may significantly prolong the lives of patients who have cancer. In this study, patients who had melanoma met with a leader in small groups once a week for an hour and a half for 6 weeks. These patients received some education about their disease, learned a few relaxation techniques, did some work on problem solving,

were given some assertiveness training, and had a chance to share their concerns with one another.

Six months after the study ended, the patients in the group had significantly better natural killer cell activity than those who received only conventional medical treatment. Six years later, group members had a significantly lower rate of tumor recurrence (21% versus 38%) and a dramatically lower death rate (9% versus 29%) [145,146].

Finally, a study by Jeanne Richardson [147] of patients who had leukemia and lymphoma demonstrated that patients who participated in a modest behavioral and educational home intervention lived significantly longer than those who did not. There was a 39% reduction in the rate of death.

Several other studies on the small-group interventions have not confirmed the striking findings of Spiegel, Fawzy, and Richardson. (In two of these negative studies, there was no significant improvement in psychologic status or longevity; the patients in the third study had very advanced cancers and no improvement.) In a large-scale attempt to replicate Spiegel's study in the United States and Canada, Goodwin and her colleagues [148] showed significantly improved quality of life but no increase in longevity. Most recently, in a second study Spiegel [149] himself did not find increased longevity in patients who had breast cancer treated with supportive-expressive group therapy.

The disparity between Spiegel's and Goodwin's results was striking and oncology professionals generally concluded that although support groups do not increase life span, they are valuable adjuncts to cancer care, generally decreasing levels of stress and enhancing quality of life and coping skills. The work of Alastair Cunningham [150–152] suggests another possible explanation for the disparity.

For many years, Cunningham and his colleagues led support groups at Princess Elizabeth Hospital in Ontario, Canada. These groups used many of the techniques described in this article, including meditation, guided imagery, and various introspective and expressive therapies—far more than in Spiegel's or Goodwin's groups. They also used them in a context that promoted psychologic and spiritual exploration and growth.

When Cunningham [152] aggregated the data on his patients who had advanced cancer and compared them to matched controls, he discovered no significant difference in longevity. When, however, he looked at a subset of patients who did live significantly longer, he discovered a clear pattern. These people had attended the groups regularly (as did Spiegel's and Goodwin's patients). They also made the practices taught a regular part of their daily life and used the lessons learned about the possibility of hope, meaning, and purpose, and their own capacity to reduce symptoms and enhance coping, as guiding principles in their lives.

Although the numbers were small, I believe the implications are significant. Support groups are not alike and membership by itself does not assure a life-changing or life-extending outcome; however, groups that offer patients various mind-body approaches to deal with their disease and provide them with

an opportunity for self-discovery and a chance to see cancer as a life-challenging opportunity as well as a life-threatening disease may be particularly helpful, even extending life. This important therapeutic possibility needs to be studied in far more depth.

LOOKING AHEAD: LESSONS FOR PRACTICE

Over the last 35 years, it has become abundantly clear that mind-body approaches should be integrated into all cancer care. Although the level of evidence for the efficacy of the various techniques varies, and although it is sometimes difficult to distinguish which aspect of each technique is most effective (as I have noted, relaxation is integral to many of them and guided imagery and hypnosis are virtually indistinguishable), certain conclusions and guidelines seem justified.

All oncology professionals, and all those who work with patients who have cancer, need to be informed about mind-body techniques and to experience them and prescribe them.

Mind-body approaches can be helpful throughout the entire cancer experience, from the day of the anxiety-producing diagnosis through the end of conventional treatment and beyond; before, during, and after painful and interventions, including surgery, chemotherapy, and radiation; as a tool for dealing with the anxiety that cancer provokes; and as a practical way of enhancing coping skills.

Mind-body techniques directly address the sense of hopelessness and helplessness that is particularly devastating to patients who have cancer. Their practice reinforces a sense of control and mastery.

Many of these techniques, particularly expressive ones, such as dance, and physical exercise and yoga, may also help restore a sense of physical pleasure and satisfaction in people whose bodies have been damaged by cancer and its treatment.

Groups, in which many of these therapies have been studied, are probably the best context for learning and practicing these mind-body and expressive techniques and also provide a source of support which is itself helpful and healing.

The use of mind-body approaches and the way they are combined needs to be individualized for each patient.

Creating a context in which mind-body approaches are encouraged as a way of life and a source of meaning and purpose may yield particularly significant therapeutic results.

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