

# Chapter 3

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## Stress and Disease

**A**n argument started more than 100 years ago about the specific cause of disease, and despite all the recent medical advances, the debate over “nature versus nurture” continues to this day. It was the French chemist, Louis Pasteur, who

*By comprehending that human beings are energy, one can begin to comprehend new ways of viewing health and illness.*

—Richard Gerber, M.D.

postulated that when we make contact with a pathogenic microbe (some virus or bacterium), our immune system is alerted immediately and goes on the defensive. In Pasteur's mind, the state of health or disease was not a measure of the integrity of the immune system, but rather of the strength of the invading microbe. Pasteur's idea took a while to catch on, but once it did, it soon carried considerable weight in the medical community. The acceptance of Pasteur's "germ theory" propelled medical science (with the financial backing of John D. Rockefeller) toward the direction of immunizations, antibiotics, and the pharmaceutical industry as we know it today. But Pasteur also had his critics, not the least of whom was Claude Bernard, a brilliant French physiologist and philosopher who disagreed vehemently with the idea that tiny microbes were the sole reason for imminent death.

Bernard, who coined the term *homeostasis*, marveled at the complexity of human physiology. He suggested that it wasn't the germs that did the damage, but rather the condition of the body and its state of health that either destroyed the germ or was destroyed by it. Using a metaphor of seeds and soil, he insisted that if the soil is fertile (poor health) enough for a seed (microbe) to germinate, it will. Bernard suggested that good living practices, including one's attitude and sound nutrition, were essential to keep the body at its optimal level of health, thereby creating an infertile and inhospitable place for the seeds of microorganisms to germinate. At the time, Bernard's theory fell on deaf ears. Pasteur remained adamant: Microbes were nondiscriminatory! Their effects would be felt by all those who were exposed to them, regardless of the individuals' state of physical or mental health.

Decades later, Pasteur's germ theory was termed the "theory of specific etiology," according to which every disease is believed to be caused by a specific microorganism. Today, this theory has evolved to suggest that diseases not caused by microorganisms can be reduced to a single genetic flaw in human DNA. As more research findings are revealed through the work of the Human Genome Project, news headlines will continue to promote the link between disease and one's genetic makeup. Despite efforts to shift the paradigm, Descartes's mechanistic philosophy of health is still alive in the Western world!

**Psychosomatic:** A term coined from Franz Alexander's term *organ neurosis*, used to describe a host of physical illnesses or diseases caused by the mind and unresolved emotional issues.

Etiology, the study of disease, is not an easy science. Some people who are exposed to microbes may carry—and spread—a disease but, in fact, never contract the disease itself. Typhoid Mary is the classic example of this phenomenon, as were people who spread, but never caught, SARS in 2003. In fact, toward the end of his life, Pasteur had a change of mind about his germ theory. On his deathbed, he said, "Bernard is right, (it's not the seed) it's the soil."

At roughly the same time that the germ theory was accepted as fact by Western medicine, another theory was proposed by a Chicago-based physician, Franz Alexander. He observed quite astutely that there appeared to be a profound connection between one's mental/emotional state and one's physical health. He coined the term *organ neurosis*, later called "**psychosomatic**," to describe this precarious mind-body relationship. Although the word "psychosomatic" caught on quickly in the American vernacular, fifty years would pass before medical science took Alexander's theory seriously. It would be another two decades before the medical community would acknowledge the highly sophisticated intricacies of mind, body, spirit, and emotions that can produce not just a detrimental effect, but a healing effect as well.

The current focus on the stress-and-disease phenomenon is directed toward the interactions of the immune system, the CNS, and human consciousness. Recently, threads of evidence scattered far and wide throughout the literature of the many allied health disciplines have finally begun to lend credence to the ageless intuition of holism. When looked at from the traditional scientific (biomedical) point of view, however, these traces continue to raise more questions than they answer.

Perhaps because of these complexities, we still can merely speculate about the exact nature of the relationship between stress and disease. All the while, scientists continue to take sides on the nature versus nurture debate. Despite world-class health care, improved living conditions, and abundant food choices, chronic diseases continue to plague the planet. Current estimates suggest that as many as 80 percent of all doctor's office visits are the result of stress. Moreover, what was once considered to be an association between stress and disease is now understood to be a direct causal link, acne being a prime example. In 2002, experts estimated that between 75 and 85 percent of health-related problems are either precipitated or aggravated by stress. The list of such stress-affected disorders is nearly endless, ranging from herpes and hemorrhoids to the common cold and cancer.

To understand the relationship between stress and disease, you first must recognize that several factors act in unison to create a pathological outcome. These include the cognitive perceptions of threatening stimuli and the consequent activation of the nervous system, the endocrine system, and the immune system. In the past, these three physiological dynamics were studied separately because they were thought to be independent systems. Today they are viewed as one network, and it is this current understanding that has given rise to the new interdisciplinary field of **psychoneuroimmunology** (PNI). As defined by Pelletier (1988), psychoneuroimmunology is “the study of the intricate interaction of consciousness (psycho), brain and central nervous system (neuro), and the body’s defense against external infection and internal aberrant cell division (immunology).”

There is a consensus among leaders in the field of psychoneuroimmunology that the expression “mind-body medicine” is rather limited in its scope, leading people such as Joan Borysenko, Deepak Chopra, Andy Weil, Gladys Taylor McGary, James Gordon, Larry Dossey, and others to call the approach to healing “mind-body-spirit healing.”

## Theoretical Models

There have been several research efforts that seek to explain the relationship between stress and disease. At best this relationship is still in the speculation stage, with no clear-cut understanding of the complexities involved. After an attempt to synthesize a definitive model, based on his own work as well as on an exhaustive survey of over 300 research articles, Pelletier admitted that there is still not enough scientific information at the present time to create a substantiated stress and disease model, and certainly not from a biomedical model. Nevertheless, some of the promising theories may in time provide medical science with the building blocks to create such a comprehensive model. Once this model is in place, the possibility of preventing and intercepting several disease processes will certainly take precedence over the current medical practice of relieving symptoms and fixing and replacing broken parts. The following are some of the most prominent theories regarding the mind-body-spirit relationship.

### The Borysenko Model

In what is currently recognized as the most accurate description of the immune system, former Tufts University immunologist Myrin Borysenko (1987) outlined both a

**TABLE 3.1**

### Borysenko’s Stress and Disease Dichotomy

<b>Autonomic Dysregulation (Overresponsive ANS)</b>	<b>Immune Dysregulation</b>
Migraines	Infection (virus)
Peptic ulcers	Allergies
Irritable bowel syndrome	AIDS
Hypertension	Cancer
Coronary heart disease	Lupus
Asthma	Arthritis

dichotomy of stress-induced dysregulation and a matrix describing the “immune balance” regarding four classifications of disease. The dichotomy broadly divides disease and illness into either **autonomic dysregulation** (overresponsive autonomic nervous system) or **immune dysregulation** (Table 3.1).

Borysenko suggests that when the autonomic nervous system releases an abundance of stress hormones, several physiological repercussions can result—among them, migraines, ulcers, and hypertension. The notion that the nervous system is responsible for several symptoms of illness and disease through the release of stress hormones (epinephrine, norepinephrine, cortisol, and aldosterone) was first postulated by Cannon, then established through the pioneering research of Selye.

No less important, however, are the repercussions of a dysfunctional immune system, which can precipitate infection, allergies, and perhaps cancer. To understand how the immune system can become dysfunctional or suppressed, let us first take a look at the current perception of

**Psychoneuroimmunology:** The study of the effects of stress on disease; treats the mind, central nervous system, and immune system as one interrelated unit.

**Autonomic dysregulation:** Increased sensitivity to perceived threats resulting from heightened neural (sympathetic) responses speeding up the metabolic rate of one or more organs.

**Immune dysregulation:** An immune system wherein various functions are suppressed; now believed to be affected by emotional negativity.

this unique physiological system. The purpose of the immune system is to protect the body from pathogens, either externally generated (e.g., bacteria) or internally manufactured (e.g., mutant cells), which impede the proper functioning of the body's regulatory dynamics. Pathogens are composed of certain molecules (antigens) that have the capacity to interact at various receptor sites on several types of immune system cells, which in turn attempt to detoxify them. Metaphorically speaking, the immune system acts like the collective branches of the armed services to ensure national security by protecting the country from both invading forces and internal insurrection. Like all other physiological systems, the immune system begins to develop in the fetus and matures at about the time of birth, when the body becomes vulnerable to external pathogens.

The immune system is a network of several organs. These include bone marrow, which throughout life supplies the lymph tissue with stem cells (the precursors to various lymphoid cells), which eventually become B-lymphocytes (B-cells); the thymus, a gland below the throat that allows stem cells to mature into T-lymphocytes (T-cells); and the lymph nodes, spleen, and gut-associated lymphoid tissue into which T-cells and B-cells migrate and are occasionally housed. Upon completion of their maturation process, both T-cells and B-cells migrate throughout the body, ready to encounter their respective targets known as antigens. Other aspects of the immune system include the tonsils, and unique lymphoid tissue associated with the bronchioles, genitals, and skin. It is interesting to note that only 2 percent of **lymphocytes** are in circulation at any one time. The remaining 98 percent constitute a dynamic defense system, housed and circulated through various organs of the lymphatic system.

The lymphocytes are one of five types of **leukocytes** in the family of cells in the immune system and the major

component of the immune system. They are produced in the bone marrow where they eventually migrate to the peripheral organs of the lymphatic system. The other members of the leukocyte family include granulocytes, macrophages (which seem to collaborate with T-cells and B-cells to help identify antigens for destruction), and eosinophils and basophils, which have a lesser role with altered immune function.

T-cells and B-cells may appear morphologically similar, but their function is different. T-lymphocytes are primarily responsible for cell-mediated immunity—that is, the elimination of internally manufactured antigens (e.g., mutinous cells) in organ tissue. It is currently believed that the human body produces one mutant cell approximately every couple of hours. In an action similar to scanning a grocery store product for its bar code, each T-cell travels throughout the body to scan all other cells for a match between their DNA structure and its own. If a cell's structure doesn't match, the T-cell considers it a foreign substance and proceeds to destroy it. Examples are a cancerous cell and transplanted tissue (i.e., organ transplant). In the laboratory where T-cells were observed performing this function, they were called “killer cells” for their search-and-destroy missions. Although the role of T-cells is more global, they have been observed to destroy mutinous cells through direct attack in which they release nonspecific substances called cytokines, which assist in the elimination process. B-cells, by contrast, are responsible for humoral immunity. This means the antibodies they discharge circulate throughout various body fluids, primarily blood, and combine with foreign antigens to deactivate the agents that make them a threat. Antibodies are a special type of protein, called globulins, found in the plasma and are typically referred to as gamma globulins or immunoglobulins (Ig). The function of B-cells is primarily the elimination of pathogenic microorganisms that contribute to infectious diseases, including viruses and bacteria. While T-cells and B-cells have their own specific functions, they often work together. In fact, in some cases, B-cells depend on T-cells for their function.

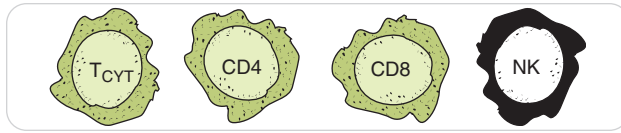
A closer examination of T-cells indicates that there are three subgroups of this crucial leukocyte, plus one additional immune cell (the NK cell) that collaborates with the T-cytotoxic cells to do its function ( **FIG. 3.1▶** ). Each leukocyte cell has a unique molecular configuration and function:

1. **T-cytotoxic cells.** The basic T-cells release cytokines, which then allow the cells to become sen-

**Lymphocytes:** Immune system cells that are housed throughout the lymphatic system, with 2% in circulation at any one time.

**Leukocytes:** The family of cells that constitute the major component of the immune system.

**T-cytotoxic cells:** Best known as the cells that attack and destroy tumorous cells by releasing cytokines.



**FIGURE 3.1** The family of T-lymphocytes includes three types of cells: T-cytotoxic cells, T-helpers (CD4), and T-suppressors (CD8). The natural killer cells collaborate with the T-cytotoxic cells.

sitized to identify endogenous antigens on the cell membrane for destruction. In addition, with the help of macrophages, they attack and destroy tumorous cells.

2. **T-helpers.** Clinically labeled as CD4, these cells appear to increase the production of antibodies released by T-cells. T-helpers and T-suppressors (see Fig. 3.1) are referred to as immunoregulatory cells as they regulate cell-mediated immunity and humoral antibody response.
3. **T-suppressors.** Clinically labeled as CD8, these cells appear to decrease the production of antibodies necessary to assist T-cells in attacking and killing endogenous antigens. A reduction in CD8 is believed to keep cytotoxic T-cells in check so that they do not attack self-proteins and thereby cause degeneration of healthy tissue. A reduction in CD8 is thought to be associated with arthritis and lupus. (Borysenko notes that clinical tests show a 2:1 ratio of CD4:CD8 to be normal, whereas a ratio less than this is a signal that this aspect of the immune system is deficient.)
4. **Natural killer (NK) cells.** Unlike cytotoxic T-cells, these immune cells (large lymphocytes) appear to have an innate ability to detect endogenous antigens without the help of any neuropeptides to sensitize them or previous memory experience. NK cells collaborate with cytotoxic T-cells to destroy mutant cells, virus-infected cells, and transplanted grafts. NK cells have a unique role in immune surveillance to detect malignant cell changes. Among immunologists, NK cells are known as “psycho-social friendly cells,” as they mirror emotional states (ups and downs) of the mind.

Current research on the relationship between the stress response and immunofunction has yielded promising

yet less than absolute results. Studies investigating the effect of catecholamines and stress-related hormones have reported questionable integrity of the immune system when excess levels of these substances were found in the blood. Increases in epinephrine and norepinephrine have been observed to promote the release and redistribution of lymphocytes, yet at the same time decrease their efficiency. Some types of stress (e.g., exercise) cause the release of neuropeptides (endorphins), which not only enhance immunofunction, but also produce an almost euphoric state of mind (the runner’s high). Injections of norepinephrine in mice have been shown to enhance NK cell activity. During chronic stress, however, the increase of cortisol and other glucocorticoids has been linked to a marked decrease in T-cells, reducing their ability to locate and destroy mutant cells. The effects of acute and chronic stress on B-cells are still under investigation but are speculated to be similar to those on T-cells. What all this means is that the integrity of the immune system is thought to be greatly influenced and quite literally compromised by emotional stress.

In Borysenko’s model, when the immune system is operating normally, it is said to be “precisely regulated.” However, when the immune system is not working as homeostatically intended, the result is immunological overreaction, underreaction, or perhaps both. In any case, disease and/or illness are certain (Table 3.2). The causes of overreactions can be exogenous, as in an allergic reaction created by a foreign substance, or endogenous, as when lymphocytes begin to attack and destroy healthy body tissue. Similarly, in an exogenous underreaction, foreign substances outmaneuver and undermine the ability of the B-cells to prevent infection; in endogenous underreactions, antigens are left undisturbed by T-cells,

**T-helpers:** Also known as CD4, these cells help in the production of antibodies released by T-cells.

**T-suppressors:** Also known as CD8, these cells decrease the production of antibodies, thus keeping a healthy balance of T-cells.

**Natural killer (NK) cells:** Large lymphocytes that can detect endogenous antigens, thus helping to destroy mutant cells.

TABLE 3.2

## Borysenko's Immune Activity Matrix

	Over-reactions	Under-reactions
Exogenous activity	Allergies	Infections (colds and flu) Herpes
Endogenous activity	Arthritis Lupus	Cancer

which may then develop into **neoplasms** (cancerous tumors). Similar findings are reported by Biondi (2001).

The concepts of immunity to disease, both exogenous and endogenous, are constantly being rewritten and updated as new studies reveal the nuances and complexities of the lymphatic system and its dynamic interrelationship to all other aspects of human physiology, particularly in light of an increase in lifestyle **autoimmune diseases** and the acknowledgment that stress plays a role, in this relationship (Kemeny and Gruenewald, 1999; Kiecolt, 2002).

In Borysenko's opinion, it is psychological stress that throws this precisely regulated mechanism out of balance. Stress is the catalyst that exaggerates the direction in which your immune system is headed, precipitating an over- or underreaction. Note that you can have an allergic reaction (overreaction) and a cold (underreaction) at the same time because they are produced by different dynamics. Borysenko adds that despite the differences among these aspects, the same relaxation techniques work to reinstate precise regulation of the immune system. In other words, regular practice of a relaxation technique, such as meditation or mental imagery, can

**Neoplasms:** Another term for cancerous tumors.

**Autoimmune diseases:** Diseases that occur because of an overactive immune system, which "attacks the body." Examples include lupus and rheumatoid arthritis.

**Neuropeptides:** Unique messenger hormones produced in the brain (and other organs of the body) that fit into the receptor sites of lymphocytes.

bring the entire immune system back into homeostatic balance.

Although Borysenko (1991) believes that "stress alters the vulnerability of the immune system to both exogenous and endogenous antigens," the connection between the mind's ability to perceive situations as stressful and the consequent changes in the integrity of the immune system he left to speculation.

In support of Borysenko's model, ongoing research to understand this link between stress and the immune system suggests that acute psychological stress decreases NK cell activity through a profound effect on cytokine production. Chronic stress is observed to suppress NK cell activity, thereby increasing one's susceptibility to infections and cancer (Herberman, 2002). Moreover, stress-related changes in the immune system have been observed in secondary lymphoid tissue (spleen, lymph nodes) where T-cells are produced. Lymphoid tissues, bathed in a "hormonal milieu," appear to be significantly affected by emotions and thought processing (Rabin, 2002).

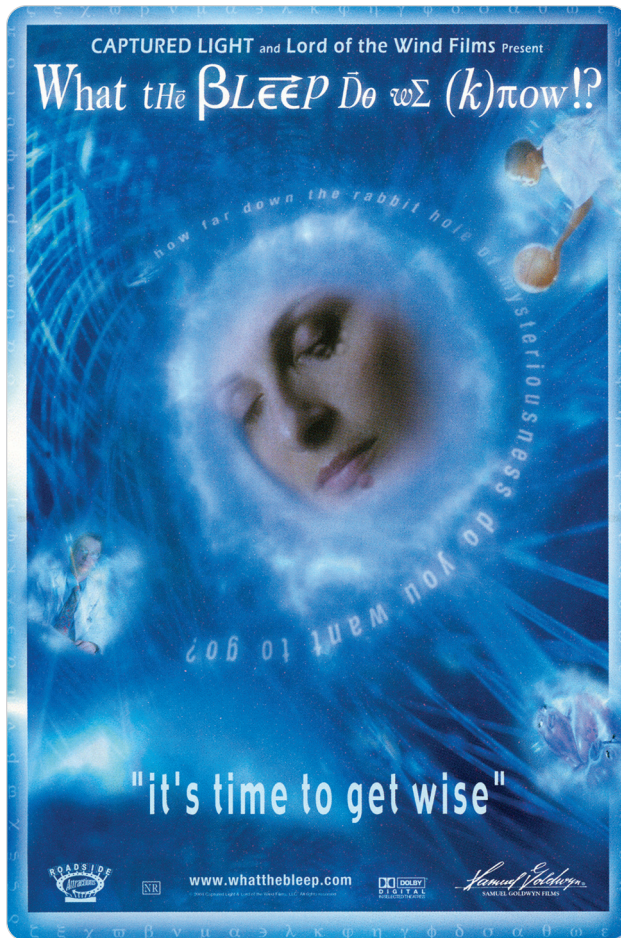
New discoveries indicate that the physiological systems are more complex than was once believed. For example, formerly described as specialized lymphocytes, T-helpers and T-suppressors may, in fact, be "double agents" working for the CNS as well.

### The Pert Model

Until recently it was thought that there was no direct link between the nervous system and the immune system; virtually all physiologists believed that these two systems acted independently. But researchers have now isolated neural endings connecting the CNS to the thymus, lymph nodes, spleen, and bone marrow. In addition, the tonsils, adenoids, and Peyer's cells of the small intestine have been found to be innervated by sympathetic nerve fibers.

A second and perhaps more important link indicates that **neuropeptides** (messenger hormones) produced in the brain are able to fit into receptor sites of lymphocytes, much like keys fit into a lock, thus altering their metabolic function. This communication system is altogether different from the efferent/afferent system observed between neuromuscular tissue and the brain. The codes of neuropeptide information are "spoken" through receptor sites of various lymphocyte cells located throughout the body, and their language is apparently influenced by emotional responses.

It was Candace Pert (1985, 1986, 1987), former Chief of Brain Chemistry at the National Institute for Mental



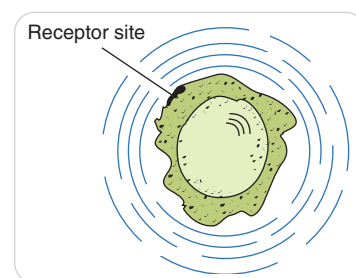
**FIGURE 3.2** Candace Pert, Ph.D., was featured in the hit movie, *What The Bleep Do We Know?*, which explored the areas of science and spirituality, consciousness, quantum physics, and the mind-body-spirit connection, combining documentary-style interviews with a feature film.

Health, who discovered that immune cells have built-in receptor sites for neuropeptides, with similar findings being reported by Edwin Blalock (1985). The identification of neuropeptides themselves is a recent discovery. In trying to uncover the dynamics in the brain associated with chemical addictions, scientists were surprised to find that the brain produces its own (endogenous) opiates, neurotransmitters that have a similar effect to those manufactured externally, such as morphine. The most publicized neuropeptide is beta-endorphin, but so far several hundred neuropeptides have been identified. They are thought to be associated with everything from mood changes to immune regulation. Pert further suggested that there may actually be only one neuropeptide mole-

cule that, like a chameleon, changes its configuration as a result of emotional influences ( **FIG. 3.3** ). Pert hypothesized that this spontaneous change may be accounted for by the wavelike oscillations or vibrations of the electrons in each neuropeptide molecule. Pert's hypothesis parallels work conducted by German physicist Fritz-Albert Popp, who discovered that DNA is capable of sending out a large range of frequencies, with each frequency being associated with a particular metabolic function (McTaggart, 2002).

Because the hypothalamus has the greatest preponderance of neuropeptide receptors, it was first believed that these substances, which are produced by the brain, were involved in the biochemical mediation of emotional responses. Pert discovered, however, that neuropeptides are not produced solely by the brain. Her research revealed that throughout the body immune cells not only have receptors for neuropeptides but can also manufacture them independently themselves. Furthermore, immune cells seem to have a kind of memory that enables them to adapt to specific emotional responses. Thus neuropeptides are believed to be the means of communication between the brain and T- and B-cells, and it is a bidirectional pathway: Immune cells speak to the brain, and vice versa. Pert's discovery has given credence to the supposition that some emotions may suppress the function of lymphocytes while others may act as immunoenhancers.

Today the scientific literature is loaded with studies that clearly document the association between the stress response, emotional regulation, and their respective influences on the immune system (Koenig, 2002). The following are some of the landmark studies that gave PNI an established foundation of validity in the medical community.



**FIGURE 3.3** From Pert's early observations all known neuropeptides appear to have a single molecular structure. The subtle differences among them may be the rate at which each molecule oscillates.

Jermott et al. (1983) looked at the influence of academic stress on the rate of secretory immunoglobulin (S-IgA) in Tufts University dental students. S-IgA is thought to be the first line of defense against upper respiratory diseases. Subjects were administered a personality profile to identify a specific personality trait called power motivation (control), and based on this trait they were divided into two groups. Saliva samples, used to measure S-IgA, were taken five times during the academic year. The results were that mean S-IgA values were significantly reduced during stressful periods, particularly in the students who demonstrated high power motivation.

Janice Kiecolt-Glaser and her husband, Ron Glaser, both pioneers in the field of PNI, have conducted several landmark studies that linked stress to the suppression of the immune system. Most noteworthy was a 1984 study that found a decrease in the number of lymphocytes in Ohio State University medical students during their first day of exams, as compared with samples taken prior to and after the exam period. A 1996 paper revealed how stress retards wound healing. Kiecolt-Glaser's most current research (2003) suggests that chronic stress accelerates the aging process (which entails many diseases) through the overproduction of a specific proinflammatory cytokine.

Studies investigating the relationship between emotional stress and immunosuppression have also been conducted using animals as subjects (Bovbjerg et al., 1984). For example, when rats were subjected to foot shocks they could not control, a significant reduction in immune function (i.e., decreased lymphocyte proliferation) was detected (Launderslanger et al., 1983). The suppression of the immune system was considered a *conditioned* response. The researchers concluded that a helpless-hopeless attitude, initiated by an inability to control factors of the environment, can pave a path toward illness.

Immunosuppression has also been observed in individuals during bereavement. A study by Bartrop et al. (1977) indicated that people manifested lower lymphocyte proliferation within eight weeks of the loss of a spouse. Similar findings were observed by Schleifer et al. (1983) in men whose wives had died of breast cancer, with results showing a significant reduction in lympho-

cyte proliferation. These studies have led some to suggest that humans, like rats, can be conditioned to suppress their immune systems by means of emotions and/or thought processes.

One of the most interesting studies regarding the effects of relaxation and coping techniques on **immunoenhancement** was conducted by Esterling et al. (1994). In this study, the effect of various stress-management skills on NK cell activity was investigated among nursing home patients. Subjects were divided into three groups: (1) those who were taught relaxation techniques, (2) those who were provided with abundant social contact, and (3) those who received no special techniques or contact. Results revealed that after a one-month period, the NK cell count was significantly higher in those subjects who received stress-management therapy than in the controls. Other studies, inspired by the work of Norman Cousins, have also been conducted to determine the relationship between positive emotions and changes in the immune system (see Chapter 12).

In her book *Molecules of Emotion*, Pert highlights the journey of discovery that brought her to the realization that the body is not a machine. "What is this energy that is referred to by so many alternative healers, who associate it with the release of emotion and the restoration of health? According to Western medical terms, energy is produced strictly by various cellular metabolic processes, and the idea that energy could be connected to emotional release is totally foreign to the scientific mind. . . . It is my belief that this mysterious energy is actually the free flow of information carried by the biochemicals of emotion—the neuropeptides and their receptors." Although the focus of her current research involves peptide T for AIDS treatment, Pert (2004) sees the frontiers of subtle-energy medicine research as the most exciting paradigm of the stress and disease model.

What all these studies seem to indicate is that there is a strong relationship between emotional responses and the biochemical changes they produce, specifically with regard to constituents of the immune system. Whereas before Pert's findings it was believed that cortisol played the crucial role in immunosuppression, it is now thought that structural changes in neuropeptides, influenced by emotional thought, play the most significant role in immunoincompetence. Currently, the search is under way for other neurotransmitters produced and secreted by the brain that may be responsible for producing the emotional thoughts, which in turn synthesize specific neuropeptides to influence the immune system. Pert is

**Immunoenhancement:** A term used to describe various stress management techniques that appear to boost the immune system.



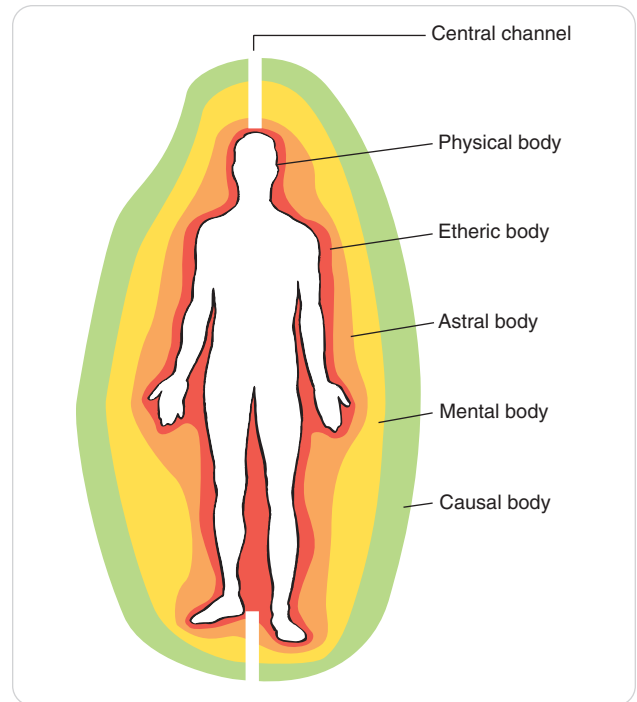
of the opinion that this type of search is fruitless. In *Noetic Sciences Review* (1987), she writes, “I think it is possible now to conceive of mind and consciousness as an emanation of emotional information processing, and as such, mind and consciousness would appear to be independent from brain and body.” It is this point of view that has led her and others (e.g., Joan Borysenko, Larry Dossey, Deepak Chopra, and Bernie Siegel) to look beyond the physical to the fields of parapsychology and metaphysics for answers to the puzzling relationship between stress and disease. Blazing a trail to this doorstep is radiologist Richard Gerber, M.D.

### The Gerber Model

Until now, clinical researchers, influenced by the reductionist theory, have designed studies based on the assumption that the mind and the brain are one, in that all thoughts are merely the result of biochemical reactions occurring within the neurons and synapses of the brain’s gray matter. Yet, in many clinical circles, human consciousness is referred to as “the ghost in the machine,” an intangible entity. In his books *Vibrational Medicine* and *Vibrational Medicine for the 21st Century*, Dr. Richard Gerber reviews hundreds of studies and takes an empirical look at the alternative hypothesis—a holistic or systems-theory approach—that mind as conscious and unconscious thoughts exists as energy that surrounds and permeates the body, influencing a host of corporal biochemical reactions. From this perspective, stress-related symptoms that appear in the physical body are the manifestation of “problems” that have occurred earlier as a result of a disturbance at a “higher energy level.”

What at one time sounded like science fiction is now regarded as solid fact as scientists at the vanguard of medicine collaborate with quantum physicists in the search to better understand the energy called consciousness. Paul Rosch, M.D., president of the American Stress Institute (2003), believes that subtle bioelectric energy modalities will soon replace pharmacological drugs as a means to treat stress-related disease and illness. In support of the Gerber model is a synthesis of information collected by Lynne McTaggart in her book *The Field*, which cites numerous studies by preeminent scholars in a host of disciplines to substantiate the quantum properties of the human energy field.

Gerber also cites several new studies that have begun to scientifically measure and validate the existence of what is now called the **human energy field**. While these efforts are embryonic at best, Gerber is confident that the end result will be findings that consciousness is indeed



**FIGURE 3.4**

The human energy field, also called the electromagnetic field and the auric field, is hypothesized to have many layers, each representing a state of consciousness. Each may also have a subtle vibrational frequency associated with it. (Reprinted from *Vibrational Medicine* by Richard Gerber, copyright © 2001 Inner Traditions.)

composed of subtle energy—a frequency band of oscillations that surrounds and permeates the body—and like Pert suggested, will show that human consciousness is independent yet tightly integrated with the physical body. Gerber describes the human energy field of subtle matter as consisting of several layers of consciousness ( **FIG. 3.4** ): the etheric, that closest to the body; the astral, which is associated with emotional thought; the mental, three tiers of consciousness including instinct, intellect, and intuition; and the outermost layer, the causal, which is associated with the soul. Each of these layers of the energy field is associated with a specific vibrational frequency and state of consciousness.

**Human energy field:** Subtle human anatomy that goes by many names, from the electromagnetic field around an object to a colorful aura. The human energy field is thought to be composed of layers of consciousness that surround and permeate the physical body.

Gerber points out that in a state of optimal health all frequencies are in harmony like a finely tuned piano. A disruption in the harmony of frequencies is said to eventually lead to illness and disease. According to this model, a specific thought (e.g., “This grade will put me on academic probation”) coupled with an emotion (e.g., fear) cascades through the energy levels, resulting in an effect on some aspect of the body (e.g., a suppressed immune system). Based on Einstein’s theory of relativity, which asserts, among other things, that matter and energy are interchangeable, Gerber builds a convincing argument that the mind and the brain are two distinct yet tightly intertwined elements of the human condition.

Since the beginning of recorded healing powers, shamans and medicine men have alluded to a multilayered body of energy that surrounds the physical body. This energy has gone by several names, including *Chi*, *Prana*, *breath*, and *spirit*. In academic circles today, this has come to be referred to as **subtle energy**, with the layer closest to the body termed the **etheric energy level** or **bioplasma**. Because subtle energy is composed of matter that appears different (less dense) than that of the physical body, it is often associated in the esoteric literature with the spiritual nature or higher consciousness. While some people claim to actually see this energy field, which they may describe as an

**Subtle energy:** A series of layers of energy that surround and permeate the body; thought to be associated with layers of consciousness constituting the human energy field.

**Etheric energy:** The layer of energy closest to the physical body (also known as the etheric body).

**Bioplasma:** Another term for the etheric layer of energy closest to the physical body.

**Kirlian photography:** A technique developed by Russian Semyon Kirlian enabling the viewer to see the electromagnetic energy given off by an object such as the leaf of a tree or human hand. This technique is one of several technologies that substantiates the human energy field.

**Subtle anatomy:** Also called energy anatomy, subtle anatomy comprises the human energy field (aura), the chakra system, and the meridian system of energetic pathways that supply energy (also known as *chi* or *prana*) to the organs and physiological systems with which they connect.

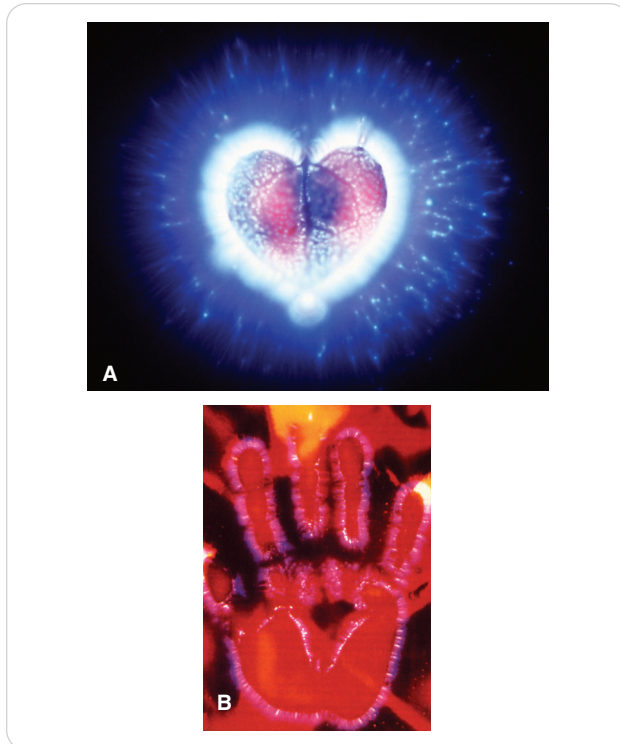


**FIGURE 3.5** Each layer of subtle energy around the body vibrates as a specific oscillation. If one layer is “out of tune,” like a guitar string, then the entire energy field is affected.

aura, it remains virtually invisible to the naked eye. The human energy field remained undocumented until 1940, when an ingenious photographic technique created by Russian researcher Semyon Kirlian detected traces of this energy field. Using a high-frequency, high-voltage, low-amperage electrical field, electrophotography, or **Kirlian photography** as it is now known, measured the electromagnetic field—the etheric layer—around small living objects. What was revealed through this process appeared very similar to the corona around the sun during an eclipse.

In simple terms, when Kirlian placed a photographic plate between an object—a leaf, say—and a specially designed electrode emitting a specific frequency (Hz), the movement of billions of charged electrons radiating from the object was captured on the film (**FIG. 3.6▶**). When the film was processed, brilliant colors and “spark patterns” became evident, creating an electromagnetic image similar to the leaf that was photographed. Surprisingly, if a partial (torn) leaf was photographed, an aura representing the entire leaf still appeared on film. In repeated experiments photographing human hands, Kirlian observed marked differences in the colors and spark patterns between those of healthy people and those diagnosed with cancer.

Among Asian cultures, thoughts and feelings are believed to pass through the many layers of the human energy field through two unique systems constituting what is referred to as our **subtle anatomy**. The first system is a series of energy vortices that align themselves vertically down the front of the body. These “doors” of energy,



**FIGURE 3.6** (a) A Kirlian photograph revealing the aura of an aspen leaf. Studies show that if a portion of the leaf is torn away, the aura of the complete leaf remains. The aura surrounding the leaf is said to consist of tiny light particles observable through the electromagnetic film process. (b) A Kirlian photograph revealing the human energy field (aura) of the hand of renowned healer Olga Worell.

called **chakras** (Sanskrit for spinning wheel, pronounced shock-ra), interface with the physical body at various points corresponding to specific organs of the endocrine and, to a lesser extent, central nervous systems. Invisible to the naked eye, these chakras act as transducers between the various layers of subtle energy.

Currently there is much interest in the human energy field in consciousness and its relationship to the chakras. Moreover, the study of subtle energy and energy medicine has led to a new field of study called **energy psychology** (Feinstein, 2003), which attempts to unite quantum physics and subtle anatomy with psychology to better understand and treat stress-related diseases at a psycho-spiritual level. In her collaborative book with Norm Shealy, *The Creation of Health*, author Carolyn Myss states that the chakras are the vital link to understanding the dynamics between health and disease. Myss, a clinical intu-

itive who can see the initial stages of disease in the auric field with a 93 percent accuracy rate, believes that illness does not happen randomly. Rather, she is convinced that the majority of disease and illness results from an overload of unresolved emotional, psychological, and spiritual crises. Gifted with the ability to see the human energy field and the chakras themselves, Myss has teamed up with several physicians, most notably the founder of the American Holistic Medical Association, Norm Shealy, to explore the mind-body connection with the use of intuitive skills. Myss's work, which substantiates the Gerber model of stress and disease, has proven quite remarkable as the health care paradigm slowly shifts from a mechanistic to a holistic approach. Myss is not alone. Physician Christiane Northrup, author of *Women's Bodies, Women's Wisdom* and former president of the American Holistic Medical Association, discusses the relationship between chakras and various disease states. In Northrup's words, "When we have unresolved chronic emotional stress in a particular area of our life, this stress registers in our energy field as a disturbance that can manifest in physical illness." As part of the subtle anatomy, the chakras are a multidimensional network that influences behavior at both the organ and cellular levels. The concept of the chakras may begin to explain why two people with the exact same stressor manifest different symptoms of disease, as their thoughts and emotions are processed energetically through the layers of subtle energy and the chakra system.

The following is a synthesis of interpretations from the works of Gerber, Myss, and renowned healer Donna Eden regarding the chakra network system.

**First Chakra.** The first chakra is commonly known as the root chakra and is located at the base of the spine.

**Chakras:** Chakra (pronounced "shock-ra") is a Sanskrit word for spinning wheel. Chakras are part of the subtle anatomy. The seven major chakras align from the crown of the head to the base of the spine and connect to various endocrine glands. Each major chakra is directly associated with various aspects of the mind-body-spirit dynamic. When a specific chakra is closed, distorted, or congested, the perception of stress, disease, or illness may ensue.

**Energy psychology:** A term used to describe the collaboration of subtle energy (chakras, meridians, and the human energy field) with psychological issues and trauma involving certain aspects of stress.

The root chakra is associated with issues of safety and security. There is also a relationship with our connectedness to the earth and feelings of groundedness. The root chakra is tied energetically to some organs of the reproductive system, as well as the hip joints, lower back, and pelvic area. Health problems in these areas, including lower-back pain, sciatica, rectal difficulties, and some cancers (e.g., prostate) are thought to correspond to disturbances with the root chakra. The root chakra is also known as the seat of the Kundalini energy, a spiritually based concept yet to be understood in Western culture.

**Second Chakra.** The second chakra, also known as the sacral chakra, is recognized as being associated with the sex organs, as well as personal power in terms of business and social relationships. The second chakra deals with emotional feelings associated with issues of sexuality and self-worth. When self-worth is viewed through external means such as money, job, or sexuality, this causes an energy distortion in this region. Obsessiveness with material gain is thought to be a means to compensate for low self-worth, and hence a distortion to this chakra. Common symptoms associated with this chakra region may include menstrual difficulties, infertility, vaginal infections, ovarian cysts, impotency, lower-back pain, sexual dysfunction, slipped disks, and bladder and urinary infections.

**Third Chakra.** Located in the upper stomach region, the third chakra is also known as the solar plexus chakra. Energetically, this chakra feeds into the organs of the gastrointestinal tract, including the abdomen, small intestine, colon, gallbladder, kidneys, liver, pancreas, adrenal glands, and spleen. Not to be confused with self-worth, the region of the third chakra is associated with self-confidence, self-respect, and empowerment. The wisdom of the solar plexus chakra is more commonly known as a gut feeling, an intuitive sense closely tied to our level of personal power, as exemplified in the expression, “This doesn’t feel right.” Blockages to this chakra are thought to be related to ulcers, cancerous tumors, diabetes, hepatitis, anorexia, bulimia, and all stomach-related problems. Gerber points out that many illnesses related to this chakra region are the result of what he calls “faulty data of old memory tapes” that have been recorded and programmed into the unconscious mind during early portions of the individual’s life. Myss adds that the enculturation of fears and issues of unresolved anger are deeply connected to organic dysfunction in this body region.

**Fourth Chakra.** The fourth chakra is affectionately known as the heart chakra and it is considered to be one of the most important energy centers of the body. The heart chakra represents the ability to express love. Like a symbolic heart placed over the organic heart, feelings of unresolved anger, or expressions of conditional love work to congest the heart chakra, which in turn has a corresponding effect on the organic heart.

Anathema to the Western mind so firmly grounded in the mechanistic model of reality, anatomical symbolism may seem to have no place in health and health care. But the ties between a symbolic and organic heart became abundantly clear through the research of cardiologist Dean Ornish. To date, Ornish is the only one known to have scientifically proven the reversal of atherosclerotic plaque. While diet, exercise, and support groups are factors in Ornish’s regime, it is the practice of meditation (what Ornish calls the “open heart meditation” to resolve anger and open the heart chakra) that seems to be the critical factor in the reversal of coronary heart disease.

The heart, however, is not the only organ closely tied to the heart chakra. Other organs include the lungs, breasts, and esophagus. Symptoms of a blocked heart chakra can include heart attacks, enlarged heart, asthma, allergies, lung cancer, bronchial difficulties, circulation problems, and problems associated with the upper back and shoulders. Also, an important association exists between the heart chakra and the thymus gland. The thymus gland, so instrumental in the making of T-cells, shrinks with age. Gerber notes that this may not be so much an age



**FIGURE 3.7**

The word *chakra* means spinning wheel. Of the seven major subtle energy chakras, Western culture recognizes only the crown chakra, known in the Judeo-Christian culture as the halo.

factor, but rather a reflection of the state of the heart chakra.

**Fifth Chakra.** The fifth chakra lies above and is connected to the throat. Organs associated with the throat chakra are the thyroid, parathyroid glands, mouth, vocal chords, and trachea. As a symbol of communication, the throat chakra represents the development of personal expression, creativity, purpose in life, and willpower. The inability to express oneself in feelings or creativity, or to freely exercise one's will inevitably distorts the flow of energy to the throat chakra, and is thought to result in chronic sore throat problems, TMJD, throat and mouth cancers, stiffness in the neck area, thyroid dysfunction, migraines, and cancerous tumors in this region. In her book *The Creation of Health*, Myss points out that self-expression and creativity are essential to one's health status. She adds that the inability to express one's feelings, whether they be joy, sorrow, anger, or love, is similar to pouring concrete down your throat, thus closing off the energy needed to sustain the health of this region.

**Sixth Chakra.** The sixth chakra is more commonly known as the brow chakra or the third eye. This chakra is associated with intuition and the ability to access the ageless wisdom or bank of knowledge in the depths of universal consciousness. As energy moves through the dimension of universal wisdom into this chakra it promotes the development of intelligence and reasoning skills. Directly tied to the pituitary and pineal gland, this

chakra feeds energy to the brain for information processing. Unlike the solar plexus chakra, which is responsible for a gut level of intuition with personal matters, the wisdom channeled through the brow chakra is more universal in nature with implications for the spiritual aspect of life. Gerber suggests that diseases caused by dysfunction of the brow chakra (e.g., brain tumors, hemorrhages, blood clots, blindness, comas, depression, and schizophrenia) may be caused by an individual's not wanting to see something that is extremely important to his or her soul growth.

**Seventh Chakra.** If the concept of chakras is foreign to the Western mind, then the seventh chakra may hold promise to bridge East and West. Featured most predominantly in the Judeo-Christian culture through paintings and sculptures as the halo over saintly beings, the seventh chakra, also known as the crown chakra, is associated with matters of the soul and the spiritual quest. When the crown chakra is open and fully functioning, it is known to access the highest level of consciousness. Although no specific disease or illness may be associated with the crown chakra, in truth, every disease has a spiritual significance. And you don't have to be a saint to have a halo—we all have one.

According to Elliot Dacher, M.D., author of *PNI, the Ageless Wisdom and Esoteric Literature*, the insight of chakras can be found in many cultures and disciplines, most notably in the Western culture through the field of psychology with Maslow's hierarchy of needs (see Chapter 4). Beverly Rubik, president of the Institute of Frontier Sciences in Oakland, California, states that although clinical research findings exist regarding various aspects of subtle anatomy and subtle energies, they remain outside the mainstream of Western medicine because they challenge the dominant biomedical model by defying conventional scientific theory. But she notes that just as Einstein opened the doors of thought that challenged Newtonian physics, the principles of energy and information exchanged through energy will gain validity and acceptance in Western science through the doors of quantum physics.

Similar to the chakras is the **meridian** system: a network of hundreds of interconnected points throughout the



**FIGURE 3.8**

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**Meridian:** A river of energy with hundreds of interconnected points throughout the body, used in the practice of acupuncture and shiatsu massage.

body, which allows for the passage of energy between the physical and subtle bodies of the energy field. The meridian system of energy is used in the practice of *shiatsu* massage and Chinese acupuncture.

To most Western physicians, the theoretical concepts behind Chinese acupuncture may seem completely unrelated to the dynamics responsible for the immune system, but to Gerber they are all very much related. If these subtle energy pathways are blocked or congested, the organs they supply may go into a state of dysfunction. Acupuncture is a healing practice that attempts to unblock congested energy pathways, thus allowing a freely flowing current of energy. This healing technique first gained national recognition during President Nixon's trip to China in 1974. At that time, one of his press corps was stricken with acute appendicitis. Rushed to the nearest hospital, he was successfully treated, without anesthesia, to the amazement of White House officials. Scientists and physicians trained in the Western tradition were quick to ridicule this healing practice, but now studies show that there appears to be a connection, albeit small, between the points designated as meridian gates (acupuncture points) and neuroimmunological crossroads.

The most clinically sound studies to determine the anatomical link between the etheric and physical bodies have been performed by Dr. Kim Han, of Korea, as reported by Rose-Neil in 1967. By injecting a radioactive isotope of phosphorus (P-32) through acupuncture nee-



**FIGURE 3.9**

Acupuncture is an ancient Chinese technique that uses tiny, bulb-shaped needles to unblock congestion at specific energy gates along the paths of subtle energy known as meridians. Classical acupuncture (based on the concept of five elements) treats individuals holistically through the integration of mind, body, and spirit.

dles at traditional points of insertion, he discovered that traces of the isotope followed a fine ductlike tubule system not related to the circulatory, lymphatic, or nervous systems; rather, they paralleled the acupuncture meridian system. Han's work was validated by Dr. Pierre de Vernejoul in 1985, who used radioactive technetium ( $^{99m}\text{Tc}$ ) to follow the lines of the ancient acupuncture meridians. When samples of the isotope were injected randomly into the skin, no particular pathways were reproduced.

The human energy field has also been studied with regard to the healing power of touch. Several studies by Bernard Grad and Dolores Krieger, involving both plants (to avoid the placebo effect) and people, have demonstrated that "healing thoughts" in the form of energy produce statistically significant changes in chlorophyll and red blood cells, respectively. Similar studies by Drs. Leonard Laskow and Glen Rein have shown that conscious thoughts can decrease the growth rate of cancer cells in the laboratory. This conscious energy transfer is said to show properties similar to those observed with electromagnetic fields. Investigations into the subtle anatomy of the chakras have also been initiated by a handful of other researchers, including Dr. Elmer Green at the Menninger Clinic in Topeka, Kansas, Valerie Hunt at UCLA, Dr. Hiroshi Motoyama at the California Institute for Human Science, and researchers at the renowned Heart Math Institute.

To date, Hunt shows the most promise in detecting electromagnetic frequencies associated with the chakras. Her work began with biofeedback studies of muscle tension, but soon shifted to electrical activity in the seven regions associated with the primary chakras, where she noted a difference in frequency many times higher (1,600 cps) than could possibly be explained by electrochemical tissue of the heart and brain (0–250 cps). So inspired was Green by the concept of the human energy field that he created the International Society for the Study of Subtle Energy and Energy Medicine (ISSSEEM), which now publishes its own research journal, *Subtle Energies and Energy Medicine*.

How does the mind-body relationship lose its harmonic equilibrium? Two possibilities have been suggested. The first faults bioecological influences—that is, repeated exposure to those energy frequencies, natural (ultraviolet rays) or human-made (high tension power lines), with a rhythm greater than 7.8 Hz, which distort some aspect of the human energy field.

To understand this relationship from Gerber's perspective, we need to first understand some additional concepts of the physical world elucidated by Einstein. First, the smallest particle within an atom is composed of energy, and energy and mass are interchangeable; thus, each object gives off a unified rhythm or series of oscillations. These oscillations are depicted in units of measurement called hertz (Hz), or oscillations per second. In turn, objects that oscillate, including the human body, create a magnetic energy field. Through processes known as **sympathetic resonance** and sonic **entrainment**, a vibration can resonate from one object to another, as observed with tuning forks. An object with a lower or weaker frequency of oscillations will alter its own frequency to entrain with (match) that of an object emitting a higher or stronger frequency of oscillations. In humans, the result over time if several organs are influenced to entrain at a higher than normal frequency is a decreased ability to return to homeostasis, resulting in metabolic dysfunction or possibly irregular cell division in those organs.

In support of this hypothesis is the work of Dr. William Becker. Becker, twice nominated for the Nobel Prize in medicine, researched the relationship between the incidence of cancer and radiation emitted from various electrical sources, including power lines, microwave ovens, electric blankets, and video display terminals (VDTs). He concluded that an unequivocal relationship exists between extremely low frequencies (ELF)—the range in which electrical current oscillates (60 Hz)—and the development of diseases in people who are repeatedly exposed to them. Becker is of the opinion that oscillations of a higher frequency are somehow absorbed through the human energy field (what he calls the human electromagnetic field), resulting in alterations to the genetic makeup of cells at the atomic level.

That the human body had magnetic properties that could be enlisted as a healing mechanism was first suggested by Austrian physician Anton Mesmer in the late 1800s; it was dismissed as nonsense. But in 1992, geobiologist Joseph Kirschvink discovered that human brain cells do, indeed, synthesize a magnetic-like substance called magnetite. Like Becker, Kirschvink speculated that exposure to various electrical impulses can alter the integrity of magnetite and affect the cells' health or rate of activity. Disturbances produced by electrical interference can result in mutations at the cellular level, which may then become cancerous tumors.

Compounding the problem is the fact that T-lymphocytes are also affected by ELF. Becker cited a study by

Dr. Daniel B. Lyle of Pettis Memorial Hospital in Loma Linda, California, in which in vitro T-lymphocytes exposed to a 60-Hz energy field significantly reduced their cytotoxic ability against foreign antigens over a forty-eight-hour period. Becker also suggested that energy currents may affect mood and emotions, which are thought to be associated with the astral and mental layers of the human energy field.

In his book *Cross Currents*, Becker concludes:

At this time, the scientific evidence is absolutely conclusive: 60-Hz magnetic fields cause human cancer cells to permanently increase their rate of growth by as much as 1600 percent and to develop more malignant characteristics. These results indicate that power frequency fields are cancer promoters. Cancer promoters, however, have major implications for the incidence of cancer because they increase the number of cases of causing agents in our environment, ranging from carcinogenic chemicals to cosmic rays. As a result, we are always developing small cancer cells that are recognized by our immune system and destroyed. Any factor that increases the growth rate of these small cancers gives them an advantage over the immune system, and as a result more people develop clinical cancers that require treatment. (Becker, 1990)

While the hazards of high-tension power lines have fallen off the radar screen of national attention, the dangers of prolific cell phone use have surfaced as a new health care risk as reported in the *Washington Post* and the *International Journal of Radiation Biology and Environmental Health Perspectives*. Several reports highlight incidences of headaches, memory loss, and brain tumors with excessive use, due to the close proximity of the microwaves (ELFs) to the head.

Regrettably, Becker's findings have largely been either ignored or denounced by the medical community and

**Sympathetic resonance:** A resonating vibration given off by one object that is picked up by another object in close proximity. Tuning forks provide a classic example.

**Entrainment:** In physics, the mutual phase locking of like oscillations; in human physiology, organs or organisms giving off strong vibrations influencing organs or organisms with weaker vibrations to match the stronger rate of oscillation; thought to conserve energy.

federal government. For many reasons, Becker's research is still very controversial. For one thing, many people find the idea of electrical pollution hard to believe because it cannot be detected through the five senses. If you find this concept difficult to grasp, think of the classic Memorex TV commercial in which the vibrations of Ella Fitzgerald's voice shatter a crystal goblet. Neither a nervous system nor an immune system is necessary to feel the effects of vibrational energy.

The second explanation for the loss of mind-body equilibrium is that *self-produced* emotional disturbances congest the energy field at the astral (emotional) layer and precipitate a host of physical maladies. Toxic thoughts that go unresolved, often referred to as emotional baggage, may translate into physical ailments that serve as a



**FIGURE 3.10** Scientific studies into the use of healing vibrations are currently under way, exploring technology like the V.I.B.E. machine, created by Gene Koonce. This device creates a slight DC charge of  $-70$  to  $-90$  millivolts to entrain the cells of the body to hold a transmembrane potential and DC difference in potential, thus causing them to function at their optimal level. When a person sits near the V.I.B.E. machine for a specified duration, the body's cells entrain to this vibration of homeostasis.

reminder of these issues. Gerber believes that, in essence, that which constitutes our human energy field can be thought of as a sixth (and in his opinion underdeveloped) sense. As examples, he suggests that people who have the power of clairvoyance (clear vision) are able to access various levels of the human energy field in themselves and others; out-of-body experiences and near-death experiences may be explained in the same way.

Thoughts, perceptions, and emotions, according to Gerber's theory, originate in the various layers of subtle energy, cascade through the mind-body interface, and are decoded at the molecular level to cause biochemical changes in the body. He states, "Thoughts are particles of energy. [Negative] thoughts are accompanied by emotions which also begin at the energy levels. As these particles of energy filter through from the etheric level to the physical level, the end result is immunoincompetence" (Gerber, 2001).

It is fair to say that human consciousness is the part of psychoneuroimmunology that is the least understood. As specialists examine the mind-body relationship more and more, though, they are beginning to look beyond the conventional scientific wisdom of a mind within a body and consider the alternative idea, a body within a mind. Gerber's theory may test the limits of your credibility. However, given his careful documentation and the support of a growing body of empirical research from members of ISSSEEM, the Heart Math Institute, and the Institute of Noetic Sciences, the possibility of this phenomenon is gaining ground every day. Gerber reminds us that Nobel laureates Lister and Pasteur, who were once mocked for their theories of "invisible bacteria" as causes of infectious disease, were vindicated after years of research. Ironically, practitioners in Western medicine are quick to use electromagnetic resonance imaging to diagnose disease, but are still reluctant to use energy medicine (e.g., acupuncture, homeopathy, Reiki, Healing Touch) as a bona fide treatment despite the fact that the National Institutes of Health's Center for Complementary and Alternative Medicine has identified subtle energy as one of five modality areas. Ultimately, what Gerber is saying is that the medical community is beginning to experience a paradigm shift in its approach to health, and this change is meeting with much resistance.

### The Pelletier Premodel

As mentioned earlier, Pelletier is yet to be convinced that sufficient medical evidence has been collected to substantiate a definitive stress-disease model. Nevertheless,





**FIGURE 3.11** World-renowned healers Mietek and Margaret Wirkus demonstrate the bio-energy technique—cleansing the chakras and human energy field.

his comprehensive research article entitled “Psychoneuroimmunology Toward a Mind-Body Model” and current research brings to the attention of the allied health professions some valid points he believes must be considered and understood before such a comprehensive model can be constructed. In the years since Pelletier’s article was first published, significant medical advances have been made and the National Institutes of Health’s Center for Complementary and Alternative Medicine now allocates funding for areas of research involving prayer and energy medicine. Despite these efforts, many pieces of the stress and disease puzzle remain missing, suggesting that a complete model has yet to be fully realized.

Some intriguing findings in the medical literature approach the fringes of parapsychology and metaphysics, areas that Pelletier hints should be taken a little more seriously and investigated empirically to develop a comprehensive stress-disease model. The following highlight some of these findings:

1. *Multiple personality disorder.* Braun (1983) cites people diagnosed as having multiple personality disorder (MPD) whose different personalities manifest different illnesses. For instance, a patient may be a diabetic under the influence of one personality, yet show no signs of this disease in the presence of another. Similarly, one personality may require prescription glasses or have asthma or severe allergies, whereas the remaining personalities show no traces of these symptoms. These disease states disappear within the individual when another per-

sonality becomes dominant. In most cases of MPD, the patient experienced some incredibly traumatic event as a child. Stress is thought to be strongly associated with the etiology of disease, yet its appearance and disappearance from personality to personality have medical experts baffled.

2. *Spontaneous remission.* Perhaps even more baffling to the medical community is the notion of **spontaneous remission**—the sudden disappearance of diseased tissue—most often observed with cancerous tumors but acknowledged with other diseases as well. What makes these reports so remarkable is that many people who were spontaneously cured were originally diagnosed as terminally ill. There are now even several documented cases of HIV remission. Typically, the first reaction of members of the medical community is denial, with the standard explanation that the patient was misdiagnosed. But a closer look into the matter reveals that in documented cases, some people who were given weeks to live seemed to go through an “about-face attitude” resulting in a “spontaneous cure.” These people end up living years, if not decades, beyond their estimated time of departure. The Institute of Noetic Sciences began to document cases of spontaneous remission in the mid-1980s. It found over 3,000 cases of spontaneous remission in the medical literature, 15 percent of which occurred with no clinical intervention (e.g., radiation or chemotherapy).

In a review of these findings, Jaylene Kent et al. (1989) noted several cases that today are still unexplained. For instance, they examined the results of the International Medical Commission of Lourdes (CMIL), a body of medical professionals that investigates the clinical cases of people who visit the shrine of St. Bernadette at Lourdes, France. Of thirty-eight cases of “cures” examined by the commission since 1954, nineteen were found to be medically and scientifically inexplicable. Kent and her colleagues are quick to point out that evidence of spontaneous remission is rare, yet its existence cannot be ignored. To date, however, it *has* been

**Spontaneous remission:** The sudden (sometimes gradual) disappearance of a nonmedically treated disease, most often observed with cancerous tumors, but other diseases as well.



## Stress *with a Human Face*

Spontaneous remission is still considered to be an anomaly in Western medicine. What should be a celebration when malignant tumors disappear is instead looked upon as a peculiarity—another unexplained ghost in the machine. But Jim Gill will tell you, it's no ghost. Rather, he says, it's a dynamic alchemy of divinity and humanity—one he now welcomes with open arms.

On September 1, 1994, Jim was diagnosed with oat cell cancer, one of the deadliest forms of cancer. Test results revealed two large tumors in his chest, one of which was wrapped around his vena cava, disrupting the flow of blood back to his heart. So discouraged were his team of physicians with the test results that they gave him at most two weeks to live with no treatment, and as long as four months with treatment consisting of radiation and chemotherapy. "Basically, they told me I wouldn't see Christmas," he said. Although Jim was scheduled for the usual routine of chemotherapy, the prognosis looked anything but promising. Knowing the odds were against him, Jim decided to call in reinforcements. He contacted Mary Linda Landauer, a therapist who was trained in mind-body-spirit healing, who taught him meditation, visualization, and guided mental imagery. She also en-

couraged him to explore all possible options of healing, with the most important being the power of faith. And that he did! Jim quit working for seven months and, as he said, "I became the captain of my ship."

Jim's curiosity led him to several modalities of healing, including a trip to Tijuana, Mexico, where he stayed at a medical facility for four weeks to boost his immune system. His healing regime included diet supplements and herbs, but he takes delight in describing his spiritual awakening as well. When he returned to the Arthur James Cancer Center in Columbus, Ohio, one tumor had completely disappeared; the other, originally the size of a baseball, was now the size of a walnut. Eleven years later, Jim (seen here with his wife Nancy) is the picture of health.

"The medical experts were baffled, but I wasn't. Ever since then I get four to five phone calls a week from people with cancer. Most are looking for the magical silver bullet. But let me tell you something. It wasn't Mexico, or the herbs or the chemo that did it," Jim explains. "It was my reconnection to spirituality that did it. Although it was a lot of work, so many positive things have come out of that darkness. I wouldn't have traded this growth experience for anything!"

ignored, in part because the findings are "anecdotal" and cannot be replicated in controlled laboratory studies.

3. *Hypnosis*. When the powers of the unconscious mind are accessed through hypnosis, documented physiological changes have been observed that also prove baffling. Hypnosis can create a state of increased suggestibility that appears able to influence the biochemical mechanisms responsible for healing. According to Pelletier, the following illnesses have been shown to be cured by hypnosis: warts, asthma, hay fever, contact dermatitis, and some animal allergies. Case studies of ichthyosis, a congeni-

tal skin disease, have also been successfully treated with hypnosis (Dossey, 1999). Pelletier notes that although hypnosis can produce a very relaxed state in which the stress hormone ACTH may be suppressed, enhancement of immune responses alone cannot account for these hormonal changes.

4. *Placebos and nocebos*. **Placebos** fall within the realm of faith healing, where a person so strongly believes that the medication he or she received will cure the illness that a healing effect occurs even when what was ingested is no "real" medication at all. The fact that a person suffering from an illness can be cured by taking a sugar pill may sound ludicrous, but indeed this is often the case. In fact, the Food and Drug Administration (FDA) insists that new medicines must produce a cure rate of greater than 35 percent—the demarcation of the placebo effect—in clinical studies before they can be approved. But some placebos have a cure rate of 70 percent. In his book *Love, Medicine, and*

**Placebos:** A nonmedicine (e.g., sugar pill) that can prove to be as effective as the medicine it is supposed to represent. Healing occurs as a matter of belief.

*Miracles*, Dr. Bernie Siegel cites several examples of patients who were healed by their “faith” in medicine even when it wasn’t really “medicine,” particularly when their attending physicians were very supportive. This type of faith healing is an aspect of clinical medicine not fully understood. What was once thought of as a fluke in modern medicine, however, is now considered a part of the mystery of the stress-disease phenomenon.

**Nocebos** is a name given to explain the phenomenon when a medication that has been proven to be extremely effective is given to a patient who is told that it is experimental and most likely it won’t work. In many cases, the result is that the medication does nothing despite its proven effectiveness.

5. *Cell memory.* With the development of medical technology that has made organ transplants possible, a critical mass of case histories has revealed that cells of various organ tissues hold an energetic memory pattern that transfers to the next recipient. In the book *The Heart’s Code*, author Paul Pearsall cites several case studies where people with transplanted organs began to have memories of events in which they took no part (yet the organ donor did). One remarkable story is that of Claire Sylvia, who, upon having a heart transplant, began to have dreams of a young blond-haired man named Tim, wearing a motorcycle jacket. Although a vegetarian and a connoisseur of wine, Claire had cravings for chicken McNuggets and beer—the last food Tim had before he died hours later from a motorcycle accident. These and other stories like them suggest that cells retain some level of consciousness that is then passed on to the recipient of the organ. Similarly, some people, who, while in the therapy, recount memories of childhood physical abuse, begin to manifest bruises in the places where they were beaten decades earlier.
6. *Subtle energy.* Another area of scientific investigation that merits attention is the concept of subtle energy. Pelletier (1988, 2000) states, “Mind-body interaction clearly involves subtle energy or subtle information exchange. . . . Given that mind-body interactions involve an exchange of subtle energy, principles of physics may be appropriately applied to issues of health and disease.” Pelletier advocates the use of magnetic resonance imaging (MRI) and the superconducting quantum interference device (SQUID), which are based on the concept of sub-

tle energy, for clinical diagnosis of disease and illness. He also suggests that researchers in the field of psychoneuroimmunology try to understand and apply the principles of quantum theory and astrophysics.

7. *Immunoenhancement.* Pelletier points out that if a suppressed immune system can, by way of conscious thought, influence the progression of tumors and other disease processes, psychological factors (e.g., mental imagery, meditation, and cognitive restructuring) may also be able to *enhance* the immune system to create an environment conducive to spontaneous remission and other healing effects. Pelletier cites two studies opening the door to this possibility. In addition to the study by Kiecolt-Glaser et al. (1999) with nursing home residents discussed earlier, he points to the findings of McClelland and Kirshnit (1989) in which subjects watched an inspirational movie about Mother Teresa. Salivary IgA samples were collected before and after viewing the film, and it was observed that values increased afterward, regardless of the subject’s opinions of Mother Teresa’s work.

In his review of the medical literature, Pelletier has found that most of the evidence collected so far has been anecdotal, meaning that, in his opinion, controlled studies cannot yet prove that positive emotions can enhance immune function. But he suggests that this is a prime area for research. In particular, Pelletier raises the following questions:

1. Is immunoenhancement merely a return to existing baseline levels of the constituents of this precisely regulated system?
2. Are some constituents of the immune system suppressed (e.g., T8) to create an *illusion* that the entire system is enhanced?
3. Could stressors produce a rebound effect, causing elements of the immune system to increase above baseline levels once the stressor is removed?
4. Can the immunological responses actually be increased above baseline?

**Nocebos:** A bona fide, effective medicine that does *not* work because the patient doesn’t believe that it will.

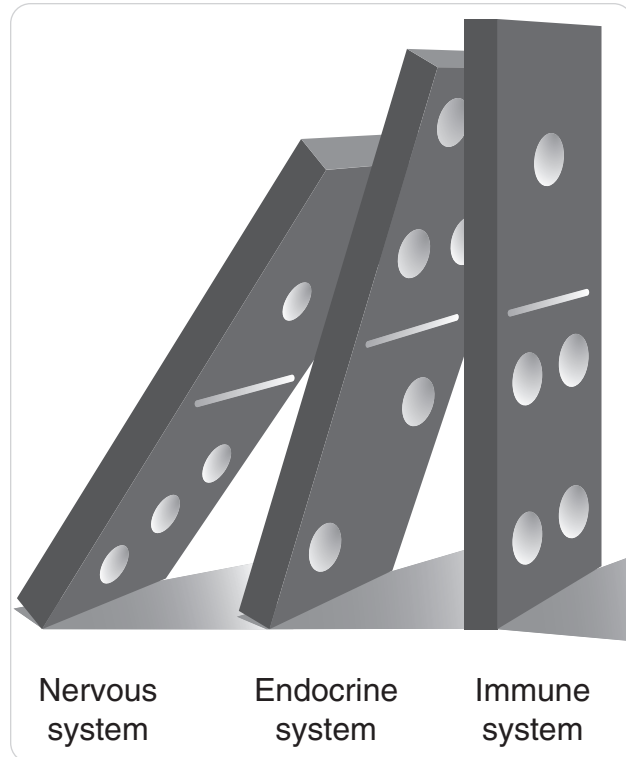
These are questions he feels need to be answered to better understand what immunoenhancement really is. Pelletier's scientifically trained, analytical side is skeptical about the probability of the healing powers of the mind, but his intuitive side allows for the possibility of immunoenhancement. He writes, "Speculations concerning the ultimate role of beliefs, positive emotions, and spiritual values in organizing and transcending biological determinism might seem like philosophical speculation if the answers to these questions were not so critical to our survival as a species balanced between health and illness, life and death."

Pelletier does not specifically use the word *spirituality* with regard to stress and disease, but we can infer that he believes spiritual well-being has been largely ignored by clinical medicine, which leaves the stress-disease model incomplete. He suggests that the only logical approach to understanding the stress-disease/mind-body phenomenon is to take the whole systems approach, in which the individual is greater than the sum of its physiological parts. Until a viable model explaining the relationship between stress and disease is complete, we must work with the information we have. And what is known through the current medical model is that physical symptoms arising from stress can wreak havoc on physical health in specific regions of the body. Two decades later, Pelletier has not changed the premise of his stress and disease premodel. However, his interest has taken him further into the exploration of mind-body healing—specifically, in the realm of complementary medicine (Pelletier, 2000).

## Target Organs and Their Disorders

Looking back at Borysenko's model, we can begin to see how disease and illness can arise from either an over-responsive autonomic nervous system (elevated stress hormones) or a dysfunctional (suppressed) immune system. The importance of understanding how these physiological systems work, as well as the pathways leading to disease, is considered by Borysenko, Pert, Gerber, and Pelletier to be the first step in the healing process. Borysenko, Gerber, and Pelletier also advocate the use of relaxation techniques, including meditation and mental imagery, as supplemental aids in any recovery process. In fact, some healing methods now take a multimodal

**Target organs:** Any organ or tissue receiving excess neural or hormonal stimulation that increases metabolic function or abnormal cell growth; results in eventual dysfunction of the organ.



**FIGURE 3.12** The balance between the nervous system, endocrine system, and immune system is quite delicate when repeatedly affected by chronic stress.

approach, combining standard Western medical practices with healing methods that employ the powers of the mind. Although this approach is now entering the mainstream of the American health care system, many physicians still remain "doubting Thomases," in part because they have received no formal training in these areas; others perceive the multimodal approach as a threat. While there has been no predictive correlation between a specific stressor (e.g., divorce) and a physical outcome (e.g., ulcers), several studies have shown relationships between the inability to express emotions, the personalities most closely associated with this characteristic, and the incidence of some illness and disease. For instance, the expression of hostility is a behavioral trait of the Type A personality and is commonly associated with coronary heart disease (see Chapter 5).

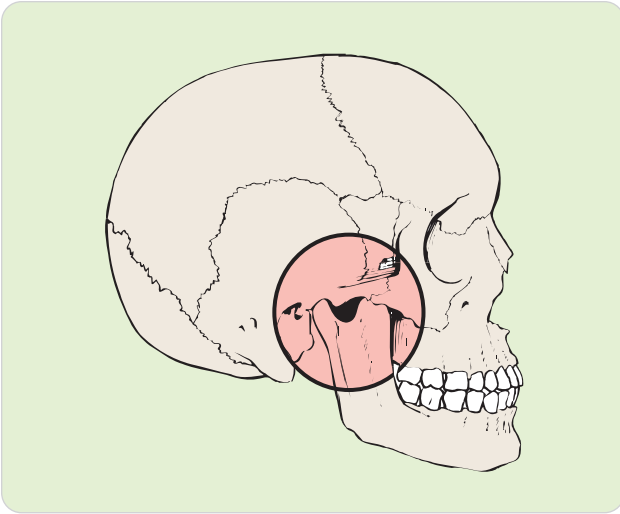
For some unexplained reason, during various stages of acute and chronic stress, certain regions of the body seem more susceptible to excessive metabolic activity than others. The organs that are singled out or targeted by increased metabolic activity are called **target organs**. Any organ can be a target organ: hair, skin, blood vessels, joints,

muscles, stomach, colon, and so on. In some people one organ may be singled out, while in others several organs may be targeted. Genetics, emotions, personality, and environmental factors have all been speculated as possible explanations for target organs, without conclusive evidence to support any of them. In fact, it is likely that they may all contribute to the disease process. The following are some of the more common disorders and their respective target organs, which are now known to be influenced by the stress response. Using Borysenko's model, they have been divided into two categories: nervous system–related disorders and immune system–related disorders.

### Nervous System–Related Disorders

In the event of perceived stress, organs that are innervated by neural tissue or acted upon by the excessive secretion of stress hormones increase their metabolic rates. When denied the ability to rest, organs may begin to dysfunction, much like a car engine that overheats on a very hot day. Several states of disease and illness first appear as stress-related symptoms that, if undetected or untreated, may result in serious health problems. The following are descriptions of the more common ones.

1. *Bronchial asthma.* Bronchial asthma is an illness in which a pronounced secretion of bronchial fluids causes a swelling of the smooth-muscle tissue of the large air passageways (bronchi). The constriction of these passages produces a choking effect, where the individual feels as if he or she cannot breathe. Asthmatic attacks can be severe enough to send someone to the hospital and, in some cases, are even fatal. Several studies have linked the onset of asthmatic attacks with anxiety; others have linked it with an overprotective childhood. Currently, drugs (e.g., prednisone) are the first method of treatment. However, relaxation techniques, including mental imagery, autogenic training, and meditation, may be just as effective in both delaying the onset and reducing the severity of these attacks.
2. *Tension headaches.* Tension headaches are produced by sympathetic-mediated contractions of muscles of the forehead, eyes, neck, and jaw. Tension usually builds as the parasympathetic inhibition of muscular contraction gives way to sympathetic drive, increasing the state of muscular contraction. Increased pain results from increased contraction of these muscles. Lower-back pain can also result from the same process. Although pain relievers such as aspirin are the most common source of relief, tension headaches have also been shown to dissipate with the use of meditation, mental imagery, and biofeedback.
3. *Migraine headaches.* Unlike a tension headache, which is produced by nervous tension in the facial muscles, a migraine headache is a vascular headache. The word *migraine* literally means “half a skull,” and usually when a migraine occurs, the sensation of pain occupies either the right or left side of the head but not both. Migraines are thought to be the result of a sympathetic response to the baroreceptors of the carotid artery, which undergo a rapid constriction (prodrome) followed by a rapid dilation. During the dilation phase, blood quickly moves in from the periphery to flood the cerebral vasculature. The change in vascular pressure combined with humoral secretions is considered the cause of the intense pain so often associated with migraines. Symptoms can include a flash of light followed by intense throbbing, dizziness, and nausea. It is interesting to note that migraines do not occur in the midst of a stressor, but rather hours later. Migraines are thought to be related to the inability to express anger and frustration. Although several medications are prescribed for migraines, current research indicates that biofeedback and mental imagery can be equally effective, with fewer side effects.
4. *Temporomandibular joint dysfunction.* Excessive contraction of the jaw muscles can lead to a phenomenon called temporomandibular joint dysfunction or TMJD (FIG. 3.13▶). In many cases, people are unaware that they have this illness because the behavioral damage occurs during sleep. But when they make a trip to the dentist, they find that they are showing signs of clenching and grinding their teeth (bruxism). Other symptoms include muscle pain and clicking or popping sounds when chewing, as well as tension headaches and earaches. Like migraines, TMJD is often associated with the inability to express feelings of anger. However, other behaviors are also associated with this symptom, including excessive gum chewing, resting one's chin on a hand, and even nail biting. Severe cases require that a mouth brace be worn at night. Relaxation techniques, including biofeedback and progressive muscular relaxation, have been shown to be effective in decreasing the muscular tension associated with TMJD.



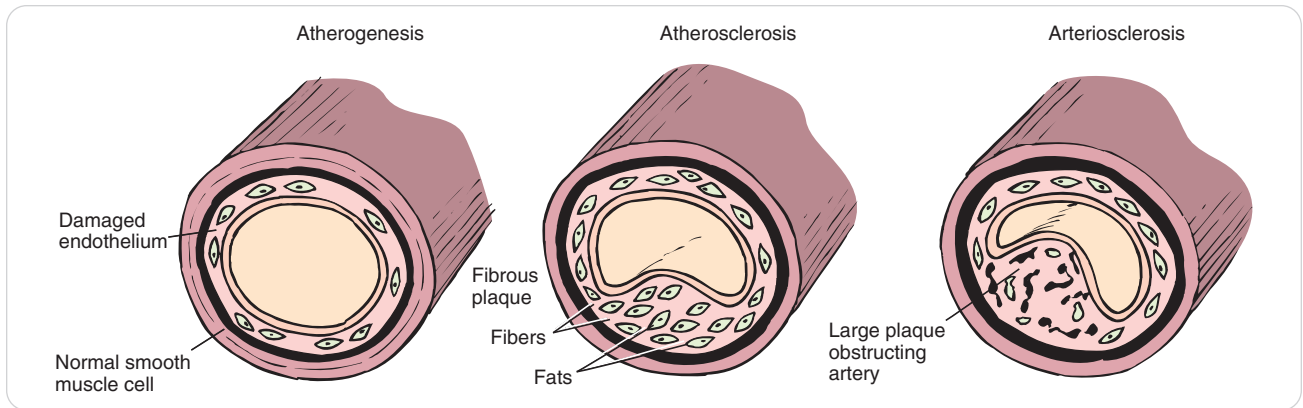
**FIGURE 3.13** There are many forms of TMJD, including clicking of the jaw and grinding one's teeth during sleep. Experts suggest that 20 percent of the American population has some form of TMJD.

5. *Irritable bowel syndrome.* IBS is characterized by repeated bouts of abdominal pain or tenderness, cramps, diarrhea, nausea, constipation, and excessive flatulence. It is often considered a result of excessive sympathetic neural stimulation to one or more areas of the gastrointestinal (GI) tract. While symptoms may vary from person to person, this stress-related disorder is most commonly associated with anxiety and depression. One reason IBS is considered so closely related to stress is that the hypothalamus, which controls appetite regulation (hunger and satiety), is closely associated with emotional regulation as well. Various diets and medications may be prescribed, depending on the nature of the symptoms. Several recent studies have employed various types of relaxation and cognitive skills, including thermal biofeedback, progressive muscular relaxation, mental imagery, cognitive reappraisal, and behavior-modification techniques to reduce existing levels of anxiety. All had promising results.
6. *Coronary heart disease.* There are two major links between the stress response and the development of coronary heart disease, which the American Heart Association now estimates kills one person every thirty-two seconds. The first link is elevated blood pressure, or hypertension. In an effort to shunt

blood from the body's core to the peripheral muscles in the event of physical movement during the fight-or-flight response, several stress-related hormones are released into the bloodstream. Sympathetic arousal releases epinephrine and norepinephrine from neural endings as well as from the adrenal medulla. These agents increase heart rate and myocardial contractility and cause the heart to pump a greater supply of oxygenated blood to the body's muscles for energy production. These catecholamines are also responsible for constricting blood vessels of the gastrointestinal tract while at the same time dilating vessels to the body's periphery, causing an overall change in total peripheral resistance. Aldosterone, secreted from the adrenal cortex, increases blood volume by increasing water retention. Vasopressin, or ADH, also acts to increase blood volume. The net effect of these stress hormones is to "jack up" blood pressure far above resting levels so as to transport blood to areas where it is needed. Ironically, stress provokes the same physiological response, even when there is no conscious attempt to physically move.

When pressure is increased in a closed system, the risk of damage to vascular tissue due to increased turbulence is significantly increased. This damage to the vessel walls appears as small microtears, particularly in the intima lining of the coronary heart vessels, which supply the heart muscle (myocardium) itself with oxygen. As a way of healing these tears, several constituents floating in the blood bind with the damaged vascular cell tissue. Paradoxically, the primary "healing" agent is a sticky substance found floating in the blood serum called cholesterol.

The second link between coronary heart disease and the stress response is the release of cortisol from the adrenal medulla. One of the many functions this stress hormone performs is to increase the level of free fatty acids carried by lipoproteins from the adipose (fat) tissue sites into the blood, to be used by the working muscles for energy production. An abundance of cholesterol in the blood makes it readily available for use in the attempt to repair damaged vascular cell tissue. However, what may seem like a protective mechanism actually becomes a major hindrance to the efficiency of the heart muscle, causing coronary heart disease.



**FIGURE 3.14** Coronary heart disease can start as early as age five when turbulent blood flow may cause damage to the inner lining of the artery wall. Cholesterol deposits, which attempt to heal damaged tissue, actually thicken the passage, thus decreasing the diameter of the vessel for blood to pass through. The greater the thickness, the greater the chance for an occlusion to that vessel—and an ensuing heart attack.

The three stages of coronary heart disease are atherogenesis, atherosclerosis, and arteriosclerosis (FIG. 3.14 ▲). With **atherogenesis**, the initial stage, a fatty streak appears on the inner lining of the artery wall. Some evidence suggests that this can occur as early as age five. As this fatty streak continues to circumnavigate the perimeter of the artery as well as travel its length, it creates a buildup of plaque, which narrows the inside of the artery. The stage at which the passage narrows due to thickening of plaque is referred to as **atherosclerosis**. As this fatty plaque accumulates, it attracts other constituents in the blood, including calcium, causing increased resistance to blood flow and increased blood pressure. With age, plaque hardens, making the artery walls like lead pipes that are no longer able to constrict or dilate. This compounds the effect of high blood pressure, which is one reason resting blood pressure increases with age. At the third stage, **arteriosclerosis**, the arteries themselves become hard, and possibly occluded from the flow of blood. If blood flow is impeded, the heart muscle may show signs of oxygen deprivation (ischemia), resulting in either angina (chest pain) or death of myocardial cell tissue. The end result is a heart attack, or myocardial infarction (MI). The degree of coronary artery blockage determines the severity of the heart attack, with the most extreme result being death. Similar etiology may occur with tears in the carotid arteries (located on either side of the vocal cords)

that supply oxygenated blood to the brain. Strokes, like coronary heart disease, are the result of blocked arteries creating an inadequate oxygenated blood supply, in this case to the brain.

The abyss between the emotions and physiology narrowed in 2005, when Western researchers discovered that emotional stress can, indeed, produce symptoms of a heart attack. Although the research team headed up by Ilan Wittstein concluded that the mechanism underlying reversible left ventricular dysfunction precipitated by emotional stress remains unknown, it was suggested that stress hormones might temporarily overwhelm heart cells. Nicknamed the **broken heart syndrome**, the cause might best be described as “adrenaline poisoning.”

**Atherogenesis:** The first stage of coronary heart disease, wherein a fat streak appears on the inner lining of artery walls.

**Atherosclerosis:** The second stage of coronary heart disease, wherein artery walls slowly become occluded by cholesterol-plaque buildup.

**Arteriosclerosis:** The third and final stage of coronary heart disease, wherein the arteries become hardened by cholesterol buildup, calcium deposits, and loss of elasticity.

**Broken heart syndrome:** A name given to the condition where symptoms of a heart attack occur due to emotional stress; when stress hormones temporarily overwhelm heart tissue cells.

## Immune System–Related Disorders

As mentioned previously, emotional stress appears both to alter the molecular structure of biochemical agents or neuropeptides and to suppress the number and functions of various key leukocytes. Stress hormones (cortisol) may also decrease the effectiveness of leukocytes. With this process under way, protective mechanisms are less efficient and the body becomes more vulnerable to exogenous and endogenous antigens. As previously discussed, diseases that are the result of immune dysfunction can be classified as (1) **exogenous-underreactive**, (2) **exogenous-overreactive**, (3) **endogenous-underreactive**, and (4) **endogenous-overreactive**. The following are examples of some diseases in each of these categories:

1. *The common cold and influenza (exogenous underreaction)*. In 1991, a study (Cohen, Tyrrell, and Smith) published by the prestigious *New England Journal of Medicine* supported the hypothesis that colds are unequivocally related to undue stress. The results made headlines across the country. From Borysenko's model of the immune system, we can see that as the number of B-lymphocytes decreases, the body becomes more vulnerable to the influences of the viruses that produce the common cold. Colds and influenza fall into the category of exogenous underreaction in Borysenko's immune activity matrix because there are insufficient B-lymphocytes to combat the exogenous antigen.
2. *Allergies (exogenous overreaction)* ( **FIG. 3.15** ). An allergic reaction is initiated when a foreign sub-



**FIGURE 3.15** The list of allergy-producing substances is nearly endless. Pollen and dust are two of the most common ones.

stance, or antigen (e.g., pollen, bee venom, dust spores), enters the body. In response to this intrusion, granulocytes secrete antibodies called histamines. When histamines encounter the antigens they form inactive complexes, in essence neutralizing their toxic effect. In an overreactive immune response to exogenous antigens, the excess of histamines causes swelling of mucous membrane tissue, in the case of inhaled antigens, or of skin tissue, in the case of infection. Some studies have shown that the introduction of foreign antigens isn't necessary to trigger an allergic reaction. Borysenko suggests that B-lymphocytes have the capacity of memory that may induce the production of histamines and other antibodies (immunoglobulins) without direct contact of an antigen. In some people, allergic reactions can occur just by thinking about the stimulus that provoked a previous attack. Several studies have also shown that allergic reactions are more prevalent and severe in subjects prone to anxiety. Over-the-counter medications containing antihistamines and allergy shots are the most common approaches to dealing with allergies. New data suggest that relaxation techniques also minimize the effects of external antigens.

3. *Rheumatoid arthritis (endogenous overreaction)*. Tissue swelling may also occur from inflammation produced by an overreactive immune system responding to cells perceived to be (endogenous) antigens. In this case, constituents of the immune system begin to attack apparently healthy tissue, mistaking it for a foreign substance. Rheumatoid arthritis, a joint and connective tissue disease,

**Exogenous-underreactive:** An underreactive immune system affected by external pathogens (e.g., colds and flu).

**Exogenous-overreactive:** An overreactive immune system affected by external pathogens (e.g., allergies).

**Endogenous-underreactive:** An underreactive immune system affected by internal pathogens (e.g., cancer).

**Endogenous-overreactive:** An overreactive immune system affected by internal pathogens (e.g., rheumatoid arthritis and ulcers).



occurs when synovial membrane tissue swells, causing the joint to become inflamed. Over time, synovial fluid may enter cartilage and bone tissue, causing further deterioration of a joint. Severe cases of rheumatoid arthritis are most evident in deformed finger joints. A substance identified as rheumatoid factor, a protein found in the blood, is thought to be associated with this disease. There is speculation that rheumatoid arthritis has a genetic link. It also has an association with stress, as it has been noted that the severity of arthritic pain is often related to episodes of stress, particularly suppressed anger. The treatment for this disease varies from pain relievers (e.g., aspirin) to steroid injections (e.g., cortisone), depending on the severity of pain and rate of joint deterioration. Relaxation techniques are now being recommended as a complementary treatment to help reduce symptoms.

4. *Ulcers and colitis (endogenous overreaction)*. Ulcers are often described as a hole in the stomach, and this depiction is not far from the truth. The series of events that lead to the destruction of this organ tissue begins with an excessive sympathetic neural drive. Increased secretions of norepinephrine are thought to cause a constriction of the vasculature in the lining of the stomach. This in turn is believed to decrease mucous secretions produced by the inner lining of the stomach wall. The purpose of mucus is to protect against the strong digestive enzymes that break down foodstuffs in the stomach. If the balance of mucosal fluid and digestive enzymes (hydrochloric acid) is thrown off, the inner lining becomes susceptible to these enzymes. The stomach may actually begin to digest itself, producing a hole in the stomach wall. Ulcers were one of the first diseases associated with undue stress; Selye noted this in his earliest studies with rats. Similarly, physicians immediately noticed an association between anxiety and the symptoms of ulcers in their patients, most notably sharp pains in the stomach.

The colon, situated below the stomach along the gastrointestinal tract, is also prone to ulceration, with a similar etiology producing colitis, or inflammation of the inner lining of the colon. Stress in the form of anxiety is thought to be strongly associated with colitis as well. Relaxation techniques are usually recommended, in conjunction with a special diet, to minimize the symptoms of this disease.

Some techniques, including mental imagery, have even helped to heal ulcerations in the stomach wall.

For years, if not decades, it was thought that stress was the primary reason for ulcers. But in 1981, Barry Marshall, M.D., of Perth, Australia, proved that over 75 percent of ulcers are caused by a bacterium known as *Helicobacter*, a carcinogen (Ubell, 1995). Clinical studies showed that these bacteria can settle in the lining of the stomach, creating an open wound that stomach acids then worsen, resulting in moderate to severe ulceration. Previously, it was thought that microbes such as *Helicobacter* could not survive in an acid-rich environment, but Marshall discovered this not to be the case. Treatment with antibiotics is now shown to be highly effective for a large percentage of people who have ulcers, yet two questions remain: What makes some people more vulnerable to the *Helicobacter* bacterium than others? and Why are antibiotics effective in only 75 percent of the cases of people with ulcers?

5. *Cancer (endogenous underreaction)*. Cancer has proved to be one of the most perplexing diseases of our time, affecting one out of every three Americans. To date there is still no cure short of prevention and early detection. The American Cancer Society defines cancer as “a large group of diseases all characterized by uncontrolled growth and spread of abnormal cells.” In other words, there are many types of cancers and the specific etiologies are still not completely understood. There are also many theories that attempt to explain the development of cancer. The most prominent and well-accepted one suggests that somewhere in the DNA structure there is a gene, called an **oncogene**, that produces an abnormal or mutant cell. Whether this gene can be inherited or is somehow externally triggered is yet to be determined; there are arguments both ways. The production of an abnormal cell in the body by itself is not uncommon. Some research suggests that the body produces about six mutant cells per day. In a precisely reg-

**Oncogene:** A gene in the DNA double-helix strand thought to be responsible for producing a mutant (cancerous) cell.

ulated immune system, T-cells and NK cells keep such endogenous antigens in check.

When a cell does mutate (that is, its genetic structure deviates from that of normal cells), it is regarded as an endogenous antigen and becomes subject to destruction by the cytotoxic T-lymphocytes, or T-cells. T-lymphocytes, you will remember, have a commando mission to search for and destroy malignant cells. If for some reason their ability is suppressed, the likelihood of a cancerous tumor is increased. While the life span of a mutated cell is markedly shorter than that of normal cells (this process is called *relative inviability*), if undetected it proliferates much more quickly than a normal cell, producing a tumor. Because of their structural inability to manufacture various enzymes necessary to perform normal cellular functions, cancerous tumors rob healthy cells of their nutrients. Unlike normal organ tissue, cancer cells are not self-contained and thus are able to detach from their original site and move to other areas throughout the body. This spread of cancerous tumors is referred to as metastasis, and at this advanced stage prognosis for recovery is not good.

Explanations for the manifestation of oncogenes are still speculative. Research has shown that external factors called carcinogens (e.g., ultraviolet rays, benzopyrene in cigarettes, asbestos) produce tumorous growths in both laboratory rats and humans. Medical researchers are still looking for endogenous factors that may also play a role in this disease process. At the same time, attention has

been given to personality characteristics, and some traits have been found to be common among those who develop cancer. Although it is hard to put one-quarter of the American population into the same personality category, several studies show that the incidence of cancer appears higher among people who have a hard time expressing their emotions, have low self-esteem, and experience feelings of rejection. By no coincidence, these same traits are said to characterize the codependent or addictive personality (Chapter 6).

The treatments for cancer include drugs, radiation, and surgery. However, thanks to the work of O. Carl Simonton, Elisabeth Kübler-Ross, Bernie Siegel, Joan Borysenko, and Jeanne Achterberg, coping skills involving cognitive restructuring, art therapy, and relaxation techniques including mental imagery and meditation are being used as complementary healing methods. While these methods are not a cure for cancer in themselves, in some cases they seem to have a pronounced effect when used in combination with traditional medicine.

Much attention is currently being given to the relationship between stress and disease in America. As lifestyles appear to become more stressful, the incidence of several illnesses that appear to be closely linked with stress is also increasing. Although stress may not seem like a direct cause of disease and illness, the association between them is too significant to be considered a mere coincidence. With the continued work of people like Borysenko, Pert, Gerber, Pelletier, and many others, some answers may be uncovered shortly.

## SUMMARY

- There has been an intuitive association between stress and disease for centuries, but the link has come to be accepted scientifically only in the last decade or so. Scientists from several disciplines have come together to form a whole new field of study called psychoneuroimmunology.
- Recently the immune system has been discovered to be greatly affected by prolonged bouts of stress.
- Pelletier states that there are still not enough data to substantiate a definitive stress-disease model that would help us to understand the relationship between the two. The focus of the stress-disease model appears to be divided between two areas: genetic predisposition, and energy medicine and subtle energy anatomy.
- Borysenko's model outlined both a dichotomy of autonomic dysregulation and immune dysregulation, and an immune activity matrix, which classifies diseases in one of four categories: (1) exogenous overreaction, (2) endogenous overreaction, (3) exogenous underreaction, and (4) endogenous underreaction.
- Pert's model cites research findings linking the nervous system with the immune system. Various cell tissues in the immune system can synthesize neuro-peptides just as the brain can. Pert believes that all neuropeptides are really one molecule that undergoes a change at the atomic level brought about by various emotional states or energy thought forms.
- Gerber's model states that the mind consists of energy (bioplasma) surrounding and permeating the body. Disease, then, is disturbance in the human energy field, which cascades through the levels of the subtle energy to the body via chakras and meridians.
- Pelletier's premodel states that a number of issues must be addressed and understood before a stress-disease model can be developed. These issues include disease states in people with multiple personality disorders, spontaneous remissions, hypnosis, placebos, subtle energy, and immunoenhancement.
- Based on Borysenko's model, stress-related diseases were placed into one of two categories: those related to an overresponsive autonomic nervous system (e.g., migraines, ulcers, and coronary heart disease) and those associated with a dysfunctional immune system (e.g., colds and cancer).
- Research shows that several relaxation techniques are effective as complementary strategies in decreasing the symptoms of stress-related illness.

## STUDY GUIDE QUESTIONS

1. Describe Borysenko's (immune system) stress and disease model.
2. Describe Pert's (brain neurophysiology) stress and disease model.
3. Describe Gerber's (energy system) stress and disease model.
4. Describe Pelletier's stress and disease premodel.
5. List five diseases that occur when the nervous system is affected by stress.
6. List five diseases that occur when the immune system is affected by stress.

## SELF-ASSESSMENT

### Physical Symptoms Questionnaire

Look over this list of stress-related symptoms and circle how often they have occurred in the past week, how severe they seemed to you, and how long they lasted. Then reflect on the past week's workload and see if you notice any connection.

	<b>How Often?</b> <i>(number of days in the past week)</i>	<b>How Severe?</b> <i>(1 = mild, 5 = severe)</i>	<b>How Long?</b> <i>(1 = 1 hour, 5 = all day)</i>
1. Tension headache	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
2. Migraine headache	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
3. Muscle tension (neck and/or shoulders)	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
4. Muscle tension (lower back)	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
5. Joint pain	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
6. Cold	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
7. Flu	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
8. Stomachache	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
9. Stomach/abdominal bloating/distention/gas	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
10. Diarrhea	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
11. Constipation	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
12. Ulcer flare-up	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
13. Asthma attack	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
14. Allergies	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
15. Canker/cold sores	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
16. Dizzy spells	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
17. Heart palpitations (racing heart)	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
18. TMJD	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
19. Insomnia	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
20. Nightmares	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
21. Fatigue	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
22. Hemorrhoids	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
23. Pimples/acne	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
24. Cramps	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
25. Frequent accidents	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5
26. Other (please specify)_____	0 1 2 3 4 5 6 7	1 2 3 4 5	1 2 3 4 5

**Score:** Look over the entire list. Do you observe any patterns or relationships between your stress levels and your physical health? A value over 30 points may indicate a stress-related health problem. If it seems to you that these symptoms are related to undue stress, they probably are. While medical treatment is advocated when necessary, the regular use of relaxation techniques may lessen the intensity, frequency, and duration of these episodes.

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