

# 4/The Mind/Body Connection

How do my thoughts and feelings change my physical condition? For instance, can stress really change my cells?

Why do I get sick after I go through a stressful time?

What is the placebo effect and does it really work?

It is more important to know what sort of a person has a disease than to know what sort of disease a person has.

—HIPPOCRATES

## REAL PEOPLE, REAL STORIES

Physician and Scientist Dr. Esther Sternberg says that for so many thousands of years, the popular culture believed that stress could make you sick, and that believing could make you well. People believe what they feel, but scientists need evidence. Until recently, however, there really wasn't any good, solid scientific evidence to prove these connections, nor was there a good way to measure them. Once scientists and physicians believed that there was a connection between the brain and the immune system, they could then take it to the next step: maybe there is a connection between emotions and disease—between negative emotions and disease and between positive emotions and health.

We can then say, okay, maybe these alternative approaches that have been used for thousands of years—approaches like meditation, prayer, music, sleep, dreams—all of these approaches that we know in our heart of hearts really work to maintain health. Maybe there is a scientific basis for them.

Excerpted from the website [http://www.nlm.nih.gov/changingthefaceofmedicine/physicians/biography\\_309.html](http://www.nlm.nih.gov/changingthefaceofmedicine/physicians/biography_309.html), retrieved April 17, 2011.

## Student Objectives

### Study of this chapter will enable you to:

1. Describe the role of stress in disease.
2. Discuss how stress can affect body systems including the cardiovascular, nervous, digestive, and immune systems.
3. Explain the concept of psychoneuroimmunology.
4. Explain the placebo effect as an example of the power of the mind over the body.

A sound mind in a sound body is a short but full description of a happy state in this world.

—JOHN LOCKE,  
PHILOSOPHER, 1693

## The Mind/Body Connection

More than 300 years after he made his observation about happiness, John Locke's insight into health and happiness still has relevance. Even though we may have widely differing experiences with stress, one thing is certain: What is going on with your mind and emotions is at least as important, if not more so, than what is happening in your body. Actually, what is going on in your mind *determines* what is happening in your body.

When you look in the mirror, what do you see? You see your body, your hair, your skin, your muscles, your face. We can see and understand how the body works. We can measure blood pressure and hormones and heart rate and body fat, but what about your mind? Can we measure an emotion? Can we see a thought? Can we prove that outlook changes the level of stress? For decades scientists have studied how stress affects the body. As you learned in previous chapters, the body of knowledge explaining the physiology of stress is substantial. More recently, researchers have been studying the mind/body connection to understand how thoughts and emotions relate to our experience with stress.

## Psychological Health

**Psychological health**, which encompasses both our emotional and our mental health, is instrumental in determining physical health. In Chapter 1 you learned, from the definitions of the dimensions of health, that emotional health relates to feelings and the ability to achieve emotional balance, while mental health relates to a state in which the mind is engaged in lively, healthy interactions both internally and with the world around you. Psychologically healthy people develop awareness and control of their thoughts and feelings. The outcome is a healthy and satisfying quality of life.

Today we know beyond question that the mind and emotions have a powerful and very real impact on the body. James Gordon, M.D., director of the Center for Mind-Body Studies in Washington, DC, says:

The mind clearly can have a profound effect on every aspect of physiologic functioning. Individuals who are chronically pessimistic, angry, anxious, or depressed are clearly more susceptible to stress and illness, including heart disease and cancer.<sup>1</sup>

Similarly, almost every medical illness affects people psychologically as well as physically.

Clearly, stress affects your body, your physiology. In Chapter 3 you learned about how the stress response activates a specific physiological process in your body. But what part does your mind play in your experience with stress? *A complex physiological process, the stress response, always starts with a single thought.* Your thoughts, your feelings, and your emotions have a profound impact on the quality of your life.

In this chapter we will explore the fascinating relationship between the mind and the body to better understand the role of stress in both disease and health. You will read about scientific studies that provide a solid foundation of scientific evidence explaining the connection between the body and the mind. You will see how you can use this information to go beyond preventing disease to also promote optimal health.

There is nothing either good or bad, but thinking makes it so.

—SHAKESPEARE

# The Role of Chronic Stress in Disease



Stress is an everyday fact of life for most people. It is becoming common knowledge, however, that stress at too-high "doses," and/or for too-long periods of time, can cause health problems. Hundreds of studies over the last 30 years have shown that stress contributes to a significant percentage of all major illness, including the number-one cause of death in America, cardiovascular disease. Cancer, endocrine diseases, emotional disorders, and a vast array of other stress-related disorders account for many visits each year to healthcare providers. *Healthy People 2010*, the document containing the health promotion goals for our nation, reports the continuing trend that health problems related to stress are among the most pressing concerns in public health. Five of the ten Leading Health Indicators (high-priority public issues) identified by the Office of Disease Prevention and Health Promotion are significantly interrelated with stress. These include mental health, obesity, smoking, physical activity, and substance abuse.

**Direct and Indirect Effects of Chronic Stress** Evidence supports the premise that stress can affect health either directly by way of physiological changes in the body, or indirectly through a change in a person's behavior. The clearest connection between stress and disease is demonstrated by the release of hormones by the endocrine system during the alarm reaction stage of the general adaptation syndrome. The cardiovascular, immune, and other systems of the body are affected.<sup>2</sup> In Chapter 3 you learned that chronic stress can result in exhaustion, the final stage of the general adaptation syndrome. If the fight-or-flight response remains activated for an extended time, we start to experience physical and emotional effects.

The indirect effects of stress on health occur when those who experience high levels of stress respond with unhealthy behaviors. For example, it has been shown that individuals under stress in general consume more alcohol, smoke more cigarettes, and drink more coffee than those who are under less stress. Use of these substances has been associated with higher risks for heart disease and cancer, as well as trauma and death from unintentional injuries.<sup>3</sup> In Chapter 15 you will learn more about how lifestyle habits and daily choices affect stress.

Chronic stress can be the result of many repeated rounds of acute stress, such as several semesters with an especially heavy load (episodic acute stress), or a life condition, such as a difficult job situation or chronic disease. In either case, the stress response remains activated as if we are responding to physical danger. The thought of threat, on a continual basis, sends the message to body systems that the survival mechanisms of fight-or-flight have to be activated continually. As a result, the normally functioning systems of the body cease to function well.

What feedback might your mind and body give you that indicate continued activation of the stress response?

## Allostatic Load

Our body strives for the balanced state of homeostasis. Yet the way our body works presents us with a paradox: what can protect can also damage. The body pays a price for the ongoing effort to repeatedly establish stability. The cumulative physiological wear and tear on the body that results from ongoing adaptive efforts to maintain homeostasis in response to stressors is termed **allostatic load**. The body's response to repeated or chronic stress is a cascade of cause and effect, with the potential end result of deteriorating health from a variety of conditions.

Allostatic load explains how frequent activation of the stress response, essential for managing acute threats, can in fact damage the body over time. Hormones such as cortisol and epinephrine, along with other physiological factors that mediate the effects of stress on the

## The Impact of Stress

Did you know that:

- 70–80% of all visits to healthcare providers are for stress-related and stress-induced illnesses?
- Stress contributes to 50% of all illness in the United States?
- The cost of job stress in the United States is estimated to be \$200 billion annually, including costs of absenteeism, lost productivity, and insurance claims?

**Source:** U.S. Department of Health and Human Services, *Healthy People 2000* (Hyattsville, MD: Public Health Service).

We are what we think. All that we are arises with our thoughts. With our thoughts we make the world.

—BUDDHA

Understanding the black-white gap related to health disparities has been a long-standing challenge for researchers. African-Americans statistically have poorer health outcomes than European Americans. Social scientists continue research to answer the question, "Is race the explanation for this disparity?"

Allostatic load is a concept that can be used to demonstrate how environmental stressors, including psychosocial stressors, can lead to a cumulative physiological toll on the body. Allostatic load helps capture the cumulative wear and tear on the body that results from repeated exposures to stressful experiences, whether physical or psychosocial. This framework helps explain the impact of factors such as discrimination and economic and emotional deprivation on health.

Other factors to be considered include:

**Perception**—How one perceives and deals with discrimination may, in the end, have more of an impact on health outcomes than actual discrimination and unfair treatment.

**Past trauma**—Another theory that seeks to explain the differences in health outcomes is the view that African-Americans have a history of unfair treatment. Trauma, experienced in previous generations, is part of the current generation's genetic makeup. This is called the Post-traumatic Slavery Syndrome. The theory maintains that slavery in America produced a collective trauma that has been transmitted across generations. The problem with this theory is that other groups have struggled with discrimination-related stress: European Jews after the

Holocaust and Japanese-Americans after mass incarceration during World War II both suffered horribly. A group-based trauma does not inevitably lead to poor group outcomes in subsequent generations. Although many in the popular press contend that race, by itself, is a risk factor for health problems among African-Americans, the scientific evidence does not appear to support this theory.

**Lifestyles**—There is no question that lifestyle factors such as those common to our culture as a whole, along with problems, such as discrimination and poverty, can and do take their toll on health and well-being. Environmental conditions also can lead to ill-health and disease, as can developmental and biological troubles during the prenatal and early childhood periods.

We can gain insights into how the disproportionate life stressors that African-Americans tend to experience physiologically translates into worse health over time. These insights can help us understand why some individuals have better health outcomes than others in the same marginalized group, even when faced with the same stressors.

In short, race alone must be rejected as a legitimate measure of intrinsic risk in etiological (cause) risk. The evidence leads us to conclude that race itself is not specific cause for the chronic health problems that affect minority groups such as African-Americans.

**Source:** "Under the Skin: Using Theories from Biology and the Social Sciences to Explore the Mechanisms Behind the Black-White Health Gap," by T. L. Green and W. A. Darity, *American Journal of Public Health*, 100 (2010): S35-S40.

body, have protective and adaptive effects in the short term, yet over longer time intervals, when called on frequently, they can accelerate disease processes.

The concept of allostatic load as an indication of cumulative lifetime effects of all types of stress on the body is based on the hypothesis that there is a cumulative physiological risk associated with exposure to psychosocial stressors over the life-course. This concept has served as a framework for research on topics such as aging and racial health disparities. See Culture Connection: The Reason Is NOT the Race.

An understanding of allostatic load will help you explain the medium-term and long-term effects of chronic stress. Awareness of these effects of chronic stress can help you appreciate why preventing and managing stress is essential to good health.

## Medium-Term Chronic Stress

When we recognize what is happening during the stress response, we can understand why medium-term health effects of stress happen. Many functions in the body turn off because they are not needed to deal with danger. Other functions in the body are activated to higher than normal levels. When we are not in danger, however, continued activation of the stress response is not necessary. You only need to *think* you are in danger for the stress response to activate.

**Effects of Medium-Term Chronic Stress** Effects of medium-term chronic stress include muscle tension and pain, headaches, fatigue, upset stomach, difficulty sleeping, bruxism, sore throat, and colds. Each of these conditions is briefly explained in relation to stress.

**Muscle Tension and Pain** Do you ever feel like your muscles are so tight that your shoulders are pulled up around your ears? Do tight neck muscles cause you stiffness and pain? Normally, a muscle is not in the contracted state for a prolonged amount of time. A muscle is supposed to contract only when it receives a message to contract. When a muscle is told to continue contracting for a prolonged time, two obvious results are pain and fatigue. When a muscle stays contracted, it activates nervous system pain receptors that deliver the message of pain.

**Headaches** A headache may result from muscles that tighten longer than intended in response to a threat. If the contracting muscles are head muscles, or posterior neck muscles, the result is a headache. This explains why people take muscle relaxants to ease the pain of the headache. A headache can provide feedback that our thoughts are causing tension.

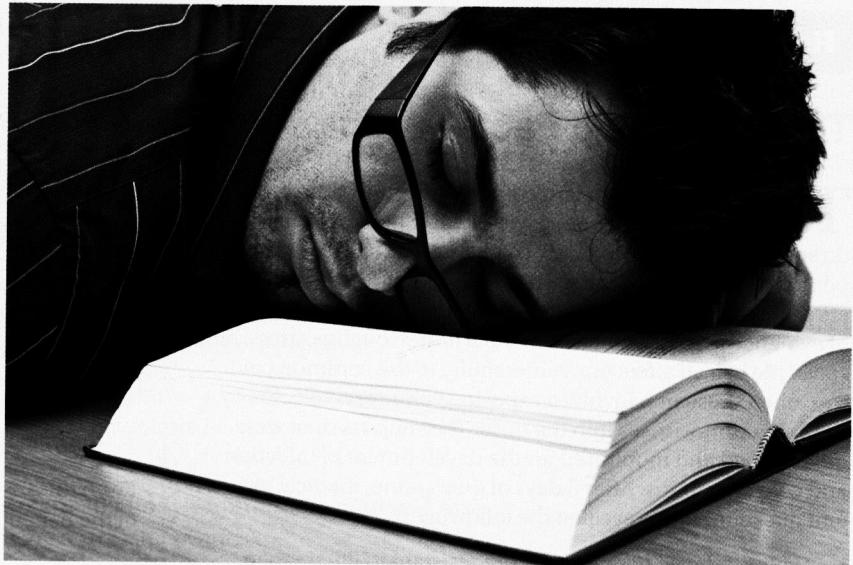
**Fatigue** Another effect of continued muscle contraction is fatigue. Have you ever come home from a rough day at work or school totally exhausted, even though you have exerted little physical effort? When a muscle is continually receiving the message to be ready for action, fatigue will result. Considerable energy is required for muscles to remain contracted.

**Upset Stomach** In fight-or-flight situations, we do not need the digestive system, so it ceases to efficiently coordinate all of the processes necessary to break down food. When the stress response is activated continually, the digestive system won't transport food from the digestive system to the bloodstream as effectively. An upset stomach is one of the results.

**Difficulty Sleeping** We should not require more than a few minutes to start sleep. We also should sleep comfortably through the entire night without waking up several times. Sleeping should come naturally. If we are having a hard time falling asleep, it may be because our minds are thinking too much about things not associated with sleeping. Troublesome thoughts of today's activities or worrisome thoughts of tomorrow's send messages to the mind that resemble threats. Consequently, the body remains aroused and alert. One physiological response of fight-or-flight is altered brainwave activity. Sleep-inducing brainwave activity can happen only when we are able to turn off the stress response. Stress can hurt you doubly because it affects the ability to sleep, which in turn affects the ability to cope with stress and anxiety.

**Bruxism** **Bruxism** is grinding, gnashing, or clenching the teeth during sleep or during situations that make the person feel anxious or tense. This condition is the third most common form of sleep disorder. Estimating how many people suffer from bruxism is difficult because it relies primarily on self-reporting. Most estimates indicate that bruxism affects about 10–20% of the population. Although physiological conditions can cause bruxism, more often the causes are psychological, including anxiety, stress or tension, suppressed anger or frustration, or aggressive, competitive, or hyperactive personality characteristics.<sup>4</sup>

If you grind your teeth because of stress, you may be able to prevent it through strategies that promote relaxation, such as exercise and meditation. Cutting down on consumption of alcohol, tobacco, and caffeine also may help, as the condition seems to worsen with the use of these substances.



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*Fatigue is a common symptom of chronic stress*

#### TIME TIP

"To help manage my time better, before I go to bed I lay out everything I need for the next day, so in the morning I'm not rushing around the apartment looking for books and shoes and keys. I also make a list of what I need to do the next day. This few minutes of preparation really helps me get off to a good start to the day. Added benefit: when my head hits the pillow, I am ready to sleep knowing I am prepared for the day to come."

—Matt S.

## The Cold, Hard Facts

The common cold is not an equal-opportunity attacker, according to research from psychologist Sheldon Cohen. Why do some people seem to rarely catch a cold in spite of being exposed to hoards of sneezing, sniffling cold-sufferers, while others seem to catch every bug that comes along? A growing body of evidence suggests that factors such as personality, stress, and social life can all affect our vulnerability to the common cold.

Cohen's research involved exposing volunteers to colds by dropping rhinoviruses into the nose. The subjects then were quarantined and monitored for the development of infection and cold symptoms. After 5 days of quarantine, medical exams and questionnaires revealed the following:

- Happy, relaxed people are more resistant to illness than those who tend to be unhappy or tense. Adults with the

worst scores for calmness and positive mood are about three times more likely to get colds than the more relaxed and contented adults. When happy people do get sick, their symptoms are milder.

- Serious work-related or personal stress that lasts at least a month increases the chances of catching a cold. In the lab, the longer that people lived with bad stress, the more likely they were to catch a cold.
- The rates of respiratory infection and clinical colds increased in a dose-response manner (as stress levels increased, so did the number of colds) with the extent of psychological stress the person had experienced in the previous year.

From this research, we apparently can add fewer colds to the list of the benefits of stress management.

**Source:** "Psychological Stress and Susceptibility to the Common Cold," by S. Cohen, D. Tyrrell, and A. Smith, *New England Journal of Medicine*, 325 (1991): 606-612.

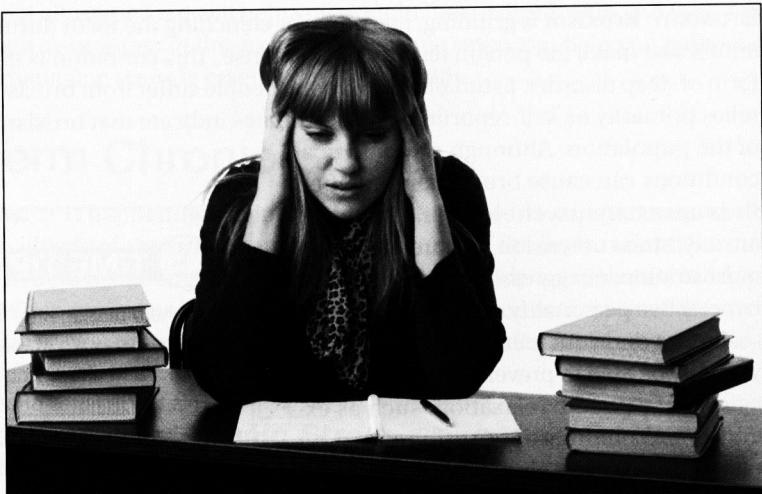
**Cold or Sore Throat** We do not need the immune system for fight-or-flight situations, so it turns down its high-functioning protection. The immune system is our internal defense mechanism that keeps us from contracting a cold or the latest flu that is going around. Without a strong immune system, the virus can get the upper hand. We will discuss the role of stress on the immune system in more depth when we look at long-term effects of stress.

Additional symptoms associated with medium-term effects of chronic stress include potentially preventable conditions such as the following:

Change in appetite	Increased blood pressure
Tightness in chest, back, shoulders	Excessive sweating
Aching jaw, tight forehead	Menstrual problems, missed menstrual periods
Shortness of breath, dizziness	Feelings of anxiety
Sweaty palms	Anger
Tingling sensation in fingers or toes	Concentration problems
Nervous tension all over	Depression
Heart palpitations	Lack of interest in food
Diarrhea or constipation	Any number of other symptoms
Constant low grade fever	
Rashes, hives, skin irritation	

### FYI

Did you know that high levels of stress hormones can interfere with memory? Stressful events that cause the release of certain hormones can make you forget things you know you should know. This helps explain why your mind goes blank when you stand up to give a presentation or why test anxiety causes you to forget information you know as soon as you walk away from the test. Normal memory function returns when the levels of stress hormones return to normal. Another good reason to practice some pre-test deep breathing and relaxation.



High levels of stress hormones can interfere with memory

**Role of the Immune System** Have you ever noticed that you tend to get sick more frequently after you go through a stressful experience? Because the immune system is unable to work as effectively when you are stressed, you are more susceptible to the diseases and illnesses that cross your path. In a three-month study of daily moods and illness, adults had more natural antibodies to counteract infection on days with positive events. The worse the day, the fewer the antibodies, according to psychologist Arthur Stone. In Stone's studies, adults got sick three to five days after their roughest days.<sup>5</sup>

Animal research may explain why people often get through acute stress but fall ill afterward, says Esther Sternberg from the National Institute of Mental Health. Stress unleashes adrenaline-like hormones first, and these stimulate the immune system. Then the body releases cortisol, a hormone that battles inflammation but weakens immunity. Sternberg explains:

For a while, both hormones are going full steam ahead. When the stress ends, the adrenaline hormones shut down first, leaving hormones that suppress immunity to hang around alone, and in these few days illness may take hold.<sup>6</sup>

Cortisol in particular lingers in the body and weakens the body's immune response. This helps explain why people frequently get sick following a stressful event.

In short, the medium-term symptoms of chronic stress result when the stress response causes imbalances throughout normally functioning body systems. These symptoms signal to us that we should make some changes. We should keep in mind that whatever system turns on or off is a direct response to what we would need for flight-or-fight. When this goes on for an extended period, health suffers.

## Long-Term Chronic Stress

While the medium-term effects of chronic stress are unpleasant and annoying, the long-term effects are dangerous and contribute to disease, suffering, and even death.

**Stress and the Heart** Cardiovascular disease is the number-one cause of death in the United States. One of the most devastating results of long-term chronic stress may turn out to be its link to cardiovascular disease. What is the relationship between cardiovascular disease and stress?

Increasingly, evidence suggests a relationship between the risk of cardiovascular disease and environmental and psychosocial factors. These factors include job strain, social isolation, and personality traits. More research is needed to fully understand how stress contributes to the risk for heart disease and whether stress acts as an independent risk factor for cardiovascular disease. Acute and chronic stress may affect other risk factors and behaviors, such as high blood pressure and cholesterol levels, smoking, physical inactivity, and overeating.<sup>7</sup>

While the research continues, researchers have made some significant advances in understanding the association between stress and cardiovascular disease. Here are some of the findings:

- Mental stress increases oxygen demand because blood pressure and heart rate are elevated.
- Vascular resistance and coronary artery constriction during mental stress decrease the blood supply, resulting in decreased blood flow to the heart muscle.
- As a result of stress, blood tends to clot more easily. Your body is designed so you won't bleed to death, but increased blood clotting in the blood vessels that surround the heart or blood vessels in the brain can increase the chances that one of those clots may lodge itself on the wall of a blood vessel. If a clot is too big and the diameter of the blood vessel is too small, and if we add to that an increase in blood pressure, which weakens the blood vessels, the result may be a heart attack or a stroke.
- Chronically high levels of cortisol may affect cardiac health by promoting inflammation that causes heart attacks.

**Stress and the Immune System** Stress has a profound impact on the immune system—the network of organs, tissues, and white blood cells responsible for defending the body against disease. The immune system includes lymphocytes, monocytes, and chemical messengers called interleukins, which allow the lymphocytes to communicate with each other. Stress causes cortisol to slow production of lymphocytes, as well as to suppress the release of interleukin. Stress hormones inhibit the immune system, making the body less capable of fighting disease and infection.

## Stress Busting Behavior

### STRESS AND YOUR HEALTH

When you are under stress, your immune system is weaker than usual. Check which of the following you do to avoid getting sick in times of stress. Then, circle the item that is your “weakest link” in times of stress.

- Avoid increased use of alcohol or cigarettes
- Avoid increased use of caffeine
- Avoid increased use of sugar
- Eat balanced meals
- Get regular physical activity
- Get a good night's sleep
- Use meditation, prayer, and other stress-reducing activities
- Try to maintain a calm and positive attitude

Simply stated, stress hinders the immune system's ability to produce and maintain **lymphocytes** (the white blood cells necessary for killing infection) and **natural killer cells** (the specialized cells that seek out and destroy foreign invaders), both of which are crucial in the fight against disease and infection.<sup>8</sup> Impaired immunity makes the body more susceptible to many diseases, including infections and disorders of the immune system itself, such as the autoimmune disease rheumatoid arthritis.

**Stress and Aging** If you have looked at “before” and “after” photos of U.S. presidents, you won't be surprised that research supports the premise that prolonged stress can age people prematurely. Some emerging research suggests that over-the-top stress actually can injure cells of the body.

In a study published in the *Proceedings of the National Academy of Sciences*, the research team found that chronic stress seems to accelerate the aging process by shortening the life span of cells, opening the door to disease. The cells of people under high stress aged the equivalent of 9 to 17 years more than the cells of people under little stress. The study involved mothers caring for chronically ill children and, as a control, mothers with healthy children. The longer a mother had been caring for an ill child, the higher was her stress level and the more severe her cellular decline.

Even in the control group, women who simply *thought* they were stressed also showed significant cellular deterioration. “It's not just that you're a caregiver,” says Elissa Epel, one of the psychologists who co-authored the study. “It may be more or equally important how you view your life and cope with demands, and what kind of support you have.”<sup>9</sup> Caregivers who viewed their situation positively didn't seem to suffer the ill effects of stress. Epel concluded that a positive outlook on life and the support of friends might help buffer a damaging stress response.

### Research HIGHLIGHT

## Chronic Stress and Immunity

Researchers at Ohio State University in Columbus have discovered a link between chronic stress and a body chemical associated with the development of serious and even deadly conditions. Professor of psychology and psychiatry Dr. Janice Kiecolt-Glaser, and colleagues studied a group of 119 men and women who were dealing with the stress of caring for a spouse with dementia. These caregivers were compared with a control group of 106 individuals of similar age and health status who did not serve as caregivers. Over the 6-year study, blood tests showed that a chemical known as interleukin-6 (IL-6) dramatically increased in the caregivers as compared to the non-caregivers.

IL-6 is a chemical known as a cytokine that is involved in the body's immune system. Overproduction of IL-6 has been

associated with the development or progression of a number of medical conditions, including heart disease, type 2 diabetes, certain types of cancer, osteoporosis, arthritis, and functional decline. Even if the spouse of the caregivers died, the increased levels of IL-6 persisted for several years in the group of caregiving spouses.

This research offers one possible explanation for the link between stress and illness by suggesting that stress may increase the risk of many typical age-associated diseases by altering the immune response. These data underscore the need for stress management and control of chronic stressors.

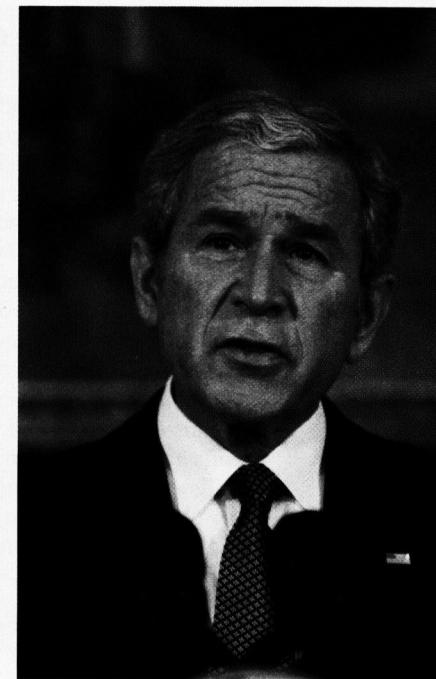
**Source:** *Chronic Stress and Age-related Increases in the Proinflammatory Cytokine IL-6*, by J. Kiecolt-Glaser, K. Preacher, R. MacCallum, C. Atkinson, W. Malarkey, and R. Glaser, *Proceedings of National Academy of Sciences (USA)*, July 2, 2003.

The link between stress and premature aging has major implications for health. The specific cellular changes identified in this study could become a warning sign to help doctors prescribe life-extending therapies. That means that people at risk for high stress could slow cell aging through exercise, meditation, prayer, or other forms of stress reduction.<sup>10</sup> We have long known that a common factor among people who live to be at least 100 years old is that they handle stress well.

## Stress and Inflammation

The evidence is mounting that chronic inflammation plays a role in diseases from cancer to depression to Alzheimer's, and stress is proving to be a key player in this chronic inflammation. Research by Carol Shively, a professor of pathology at Wake Forest School of Medicine, shows that fat cells that accumulate near organs in your abdominal cavity tend to behave like little factories, responding to stress hormones that you produce when you're frazzled or overtired by pumping out chemicals of their own. The stress hormone cortisol appears to bind to receptors on these fat cells, setting off a process that promotes the storage of fat and increases the number of fat cells. These extra cells then produce more chemicals that increase inflammation. Anything that stresses the body, from too little sleep to too much tension, can cause belly fat to accumulate. Shively recommends seven to eight hours of sleep per night and simple stress reducers. She suggests cutting back on multitasking, which she says, "can be very anxiety-provoking."<sup>11</sup>

Left: © Naiyah Farny/CORBIS. Right: Ken Cedeno-Pool/Getty Images



*Stress contributes to premature aging. Look at the pictures of former President Bush at the beginning and the end of his presidency and see if you agree.*

**Other Disease Conditions of Stress** Long-term chronic stress adversely affects health beyond increasing the risk for cardiovascular disease and compromising the immune system. Studies suggest that high levels of stress can trigger a large number of diseases and conditions—from obesity to ulcers. These and other stress-related diseases sicken millions of people each year, says brain researcher Bruce McEwen at Rockefeller University in New York.<sup>12</sup> Chronically high cortisol levels lead to a number of health effects, including insulin resistance and poor sleep patterns. This can reinforce bad eating habits that can then trigger fatigue, which saps our desire to exercise. It is a vicious cycle. The list of stress-related conditions is long, as you can see.

- Abnormal heartbeat (arrhythmia)
- Alcoholism
- Allergies
- Angina pectoris
- Arteriosclerosis
- Asthma
- Atherosclerosis
- Autoimmune problems
- Birth defects
- Breast cancer
- Bruxism
- Burnout
- Cancer
- Carpal tunnel syndrome
- Cholesterol levels elevated
- Chronic backache
- Chronic fatigue syndrome

- Chronic obstructive pulmonary disease (COPD)
- Chronic tension headaches
- Chronic tuberculosis
- Cold sores
- Common cold
- Coronary heart disease
- Coronary thrombosis
- Depression
- Diabetes
- Eczema
- Endocrine problems
- Epileptic attacks
- Erection problems
- Fertility problems
- Fibromyalgia
- Gastritis

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*A common factor among people who live to be at least 100 years old is that they handle stress well.*

Gastroesophageal reflux (GERD)	Myasthenia gravis
Headaches	Night eating syndrome
Heart disease	Ocd (obsessive-compulsive disorder)
High blood pressure	Pmdd (premenstrual dysphoric disorder)
Human immunodeficiency virus (HIV)	Pancreatitis
Hives	Premature aging
Hypertension	Psoriasis
Hyperthyroidism	Raynaud disease
Immune system disturbances	Respiratory ailments
Impotence	Rheumatoid arthritis
Infertility	Shingles
Insomnia	Social anxiety disorder
Irritable bowel syndrome	Stroke
Kidney disease	Systemic lupus erythematosus
Loss of interest in activities	Tmj (temporomandibular joint) syndrome
Memory loss	Ulcerative colitis
Menstrual problems	Ulcers
Migraine headache	
Multiple sclerosis	

The American Institute of Stress issued this statement about the long-term effects of stress:

Many of these effects are due to increased sympathetic nervous system activity and an outpouring of adrenaline, cortisol, and other stress-related hormones. Certain types of chronic and more insidious stress due to loneliness, poverty, bereavement, depression, and frustration due to discrimination are associated with impaired immune system resistance to viral-linked disorders ranging from the common cold and herpes to AIDS and cancer. Stress can have effects on other hormones, brain neurotransmitters, additional small chemical messengers elsewhere, prostaglandins, as well as crucial enzyme systems, and metabolic activities that are still unknown. Research in these areas may help to explain how stress can contribute to depression, anxiety, and its diverse effects on the gastrointestinal tract, skin, and other organs.<sup>13</sup>

You can clearly see that the effects of stress have a profound impact on body physiology. The scientific evidence confirming stress-related disease is strong. Understanding how stress contributes to disease is facilitated by exploring how the mind and body communicate.

## How the Mind and Body Communicate

An ever-increasing body of research documents the way in which attitudes, thoughts, and emotions impact health. Growing awareness of the role that thoughts and emotions play in health opens some exciting possibilities into our ability to prevent disease and heal ourselves. Awareness of the thoughts and emotions that contribute to stress and the conscious effort to control and change those factors can clearly result in improved health.

Author and physician Deepak Chopra describes this mind-body connection:

Sad or depressing thoughts produce changes in brain chemistry that have a detrimental effect on the body's physiology, and likewise, happy thoughts, loving thoughts of peace and tranquility, of compassion, friendliness, kindness, generosity, affection, warmth, and intimacy... each produce a corresponding state of physiology via the flux of neurotransmitters and hormones in the central nervous system.<sup>14</sup>

To help you understand how the mind and body communicate, we will explore three areas of study: psychosomatic illness, the placebo and nocebo effect, and psychoneuroimmunology. This knowledge will help you discover the power of the mind techniques for relaxation, which you will be introduced to in later chapters.

**Psychosomatic Illness** You might have heard someone say, "She's not really sick. It's all in her head." For years the common perception of psychosomatic illness was that it was not real, that somehow the person imagined that he or she was sick or didn't feel well. The belief was that all illness was caused by things such as germs, radiation, tobacco, or diet. How

Stress in Japan purportedly claims the lives of 10,000 Japanese men a year.\* *Karoshi* in Japanese means “death by overwork.” *Karoshi* is a rising social concern that has resulted directly from the well-known Japanese hard-working society that produced the highest productivity for its economy in the late 20th century. The Japanese government reported a significant increase in fatal heart attacks and strokes attributable to overwork, with the hardest-hit professions being information technology experts, doctors, teachers, and taxi drivers. Also reported was a record high number of suicides. In its evaluation of working practices in the 6 months before death, the Japanese Health, Welfare and Labor Ministry found that the *karoshi* victims were working an average of more than 80 hours each week.

The good news is that many Japanese workers and businesses are finding options to help relieve *sutoresu*, the Japanese word for stress. English gardening, aromatherapy, reflexology, pets, and herbs have joined the traditional leisure pursuit of hot-spring bathing in a boom in *iyashi*, a word that conveys a mixture of healing, calming, and getting close to nature.

The bad news is that the ingrained belief that a worker should sacrifice personal well-being for the company means that even the most *iyashi*-conscious have to compromise. Compounding the situation is that an obsession with work is often seen as a virtue in Japanese culture, and weariness a sign of weakness. “Americans and Japanese work the most in the world, but the work ethic is much more extreme in Japan because of the patriarchal legacy of loyalty between the samurai and feudal lord,” says Dr. Reiko Homma True, a psychologist and consultant to many Japanese mental health organizations.\*

Despite the *iyashi* boom, Japan seems to be working harder than ever. Labor statistics show that the average worker takes only 49.5% of his or her vacation allowance. Ironically, this hard work is creating economic as well as psychological problems because many in the workforce do not have enough free time to spend their money, which slows economic activity.\*\*

**Source:** \*“Health and Productivity Management on the March in Europe,” by W. Kirsten, *Health and Productivity Management*, 4(1) (2005) 31.

\*\*“In a Climate of Overwork, Japan Tries to Chill Out,” by J. Watts, *Lancet*, 360 (9337) (2003): 932.

could diseases such as cancer and heart disease, or even a stomachache or the flu, be the result of how our mind interprets events in life? Our mind could not actually be the cause of our ill health, could it?

Experience tells us otherwise. Have you ever wanted to avoid participating in some activity and as a result had the incredible power of creating a short-lived sickness that got you out of the event? We do have the power to make ourselves sick.

Fortunately, we have come a long way in our understanding of psychosomatic conditions. The term **psychosomatic** originates from the core words *psyche*, meaning the mind, and *soma*, meaning the body. Conditions that have a mind and body component are often called psychosomatic. Today, psychosomatic conditions also are called **psychophysiological** to avoid the negative connotation that the condition is somehow imagined.

It has become evident that our bodies are thinking and feeling bodies. Research by Dr. Candace Pert, internationally recognized pharmacologist and author, has demonstrated that our thoughts and feelings affect our health. She wrote:

As I've watched as well as participated in this process, I've come to believe that virtually all illness, if not psychosomatic in foundation, has a definite psychosomatic component. Recent technological innovations have allowed us to examine the molecular basis of the emotions, and to begin to understand how the molecules of our emotions share intimate connections with, and are indeed inseparable from, our physiology. It is the emotions, I have come to see, that link mind and body.<sup>15</sup>

Deepak Chopra recognized the mind/body connection in relation to health and disease when he said:

Conventional medicine already recognizes that ordinary experience can play a complex role in disease. For example, statistics show that single people and widows living alone are more likely to get cancer than people who are married. Their loneliness is called a risk factor—one could just as truly call it a carcinogen. Then why isn't curing loneliness a cure for cancer? It may well be, but in a different kind of medicine than we now practice.<sup>16</sup>

**The Placebo and Nocebo Effects** One of the best-researched examples of the power of the mind to create physical changes in the body is the **placebo effect**, a phenomenon whereby an inactive substance or treatment is used to determine how the power of suggestion affects the psychology, physiology, or biochemistry of experimental participants.<sup>17</sup> The placebo effect is created by a person's belief that he or she will benefit from an intervention.

For as a man thinketh in his heart, so is he.

—PROVERBS 23:7

## What's Lipragus?

Larry Dossey, M.D., writes about an early experience with the placebo effect while he was working in a hospital pharmacy during his college days. Curious to learn about the most popular medications prescribed in the hospital, he encountered the medication Lipragus.

He learned that Lipragus was *sugar pill()* spelled backward. Healthcare providers have long understood the impact of the placebo effect.

**Sources:** *Meaning and Medicine*, by Larry Dossey (New York: Bantam, 1991).

Placebos frequently are used in studies to test new medications. Some subjects are given the medication and, as a control, some are given a placebo—an inert substance—and the results are compared. In study after study, across a broad range of medical conditions, 25–35% of patients consistently experience satisfactory relief when they receive placebos instead of regular medicines or procedures. The research supports the premise that belief that a treatment works *does* result in increased effectiveness.

A study reported in the highly respected

*Journal of the American Medical Association* involved a review of pain treatments over the previous 20 years, encompassing both medication and surgery. The researchers found that placebo response rates varied greatly, and frequently were much higher than the expected 25–35%. The study concluded that the quality of the interaction between the patient and the physician can be extremely influential in patient outcomes and in some cases, perhaps many cases, patient and provider expectations and interactions may be more important than the specific treatments.<sup>18</sup> These researchers are saying that when the patient and the healthcare provider expect a treatment to be successful, the likelihood of success increases.

Here are other examples demonstrating the placebo effect:

- *Hair growth in balding men.* Men who believed they were receiving a drug that would increase hair growth actually experienced such growth even when given an inert substance, a placebo.<sup>19</sup>
- *Cure for nausea and vomiting.* The placebo effect has been a source of fascination for over 60 years. This 1950s study found that pregnant women were cured of their nausea and vomiting when given a substance they were told would prevent these conditions. Even more amazing is that the substance used as the placebo was not simply an inert substance, but in fact Ipecac—which is actually used to induce vomiting.<sup>20</sup>

If our thoughts and emotions have a positive impact on health, it makes sense that they also might affect us in negative ways. The **nocebo effect** explains the causation of sickness and death by expectations of these negative outcomes and by associated emotional states.<sup>21</sup> For example, when people who are susceptible to poison ivy are exposed to a harmless look-alike plant and told it is the real thing, they can develop a rash. Cancer patients experienced hair loss when they were given a totally inert substance and were told it was a powerful anti-cancer medicine that causes hair loss.<sup>22</sup>

### Author Anecdote

#### Power of the Mind

In the early days of my nursing career, I worked on a busy orthopedic unit in a Midwestern hospital. One of our repeat patients, George, suffered from long-term back pain of unknown origin. Despite physical therapy, medications, and even surgery, George didn't feel relief from his chronic pain. Injection of a high-potency analgesic drug was the only thing that seemed to provide relief, yet this type of drug comes with negative side effects.

George's healthcare team decided to see if a placebo would work. Without his knowledge, the plan was to alternate the narcotic injections with an inert water injection. I remember feeling conflicted with the idea of "tricking" George this way and was sure the placebo would not result in pain relief. No one doubted that his pain was very real. But sure enough, the placebo injections did result in pain relief. Through some complex mechanism that we are only now beginning to understand, George received pain relief because he expected it. This was an amazing lesson to me in the power of our mind on our body.

—MH

Studies on both the placebo and nocebo effects provide strong support for the connection between thoughts and feeling and physical health. The literature is filled with examples demonstrating the placebo and nocebo effects. As you will learn in Chapter 5, an understanding of the power of our mind has important implications for stress prevention and management. This information can empower us to understand the role our thinking plays in our health. And, as has been demonstrated, expectation affects reality.

**Blaming the Victim** We cannot conclude this section on placebo and nocebo effects without making an important point about the relationships between body, mind, and disease. In spite of our best efforts to manage stress and have a positive outlook on life, disease happens. The mentality that disease is the victim's "fault" is not a productive approach to health. This line of thinking, also called

blaming the victim, reinforces the attitude that if the person would have just tried harder and believed, he or she could have prevented the illness. Although this may be true at times, a more constructive approach to health is to acknowledge that even though how we think and feel does have an impact on our health, some disease and death are inevitable. There is a 100% chance that we will die. But our thoughts and emotions can make a difference in the quality of our journey through life.

**Psychoneuroimmunology** Today, entire areas of science are studying the relationship between the body and mind. One interesting field of scientific inquiry studies the chemical basis of communication between the body and mind as it relates to the nervous system and the immune system. This area of study, called **psychoneuroimmunology** (PNI), seeks to understand the complex communications between and among the nervous system, the psyche, and the immune system, and their implications for health.

As you have learned, the effects of a compromised immune system are far-reaching, and extend to everything from susceptibility to the common cold, to the rate of wound healing, and even a link to developing breast cancer. Following is a brief summary of several studies linking stress to its effect on the immune system.

- PNI research has shown that traumatic stress, such as the death of a loved one, can impair a person's immunity for as long as a year.
- Studies of university students and staff in the United States and Spain have implicated stress and a generally negative outlook in increasing susceptibility to the common cold.<sup>23</sup>
- By inflicting small cuts in volunteers who then were subjected to controlled stressful situations, researchers have shown a significant delay in healing among those who are under stress.<sup>24</sup>
- People who were shown films of Mother Teresa consoling the poor and the sick experienced increased levels of salivary immunoglobulin A, one of the body's first lines of defense against invading pathogens. The levels of this substance in children have been shown to increase through relaxation and self-hypnosis. In adults, the levels have been shown to increase when humor is introduced.<sup>25</sup>
- In research on women with metastatic breast cancer, psychiatrist David Spiegel found that stress hormones played a role in the progression of breast cancer. The average survival time of women with normal cortisol patterns was significantly longer than that of women whose cortisol levels remained high throughout the day (an indicator of stress).<sup>26</sup>
- Dr. Janice Kiecolt-Glaser, a National Institutes of Health-funded researcher, reported that her team administered a small puncture wound to a group of dental school students, doing so once during an exam period and then again during a vacation period. They examined how the wounds healed. All the students took longer (on average, 3 days longer) to heal their wounds during exams than during vacation; the researchers attribute this to stress. "If you're wounded and you're stressed," Dr. Kiecolt-Glaser commented, "you take longer to heal. You also have a greater chance of infection."<sup>27</sup>

Dr. Candace Pert says:

The immune system, like the central nervous system, has memory and the capacity to learn. Thus it can be said that intelligence is located not only in the brain but in cells that are distributed throughout the body, and that the traditional separation of mental processes, including emotions, from the body is no longer valid.<sup>28</sup>

In his book *Spark: The Revolutionary New Science of Exercise and the Brain*, Dr. John Ratey explains that toxic levels of stress erode the connections between billions of nerve cells in the brain. Stress is a threat to the body's equilibrium. It is a challenge to react, a call to adapt. He proposes that what could be missing on advice about reducing stress in modern life is that

## Author Anecdote

### If Only

Laura was a graduate student, a wife, a mother of two young children, and a happy, giving person. She was training to run her first marathon when she was struck with a rare and aggressive form of cancer. Laura and her family pursued every avenue of treatment, both conventional and unconventional, yet the cancer spread.

In her final days of life, Laura shared with me her feelings: "I feel so guilty and responsible. Could I have prevented this by thinking more positively or by having a better attitude? I really believe how I think affects my health, so I keep wondering what I did to cause this."

Although many studies show that in some cases a positive approach does make a difference, disease cannot always be prevented. There comes a time when accepting that fact can help make the journey easier.

—MH

## Psychoneuroimmunology Finds Acceptance as Science Adds Evidence

According to Margaret Kemeny, professor at the University of California, San Francisco, psychoneuroimmunology (PNI) research has exploded demonstrating that hormones and neurotransmitters released under stress can change immune cell behavior. These various cells actually have receptors to "hear"

the signals, allowing the nervous, endocrine, and immune systems to "talk."

For example, studies with a group of medical students focused on the effects of academic stress and response to a hepatitis B vaccine that would mimic the response to an infectious agent. These studies demonstrated that antibody and immune cell responses were diminished in subjects with more anxiety, higher stress, and less social support.

**Source:** *The Scientist*, 10(16) (1996): 14.

challenges are what allow us to strive and grow and learn. Could stress actually spark brain growth?<sup>29</sup> The evolving research on the connections between the nervous system, psyche, and immune system opens up new ways of thinking about how the body, mind, and emotions are inextricably interconnected. The science is complex and has tremendous ramifications for how we view health and illness.

## Conclusion

In this chapter we explored the relationship between the mind and the body to better understand the role of stress in disease and health. We cannot predict which maladies will develop from too much stress in our lives, because so many factors are involved. One thing we can know with certainty, though, is that keeping the stress response activated increases our risk for many diseases.

The bottom line is that the body is affected by what the mind experiences, and the mind is affected by what the body experiences. Scientific studies provide a solid foundation of scientific evidence explaining the associations between the body and the mind. In his book *Mind as Healer, Mind as Slayer*, Kenneth Pelletier summed it up in writing, "Generalized, and unabated, stress places a person in a state of disequilibrium, which increases his susceptibility to a wide range of diseases and disorders."<sup>30</sup>

The mind is a powerful weapon in the battle for health. The mind can be both *healer* and *slayer* because thoughts, feelings, and perceptions have profound implications for health and disease. Understanding the power of the mind will empower you to prevent some diseases and also to promote optimal health.

## LAB

### 4.1 Body Signals

**REVIEW** Think about a health concern that you, or someone you know, might be experiencing right now. In light of the information in this chapter, think of how stress may have contributed to the problem. This health problem may be a headache or insomnia, or it may be something more serious like depression or ulcers.

1. What is the condition?
2. Based on what you have read in this chapter, explain how stress either contributed to or caused the problem?