

STRESS, BEHAVIOR, AND HEART DISEASE

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INTRODUCTION

Scientists have long puzzled over the fact that many heart attacks occur in persons apparently free of risk factors such as high blood pressure, smoking, and high cholesterol. What, they ask, accounts for these heart attacks?

The answer, according to some, may lie not merely in physiology but in behavior. In the last 30 years or so, a small group of scientists has held steadfastly to the hypothesis that the way people think, feel, and act as they cope with the daily stresses of life can have a profound—and sometimes deadly—effect on their hearts. Through thousands of interviews with heart attack patients, these researchers have discerned common traits, behavioral responses, and stress reactions that appear to be associated with increased risk for heart disease. By following individuals with evidence of such patterns, they have been able to amass enough evidence to support the idea that stress and how we react to it plays an important, albeit controversial, role in the risk factor profile.

WHAT IS STRESS?

For some people, stress is the feeling of being stretched to the breaking point, like a rubber band

about to snap. For others, it is the events that lead to muscle tension, tightened fists, and clenched jaws. Dr. Hans Selye, a pioneer stress researcher in the 1930s, described it as the response of the body to any of a variety of demands, such as extremes of temperature. Later researchers have defined it as the state in which individuals are faced with the need to make difficult or undesirable changes in order to adapt to events and situations in their lives. Under this definition, stress includes not only the body's response to physical and psychological demands, but the mental, emotional, and behavioral responses as well. (See box, "Signs and Symptoms of Mental Stress.") The demands may be highly significant—a death in the family, for example, or the loss of a job, or taking part in armed combat. But more often they are the ordinary hassles we all experience in the course of our daily routine—a traffic jam, a disagreement with a colleague, a deadline at work, a day that just does not go as planned. It is the way we handle these demands that has a profound impact on our health and well-being.

Not all stress is detrimental. Indeed, a certain amount of stress in life is desirable. It relieves monotony, spurs people toward worthwhile goals, and is an integral part of many pleasurable activities: the joy experienced with successful accomplishments, for example. Selye coined the word "eustress" (good stress) to refer to stress of this kind, and to distinguish it from distress, which is prejudicial to health and well-being. How can an individual tell whether the stress experienced during a difficult task is eustress

Signs and Symptoms of Mental Stress

Following is a partial list of common stress indicators.

Not all of these indicators are due solely to stress; some (particularly the physical ones) may have other causes, while others may be exacerbated by stress. If you experience a number of them, however, it may be an indication that the mental stress you are under is being manifested in how you feel and the way you behave.

Physical Indicators

Facial tautness
 Muscle aches, stiffness, or tension
 Profuse sweating or facial flushing
 Cold, clammy hands
 Facial tics: rapid eye blinking or horizontal eye movement, repeatedly retracting eyelids, raising eyebrows, etc.
 Tapping foot or drumming fingers
 Headaches
 Sleep problems
 Dizziness
 Gastrointestinal symptoms: nausea, stomach pains, cramps, diarrhea, constipation, indigestion, heartburn
 Coughing
 Fatigue
 Skin disorders: rashes, hives, acne
 Asthma
 Back pain
 Dry mouth or throat
 Change in appetite (increase or decrease)
 Palpitations

Emotional Indicators

Anger
 Frustration
 Withdrawal, lack of emotional feeling
 Excessive crying, especially without obvious cause
 Depression
 Anxiety
 Fears, phobias, panic attacks
 Excessive talking or inability to express self
 Irritability
 Impatience
 Overreaction to events
 Difficulty concentrating
 Forgetfulness, confusion
 Feeling of time pressure

Behavioral Indicators

Rapid speaking
 Rapid walking
 Chain-smoking
 Excessive drinking
 Teeth grinding
 Doing two things at once
 Restlessness, pacing, inability to sit still
 Nail-biting
 Picking at skin on face or around nails
 Hair-twisting
 Eating other than when hungry
 Sexual problems
 Short-fuse reactions

or distress? The most apparent distinguishing characteristic is emotional: Eustress is associated with joy, exhilaration, a feeling of a job well done; distress is associated with frustration, anger, anxiety, fatigue, or a general feeling that something is wrong.

HOW STRESS WORKS

MENTAL, EMOTIONAL, AND BEHAVIORAL RESPONSES

A person faced with a particular situation assesses it to determine whether it calls for anything special—that is, he or she interprets the event. These mental responses lead the individual to take the action the situation requires. This behavioral response may be calm or, if the situation is perceived as highly demanding and upsetting, it may be associated with negative emotions such as irritation or anxiety.

For example, some people faced with a deadline experience a sense of dread and foreboding. They perceive the situation as insurmountable and become virtually paralyzed. Others are motivated by deadlines, and do their best work “against the clock.” Some people can study in a crowded subway car; others find they need quiet and solitude, or concentration is impossible.

Another factor affecting how people react is their sense of having or not having control. One study found that assembly-line workers who could control the pace of work or select their work station on the line were able to work more effectively than colleagues on a “set” assembly line. The workers with some flexibility felt better at the end of the work day and had fewer stress-related problems. Other studies have found that a lack of autonomy is one of the major characteristics of a stressful job.

Yet another factor making a situation stressful is unpredictability. A loud unexpected noise makes us “jump out of our skins”; the same noise, if we know

it is coming, is no more than an unpleasant sound. Similarly, it is unexpected bills and unexpected traffic jams that we find to be most taxing.

It also seems that people with “stress-buffering” resources—including a social support network, good overall health, and a clear sense of self-worth—are better able than others to deal with the stress in their lives. It appears that these resources enable a person to keep things in perspective and not become stressed as easily. They also enable a person to have a sense of being able to handle whatever comes along during the day. Last, they provide a sense of belonging and of having people around to call on in times of need.

PHYSIOLOGICAL RESPONSES

The mental, behavioral, and emotional responses described above play a key role in determining the magnitude of what is commonly called the “fight-or-flight response,” an innate set of physiological changes that occur during stress and prepare the body to meet the associated demands. Humans share this response with other animals, and it has been part of our physiologic makeup since the earliest times.

The “fight-or-flight” response occurs automatically in a dangerous or challenging situation—or one that is perceived as being dangerous or challenging. Within a split second, the sympathetic nervous system “turns on” and the pituitary gland releases certain hormones that result in the pouring out of adrenaline-like substances and cortisol, which gird the body and the brain for action. In response to these hormones, many changes occur throughout the body. The heartbeat quickens, the blood pressure rises, and blood is directed to the large muscles and the brain—the areas that need it most for effective performance. Fat is mobilized from tissues in the body where it is stored and transformed into fatty acids so that it is available to fuel the muscles.

In situations of real danger, such as being caught in a fire, the physiological changes that occur with stress can be life-saving, as they ready the body for extraordinary action. When demands are physical, as they often were in earlier times, the hormones and fats released during the stress response are rapidly delivered to the muscles by the increased heart rate and blood pressure. In the muscles, they are “burned up” as the work is carried out. Thus, the sympathetic nervous system response can lead to effective mobilization of the body’s resources to respond to highly challenging physical demands. While it is hard to mistake the pounding heart and sweating palms of a full-blown fight-or-flight response occurring in the

face of physical threat, the response to mental challenge or to chronically stressful situations may be more subtle—and more damaging.

MENTAL STRESS AND THE DEVELOPMENT OF HEART DISEASE

Mental demands, more characteristic of modern-day life, are different from physical demands. They do not abate—there’s always more to do—and hence the demands may be more continuous. Meeting mental demands requires lower, but ongoing, levels of stress hormones and fatty fuels. Yet, the physiological response to a situation is the same whether it calls for physical work or mental work. When the work to be done is mental, the hormones and fats that have been mobilized for action are not used up. The unnecessarily high heart rate and blood pressure set up a condition of increased turbulence in the bloodstream, which in turn increases the tension on the walls of the arteries; this is particularly the case in the coronary arteries, which provide the heart with its own supply of nourishment.

The increased turbulence and the circulating stress hormones may damage the lining of the arteries. When such damage occurs, platelets in the blood (which are also mobilized by the stress hormones) adhere to the injured walls in an attempt to promote a healing process. Unfortunately, the healing process results in a thickening of the arterial wall—setting the stage for a possible blockage. The thickened wall attracts other substances in the blood, most notably low-density cholesterol (LDL), which is produced by the body from mobilized fat left over from the behavioral stress response. Over time, some scientists believe, this process may also result in a speeding up of the process of atherosclerosis in the coronary arteries. It is this process of stress reactivity that many believe plays a key role in the development of atherosclerotic heart disease.

STRESS, MYOCARDIAL ISCHEMIA, AND HEART ATTACK

Whatever its cause, when the narrowing that has developed in a coronary artery grows to the point that blood flow is significantly reduced, stress can lead to a condition known as myocardial ischemia. This con-

dition occurs when the amount of blood reaching heart tissue through the coronary arteries is not enough to support the pumping work the heart is doing. How can stress make this happen? Remember, the stress hormones cause the heart to pump harder and faster. If the blockage in the coronary arteries is severe enough, the heart may reach a point where its work cannot be supported by the amount of blood that can pass through them. Moreover, while the stress hormones cause a normal, healthy artery to dilate—that is, open wider to allow more blood to pass—they may cause an artery that is diseased by blockage to constrictor become narrower, reducing the flow of blood even further. As an example, when the blockage reaches 90 percent, the constriction caused by the stress hormones during a stress response and the blood platelets mobilized by the hormones during this response can actually cause the remaining 10 percent to be closed off, resulting in a heart attack.

When myocardial ischemia is provoked by a partially blocked coronary artery in combination with the extra demands of physical work, the effects can be felt as chest pain and other symptoms of angina pectoris. (See Chapter 11.) Sometimes, especially as a result of mental or emotional stress, the ischemia may be silent. Silent ischemia has been found in some studies to raise the risk of a significant coronary event, probably because there are no signals of pain or discomfort that cause a person to slow down or take medication. Indeed, some researchers believe that silent ischemia is one of the factors that may lead to a fatal heart attack.

PSYCHOSOCIAL FACTORS AND THE RISK OF HEART DISEASE

Today's Western society is fast-paced and challenging, and often fraught with insecurity and change. Day-to-day living is undeniably stressful, but it is not easy to measure just how stressful, nor to say what the effect of life stresses on any given individual's health and well-being might be. Many individuals handle day-to-day stress without major physiological responses. To delineate the effects of stress, scientists have developed a number of instruments.

One of the best-known of the self-rating scales for stress is the Social Readjustment Scale developed by Drs. Holmes and Rahe of the University of Washington in the mid-1960s. After interviewing thousands of patients, these researchers compiled a list of 43 life

events that are generally perceived as stressful and ordered them according to their stressfulness. Not surprisingly, the death of a spouse heads the list, with 100 "stress points." But events that are positive (outstanding personal achievement) or that happen routinely year after year (school opening) also receive a considerable number of stress points (28 and 26 points, respectively). The critical aspect is how much life change the event requires.

Having followed their patients over a number of years, Drs. Holmes and Rahe concluded that an accumulation of 150 or more stress points in any one year is associated statistically with a significant risk of a major illness such as heart attack within the next two years. This is probably due to the amount of life change the events require and the resulting chronic activation of the fight-or-flight response. These researchers point out that while some of the stressful events are unpredictable or outside an individual's control, others can be postponed or even avoided altogether. By anticipating life changes, where possible, and by planning for them, individuals can do much to prevent too great an accumulation of stress points in a short time, and so can help keep the risk of stress-related illness down.

Many of the more stressful life events listed in the Social Readjustment Scale have a clear association with heart disease. For example, the recent death of a loved one has been connected with heart attack death. So, too, can the intense emotions that accompany a catastrophic event trigger an acute heart attack, or sudden death. In devastating earthquakes such as the one in Athens in 1981, many of those who perished died as the result of fear, not from falling debris. More recently, several fatal heart attacks occurred during the missile attacks outside Tel Aviv in February 1991.

Chronic negative emotions also can have a major impact on heart disease. Individuals who continue to be anxious and depressed as a result of a heart attack show substantially higher rates of illness (a second heart attack, restenosis of coronary arteries, or a change in the pattern of angina pain) and death than those who are able to put these feelings behind them.

In studies by Dr. Robert Karasek of Columbia University, people in different professions were asked to rate their jobs in terms of psychological demand (how taxing their work seemed, what time pressures they felt) and in terms of occupational self-esteem and autonomy. It was found that jobs that combined a high level of psychological demand with a low level of self-esteem and autonomy were associated with higher

rates of heart disease; assembly-line work, in which time pressures are relentless, work is repetitive, and there is little or no autonomy, carried the greatest risk.

Women who work outside the home and also have the responsibility for children and housework are in a particularly stressful situation. They report more stress-related physical and emotional symptoms (depression, nightmares, gastrointestinal disturbance, a sense of being overwhelmed) than do either employed men or housewives. Not surprisingly, those who are lower on the socioeconomic scale and have less help at home experience more stress. They also have a greater incidence of heart disease.

Illness itself is profoundly stressful, and heart disease perhaps particularly so. This can be most evident in the year after a heart attack. After taking into account the severity of the underlying disease, researchers have found that psychological factors and stress play a key role in this circumstance. In one study, successful coping with the recuperation process was shown to be associated with a better prognosis. Cardiac patients who failed to adjust adequately to their illness while in the hospital coronary care unit, however, had higher death rates in the first six months following discharge than their better-adjusted fellow patients. In another study, male survivors of a heart attack who were socially isolated and showed high degrees of life stress (anxiety, competitiveness, sense of pressure) had a risk of death four times greater than that of men with low levels of stress and with strong social and community ties.

In the laboratory, the role of psychosocial and behavioral factors in heart disease has been explored by exposing monkeys to stresses that are designed to mirror those experienced in today's society. In a series of studies in which high-cholesterol diets were combined with social stress, it was found that the socially dominant monkeys were the ones to develop the most severe heart disease, but only when they ate a high-cholesterol diet and were housed in environments where their control or stability was threatened. The environment alone or the diet alone did not produce the same result.

What do these psychosocial factors have in common? And what is it about them that increases the risk of heart disease? The answer is not clear, but we can speculate that they all expose people to chronic, excessive psychological demand, and to chronic states of arousal that cannot be relieved, because of the absence of physical activity or escape.

THE CORONARY-PRONE STRESS RESPONSE AND TYPE A BEHAVIOR

According to many experts, there is a specific constellation of behaviors that increases the risk of heart disease in people who display these behaviors. The two California cardiologists who were the first to describe this, Drs. Meyer Friedman and Ray Rosenman, surveyed a group of fellow physicians and found that their colleagues attributed some heart attacks in their patients to competitive drive and the stresses of work, rather than to smoking, high blood pressure, or high cholesterol. They went on to study their own patients and other individuals in demanding professions, discovering that certain behaviors were more likely to exist in people with heart disease than in others. They called the combination of these behaviors the Type A behavior pattern and the absence of them Type B. The two cardiologists reported that as much as 50 percent of the population can be classified as Type A.

The Type A behavior pattern, according to Friedman and Rosenman, is characterized by a continuous, deeply ingrained struggle to overcome real and imagined obstacles imposed by events, other people, and, especially, time. (The struggle against time is so pervasive that these doctors initially gave the name "hurry sickness" to the behavior pattern they had identified.) Type A men are frequently impatient, competitive, easily irritated, quick to anger, suspicious, and hostile. They are often highly successful in their professions, but are dissatisfied with themselves. They try to do more than one thing at a time—they talk on the phone while working on the computer, or eat while driving—and are preoccupied with deadlines. They tend to speak rapidly and loudly, and often interrupt or finish others' sentences. Type A women share most of these characteristics but generally show less hostility than Type A men, perhaps because girls are taught to handle anger differently. In contrast, Type B people of both sexes are less driven and competitive, more easygoing—and usually as successful as or more successful than their Type A counterparts!

Friedman and Rosenman suggest that Type A behavior represents an effort to diminish an underlying sense of insecurity or self-doubt. Unfortunately, this behavior tends to set a self-defeating cycle in motion. Type A people "choose" more demanding situations

HOW TO LOWER YOUR RISK OF HEART DISEASE

and assess their situations as more demanding and challenging than they really are; they evaluate their response to these situations negatively, increasing the need for more aggressive striving. This aggressive striving leaves them in prolonged contact with the very situations that provoked feelings of insecurity in the first place, and the cycle is repeated.

Why are Type A persons more vulnerable to heart disease than Type B persons? It may be because they have a substantially greater sympathetic nervous system response to stressful or demanding circumstances—more stress hormones, a faster heart rate, higher blood pressure. Because Type A people tend to view a greater number of circumstances as demanding and because they place themselves in a greater number of demanding circumstances, they experience these heightened physiological responses for longer periods of time each day. Many studies have found that Type A individuals tend to maintain high levels of stress hormones throughout the daytime hours—levels that do not abate until after they have gone to sleep. Thus, the deleterious effects of stress hormones on the heart and the arteries (described previously) are greater.

How and when does Type A behavior develop? Is it inherited, or does it result from outside influences? The typical profile has been noted in children as young as 3 years, which suggests a genetic contribution. Further, studies of twins separated from birth indicate that at least some Type A characteristics are inherited. On the other hand, several theorists have suggested that Type A parents may model Type A behavior for their children, who thus imitate rather than inherit the pattern.

Dr. Karen Matthews, of the University of Pittsburgh, has noted striking parallels between the behavior of Type A adults and Type A children. Type A children, like adults, work at rapid rates (with and without deadlines), have high aspirations, and are more often impatient, frustrated, and aggressive than Type B children. As she sees it, Type A behavior may develop as the result of child-rearing practices in which parents and strangers alike urge children to achieve at higher and higher levels, but give them ambiguous standards for evaluating their performance. ("You're doing fine, but next time try harder.") This leaves the children frustrated, without a sense of belonging, and mistrustful of society. Moreover, there seems to be a snowball effect: Children react to the combination of positive evaluation ("You're doing well") and urging of improvement ("Next time, try harder") by becoming

more competitive. In turn, competitive, impatient children elicit more positive evaluation and urging. The structure of the American classroom, with its reward system, its competitiveness, and its hourly bells, can be seen to encourage such behavior in children whose home environment makes them susceptible.

The Bortner Type A Rating Scale

Check the space that most clearly describes where you fall on each dimension.

- | | | |
|---|-------|---|
| 1. Never late. | ----- | Casual about appointments. |
| 2. Very competitive. | ----- | Not competitive. |
| 3. Anticipate what others are going to say (nod, interrupt, finish for them). | ----- | Good listener. Hear others out. |
| 4. Always rushed. | ----- | Never feel rushed, even under pressure. |
| 5. Impatient when waiting. | ----- | Can wait patiently. |
| 6. Go "all out." | ----- | Casual. |
| 7. Try to do many things at once, think about what to do next. | ----- | Take things one at a time. |
| 8. Emphatic in speech (may pound desk). | ----- | Slow, deliberate talker. |
| 9. Want good job recognized by others. | ----- | Only care about satisfying myself, no matter what others think. |
| 10. Fast (eating, walking, etc.). | ----- | Slow doing things. |
| 11. Hard-driving. | ----- | Easygoing. |
| 12. Express feelings. | ----- | "Sit" on feelings. |
| 13. Few interests outside work. | ----- | Many interests. |
| 14. Ambitious. | ----- | Satisfied with job. |

Source: Bortner, "A Short Rate Scale as a Potential Measure of Pattern A Behavior," *Journal of Chronic Diseases*, 1969, vol.22, pp. 87-91.

MEASURING TYPE A BEHAVIOR

Type A behavior is not a personality type, but a constellation of behaviors, all contributing to a pattern. The challenge in “diagnosing” Type A is assessing the relative presence or absence of these behaviors. Two general methods have been devised for this task: structured interviews and self-report questionnaires.

The “gold standard” in Type A assessment is the structured interview method developed by Rosenman and Friedman. The interviewer asks a series of questions designed to elicit the individual’s response to situations that might be met with impatience, aggression, competitiveness, and hostility. For example, subjects are asked how they react to waiting in lines, driving in slow traffic, and facing deadlines at work and problems at home. The interviewer evaluates style of response as well: displayed irritation, for example, and explosive, loud, and rapid speech. Classification of individuals is based on admission of Type A behavior (“Yes, I walk and eat fast, and I do two things at once”) and on the behavior and speech patterns observed during the session; the latter two carry more weight. In a more precise format, the interview is videotaped so that the frequency and intensity of such Type A behavior indicators as head-nodding, rapid eye-blinking, hostile face set, and vehement gestures can be seen.

Self-report methods usually involve a list of items on an evaluation form that quizzes subjects about their Type A behavior. (For an example, see box, “The Bortner Type A Rating Scale.”) These questionnaires have the disadvantage that responses are based on self-perceptions (subjects may be pleased to characterize themselves as ambitious and assertive, less likely to admit to being hostile or impatient). However, self-report methods are less expensive and easier to administer.

TYPE A BEHAVIOR AND THE ASSESSMENT OF RISK

Large-scale studies on Type A behavior as a risk factor for heart disease began in the early 1960s. The Western Collaborative Group Study (WCGS) fol-

lowed 3,500 healthy men for more than eight years and demonstrated that (1) Type A was an independent risk factor for heart disease; (2) men characterized as Type A had roughly twice the risk of developing heart disease as their Type B counterparts; and (3) the pattern was a good predictor of a second heart attack in men who had already suffered a coronary. Similar results were found in the Framingham Heart Study.

A review of these and other studies, in 1978, supported the association of Type A behavior with an increased risk of heart disease in employed white middle-aged men. The risk appeared to be greater than that incurred by age, elevated blood pressure, elevated cholesterol, or smoking. Follow-up data from these studies as well as new data from studies conducted in Europe and the United States have given further support to these conclusions.

A number of more recent studies, however, have not found an association between Type A and recurrent heart attack or early death from heart disease. This discrepancy may stem from problems in the methods used to assess Type A in these studies. More research remains to be done, but evidence suggests some type of a causal link between the Type A behavior pattern and coronary heart disease.

The initial studies on risk-associated stress-response patterns focused on middle-aged men in white-collar jobs, but do the findings also apply to blue-collar workers? There is no clear answer. The Framingham Heart Study, which included both white- and blue-collar men, predicted a greater risk of coronary heart disease in white-collar Type A men than in their blue-collar counterparts. On the other hand, a European study of male civil servants and factory workers found that the Type A behavior pattern was a significant predictor of coronary disease in both groups.

Studies of people who have already had heart attacks indicate that Type A behavior increased the likelihood that another heart attack will occur. Dr. Lynda Powell of Yale University and Dr. Carl Thoresen of Stanford University recently demonstrated that “living a life-style of chronic struggle” is a significant predictor of recurrent heart attack, independent of the risks incurred by high cholesterol, high blood pressure, and relative weight.

The subjects of most studies on Type A behavior and heart disease risk have been men. However, some data do exist on women. In the Framingham study, Type A behavior has been shown to be a predictor of heart disease and angina in women aged 45

to 64. Among employed women, especially clerical workers, those with three or more children appear to be twice as likely to develop heart disease as those who have no children. Overall, heart disease was found to be four times more prevalent in Type A working women than in Type B working women. The women in Thoresen's study who were at the greatest risk of a second heart attack were extremely anxious, accommodating, tolerant, and unlikely to express their anger. In contrast, the men most at risk scored high on hostility and anger.

With children, the question is whether the Type A behavior pattern continues over time—that is, whether it will persist into adulthood and put these children at risk for heart disease in their adult years. A study at the University of Stockholm showed that Type A-related behavior—including aggressiveness, hyperactivity, overachievement, and high ambition—measured in 13-year-olds remained the same at age 27. From other studies we know that Type A attributes assessed during college predict heart disease later in life. We also know that coronary artery disease is a gradually progressive disease that begins in childhood. While this evidence is compelling, a definitive study is needed to clarify the true role of Type A behavior through the life span.

MODIFYING THE RISK OF STRESS

Like the risks of smoking, high blood cholesterol, and high blood pressure, the risks associated with stress

and behavior can be modified. A number of activities and learned responses can have a beneficial effect on stress. For example, regular aerobic exercise can reduce the level of stress-related hormones circulating in the blood. (See Chapter 7.) Even the moderate exertion of a brisk walk at the end of the day can be beneficial, because it may help to “burn off” the excess hormones produced by hours of stress.

For some, individual counseling and psychotherapy are helpful; many experts consider that the changes brought about by this approach are the most profound and long-lasting. Group therapy has also proved useful, especially with people who have been bereaved, and with those who have had traumatic experiences. Building, or rebuilding, a network of supportive interpersonal relationships can help moderate the effects of life stress and provide protection from its consequences. There is growing evidence that “loners” and people without strong attachments to others are especially vulnerable to stress. Caring for a pet provides a “buffer” against stress for some individuals.

RELAXATION TECHNIQUES

Simple relaxation techniques can easily be learned. (For an example, see box, “The Relaxation Response.”) If practiced regularly, they reduce the degree and duration of sympathetic nervous system arousal produced by stress. Yoga, transcendental meditation, and t'ai chi have similar effects.

There are also more formal programs that teach relaxation techniques. In Progressive Muscle Relax-

The Relaxation Response

According to Dr. Herbert Benson of Harvard University, the relaxation response is an innate mechanism that can be used to counteract the effects of the innate “fight-or-flight” response. One technique for eliciting the response is as follows:

1. Sit quietly in a comfortable position. It is important that there be no undue muscular strain in the body.
2. Close your eyes.
3. Beginning at your feet and progressing up to your face, relax all your muscles and keep them relaxed.
4. Breathe through your nose, naturally and evenly,

becoming aware of your breathing. As you breathe out, say a short phrase or single word, such as “ONE,” silently to yourself. The repetition of the word or phrase helps break the train of distracting thoughts.

5. Continue for 10 to 20 minutes. (You may open your eyes to check the time, but do not use an alarm.) At the end of that time, sit quietly for several more minutes, at first with your eyes closed and then with them open.
6. Do not worry about how well you are performing the technique, but adopt a passive attitude. If distracting thoughts occur, disregard them and redirect your attention to the repetition of the word or phrase.

ation, therapists teach a series of muscle tension and relaxation exercises, lasting five to ten seconds for each muscle group. Patients are instructed to note the difference between sensations associated with tension and those associated with relaxation. Deep breathing is added for further relaxation. With training and continued practice, subjects can recognize the initial sensations associated with sympathetic activation and achieve a relaxed state that reduces physiological arousal but does not prevent them from functioning effectively.

BEHAVIOR MODIFICATION TECHNIQUES

Among stress reduction treatments, the best-documented are the behavior modification techniques. In most of these methods, patients receive training in deep muscle relaxation and practice relaxation responses during imagined stressful situations, such as being behind a slow driver or having to wait for change at a cash register. Special focus is placed on helping people recognize their arousal cues. Patients are also taught to examine their mental and emotional responses and to restructure them in a nonstressful way. These interventions are not aimed at changing the value people place on achievement, but at changing the style in which they strive toward their goals. In healthy individuals, changes have been documented in psychological symptoms and, in some cases, in cholesterol and blood pressure levels.

Patients with coronary heart disease respond well and benefit from treatment aimed at stress reduction, according to several investigations. In one long-term study conducted by Dr. Nancy Fraser-Smith at McGill University in Montreal, patients who received stress management services were found to experience fewer complications or cardiac events than patients who did not receive these services. In another large-scale study, the Recurrent Coronary Prevention Program in San Francisco, post-heart-attack patients who exhibited Type A behavior were assigned either to a group that received behavioral modification training plus cardiac counseling (regarding such risk factors as diet or exercise) or to a group that received cardiac counseling alone. Those in the behavior modification group learned how to recognize their exaggerated physiological, mental, and behavioral reactions to stressful situations. They were taught how to relax physically and mentally, as an alternative response. Lectures, demonstrations, role-playing, and behavioral drills helped them develop new, non-Type A coping skills. After the first year, people in

this group showed a lessening of their Type A behavior; four and a half years later, they were found to have approximately half the number of heart attack recurrences as the group that received only cardiac counseling.

Most experts believe that behavior modification programs are worthwhile for at-risk individuals. In general, they say, it depends on the person: his or her history, condition, preferences, and, especially, willingness to participate. Among the techniques most widely used are the following.

Biofeedback

In biofeedback training, people are provided with continuous information that tells them how their bodies are responding, and then they are taught to control certain stress-related physiologic responses. Stressful challenges are presented and the body's response is measured and "fed back." The feedback may be audio, using beeping sounds that denote a rise in blood pressure, or visual, using graphs on a monitor showing heart rate. For example, to reduce blood pressure, a "constant cuff" obtains beat-by-beat measurements of relative pressure and emits a tone when pressure rises. The patient is instructed to "keep the sounds off." To help patients reduce cardiac arrhythmias, or abnormal heart rates, biofeedback trains them to alternately accelerate and decelerate the rate, by noting the difference on a pulse monitor. Having learned how to manipulate the rate, patients are then able to maintain it within a fixed range. Biofeedback is known to be moderately effective—as effective as relaxation training. Because equipment is required, however, it is more expensive to administer.

Anxiety Management Training

Anxiety management training is a brief, three-stage cognitive-behavioral program to provide subjects with stress management skills that can be easily applied to tension-producing situations. The program includes practice in imagery, in increasing awareness of physical sensations, and in deep relaxation techniques. A special offshoot of the therapy, which emphasizes the modulation of responses when the stressors have to do with time urgency, has been designed for cardiac rehabilitation programs. Anxiety management training has shown some promising results in controlling high blood pressure.

*Anger Management Training/
Stress Inoculation Therapy*

Anger management training, or stress inoculation therapy as it is sometimes called, is an effort to modify anger and hostility by teaching effective coping skills. As in anxiety management training, there are three phases to the treatment. In the first, the therapist helps the individual observe and focus on his or her individual perceptions of a situation as anger-arousing and to record responses to such situations in a diary. Individuals are taught to discriminate between what is a positive display of anger and what is not. In the second phase they learn to use coping strategies—relaxation procedures, meditation, and humor, for example—to help replace angry thoughts with thoughts that are more adaptive. Assertiveness training is employed to teach nonaggressive communications in which patients learn to express negative sentiments without antagonizing others.

The third phase involves role-playing; the person is presented with provocative situations that he or she is likely to encounter in real life. Under supervision of the therapist, the patient learns to manage them with the newly acquired coping skills. Stress inoculation training, often used in cardiac rehabilitation, has been found especially effective in reducing high blood pressure.

All programs mentioned above are safe, as long as they are properly administered. It is important for persons seeking a behavior modification program to make certain it is run by a qualified health professional, preferably in a medical setting.

**WHEN SHOULD TREATMENT BE SOUGHT,
AND BY WHOM?**

People can rely on common sense and the examples of the signs and symptoms of stress listed in the earlier part of this chapter to answer these questions. In general, however, the services of a psychologist trained in stress management and stress reduction techniques may be beneficial to people who:

- Work in a demanding job and find that they experience more than five of the signs and symptoms of stress on a regular basis.
- Are experiencing one or more major life events such as the death of a loved one, a new home, or a divorce.

- Recognize themselves in the description of attributes associated with the Type A behavior pattern.
- Have heart disease (heart attack, angina pectoris). This is particularly helpful for people who also have characteristics of Type A, or are finding that the adjustment to life with heart disease leaves them feeling chronically anxious, worried or depressed.

SUMMARY

Stress in itself is not necessarily a negative condition; in fact, it can have positive effects, giving individuals an added “edge” to do their best in challenging situations. But it can be detrimental if it is not handled properly.

A physiologic holdover from ancient times, the fight-or-flight response to a stressful situation helps the body mobilize for physical defense. When it occurs in response to mental stress, however, the hormones and fatty fuels it unleashes can be excessive and thereby set the stage for coronary heart disease or exacerbate existing myocardial ischemia. Among other things, these changes can raise the heart rate and increase the blood pressure by constricting the blood vessels, both of which can result in angina pectoris or other manifestations of myocardial ischemia.

Whether responses to stress are inherited traits or learned behavior is not yet clear; however, research has clearly shown that there are certain types of behavior that raise the risk of heart disease. This constellation of traits—which includes anger and hostility, extreme competitiveness, and preoccupation with time pressures—is sometimes referred to as Type A behavior. Fortunately, it can be modified with counseling and behavior modification training. Other useful antidotes to stress include aerobic exercise, relaxation exercises, and meditation, or just plain reading a book or taking a walk.

Although much has been learned in 30 years of scientific investigation, the exact roles of stress and behavior in heart disease need greater examination. They are, perhaps, the most difficult risk factors to study, yet it is only through research that we will find the clues to effective prevention and treatment.

