



*From the Desk of Dr. Stephen Sinatra*

## Stress and the Heart – Behavioral Interaction and Plan for Strategy

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Reprinted from Connecticut Medicine  
February 1984 Issue, Vol. 48, No. 2

## Stress and the Heart—Behavioral Interaction and Plan for Strategy

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**ABSTRACT**—For centuries, psychological and behavioral factors have been known to influence disease. The powerful role of the mind in health and healing has long been recognized, and physicians have been particularly cognizant of the impact of emotional states influencing acute and chronic disease. The following communication is a representation of a lecture given by the author throughout many of the hospitals in Connecticut. The article discusses the role of emotional stress, suppressed feeling, behavioral in-

teraction and cardiovascular disease. Type A coronary prone behavior is becoming an adaptive and frequently maladaptive behavioral response in a modern society faced with rapidly changing times. Research suggests that Type A behavior may be the missing link and perhaps the strongest predictor in the genesis of future coronary heart disease. Since many physicians themselves are prone to Type A behavior, it is particularly important for physicians to be aware of the manifestations of "Type A-ness." In the following article, behavioral manifestations of coronary heart disease are described with particular emphasis on the individual variability of one's physiological and psychological behavioral response to stress. The origin of Type A behavior is discussed. Some guidelines for detection and management are suggested, and a plan for behavioral strategy is advised.

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Although emotional stress has long been recognized by the physician as an intuitive belief in the etiology of coronary heart disease, sufficient data now exist that psychogenic stress is a major coronary risk factor.<sup>1</sup> Stress is frequently associated with rapidly progressive social change inducing an imbalance between the individual and the environment. With our society's competitive structure, environmental imbalances and rapidly changing social mores, modern man, by necessity, has developed behavioral patterns in response to an uncertain, unpredictable and threatening world. Twentieth century man has responded to external stress with a complex behavioral response composed of multiple variables affecting emotion, feeling and personality. Type A behavior, coronary prone behavior and narcissistic aggressive patterns have become contemporary man's means of coping with an uncertain changing environment.

Anxiety, illness, depression, fatigue, severe emotional and medical problems—these are all symptoms of adult stress and manifestations of coronary prone behavior which often has its origins in childhood.<sup>2</sup> Adults with Type A coronary prone behavior have twice the risk of myocardial infarction over their Type B counterparts.<sup>3</sup> They also exhibit more extensive coronary atherosclerosis, both at autopsy<sup>4</sup> and on angiographic evaluation.<sup>5</sup> One of the major characteristics of coronary prone Type A individuals is a sense of time urgency, competitiveness, desire to control events and easily provoked hostility.<sup>6</sup> Thus, they appear to be high-driving, aggressive, easily annoyed and competitive in their struggle to control events. When attempts to control are met with repeated failure, they act helpless and give up. The Type A behavior pattern, therefore, is a specific way of coping with stressful events in our external environment. Its etiology remains unclear. It may be that certain individuals during early developmental stages of life inherit a predisposition to perform and think rapidly. A subset of these individuals go on and learn to be competitive from family who hurry a child to achieve. Finally, another subset as they grow older, gets frustrated and hostile when others do things more slowly and interfere with their own goal attainment.<sup>7</sup> Others feel that a Type A individual creates a sense of urgency as a result of underlying panic. If the drive of a Type A person is concerned with control, the individual strives to break free because on some level he feels trapped.<sup>8</sup> Research in this developmental phenomenon of Type A behavior in childhood has identified certain behavior patterns that mirror the adult Type A coronary prone behavior pattern. Such behaviors as eating and talking fast, talking loud, being high-driven and diligent, characterize children who at early age demonstrate physiological evidence predictive of future cardiovascular events. Even in childhood, measurement of the Type A behavior pattern has demonstrated increased levels of cholesterol and blood pressure values.<sup>9,10</sup> When adults, these Type A children may go on to develop self-destructive coronary prone

behavior culminating in coronary heart disease. Since disease may be an ongoing process which frequently has its origin in childhood, the inappropriate coping styles and maladaptive behavior patterns may result in biochemical alterations which may eventually predispose individuals to pathological situations.<sup>11</sup> Of cardinal importance and perhaps the major theme in this communication is an individual's behavior response to stress. Although the inherent Type A behavior pattern is quite significant, one's physiological and psychological behavioral response to stress is of paramount importance and is perhaps the catalyst in the stress-distress cascade (Table 1) which may eventually culminate in illness. Several investigators, for instance, have demonstrated the independent variability and susceptibility of an individual's response to stress. Selye,<sup>12</sup> for instance, in describing the general adaptive syndrome revealed the importance and relevance of the stressor and stress response model. Wolff et al<sup>13</sup> demonstrated the effectiveness of defense and coping styles, in parents dealing with terminally ill children. In a previous study,<sup>11</sup> we demonstrated the significant impact of a positive self-image and "support" in an individual's response to stress. Moreover, it has been demonstrated that negative emotions, particularly fear and depression, may be associated with a significantly higher incidence of disease and is frequently seen in situations of recent bereavement.<sup>14</sup> Hence individuals will exhibit a difference in susceptibility to disease based upon their own feelings and their own characteristic response to various stressors.

Table 1  
STRESS-DISTRESS CYCLE

- |   |
|---|
| 1. External performance demands, challenges, stressors      |
| 2. Internal behavioral response—physiologic and psychologic |
| 3. Biochemical alterations—neuroendocrine response          |
| 4. Optimal stress vs. distress                              |
| 5. Adaptability vs. maladaptability                         |
| 6. Pathological changes—illness                             |

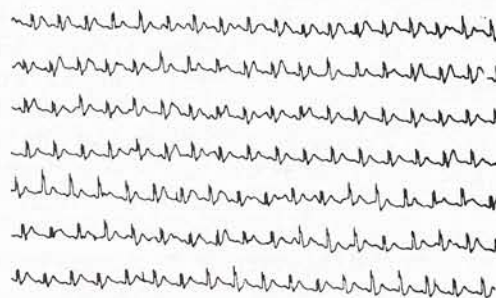
Accordingly, one has to consider the strong behavioral and emotional components of maladaptability frequently manifesting itself in the well-known traditional cardiovascular risk factors. The impact of neuroendocrine mechanisms in the acceleration of atherogenesis, for instance, has been demonstrated in experimental animal studies<sup>15</sup> and hypertension has been associated with internalized anger and rage and an increase in norepinephrine levels.<sup>16</sup> Multiple lipid studies have also demonstrated subsets of individuals prone to an increased lipemic response as a result of emotional<sup>17</sup> and/or occupational stress.<sup>18</sup> Maladaptive mechanisms such as smoking, overeating, overuse of alcohol and hypertension are frequently seen as an individual's maladaptive coping mechanism in response to chronic stress. Personality type, experience, adaptability and cultural factors may also determine why one individual responds to a stressful event by developing disease while another does not.<sup>19</sup> External stressors, feelings, personality and one's intrinsic behavioral response to stress are frequently observed as

significant variables that may interact in the pathogenic process. Chronic stress may potentiate underlying structural disease and acute psychological arousal may actually precipitate overt attacks.<sup>20</sup> In one study, high levels of anxiety, depression and sleep deprivation were found in coronary patients<sup>21</sup> and in another study, the high incidence of myocardial infarction and sudden death was found in depressed individuals with recent changes in their psychological arousal.<sup>22</sup> Acute psychological arousal and active coping increase sympathetic activity and augment the discharge of catecholamines such as norepinephrine which may elevate blood pressure, enhance the rate of arterial damage and facilitate the occurrence of fatal cardiac arrhythmias.<sup>1, 23, 24</sup> With a shift to parasympathetic dominance, often associated with helplessness in giving up, there is severe depletion of norepinephrine.<sup>25</sup> One theory is that it is this abrupt shift between sympathetic and parasympathetic activity which may contribute to sudden unexpected cardiovascular disorders, including sudden cardiac death.<sup>26</sup> The chronic struggle to exert control over threats in the environment with a subsequent increase in sympathetic activity may result in maladaptive behaviors that cannot possibly succeed. This may result in cumulative, negative and physiological consequences as seen in the following example. A corporate executive, on his way up in the company, has found his expected promotion blocked due to company politics. It will come, but not so soon as he has anticipated. Meantime, his work goes on, pressured, but no more than usual. He has, however, begun to develop headaches and shortness of breath, both of which generally disappear on weekends. Life at home is pretty much the same; relationships are fine, if occasionally unsatisfactory. However, in the last month, he has had to buy a new car, pay towards his son's braces and try to understand his wife's need for increased self-fulfillment. It is now Saturday evening, our executive is unwinding from his time-pressured hectic week by having dinner in a local restaurant with his wife and another couple. Over cocktails and cigarettes, they laugh, sharing stories of family situations and job pressures. They order bottles of wine and enjoy a dinner high in lipid content. Later that evening, our corporate executive suffers a massive myocardial infarction.

This is a typical scenario—the scenario of sudden unexpected cardiac death. Generally, there are strong behavioral and psychological factors just preceding the event. Sudden death occurs more on Monday and Saturday and is related to either gearing up or gearing down.<sup>27</sup> The profile of the person typically affected is the middle-aged male who has recently ingested an alcoholic and free-fatty acid meal. He is a smoker, is psychologically hyperactive and is generally experiencing some acute stress. In all probability, he has a tendency towards hypertension and/or a tendency towards arrhythmia (Figure 1).

It is easy to look at this rather typical corporate executive and see that he has violated nearly all of the risk

## Control



## Psychologic Stress Testing

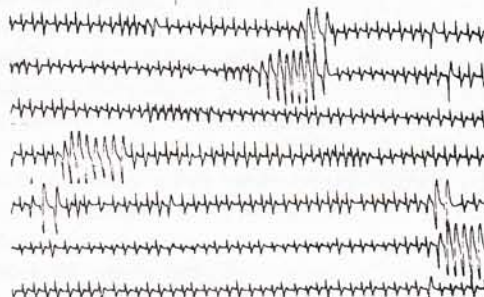


Figure 1

Ventricular tachycardia induced by psychologic stress testing (monitor leads). TOP, control tracing preceding test shows sinus rhythm at 65 beats/min. (During the preceding 24 hours of monitoring, no advanced grades were recorded.) BOTTOM, during psychologic stress testing, heart rate increased to 92 beats/min, and recurrent runs of supraventricular tachycardia and ventricular tachycardia occurred. (With permission from Lown, et al: *Roles of Psychologic Stress and Autonomic Nervous System Changes in Provocation of Ventricular Premature Complexes*. *Am J of Card* 41:979-985, May 1978.)

factors associated with heart disease. He has chosen to ignore the cost his body will pay for his life style. Generally, the question is "why?" Why does a person put so much strain on his body that ends in total collapse? The answer, complicated and relative, lies in perceived needs, unspoken fears, and a strong need to succeed according to external and societal standards. To even begin to alter these needs would be a lifelong nearly impossible task. For these individuals, the question is not so much "why" as "how." How can they maintain their goals, meet their needs and yet keep their bodies from paying too high a price. The answer is woven within the words "STRESS," a six letter word that has become a tapestry of why's and how's.

The world is filled with situations and happenings; some by their own very nature, are more important than others. Hunger and deprivation are unquestionably more important than a flat tire. Except for the individual who has to deal with one flattened tire and no jack. A failing grade should be eminently more important to a college coed than a broken fingernail except if she views her polished fingernails as a source of attractiveness. The flat tire and broken fingernail, then become external stressors in these person's lives. How they respond to these and other stressors will determine their bodies physiological reaction and ultimate health. A stressor is something to which special

weight and significance has been attached. Stress is a resistance of the body and mind to those external stressors; it represents an individual's response to threat, demand, or change. Stress can be something as simple as a feeling of being overwhelmed—too much to do and not enough time to do it; it can be the lack of surrender—the inability to give into a situation with fear of losing control; or it can be the feeling of threat or uncertainty. Often a stressor cannot be changed or even controlled. What can be controlled, however, is the patient's behavioral response that develops due to an individual's response to the external stressor. When the promotion does not come, when the tire goes flat, when the fingernail breaks, the individual has only one of two choices—adapting or maladapting. He can adapt by "going with the flow," accepting situations or working to affect the change. Or, maladapting. He can prepare his body for visceral vascular readiness, either withdrawing into himself or pushing beyond normal expectations in an effort to make the stressor go away. Sometimes, this maladaptability is exhibited in coping styles that are unhealthy and inappropriate such as drug or alcohol abuse, overeating or overworking. These activities, in themselves take an enormous toll on the body.

Today's stressed individual cannot "fight or flee," an effective mechanism used by our ancestors. Within the confines of a sophisticated and demanding society, most people accept external stresses by putting their bodies in a chronic state of preparation. The chronic alarm reaction that develops is a harmful response in which the body continuously overdoses on its own cortisol and adrenalin.

When the body enters into this modern fight-flight response, the released catecholamines raise blood pressure, increase heart rate and breathing. If the body remains in this chronic alarm action for any length of time, the individual becomes prone to any of the stress produced conditions, ranging from aching neck muscles and headaches to ulcers, allergies, diminished sexual desire and perhaps cardiovascular disease.

The biochemical alterations that occur from the behavioral response to stress are powerful, and physicians have long been witness to both the physiological and psychological responses to stress. When these responses are inappropriate or ineffective, the individual develops "distress." When the person cannot find an appropriate adapting mechanism to a particular stressor, he, by necessity, maladapts. Pathological changes that occur in the body because of this maladapting and hormonal secretion can be long term and even permanent. (Table 1)

The corporate executive cited earlier is a perfect example of the individual who maladapts to stress that is out of his control. He overworks; he overeats; he smokes. All of these are behavioral reactions to, and manifestations of, stress. He is also doing grave harm to his body. In addition, because he is always reacting to stress and very seldom adapting to it, his body remains in a chronic state of visceral vascular readiness. It is no coincidence

that eventually he suffers an unexpected cardiac event.

Much of the answer in dealing with stress lies, not in the stressors themselves, but in an individual's response to these stressors, i.e., his behavioral response and coping style. An important step in learning how to adapt is recognizing some of the situations that create stress. These can be lack of communication, unfulfilled expectations, retirement, death of a loved one, job pressures, hostile relationships, and particularly important, dwelling upon past events or imagined future ones. Dwelling on "what might have been" or how life will change with future imagined events may influence stress biochemicals. So often, a patient will tell his physician, "my life will work when I retire" or "my life is going to be O.K. when I get divorced" or "when I change my job, things will begin to change." These projections keep the body in a constant state of anticipation and the eventual reality of unfulfilled expectations has a devastating effect on the body. The key is to live for the moment, to deal with problems as they occur rather than put them off to some vague future time. Life is now, this is it; and any real change is not going to come because of a relocation, advancement or a retirement; it will come only through adjusting attitudes towards present circumstances and understanding that the burden of future happiness cannot be placed upon a single, anticipated event. However, because attitudes and behaviors are learned at an early age, they are often difficult to change. Rather than enhance coping, attitudes and beliefs can actually become a barrier. They create the "truth" to which the body must react. An employee says, "my boss always makes me feel inadequate." In truth, the boss does not make him feel inadequate; he does, however, serve to enhance the employee's already established attitudes about himself. The employee reacts by becoming tense and hostile whenever his boss is around. Changing jobs will not alleviate the problem; it will only surface again. The only way for the employee to change the situation is to develop positive attitudes about himself and his capabilities. A great deal of stress is actually the result of the individual upsetting himself, of reacting to a situation by saying "such and such has been done to me." In all actuality, nobody can make another person feel inadequate, unhappy, unloved or guilty. These feelings and insecurities come from within and are accepted from outside sources only when the belief already exists. The immediate stress can be relieved if the person removes himself from the external situation that reflects these attitudes. The long term coping will only come when the individual begins to alter his own attitudes and beliefs about himself. This is the power of self-talk—a powerful coping skill.

This is where physicians come in. Today, more than ever, we are dealing with patients whose diseases are a result of mind and body and no longer capable of coping with external stressors. Over a period of time, the patient has lost his ability to adapt to the presence of the world; yet he is not able to remove himself from them. The result

is illness. One of the greatest challenges for today's physician is to treat these illnesses by looking for the cause as much as for the treatment. Cause and cure are inter-related in such a way that total cure cannot be affected until the cause is determined and treated. This generally means that the patient and physician share in the healing process. Patients have the power to enhance healing; it is the role of the physician to stimulate that power. One of the most effective methods utilized by physicians in this healing partnership is that of listening. A powerful medicine, it has also become a modern day art form. When a physician listens in a non-hurried, non-judgmental manner, the patient unearths feelings about himself and his behavior, and begins to understand which actions become personally self-destructive. With some direction, the patient can try on new behaviors which may result in better coping and therefore, less stress. Because behavior is learned at a very early age, quick or drastic changes cannot be expected. Changes will be gradual and, in all possibility, there will be resistance from many patients who want the "quick pharmacological" cure. It will be up to the physician to point out, for instance, the causes of over-arousal which frequently result in biochemical alterations resulting in more susceptibility to illness and disease. (Table 2) It will be up to the physician to point out the cause and effect relationship between behavior and disease and urge the patient to adapt more effective coping mechanisms. A person with a Type A personality will probably not be able to shed the traits which have seen him successfully through life. But, with guidance from his physician, he can learn to be healthier Type A.

Table 2  
CAUSES OF OVER-AROUSAL

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|--|
| <ol style="list-style-type: none"> <li>1. People exerting excessive control over our lives</li> <li>2. Unacceptable time pressures</li> <li>3. Sleep deprivation</li> <li>4. Increased frequency of life style events</li> </ol> |
|--|

Stress, and its resulting illnesses, occur when the body is no longer able to effectively cope. When the body, itself, has remained too long in the chronic alarm stage. This happens most often when the patient is going through major lifestyle changes. Very often, the changes may have already taken place. The reactions, however, are still occurring. Too many lifestyles changes within a short time can trigger a bodily breakdown including a major cardiac event.<sup>28</sup> It is important for the physician to recognize this and not, unwittingly, add to the stress, by requiring even more adjustments for the sake of the patient's health. An example of this might be the person who has had frequent lifestyle changes and sees his physician for treatment and investigation of illness.

If the physician sees the signs of possible coronary insufficiency, he tells his patient to immediately give up smoking, lose weight and alter his diet. More lifestyle changes, perhaps too many at once. Before requiring more changes from his patient, it is essential that the physician encourage him to talk about his life in other ways, that

he might better handle the stressors he is facing. Once effective coping mechanisms have been discussed, the physician can move slowly into the necessary medical requirements that also require a change in lifestyle. If at all possible, these should be implemented one at a time, leaving room for adjustment—smoking one month, diet the next. The objective is to keep the limits of stress and arousal within the patient's coping capabilities in order to avoid excessive biochemical stimulation.

There are no easy answers in dealing with the manifestations of stress. It is the result of external and internal pressures placed on individuals who live in a technical, sophisticated society—a society in which competition and financial status are held in high regard. Stress is a by-product of progress and certainly, a life totally void of it would lack challenge, excitement or motivation. Some stress is necessary and even healthy. The important factor is to reduce the amount of unpleasant stressors and to learn techniques that allow for appropriate coping. (Table 3)

Table 3  
BEHAVIORAL MANAGEMENT TECHNIQUES—COPING STRATEGY

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|---|
| <ol style="list-style-type: none"> <li>1. Know yourself—"Listen to the body"</li> <li>2. Learn to say "No," recognize fatigue and remedy it</li> <li>3. Stay fit with proper diet and exercise</li> <li>4. Vacation and leisure time</li> <li>5. Experience emotions without self analysis or editorialization</li> <li>6. Lower arousal through muscle relaxation techniques—yoga, progressive relaxation, bioenergetics, etc.</li> <li>7. Beware of negative "self-talk" and how much we upset ourselves, do not dwell on past and future events</li> <li>8. Laugh and play</li> <li>9. Reduce frequency of life style events</li> <li>10. Cannot fight or flee—go with the flow</li> </ol> |
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One important technique is to reduce the frequency of negative life style changes and another source of release is old-fashioned horse play. Exercise is extremely helpful, and the benefits of exercise were discussed in a previous communication in this Journal.<sup>29</sup> Still another technique is learning to express emotions; it is not weak to cry or show feeling—it is healthy, far healthier than the effects of internalized sadness or anger. And, of course, there is laughter, a medicine that has transcended time.<sup>14</sup>

If a person can contribute, however, unwittingly, to his own disease process, then he is also capable of triggering mechanisms in his mind and heal the body and keep it well. Channeled correctly, the emotions and reactions that hurt the body can also heal. The trick is to be able to look at something negative and find some positive force, no matter how small; to be able to laugh at yourself and not take everything quite so seriously, to be able to communicate honestly and not internalize personal work pressures and be able to reach out, love, and, in return, accept the sincere affection of others. These are the forces and positive emotions that heal. And these are the forces that create a vital and challenging role for today's physician, for he may find a way to unearth and mobilize these positive forces in patients who exhibit disease as a negative reaction to stress. The physician needs to carry his role

another step beyond diagnosis and treatment; he must now accept an active role in responsibility in dealing with the cause of the illness. Only then can health truly be effective and well-being maintained. The physician needs to be supportive and noncoercive and acknowledge his patient's feelings and emotions without his own judgment and editorialization. The physician cannot take away the stress, past or present, in his patient's life, but he can provide the time and the space to explore with the patient the negative forces, as well as any destructive personality traits that have contributed to the illness. In this way, the patient and the physician become partners in the treatment and control of the disease. Both begin to share in the ongoing process of health rather than the treatment of disease.<sup>30</sup> Learning to cope takes practice and awareness. But as patient and physician learn to listen to the body, they will learn what is happening to it ... and why. The body will give a message and will almost always speak the truth.

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