

STRESS AND PHYSICAL ILLNESS

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It has been known for a long time that emotions do produce physiological changes. Walter Cannon postulated that arousing events lead to a specific sequence of activity in the hypothalamus, and the simultaneous activation of the cortex produces a series of physiological changes involving the endocrine and autonomic nervous systems. These series of reactions prepare animals to deal with stressful events by fight or flight reaction. Such stress reaction functions are biologically important because the increased adrenal activity produces: An increase in blood sugar for extra muscular energy, peripheral vaso constriction for extra blood supply to vital organs, increase in respiration for oxygenation to meet the new demand, and an increase in blood coagulation to reduce the possibility of serious blood loss. Thus, in situations causing emotional arousal, all bodily resources are mobilized in a biologically purposeful fashion. Selye¹ further clarified the body's organized reaction to stress which he called "the general adaptation syndrome". He focused on stress response in the pituitary adrenocortical system and the role of adrenocorticotrophic hormone (ACTH) as a mediator.

Hypothalamic centers regulate the secretion of virtually all of the hormones produced in the anterior pituitary, and it has also become evident that psychological stimuli can have an important influence on this neuro-endocrine apparatus. Among the hormones that have been shown to be highly sensitive to psychological stress in both animals and man are ACTH, cortisol, growth hormone, prolactin, testosterone and perhaps thyroxine. Because this group of hormones from the pituitary and its target glands effect virtually every biochemical process in the body, it is obvious that the neuro-endocrine system can play a significant role in somatic disease.

Prolonged emotional arousal produces transient pathological changes in various organ systems, especially those controlled by the autonomic nervous system. Sometimes, as a result of persistent arousal, transient patho-

logical changes become pronounced, and continue for an extended period of time. When this happens, both gross and microscopic changes in the anatomy of the affected organ may occur.

Many psychosomatic theories offer the hypothesis that specific psychological factors, personality traits, intra-psychic contents such as conflicts, defensive mechanisms and past experiences cause somatic disease or physiological dysfunctions.² However, research during the past decade has shown that specific psychological variables or conflicts are not reliable predictors of specific psychosomatic illness. A variety of nonspecific stressors can evoke a specific psychosomatic dysfunction in one individual, while it may evoke an entirely different psychosomatic dysfunction in another individual. The only current evidence for the specificity hypothesis is the relationship between a type A personality trait and the development of coronary heart disease. Friedman and Rosenman have characterized the type A personality as including: Upward strivings, a sense of urgency about excessive consciousness of deadlines, a driven quality of speech and a tendency to be impatient.³

During the last decade, there has been a shift in the focus of interest in psychosomatic illness from specific to nonspecific psychological factors. Research in this area has produced impressive evidence that a wide variety of life stress and life change events can substantially increase the likelihood of developing somatic illness. The nature of the physiological mechanisms by which life stress or change can lead to somatic disease is not yet clear.

Emotional Stress and Heart Disease: There is impressive evidence that psychosocial conflict, emotions and patterns of behavior can and do play an important role in the pathogenesis of certain types of cardiovascular disease. For example, using animals, Buell & Eliot have been able to induce a variety of disease entities, including sustained hypertension, renal failure, accelerated atherosclerosis, coronary insufficiency, myocardial infarction and sudden death.⁴

However, whereas animal studies provide a high degree of control, comparably objective and controlled human studies remain uncommon. Despite these limitations, experimental animal data indisputably links situational stress to cardiovascular disease. This suggests that analogous relationships, although imperfectly defined, may be operating in humans.

Numerous psychophysiological studies have recognized that blood pressure may become transiently or acutely elevated in situations of emotional stress in humans. In most western countries hypertension can be traced to an identifiable biological cause in only 10% or fewer patients. For people living in primitive societies, hypertension is almost totally absent. Nevertheless, immigrants from primitive societies who enter urban communities can develop hypertension.

Emotional Stress and Thyrotoxicosis: Patients with thyroid "hot spots" have been studied for several years. Hot spots are the areas that take-up radioactive iodine more readily than other areas of the gland. It has been reported that changes in the hot spots are related to life strain. Prolonged life stress has resulted in the hot spot progressing to clinical thyrotoxicosis. It has been suggested that the sympathetic nervous system may have a direct influence on the secretion of thyroid hormone, and may act to modulate its effects.⁵

Life Changes - Stress and Illness: Both Rahe and Holmes have studied the relationship between stress (life events) and physical illness.^{6&7} They have concluded that life changes tend to be temporally associated with health changes. In order to study the effects of life change, stress and illness, Rahe & Holmes⁸ have developed a list of 43 life events that normally require adjustments to one's pattern of living which they believed might trigger stress. Rahe⁹ has validated his life events questionnaire on over 2,000 Navy personnel where he found a higher incidence of physical illness among those with scores falling above the study sample mean score of 75.

The relationship of recent life change and myocardial infarction has been studied extensively. A retrospective study of survivors of myocardial infarction in Sweden demonstrated an elevation in the level of life change scores in a six month period prior to myocardial infarction compared to corresponding six months periods in the same patients one and two years

previously. Prospective and retrospective studies of fatalities from myocardial infarction in Swedish and Finnish patients was demonstrated and significantly higher elevation of life change scores during the six months preceding infarction when compared to those who recovered. Fatal cases demonstrated life change scores that peaked 3 - 4 times above the average score.¹⁰

Selye has tended to take on "activation theory" perspective of stress similar to that popularized by Duffy.¹¹ That is, organisms release energy into various internal physiological systems in preparation to overtly react to environmental change. This process is related to seeking what the early neurologist Sherrington¹² has referred to as organismic "integration" or homeostasis. The activation level of it may vary from a low point in deep sleep to a high point when under threat of serious bodily injury. The problem associated with defining stress in this manner is that it is difficult to determine where human reactions to change result in what can be characterized as stress. There are no absolutes in this matter. What may be stressful for one person, may be innocuous or merely stimulations for another. For the author, who does not ski, moving down a snow covered hill on a pair of boards would be a terrifying and stressful experience, for many people, however, this may be perceived as sport, exercise, or even relaxation. Obviously, such factors as an individual's learning experiences, cultural environment, genetic endowments and psycho-social development can play a significant role in defining any ultimate physiopathological response to events.

To define stress that is not always harmful, Selye has used the term "eustress" as opposed to "distress". Eustress results from pleasurable activities, e.g., marriage, adventurous sports (canoeing, mountain climbing, etc.) and sexually oriented activities. The effect of experiencing such stress results in a pleasurable experience. Both distress and eustress can result in activated arousal mechanism and subsequent wear and tear on the body. However, distress may result not only in unpleasant psychological experiences but is more likely to precipitate the breakdown of adaptive and coping mechanisms which ultimately results in persistent physiological disturbances and pathology.

Anxiety is the most common symptom produced by stress, and physicians should attend to anxiety when it affects a patient's

normal functioning. Supportive psychotherapy can provide relief from anxiety in cases where normal functioning is not severely impaired. However, a medical treatment using an anti-anxiety agent is indicated when anxiety is associated with physical problems, such as cardiovascular disturbances, gastrointestinal disturbances, or major impairment in normal functioning. Of course, anti-anxiety agents should not be used indiscriminately nor for an indefinite period of time.

Rubin, describing mind-brain-body interactions, has emphasized the need to consider illness in its total functional and dynamic sense, and suggests the use of therapeutic modalities that might deal with stress related to the psychological factors inherent in the mind, to the neurochemical factors in the brain, to the peripheral pathophysiological factors inherent in the body.¹³ A patient with essential hypertension might simultaneously require anti-hypertensive drugs, anti-anxiety agents, as well as psychotherapy in order to resolve stressful psychological pressures in life.

In addition to recognizing and treating the harmful effects of stress, physicians should not overlook the value of early identification and prevention of the effects of stress. Some people can tolerate a great deal more stress than others. It is important for patients to recognize their level of stress tolerance and avoid pushing beyond endurance. Physicians should watch for psychophysiological responses, such as anxiety, increased heart rate, hypertension, insomnia and immobility. When such symptoms are recognized the pressures and stress should be considered and discussed with patients. Physical exercise, sharing feelings, and assessing the amount of responsibility one can handle are all helpful factors in dealing with stress in a positive manner. By learning health ways of coping with life stress one can prevent the harmful psychological and pathological effects of "STRESS".

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