



From the Desk of Dr. Stephen Sinatra

A Stress Management Program with Biochemical Assay

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A Stress Management Program with Biochemical Assay

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ABSTRACT—The link between stress and cardiovascular disease recently has been gaining increasing popularity among health care professionals. In a stress management seminar, 40% of fifteen volunteers had significant elevations of urine 17-hydroxycorticosteroids. This finding was more apparent in male participants, particularly in those with a history of clinical cardiovascular disease and probably reflects the association of biochemical alterations and frequently observed pathological situations. There appears to be a significant relationship between personality, psychosocial events and

one's interaction with stress and illness. Physicians need to be cognizant of stress and tension management for their patients and particularly themselves since the stress of modern medicine has resulted in burn-out and maladaptability in a considerable portion of health professionals. Teaching people how to cope with stress that relates to disease is a significant step in preventive medicine. The following is a discussion of a stress management seminar utilizing a biochemical parameter as an index of emotional arousal.

For many centuries, psychosocial and behavioral factors have been known to influence disease. Maimonides, in his essays on health and youth,¹ concluded that emotional disturbances caused marked changes in the body. Sir William Osler,² lecturing before the Royal Academy of Physicians in the early twentieth century discussed the "Type A" personality characteristics of the angina prone individual, formerly discussed by Rosenman and coworkers³ as significant factors in the development of coronary heart disease. Recently, there has been renewed interest in the literature³⁻⁷ in the documentation of stress and the pathology of cardiovascular disease. These reports have included numerous animal models in addition to retrospective and prospective population studies and have documented that chronic exposure to emotional stimuli leads to

biochemical changes in the body that may predispose to pathological conditions. For instance, Thiel et al,⁶ describes the high levels of anxiety, depression and sleep deprivation apparent in coronary patients, and Green et al,⁷ describe the high incidence of myocardial infarction and sudden death in depressed individuals with sudden changes in their psychological arousal. The recognition that biochemical alterations and relationship to pathological situations appear to present a major challenge to contemporary health care professionals. Group therapy sessions have been utilized by physicians in helping susceptible individuals recognize established and frequently unsatisfactory psychological responses to life situations. The analysis and strengthening of coping strategies associated with alleviation of "arousal" has become a new therapeutic endeavor in the management of these patients.

Patients and Methods

In a stress management seminar, 18 volunteers agreed to collect 24 hour urine samples for 17-hydroxycorticosteroids. After a two hour introductory session concerning the philosophy of stress and illness, a question and answer period followed enabling the participants to become familiar with the group and to alleviate any effects of novelty on the study. Immediately following the group session and after voiding at

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11:00 a.m., the participants began a 24 hour urine collection. The stress management seminar commenced at 11:00 a.m. and terminated at 7:00 p.m. The focus on this group session was to have participants look at their own reasons for creating stress and tension in their lives. Each person had an opportunity to examine his attitudes and beliefs, and assistance and feedback were obtained from group leaders. Beliefs and attitudes were also examined through relaxation techniques utilizing the Jacobson technique in progressive relaxation as well as other body processes. Each process led to further understanding of how that person participates in creating his own stress. The response of this awareness was considerably varied; it resulted in a great relief to some and a high level of resistance and anxiety for others. The expression of any emotions was encouraged throughout the seminar. A second 24 hour urine collection was obtained 72 hours after the first collection. Urine from three participants had to be discarded because of incomplete 24 hour urine collection. Fifteen urines were collected and analyzed by the modified Porter-Silber reaction for 17-hydroxycorticosteroids.

Results

40% of the patients had marked elevations in the urinary 17-hydroxycorticosteroid fractions. In Table 1, the values of the urinary 17-hydroxycorticosteroid fractions for nine females are shown. Only one female showed a marked elevation of the urinary 17-hydroxycorticosteroid. Table 2 shows the values of the urinary 17-hydroxycorticosteroid fractions in the male participants. Five of the six males showed marked elevation of the urinary hormone.

Table 1
17-HYDROXYCORTICOSTEROIDS
(Normal Range—2-6 mg/24 hour)

Females	Stress	3 Days Later
J.S.	2.9	4.5
M.B.	11.0	5.4
K.P.	7.2	5.9
V.C.	6.2	5.4
C.R.	9.2	10.2
D.T.	2.4	7.2
L.W.	9.2	6.2
K.M.	4.0	4.0
D.R.	4.9	5.4
	6.33 - Mean	6.02 - Mean
	3.03 - S.D.	1.8 - S.D.

Table 2
17-HYDROXYCORTICOSTEROIDS
(Normal Range—2-10 mg/24 hour)

Males	Stress	3 Days Later
D.S.	13.6	6.1
T.M.	21.6	9.4
A.C.	10.2	7.2
T.C.	14.7	6.0
R.T.	13.8	4.4
T.W.	9.5	4.7
	13.9 - Mean	6.3 - Mean
	4.3 - S.D.	1.8 - S.D.

Comment

Two interesting findings were noted in this small group of patients. Although the expected individual variation of 17-hydroxycorticosteroids was present in this group of patients, 83% of males had marked elevations of 17-hydroxycorticosteroids during the 24 hour collection whereas only one of the female participants had similar changes.

The unexpected variation of 24 hour urine collection for 17-hydroxycorticosteroids in stressful situations has previously been studied⁸ and may be a reflection of independent cortisol secretion unrelated to any specific anxiety provoking events or environmental stimuli.

Wolff and coworkers,⁹ however, suggested that the effectiveness of defense mechanisms and ability to cope with threatening situations appear to be a dominant factor in cortisol secretion and may perhaps be the major role in the individual response to threat. In their study with parents of children with terminal illnesses, effective defensive mechanisms may have allowed for lower psychic tension resulting in reduced 17-hydroxycorticosteroids.

In our study, the individual variation was present within the normal range of the female group; however, all but one male had marked elevation of 17-hydroxycorticosteroids. A possible explanation for the increase in males would suggest that men, in general, may experience an inability to express emotion and perhaps adapt to stress in a group and henceforth may easily trigger high levels of cortisol. Miller¹⁰ showed that failure to adapt was a significant indicator in the increase of urine 17-hydroxycorticosteroids in inexperienced Vietnam military pilots. Further clinical analysis of the male participants fortuitously revealed the strong presence of cardiovascular disease in four of the five participants with elevation of the urinary hormone. The association of increased 17-hydroxycorticosteroids, maladaptability, inability to experience emotions and clinical disease is of considerable provocative interest and perhaps worthy of further study, particularly since correlation between coronary artery disease and increased cortisol levels has previously been demonstrated.¹¹ If Selye's "general adaptive syndrome"¹² has any relevance to the pathologic response to stress, perhaps consideration should not only be given to the nature of the stressful stimulus, but also to the stimulus response model with interaction of the individual's perception, ego, and defense. Moreover, a key point suggested by Wolff et al⁹ is that individuals may have different susceptibilities to various types of medical illnesses, on the basis of their own characteristic response to stress. This hypothesis is further elucidated by Cassell¹³ in suggesting that psychosocial events may serve as conditional stressors that may accelerate susceptibility to disease. Perhaps the experience of some disease states is in reality the breakdown of one's self-image, inner strength and

perceived support systems. Additional biochemical studies appear warranted in determining the interaction of biochemical parameters in pathological situations. For instance, Taggart and Carruthers¹⁴ have demonstrated that autoaggression and acute emotional stress of race car driving has resulted in considerable elevations of catecholamine levels and endogenous free fatty acids and triglycerides. The hormones of fight or flight, i.e., catecholamines may be more appropriate to measure when a threat to survival is perceived as the major determinant of acute emotional stress. Adrenocortical hormones may then be considered more specific in stressful situations dealing with emotional urgency, arousal and anxiety.^{15, 16} Serial measurements of urinary 17-hydroxycorticosteroids perhaps could be utilized as an effective means of assessing individual responses to stress management sessions.

Summary

A stress management seminar utilizing the measurements of urinary 17-hydroxycorticosteroids as a reliable index of emotional arousal¹⁵ was administered to various male and female participants in a group setting. The purpose of such a session was to teach participants how to be cognizant of their limits of arousal and how to utilize coping strategies in the reduction of stress and tension. Significant changes in urinary 17-hydroxycorticosteroid levels were noted particularly in male volunteers with a history of cardiovascular disease. Increased production of hormone may be an indicator of disease and perhaps be a reflection of ineffective defense mechanisms, maladaptability, and/or susceptibility to emotional stress. This recognition in patients with a history of clinical disease emphasizes the need for stress and tension management sessions as an appropriate maneuver in the treatment of patients with cardiovascular disease. Efforts must be made to make people aware of how destructive, high-stress behavior can negatively impact on one's life style. Physicians need to be aware of ineffective coping strategies, inefficient support systems and increased psychological arousal. Perhaps earlier and more frequent utilization of psychiatrists, psychotherapists and other stress management professionals would appear warranted in helping people deal with the frustrations of modern living.

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