HEART STRESS: THE CONCEPT OF "TYPES A & B"

Stephen R. Elek, M.D.*

I am going to present a clinical portrait to you about the type of individual who is likely to, and prone to, develop heart disease. One would think that this personality profile would have been known a long time ago, but it has only been within the past fifteen years or so, based on the pioneer work of Drs. Friedman and Rosenman, working at the Harold Brundt Institute for Cardiovascular Research in San Francisco, that this clinical protrait has become known and understood. It is important to understand a personality profile because it does create proneness to heart disease. That immediately raises the question, "What are the factors that predispose one to heart disease?"

The factors that predispose one to heart disease are: heredity, excessive smoking, high blood pressure, hypertension, diabetes (known or undetected) excessive cholesterol, inadequate excercise, and obesity. These factors, singly or in combination, contribute to the proneness factors leading to heart disease.

Heart disease is the leading cause of death in this country, and, indeed, in Western civilization. It is a sad and appalling fact, but a true one, nevertheless. Therefore, it behooves us as physicians responsible for the lives of patients, and health of individuals that suffer from this malady, that we know as much about this malady as we can. What is not mentioned in the preceding list of predisposition factors is the personality profile. It is that theme to which I'll address myself.

The "hurry-up" disease, the profile of that individual who is especially prone to heart disease, is called a Type A behavior pattern. That Type A behavior pattern, curiously enough, is well characterized in these six items: intense sustained drive to achieve self-selected goals, profound eagerness to compete; persistent desire for recognition and advancement, continuous involvement in multiple and diverse functions, habitual propensity to accelerate the rate of execution of many physical and mental functions, and great mental and physical alertness.

Now a question arises as to how do we find out about these behavioral characteristics in an individual. We do it by asking questions. And the simpler the question, the better. The questions are directed to elicit three important responses, namely, the extent and drive of ambition, the extent of past or present competitive and/or hostile feelings, and most importantly, the intensity of the patient's time-urgency. And when we can find about about these by simple questioning, then we have learned a great deal about the individual.

Let me give you a sample of the questions we ask. We use a type of medical history, restructured in order to enable the physician or the investigator to learn

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*Associate Clinical Professor of Medicine, University of Southern California School of Medicine

more about the behavioral pattern. For example, in checking for the extent of drive or ambition we will ask the following simple questions:

> Did you participate in athletic or team activities in high school or college?
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> Were you captain of any of them?
>
> Since making a living, do you tend to improve your chances of advancement by going to school or taking additional courses?
>
> Are you satisfied with your present job?
>
> When you were younger, did you deliberately strive for advancement and do you still do it?
>
> Do you belong to extracurricular community activities; are you a leader in any one of them?

And the answers with regard to the Type A behavior problem are uniformly affirmative. These patients have done all of that and have a high degree of drive and ambition.

The questions designed to elicit the extent of past and present competitive and/or hostile feelings are as follows:

> What do your wife and close friends think about you?
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> Do you strive for the respect and admiration of your friends and coworkers or do you seek their affection?
>
> When you participate in athletic or other games, do you give them your maximum effort, fighting all the way? Do you play mainly to win or just for the fun of it?
>
> And, by the way, are a fast car driver? Does it irritate you if you are delayed by the car in front of you? Would you rather move him out of the way? What do you say? Do all of your close friends try to slow you down?
>
> Do you often get upset and angry? And how do you display it?

And it becomes obvious that the Type A behavior pattern, the so-called "hurry-up" disease, do all of these things. They are irritated and they bottle it up. They want any person or event that impedes their progress out of the way.

Finally, and most importantly, questions designed to elicit the intensity of the person's time urgency are:

> Are there many deadlines in your work? Do you enjoy them? Are they exciting? Do you accomplish more by working against deadlines or working until the very last minute? Do you prefer to work up to that time?
>
> Does it bother you if you are kept waiting? What do you say or do about it?

Do you become impatient when you see something being done at work or at home slower than you think it should be done?

Do you often try to get something else done when eating alone? Or while in the bathroom? Or while shaving?

Do you become irritated if you have to wait in line at a bank? Movie? Or at a restaurant?

These questions are surprisingly sensitive. If you take these questions and have a good many workers assess their replicability, the statistical results are extremely good. We have to train, however, our physician colleagues to appreciate the enormous sensitivity of these questions, even though they sound almost like non-medical questions. There is no doubt that the results are valid; they give you a great deal of information about the behavior temperament of that individual.

I'll now summarize the behavioral characteristics of the Type A individual, the individual especially prone to heart disease. He has excessive drive and ambition; he is very alert and highly competitive; he dislikes waiting in line; he angers easily and often, but conceals his feelings; he is involved in multiple tasks and, most frighteningly, has an excessive, frenzied sense of the passage of time. It is obvious why that frenzied sense exists. This alert individual has set up so many goals, so many ambitions, and has such a keen and unremitting desire to accomplish them, that only one thing stands in his way--time.

In addition to the above characteristics, these individuals have very distinctive kinetic features. They scowl a lot, have frequent grimaces and use their chewing muscles frequently. They have very vigorous gestures, like those made by Mussolini and Hitler. You will never see the opposite type, Type B, gesture like that because he is not angry or hostile. But you will see the Type A tell you exactly what he thinks. And when you ask the Type A if he likes waiting in line, he says, "I hate it!" If you ask the Type B, he will say, "We'll see what happens."

You will also notice that the Type A individual raises his voice frequently. You can diagnose this on the telephone if you are very alert to this.

With regard to smoking we have a different concept. Is it smoking that leads to coronary disease, or is it the Type A's sense of urgency that leads to smoking? An interesting intellectual question. There is an article I wrote for one of the medical journals which is characterized uniquely by its magnificent illustrations. To my great surprise, the art illustrator of this journal, who resides in New York, called me personally. He said, "Dr. Elek, I really enjoyed your article! I really learned a lot from it." I asked him, "You mean about yourself?" "Exactly, about myself." Then he went on, "But I have to draw pictures and illustrate this. What do you suggest in the way of pictures? And I said, "Well, if you've learned so much about yourself, why don't you draw your own pictures, and I'll learn something, not only about you, but about the subject of coronary proneness." In the illustrations he drew, you can see the time calendar in the back, the vigorous gestures, the time watching (frequent looking at the wristwatch because of the frenzied passage of time).

In one illustration, there was a patient of mine I had described. This man had developed angina at the age of fifty-two. He did not have many hobbies, except

golf. I urged him to play more golf. "Oh, that's not my favorite sport." It's not a highly competitive sport, as you know. But my patient did that, and I remarked to his son how pleased I was that his father was playing more golf. And his son said, "Oh, yes, he's playing more golf, but you don't know the kind of severe Type A my father is." "Tell me about it," I said. "Well, he plays golf a lot. You also know my father is in the drama business. He represents people in theatrical groups, and he buys scripts for purchase and so on. And in between holes he has the caddy reading these scripts to him so he can make a decision as to whether or not he is going to purchase them."

This story illustrates how keen a physician has to be in amassing seemingly unimportant details, or conversely, how easy it is for a physician or an interrogator to miss important details which reveal so much of the individual's personality structure.

One of the interesting things about Type A, and its converse, Type B, is that they handle fats and cholesterol quite differently. The Type B handles his cholesterol quite comfortably. The Type A, however, does not handle his cholesterol very well. Large amounts remain in his blood, contributing to a build-up of the inner walls of the arteries and thus narrowing their openings. The blood supply to the heart is diminished, leading to a high risk of coronary occlusion.

As I mentioned, the individual with the "hurry-up" disease has a staccato voice, harsh with rising inflections. I stated that one can recognize it over the phone --it is very rapid. So we decided that we would take some oscilloscopic recordings of these individuals. The determinations were done by having them read an exhortative paragraph by a lieutenant addressing a combat squad. And this is a kind of psychodramatics, you see. The black line running across an oscilloscope screen is about normal, anything above that is abnormal. You can see the enormous spikes going above the black line. That's the Type A with his agitated, stacatto inflection. The soft, mellifluous, gentle voice of the Type B produces a smooth pattern close to the line indicating the normal level. Oscilloscope recordings such as these have evolved into the stress test used by detectives and the CIA. In my files are recordings of Lee Harvey Oswald. But that's a separate subject.

They are very combative people. Indeed, they are locked in mortal combat. By mortal, I mean that their personality is eventually going to get them. You can see the whirring rush, the great speed and acceleration of their physical activities. An octopus can be used to represent their involvement in diverse activities.

Now this type of activity is not the only activity that produces distress in contrast to stress. You can produce it in rats with high sound. And high sound and frequent noises are considered one of the major ecological disturbances today. To demonstrate the effects of noise we can look at the cholesterol level of rats when they are subject to types of noise. Rats in a soundproof room develop very little rise in their blood cholesterol. However, when the same rats are exposed to a duration of high sound, they develop a marked rise in their cholesterol. This is another indication that the cholesterol is handled differently under conditions of stress, here namely noise.

Now it is important that I emphasize to you that our studies are based on chronic stress. The results are different, or can be, when you are talking about acute stress. One study is an example of the effects of acute stress. It looks at

changes in blood chemistry after a racing car event of national importance in England. The blood is taken within the hour. Only one set of chemicals is found to be elevated, all the others are normal. The stress chemicals are found to be elevated. These include adrenalin and its chemical cousin, noradrenalin. You can see the marked rise, the bell curve of the production of stress chemicals in racing car drivers. In this instance the cholesterol does not rise. This difference is due to a condition of acute stress, rather than chronic stress.

One of the stresses that society invents for us is April 15. It occurred to us that using this date would be a very good clinical device for studying chemical changes incited or produced by social, cultural or U.S. government stresses. What Friedman, Byers, and Rosenman did was to study the blood cholesterol of certified public accountants. This was very carefully done. Cholesterol levels were tested once a week. The accountants' amount of activity, smoking, food and so on were known. Our subjects were compared with another group. The results were what you would expect. The sharpest rise in blood cholesterol levels occurred April 1-15. These have been duplicated many times by many different investigators. The implication of the study is significant because we can now get away from the frozen concept that high blood cholesterol in humans, or in animals, represents *only* high cholesterol intake. It does represent high cholesterol intake, but high blood cholesterol is also a stress indicator, a stress tag. We can develop high cholesterol levels as a result of stress. Therefore stress is measurable more objectively.

It is necessary to observe these high stress individuals very, very carefully and in an almost non-medical fashion. It is hard to train our interns to do this because they are more interested in the laboratory tests than in the holistic approach to the individual. So we direct their attention to simple things, almost non-medical, but vitally important. Astute observation of the patient is vital.

Looking at a picture of a patient who has just retired, one can see deposits of cholesterol in a most visible area, namely, the eyes. There is a rim of white around the eyes which is seen at the periphery of the pigmented portion of the eyes as a thick white line. This arcus senilis represents cholesterol deposits. It is sometimes normal. When occurring in younger patients, it is absolutely abnormal.

Let's talk about an actual patient--Type A, bad family history, now fifty-six--who already had a coronary attack. I had to work hard to make him show a happy face for a photograph. He usually does not have a happy face. I had him look up and in the picture you can see a white rim around the pigmented portion of his eye. Those are cholesterol deposits. They occur in the individuals who have high cholesterol levels, representing stress over a period of time. You can see the cholesterol deposit only in the eye, but I ask you to stretch your imagination. What if this excessive cholesterol is also depositing in the heart arteries? I think you can more readily and easily understand why the Type A individual is so especially prone to heart disease when this event occurs in the heart arteries.

The same phenomena can be demonstrated in experimental animals. You can compare the eyes of control animals and those on a high cholesterol diet. You can see the deposition of cholesterol in rabbits fed a high cholesterol diet. An intermediate result is obtained with intervention with cortisone because cortisone given to animals will reduce cholesterol. (However, that does not occur in man.)

Now further evidence that the patient with the "hurry-up" disease is significantly and adversely affected is found in slides taken from postmortem individuals. We can look at the artery of a Type B individual who died from other causes. We can see that the three coats of the coronary artery--the inner, middle and outer coat--are quite normal as are other blood vessels of the Type B non-coronary prone individual.

In contrast are the coronary arteries of the Type A individual. In one specimen the clot is already present, the luminal size of the vessel is profoundly reduced, you can see much disturbance in the whole architecture of that artery. It is unusual in epidemiologic studies to have postmortem observations. However, they are very useful. We have demonstrated pathologically that the Type A individual is highly coronary disease prone.

I have been telling you about the behavioral features, the kinetic gestures, the high cholesterol levels, and the increased catacholine production in these individuals prone to coronary disease. Finally, let's look at the clinical data. If we take about 1500 Type A's and a like number of Type B's, and compare the incidence or prevalence of heart disease you will find that Type A individuals have twice as much clincial coronary heart disease (Friedman and Rosenman). Type A individuals have at least twice as many actual heart attacks. With regard to angina chest pain, Type A's have at least twice the amount. Individuals with the "hurry-up" disease have a fourfold incidence of recurrent heart attacks. With regard to fatal events, Type A's have a twice greater incidence. There is an appalling difference then between the Type A's and the Type B's.

It is no wonder that the incidence of heart disease is so great in our country. It is estimated that well over fifty percent of the individuals, men and women, in our country and perhaps in Western civilization, are Type A. That may be because of the way our civilization structures itself. It promotes, abets, and stimulates Type A behavior.

I would like to remark on what causes this disease. This must be disturbing you, as it has disturbed us. We know that hepatitis is in the liver and that ulcer is in the stomach and heart attack is in the heart artery. Where is this "hurry-up" disease? Dr. Friedman and I, who had studied another disorder during World War II, decided not to let this question go. A priori considerations indicated to us that we ought to study the emotional setup, specifically the emotional centers of the brain. We were fortunate in this because preliminary observations in rabbits showed that if you put a needle into the emotional center called the hypothalamus and do not stimulate that animal, very little atherosclerosis or hardening of the artery occurs. However, if you stimulate that animal three to five minutes twice a day, every day for three months, you see a profound deposition of cholesterol in the major arterial vessel.

So we proceeded to investigate this further, but in smaller animals--for various technical reasons. We chose again to work in the hypothalamus, a very significant area. There are important fibers running between the hypothalamus and the lower organ, which is the pituitary. The production of many of the chemicals manufactured by the pituitary are stimulated by the activity in the emotional center, the hypothalamus.

In our experiment, we insert a small needle in the animal's hypothalamus to get a bull's-eye lesion. We have to hit two or three of these areas of the hypothalamus to get the results we do. The lesion, by the way, in no way hurts the ani-

mal. The only thing that happens is that the animals become extraordinarily hostile. You cannot handle them in a docile way. That is exactly what happens in man. So the simulation is not bad at all.

The reason for creating the lesion in the hypothalamus is to try to evaluate whether the emotional center is, as we suspect, profoundly disturbed in the Type A individual. We then studied the chemical changes in the animals with lesions. Notably the cholesterol level changes (remember, it is the cholesterol that admirably, or otherwise, rises in the Type A disease). The control animals show no rise in cholesterol.

If you produce this lesion in the emotional center, and if to that animal you feed a small degree of cholesterol, you will get a profound increase in cholesterol levels. The increase is so great that you need no statistical correlation. But we have them nevertheless. The cholesterol level of the experimental animals rises three or four times that of the control animals. And we have produced this change many, many times.

We now have some understanding of why it is that the individual with the "hurry-up" disease has a high cholesterol level. We know that his emotional center is disturbed. There are only two drugs, by the way, that will lower this cholesterol level--one is glucagon which mobilizes blood sugar, and the growth hormone. Presence of the growth hormone is necessary for normal cholesterol. What happens in the highly stressed individual is that the amount of his growth hormone drops. Similar studies made by NASA at Palo Alto on levels of growth hormone indicate the same thing. So by giving growth hormone to the prolongly stressed individual, we do lower the cholesterol level. If the amount of his growth hormone drops, his cholesterol level rises.

This is how the English describe what happens to Type A individuals. The English call it autoaggression, we call it the "hurry-up" disease or Type A behavior. More catacholamines are produced, releasing more fatty acids which release more fat and cholesterol, ending up finally with plaques in the blood vessels. We cannot reverse the process. We do know we can have it occur in the given sequence. The feedback mechanisms from the brain to the hypothalamus and pituitary are enormous. Many of the chemicals produced are known and isolated, so we can manipulate them.

This is a schematic picture of the stress interrelationships in the brain. Environmental stresses impinge upon the cortex, uniquely stimulate the hypothalamus. The hypothalamus then, in some way, pours out chemicals. The cholesterol level rises. The cholesterol goes to the liver where it is not handled properly, and so remains at high levels in the blood. The longer the cholesterol remains in the blood, the longer the period over which there is a narrowing of the blood vessels, and the greater the hardening of the arteries.

Let's look at some means of treatment. You know what the environmental stresses are: disturbed ecology, inflation, limitations of space, and so forth. As treatment, is TM good? Is biofeedback good? Is it an emotional aspirin? (If so, it is an aspirin of short duration, and useful as well.) What do we place between mental stresses and the hypothalamus? We do not have very good measures for treating these patients. Actually the best treatment at this time is recognition of the problem and advancing an understanding of it.

I should say that my remarks about the Type A individual are not meant to be pejorative. The Type A is not the bad guy, and the Type B is not the good guy. If I had a committee of five, I would want at least two Type A individuals because of the Type A's alertness and intelligence. I would then be assured that the work would be done and done well. The problem is that the Type A works with such tremendous emotional overhead that he pays a heavy price, which is the increased incidence of heart disease.

Thus far I have said nothing to you about the Type B. I have merely implied that he is the converse of the Type A. He is easygoing, he does not gesture much, he listens to you, and he is pleasant. He may not be as colorful as the Type A. To the Type A the Type B seems sluggish, inert, apathetic and perhaps dull. The Type A cannot possibly conceive that the Type B can get things done in this world with his kind of lifestyle. It is for that reason I commenced a study of prominent Type B's in order to influence Type A's. The Type A is pretty smart and he is not going to be influenced by just any old Type B. Two months ago I had a unique opportunity to spend two days in residence with a senior senator, Alan Cranston, a junior-senior senator, S. I. Hayakawa, and with Senator Proxmire, with whom I have corresponded about this subject. I spent a half day with Dr. William McGill, president of Columbia University. We had a most stimulating time. I am working on the State Senate and on our Mayor. I am studying two spies, because spies are under a fascinating form of one-to-one stress. And notably, I have some intriguing tapes on my late good friend, Francis Gary Powers. I think I probably was the last one to interview him. So we will build up understanding of the Type B in order to use him as a role model for the Type A. Hopefully we can influence the Type A, because treatment of his disease is extremely difficult.

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NIOSH Project Officer: M.J. Smith, Ph.D.
Principal Director: Angus Macleod
Proceedings Editor: Rosalind M. Schwartz

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