Stress testing in the evaluation of patients suspected of having coronary heart disease

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It has been recognized for some time that of the 600,000 people who die of coronary heart disease each year, about 350,000 die suddenly, apparently without prior warning. Hundreds of thousands of men of susceptible age group probably go to their private physicians each year or intermittently for a checkup. They go either because they believe some latent disease might be discovered at examination or because of symptoms that they may often fail to relate to their physicians. This is either because of fear of what they might find or because of misinterpretation of the signs.

Risk factor testing is so routine in such a clinical setting that its omission might well be grounds for malpractice. The American Heart Association handbook depicting the risk factors derived from the Framingham study is the standard used. The estimation of the patient's risk by this type of evaluation is useful in enlisting his cooperation when a change in life-style seems indicated. In such a situation is it legitimate for the doctor to withhold a test which has been demonstrated to have the highest predictive value? The stress test, when positive, will be associated with some coronary event in 5 years in about 60% of the subjects. This finding is not

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only present in our data, but in follow-up studies from other laboratories. All other risk factors yet published have a lesser sensitivity. Although a significant number of subjects with positive stress tests do not have significant obstruction in their coronary arteries and a number of patients with significant coronary artery disease fail to have positive stress tests, a number of clinical findings associated with the ischemic S-T response can be used to help us improve the predictive power. Some of them are listed below:

1. The time of onset on S-T segment depression in terms of work load.
2. Magnitude of the S-T segment depression during stress testing and during recovery.
3. The maximum achieved heart rate during the test.
4. Presence or absence of anginal-type pain at the time of S-T segment depression.
5. Age and sex.
6. Electrocardiographic patterns.

The usefulness of each one of these parameters has been confirmed by a number of investigators.

When one combines a number of clinical findings with the presence or absence of ischemic S-T changes in a multivariate analysis program, the importance of the use of clinical data becomes obvious. The ranking of various findings varies with age and sex in the ability to predict the presence or absence of coronary artery stenosis as depicted.

Although most of the workers who have analyzed stress-testing data and coronary anatomy have found a significant number of false-positives and false-negatives, the studies are, of course, heavily weighted by the clinical indication for coronary angiography in the first place. The reliability of using the S-T segment alone will vary according to the prevalence of disease.

In our search for parameters which might improve the reliability of stress testing, we have recently completed some studies on alteration in R wave amplitude with exercise. These findings suggest that this parameter might improve our ability to identify coronary disease. Work is also in progress at Cedars of Lebanon Hospital and in our hospital using a magnetic wall motion sensor to detect ischemic bulges during exercise. This also has shown considerable promise.

With our multivariate analysis approach and with the newer parameters available, we are now in a position to identify patients even without coronary symptoms with an increased accuracy. I feel that it is safe to predict that within a few years the validation of the work now in progress will further confirm that stress testing is the most important predictive noninvasive technique available for the identification and evaluation of coronary disease.

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