LETTERS TO THE EDITOR

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V_max as an Index of Contractile State in Man

To the Editor:

The exchange of letters between Dr. I. Mirsky and Drs. H. L. Falsetti et al., which appeared in CIRCULATION (44: 486, 1971), appears to me to miss the major question raised by the many derived indices of myocardial contractility examined by Falsetti et al. (CIRCULATION 43: 467, 1971).

This question, in my opinion, is not the extent to which these indices correlate with each other, but, instead, their usefulness in evaluating the state of the myocardium in patients with heart disease.

Table 1, compiled with the aid of a PDP-8e computer from table 1 in the paper by Falsetti et al. provides some answers to two important questions regarding these indices:

1. Are these criteria of value in distinguishing between populations categorized as compensated, as opposed to decompensated, in the face of an LV volume overload?

2. More important, are these criteria of any value in evaluating individuals with LV volume overload, in terms of state of compensation?

The statistical data provided in table 1 indicate that, with populations of the numbers reported by Falsetti et al., only three derived indices of myocardial contractility serve to discriminate between group 3 (volume overload, decompensated) and group 1 (normals), and none shows a significant difference between group 3 and group 2 (volume overload, compensated). Differences having no statistical significance in this table might show significance if larger populations were studied, but there is clearly much overlap when individual cases are considered. For example, taking V_max (calculated from V_cal), which the authors found to be most useful in this study, one finds that seven of 17 patients in group 3 equaled or exceeded 1.14 length/sec, the lowest value seen in group 2; and, conversely, seven of eight patients in group 2 fell below 2.36 lengths/sec, the highest value for V_max in group 3. Thus, even the potential significance of a difference between mean values when “decompensated” left ventricles are compared with those that are “compensated” will not permit these indices to be used to define left ventricular contractility in individual patients.

Because there is serious doubt as to the validity of these indices in terms of both classical skeletal muscle mechanics and analyses of cardiac muscle biochemistry and biophysics,1 their usefulness must be considered primarily on clinical grounds. The data provided by Falsetti et al., however, do not indicate that these complex derived indices hold much promise to the clinician who must evaluate myocardial performance in individuals with valvular heart disease.

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Reference

1. KATZ AM, BRADY AJ: Mechanical and biochemical correlation of cardiac function. Mod Conc Cardiovasc Dis 40: 39, 1971

Reply to Dr. Katz

To the Editor:

This writer is not in complete agreement with the comments and conclusions made by Dr. Katz for several reasons:

1. Since there is no standard index of contractility, correlations between indices may be meaningless. However, if similar qualitative and possibly quantitative information based on reliable data can be obtained without the need for a tedious angiographic analysis, these alternative indices have merit until proven otherwise.

2. In their studies, Falsetti et al. (CIRCULATION 43: 467, 1971) assumed the same stiffness constant K = 28.8 for each patient. This assumption has yet to be justified in man. It would appear, therefore, that appropriate grouping of patients is one way of relaxing this assumption bearing in mind that K may not only vary from group to group but also from patient to patient.
V_{max} as an Index of Contractile State in Man
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