**Sphygmorecording for Assessing Thyroid Function**

To the Editor:

Parisi et al.\(^1\) state that noninvasive techniques have not been used routinely to assess the influence of thyroid function on the circulatory system.

They have elected to disregard the noninvasive technique of *sphygmorecording*\(^2\) which has been in widespread use for the analysis of thyroid\(^3\) and cardiac function\(^4\) for more than a decade. An extensive literature has appeared in American journals as well as in Japan,\(^5\) Switzerland,\(^6\) India,\(^7\) Argentina, Czechoslovakia, Romania, Sweden, etc.

Sphygmorecordings can be obtained on a two-channel phonocardiograph. XY plotters, oscilloscopes, and digital read-outs are also in use for this purpose. Onset (Q) of each QRS complex is taken as zero time of each beat. Microphonic voltages generated by the brachial arterial sounds of Korotkoff (K) heard during blood pressure measurement enter the second channel.\(^2\) The time interval between onsets of Q and K at diastolic cuff pressure (d) is referred to as QK\(_d\). The normal value is 210 msec with a standard deviation of 12 msec.

QK\(_d\) provides a quantitative measure of the specific response of the target organ, the heart, to myocardial-bound thyroid hormones. In hyperthyroidism QK\(_d\) may be as short as 100 msec. Antithyroid therapy (\(^{131}\)I, propylthiouracil, etc.) progressively returns QK\(_d\) to the normal range.

In hypothyroidism QK\(_d\) may be as late as 320 msec.\(^3\) With thyroid replacement, QK\(_d\) approaches euthyroid values as T\(_3\) and T\(_4\) rise. QK\(_d\) is of special value in evaluating cardiovascular receptivity to thyroid hormones in patients with genetic end-organ resistance or with disturbances of thyroxine binding globulin such that total T\(_4\) and T\(_3\) values are misleading with respect to clinical status.

The remarkable sensitivity of QK\(_d\) to myocardial contractility is also seen in the shortening of this interval to 100 msec during treadmill exercise, or in the presence of elevated catecholamines as in pheochromocytoma. QK\(_d\) is prolonged by propranolol, and markedly so (to 350 msec) by halothane.

QK\(_d\) is unaffected by heart rate, blood pressure, or gender. Further, measurement of QK\(_d\) does not require recording of heart sounds or the carotid pulse and thus is prone to fewer sources of error. Unlike systolic time intervals, QK\(_d\) does not require resort to corrections for heart rate, indices or exponential manipulation.

Sphygmorecording techniques and results have been presented at meetings of the American Heart Association, American College of Cardiology, American and European Thyroid Associations, etc. A recent scientific exhibit with specific attention to thyroid dysfunction was presented at the 1973 meeting of the American Heart Association.

We must conclude that Parisi et al.\(^1\) are wrong when they state that their currently reported technique is "a unique noninvasive measurement" of cardiac responsiveness to thyroid function.

**References**

1. **Parisi AF, Hamilton BP, Thomas CN, Mazzaferri EL:** The short cardiac pre-ejection period: An index to thyrotoxicosis. *Circulation* 49: 900, 1974
2. **Rodbard S, Rubinstein HM, Rosenblum S:** Arrival time and calibrated contour of the pulse wave, determined indirectly from recordings of arterial compression sounds. *Am Heart J* 53: 205, 1957
3. **Rodbard D, Fujita T, Rodbard S:** Estimation of thyroid function by timing the arterial sounds. *JAMA* 201: 884, 1967

**The authors reply:**

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The QK\(_d\) interval of Rodbard et al. represents a summation of the *cardiac* pre-ejection period (PEP) and *extracardiac* pressure pulse transmission time to the brachial artery.\(^1\) Since the velocity of pulse transmission is dependent on many factors, such as the state of the blood vessel wall, the length of the pulse propagation path, blood viscosity, as well as myocardial force,\(^2\) the QK\(_d\) is a measure of over-all cardiovascular response to alterations in thyroid activity.

Determination of systolic time intervals specifically measures the cardiac response to thyroid dysfunction. Our data indicate that there is a shortened cardiac...
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