Summary. Of 8 sexually immature monkeys maintained on a folic acid-deficient, synthetic diet until evidence of dietary deficiency appeared, 6 failed to show the characteristic normal response to estrogen administration. Two control monkeys fed the same diet plus liver and 2 of the apparently deficient animals showed typical estrogen response to similar hormone treatment.

16221 P

Renal Resistance in "Essential" Hypertension. Relation to the Effect of Sympathectomy on Blood Pressure.*

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Blood pressure and renal dynamics were studied preoperatively in 13 hypertensive patients subjected to extensive sympathectomy in 1940-42.[1,2] These observations were repeated on 12 of these cases at intervals extending up to 8 to 40 months after operation. Current analysis of these data suggests that the preoperative renal resistance may indicate with reasonable accuracy whether a significant reduction in blood pressure will follow the operative procedure. While renal resistances were also calculated by the method of Lamport,[3] a value for "crude" renal resistance is satisfactory. The "crude" renal resistance is defined as $\frac{\text{Blood Pressure}}{\text{Renal Blood Flow}} \times 100$. The arithmetical mean of systolic and diastolic brachial arterial pressure determined by sphygmomanometer, is taken as the blood pressure; and the diodrast or para-amino hippurate clearance of blood in cc per minute per 1.73 square meters of body surface is considered to represent renal blood flow. The resistance value obtained was above normal in all cases. It was less than 22 in 5 cases with definite postoperative reduction in blood pressure and was 22 or more in 7 cases with little or no reduction in blood pressure. The means of the postoperative diastolic blood pressure in these two groups were 88.8 and 120.3 mm Hg, respectively, the difference between these being significant (Fig. 1), when subjected to Fisher's method for the comparison of small samples.[4] Diastolic pressures were averaged for each patient during periods of hospitalization for the studies. The pressures taken during the renal tests for each patient tend to be slightly higher than the corresponding hospital averages. Using either "test" diastolic, or ½ (systolic plus diastolic) pressure values, the difference in the means of post-operative pressure in the two groups arbitrarily divided according to resistance, remains significant ($t = 5.41$, 4.49).

It is therefore unlikely that chance alone would produce the results obtained in this grouping. However, the data of our series alone is inadequate to prove that the difference in resistance is the only responsible factor. Several other factors may be involved. Four of the patients where blood pressure was markedly reduced by operation were the 4 youngest in the series. If we divide our patients according to age, a significant difference in the mean of postoperative pressure is noted when this division is made at or under 35 years (Fig. 1). The

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2 Grimson, K. S., Adams, W., Alving, A. S., and Landowne, M., in preparation.

3 Lamport, H., *J. Clin. Invest.*, 1943, **22**, 461.

4 Fisher, R. A., *Statistical Methods for Research Workers*, 10th edition, G. E. Stechert, New York, p. 122, 1946.

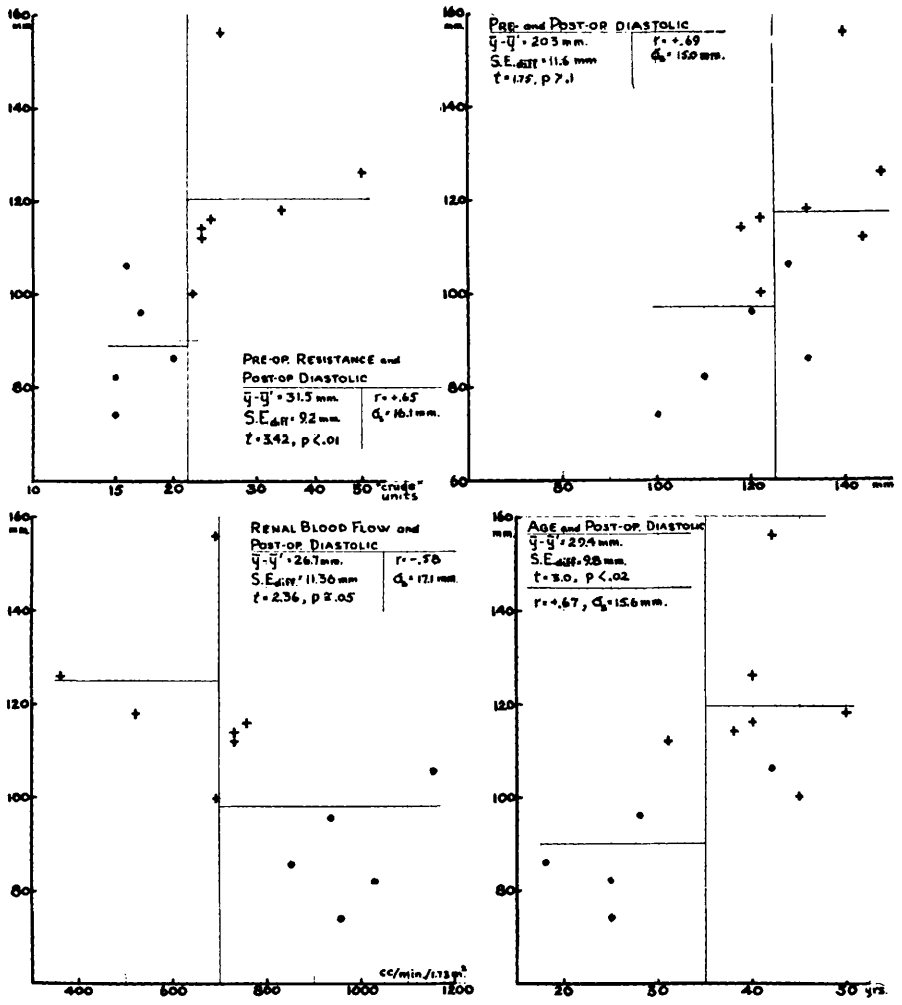

FIG. 1.

Scatter diagrams from data of 12 hypertensive patients subjected to sympathectomy. The averaged post-operative diastolic pressure in mm Hg (ordinates) is related to each of 4 pre-operative measurements. r indicates the first order coefficients for the data as plotted, and σ_s the standard error of the estimate. The means of ordinate values greater and less than arbitrary vertical divisions are indicated by horizontal lines. The difference of the means (y–y'), the standard error of this difference (S.E.$_{diff.}$), their ratio (t) and the probability value (p) are shown.

average preoperative "crude" resistance of the patients 35 years of age or younger was lower than the average of the patients over 35 years of age, but the difference has little significance ($p > 0.05$). Analysis of the component values used to derive "crude" resistance indicates that a grouping of cases on the basis of preoperative diastolic pressure level reveals no significant differences in results. Division according to preoperative renal blood flows at or below the value of 549 cc per minute selected by Foà *et al.*,[5] or even at 700 cc per minute, does not result in a significant difference in the postoperative diastolic means. Only if the cases are divided at a renal blood flow of 800 cc per minute, are significant differences manifest. At this level the grouping is identical to that obtained by division at a "crude" resistance of 22 units.

[5] Foà, P. P., Woods, W. W., Peet, M. M., and Foà, N. L., *Arch. Intern. Med.*, 1943, **71**, 357.

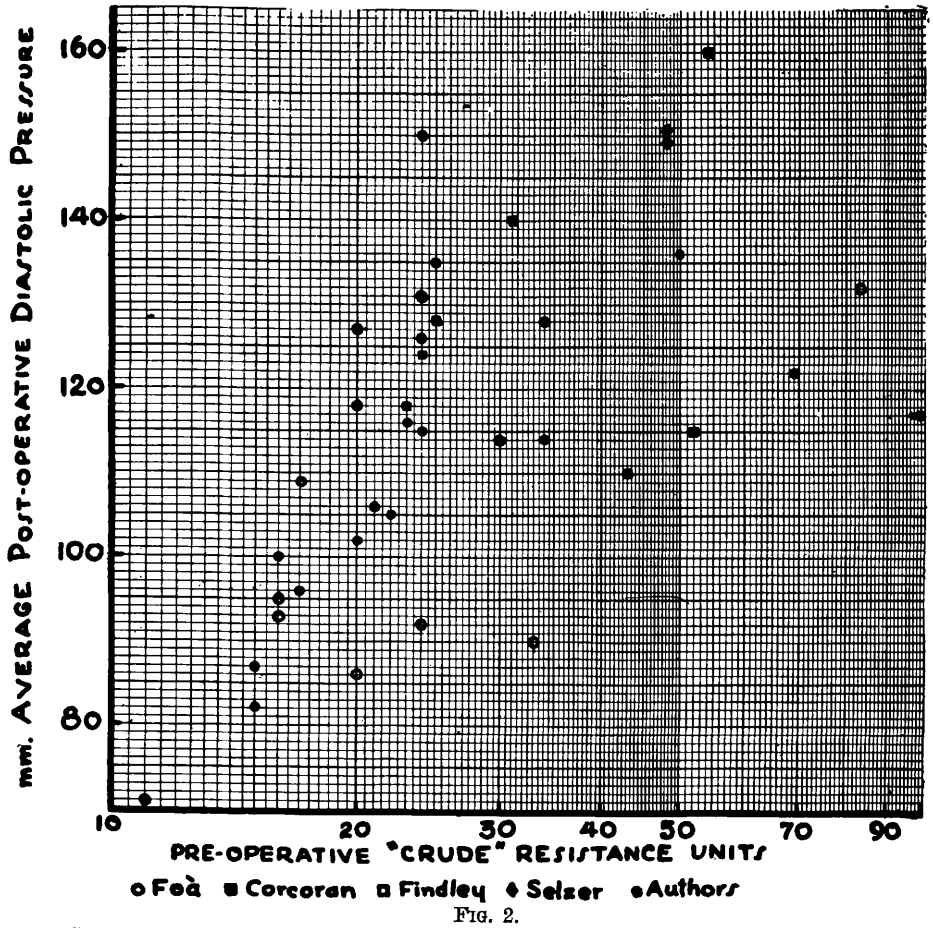

FIG. 2.

Composite scatter diagram relating preoperative renal resistance in "crude" units to the average postoperative diastolic pressure in mm Hg of 38 patients with hypertension subjected to sympathectomy. Twenty-six cases are calculated from data in the literature.[5-8]

Fig. 1 also indicates the zero order coefficients of correlation (r) and the standard error of the estimate (σ_s) of the relation of postoperative pressure to each of the 4 parameters mentioned, viz., log "crude" preoperative resistance, preoperative diastolic pressure, preoperative renal blood flow, and age. All show good correlation but with a wide scatter.

Fig. 2 indicates the relation between the postoperative diastolic pressure and the preoperative "crude" resistance, again for the present series (black dots) and for the calculated values in 26 additional cases reported in the literature.[5,6,7,8] If these 26 cases are similarly divided into 2 groups on the basis of whether their calculated preoperative "crude" resistances are below 22 units, or are 22 or more; the differences of the means of their postoperative diastolic pressures is also highly significant ($y - y' = 25$ mm, $p < 0.01$). No significant differences in postoperative diastolic means are revealed by groupings using age, preoperative diastolic pressures, or renal blood flows. If divided at a renal blood flow of 549 cc per minute, p is greater than 0.1, and, if the higher level of 700 cc per minute is used, the likelihood that chance explains the difference is almost as great

[6] Corcoran, A. C., and Page, I. H., *Arch. Surg.*, 1941, **42**, 1072.

[7] Selzer, A., and Friedman, M., PROC. SOC. EXP. BIOL. AND MED., 1941, **48**, 429.

[8] Findley, T., Clinton, E., and Edwards, J. C., *Surgery*, 1942, **12**, 64.

($y - y' = 20.2$ mm, $p > 0.05$). Only 4 cases had preoperative renal blood flows above 800 cc per minute. Resistance values were calculated from the publications of these authors, using pressures at the time of the tests wherever designated by them, and without modification of data. Where hematocrit was not given, a value of 0.43 was assumed.

Conclusion. A relation of the preoperative renal resistance to the postoperative blood pressure has been demonstrated in patients with hypertension subjected to sympathectomy. A complete test of the reliability of this relation in predicting the result of sympathectomy requires additional data.

16222

Antagonism by Cellular Extracts of Effects of Respiratory Poisons on Onion Roots and Sea Urchin Eggs.

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Aqueous yeast extract has been shown to antagonize the deleterious effects of potassium cyanide, basic phenylmercuric nitrate and sodium azide upon respiration[1,2,3,4] and of basic phenylmercuric nitrate on the growth[1,5,6] of unicellular organisms and fragments of mammalian tissues. Study of the antagonism of yeast extract against the effects of these respiratory poisons has now been extended to intact multicellular structures, namely, the roots of the onion and the eggs of the sea urchin.

Onion Roots. Onions (*Allium cepa*) of approximately 5 cm in diameter, purchased in market, were germinated over water in the dark at room temperature. When the roots were approximately 4-7 cm in length they were reduced in number to 10-25 of uniform appearance. The normal rate of growth was 1 cm to 1.5 cm per day. The poisons employed were basic phenylmercuric nitrate (PMN) in concentrations of 1:200,000 to 1:24,000 (7.5×10^{-6} to 6.3×10^{-5} M); potassium cyanide, 0.4% (0.06 M); mercuric chloride, 1:72,000 (5.1×10^{-5} M), and urethane, 3 and 5% (0.34 M and 0.56 M).

The crude yeast extract, in dilutions of 0.8 to 2.5%, was an alcoholic extract corresponding to Sample A as described by Cook, Kreke, and Nutini.[7] In a few experiments beef spleen extract[8] was used in concentrations of 0.4 and 0.2% with concentrations of 1.6×10^{-5} PMN. The onion roots were immersed about half their total length in the test solutions for 1 hour and were thoroughly rinsed before replacement in tap water. The lethal dose of the poison was established as the amount which would lead to the death of all of the roots as a consequence of 1 hour of exposure. On surviving roots, enlarged tips, if they developed, usually did so in the 24 hours following exposure to the test solutions.

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3 Kreke, C. W., and Suter, Sr. M. St. A., *J. Biol. Chem.*, 1945, **160**, 105.

4 Kreke, C. W., and Suter, Sr. M. St. A., *Studies Inst. Divi Thomae*, 1945, **4**, 85.

5 Cook, E. S., and Kreke, C. W., *Nature*, 1940, **146**, 688.

6 Thomas, G. W., Fardon, J. C., Baker, S. L., and Cook, E. S., *J. Am. Pharm. Assn., Sci. Ed.*, 1945, **34**, 143.

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8 Staff, I. D. T., *Studies Inst. Divi Thomae*, 1947, **5**, 55.