graph the relationships between the amount of bromides obtained to that actually present in solutions of NaCl of different concentrations. This graph to be used for purposes of correction in this method.

Known quantities of sodium bromide in the proportion of 20, 30, 40, and 50 mg. per 100 cc. were added to solutions of NaCl in water in concentrations of 400, 500, 600, 700, 800, and 900 mg. per 100 cc. The quantities obtained in each case were determined, and on that basis the above mentioned graph was prepared. With the aid of the above mentioned graph, given a certain figure representing mg. of bromide per 100 cc. and knowing the quantity of chlorides in that fluid, the amount of bromides actually present in the fluid can be computed. The graph was prepared on the basis of solutions of 20, 30, 40, and 50 mg., and as the loss seems to increase fairly regularly with the increase in chloride concentration we felt justified in assuming the figures between these quantities by dividing them into 10 parts. The error introduced up to about 50 mg. of chlorides in 100 cc. is so small that it was felt that in cases where the chlorides do not deviate from the normal in a very pronounced fashion the correction is not necessary, as the margin of error is not greater than the error usually introduced by colorimetric determinations.

7299 P

Skin Temperature Changes After Total Thyroidectomy.

ELLIOTT C. CUTLER AND MAX T. SCHNITKER.

From the Surgical Clinic, Peter Bent Brigham Hospital, Boston.

As a part of the careful study of patients submitted to the operation of total thyroidectomy for heart disease, we have conducted skin temperature observations before and after the operative procedure. We have utilized the method of Gibbon and Landis.[1] This method has been shown to produce adequate vasomotor dilatation and is far simpler than the other methods of injection of foreign proteins, the induction of a general or spinal anesthetic, or the blocking of sympathetic ganglia or peripheral nerves with novocaine or alcohol.

[1] Gibbon, J. H., Jr., and Landis, E. M., *J. Clin. Invest.*, 1932, **11**, 1019. Landis, E. M., and Gibbon, J. H., Jr., *Arch. Int. Med.*, 1933, **52**, 785.

The operative procedure on all patients was done under local anesthesia, thereby eliminating the variability of blood flow studies as seen after a general anesthesia (Herrick *et al.*[2]). The skin temperature determinations were all done in a small room, free from air currents, and having a constant temperature of 68-72°F. and humidity between 40 and 50%. This gives constant findings as shown by Talbot.[3] The patients in all cases were in bed in a semi-Fowler position and the points of election of skin temperature were the tibial tubercle, anterior ankle, and great and small toes of both lower extremities.

According to Morton and Scott,[4] there is a maximum vasodilatation response for normal vessels that has been designated the "normal vasodilatation level". The lower limit of this maximum level for the surface temperature of the great toe whose vasoconstrictors have been released by general or spinal anesthesia (and the water-bath technique of Gibbon[1]) is 31.5°C. at a room temperature of 20°C. (69°F.).

Studies of the skin temperature were made on 13 patients before

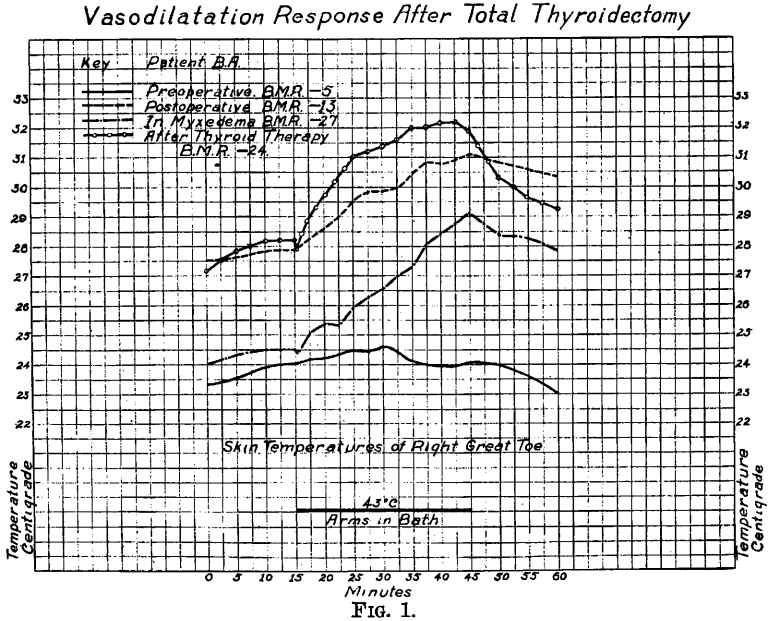

FIG. 1.
Vasodilator ability in relation to thyroid function.

[2] Herrick, J. F., Essex, Hiram E., and Baldes, Edward J., *Am. J. Physiol.*, 1932, **101**, 213.

[3] Talbot, Fritz, *Am. J. Dis. Child.*, 1931, **42**, 965.

[4] Morton, John J., and Scott, W. J. Merle, *New Eng. J. Med.*, 1931, **204**, 955.

operation and the vasodilator response determined. In these same patients postoperative studies were carried out at varying intervals, as from the fourth postoperative day to about 7 weeks later when the patient was in clinical myxedema, and again after thyroid therapy. The results of these studies in a typical case of angina pectoris are shown in Fig. 1. These results indicate what was anticipated, a definite link between the thyroid and the sympathetic vasomotor apparatus. That the adrenals play an important rôle in this mechanism is shown in Fig. 2. A patient with cardiac valvular

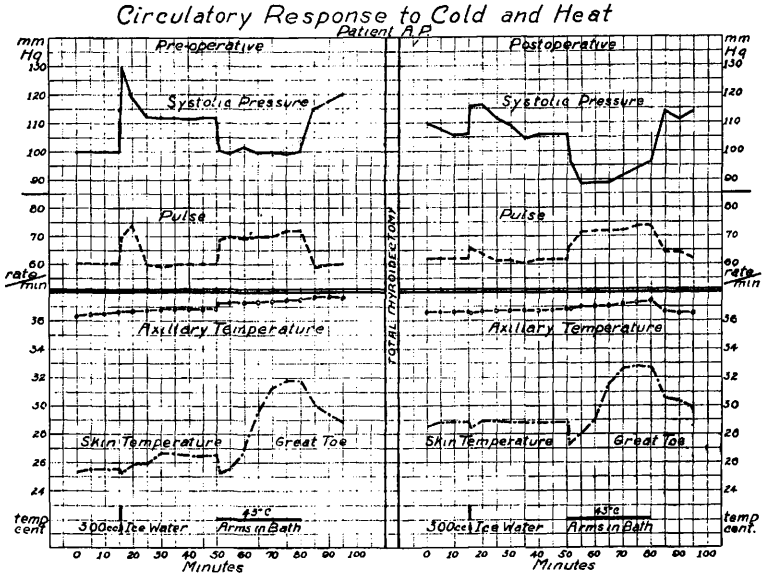

FIG. 2.
Sympathetic-adrenal activity in relation to thyroid function.

disease (compensated) before operation was given 300 cc. of ice water at 0-1°C., to drink rapidly. This causes an outpouring of adrenalin into the circulation as has been shown by Cannon *et al.*[5] The response was characterized by a rise in blood pressure and pulse rate; the water-bath skin temperature test showed a normal response. The complete test was repeated 4 days after operation. There was then only a slight rise in blood pressure and pulse rate with a higher initial skin temperature. This definitely suggests a diminished sympatheticotonic-adrenal activity following total thyroidectomy.

It would appear that the vasodilatation response in patients whose

[5] Cannon, W. B., Querido, A., Britton, S. W., and Bright, E. M., *Am. J. Physiol.*, 1927, **79**, 466.

thyroid gland has been removed *in toto* might suggest some utilization of this finding in the future treatment of patients with peripheral vascular disease. At least it appears that the increased dilatation response is as great as that achieved by operations upon the sympathetic apparatus, whether central in type, that is, ganglionectomy or ramisection, or peripheral in type, that is, decortication of the arteries.

Moreover, it would appear that, even with observations carried on for only 4 months, we have already indicated as permanent a vasodilatation response as the various sympathetic procedures have given us up to this time.

7300 C

Cobalt Glutamate in Nutritional Anemia.*

ERWIN BRAND AND CHARLES J. STUCKY.

From the Department of Chemistry, New York State Psychiatric Institute and Hospital, New York City.

While our studies on milk anemia[1, 2] were in progress, evidence appeared in the literature[3, 4] which indicated that cobalt stimulated blood regeneration in nutritional anemia. Therefore, experiments were conducted to determine the effect of cobaltous glutamate as compared to inorganic cobalt in hematopoiesis, when supplementing a whole milk (klim)-iron-copper diet. The technique was as previously described.[1]

In preliminary experiments it was found that rats, which had recovered from anemia by supplementing the whole milk (klim) ration with Fe and Cu showed renewed hematopoietic activity when the diet was further supplemented with 0.5 mg. cobalt as cobalt nitrate. Thus at the end of a feeding period of 6 weeks, a group of 3 "cobalt" rats gave average values of 18.6 gm. and 11.0 millions for the hemoglobin and erythrocytes respectively as compared to

* In coöperation with the Research Department of the Calco Chemical Co., Bound Brook, N. J.

1 Brand, E., and Stucky, C. J., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 627.

2 Brand, E., and Stucky, C. J., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 689.

3 Orten, J. M., Underhill, F. A., Mugrage, E. R., and Lewis, R. C., *J. Biol. Chem.*, 1932, **96**, 11.

4 Orten, J. M., Underhill, F. A., Mugrage, E. R., and Lewis, R. C., *J. Biol. Chem.*, 1933, **99**, 457.