TABLE I.
Effect of Injection of 1/16 Units Insulin per Kilo in Monkeys.

Condition animal	No. monkeys	No. samples	Aver. initial mg. %	Aver. mg. % 30 min. after insulin	% decrease
Normal	5	12	115	99	14
Incompleted	3	5	78	66	15
Hypophysectomized	7	11	57	37	35

sugar drop from an average initial value of 57 mg. % to 37 mg. %, a decrease of 35%.

It appears of interest that although the initial level of the blood sugar in the partially hypophysectomized animals was considerably lower than in the normals, nevertheless the percentage drop in blood sugar was nearly identical with that of the normal animals. The 3 partially hypophysectomized animals never went into collapse from the insulin injections whereas the completely hypophysectomized ones often did. In the incomplete hypophysectomies it is estimated that in no case was more than one-fourth of the normal anterior lobe present.

The blood sugar values in 6 cases of hypophysectomized animals in collapse from fasting alone averaged 29 mg. % while in 4 normal and 3 hypophysectomized animals in collapse after insulin injections the average values were approximately the same, 26 mg. %.

8580 P

Functional Auto- and Homoplastic Thyroid Grafts in the Rat.*

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Many of the attempts to graft the thyroid gland have met with little success. Manley and Marine,[1] however, reported auto-transplanted thyroids in rabbits which survived with apparently normal structure for 271 days, the animals showing "marked amelioration of symptoms of operative myxedema." Loeb[2] in a series of

* Aided by a grant from the Committee for Research in Problems of Sex, the National Research Council, administered by Dr. P. E. Smith.

1 Manley, O. T., and Marine, David, PROC. SOC. EXP. BIOL. AND MED., 1915, **12**, 202.

2 Loeb, Leo, *J. Exp. Med.*, 1920, **31**, 765.

heterotransplants found complete early degeneration in all cases usually much before the 18th day. Marine and Rosen[3] attempted to extend the life of homotransplants in the guinea-pig by administering anterior hypophysis extract, but these thyroid grafts remained viable for only 8 days. A method for obtaining persistent functional homotransplants of the thyroid is a desirable and important aid to experimental studies of the gland and it may have clinical significance.

We have been engaged in an extensive series of thyroid transplants in rats of the Long-Evans strain, which have been inbred since 1913. Autotransplants in these rats resulted in 100% viable grafts, if the thyroid was removed at 1 to 7 days of age and immediately grafted subcutaneously over the left ribs. The rats reached maturity with a normal growth curve and with no evidence of any glandular deficiency, gross or histological. The extreme ease with which viable autotransplants were obtained when infantile thyroid tissue was used prompted a subsequent series of homo-grafts.

In a series of 18 rats, homo-grafts were made as follows: (1) Reciprocal homoplastic thyroid grafts between day-old littermates. (2) Thyroids of day-old rats into thyroidectomized rats whose ages varied from 16 to 92 days. (3) Reciprocal transplants between littermates of approximately 2 weeks of age. In all but one case the grafts had taken and were functional at one month as judged by significant reactions of the host, *e. g.* rate of body growth, growth and appearance of hair, etc. Certain individuals in each group were sacrificed at this time in order that the grafted thyroids and the hypophyses might be studied cytologically.

The thyroid transplants showed an intact glandular structure, but almost invariably with a heightened epithelium and considerable colloid depletion. The cytological features, Golgi apparatus and mitochondria, were comparable to the hyperactive thyroid previously described.[4] The fact that excellent Golgi and mitochondrial preparations were obtained indicates in itself the healthy state of the thyroid tissue. There is no evidence of cytolysis or glandular absorption.

The hypophyses of the graft recipients are furthermore an excellent indication of the functional activity of the transplanted thyroids. Severinghaus, Smelser and Clark[5] have shown that marked

[3] Marine, David, and Rosen, S. H., *Am. J. Physiol.*, 1934, **107**, 677.

[4] Severinghaus, Aura E., *Z. für Zellforsch. u. Mikr. Anat.*, 1933, **19**, 653.

[5] Severinghaus, A. E., Smelser, George K., and Clark, Helen M., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 1125.

and typical changes of the rat hypophysis regularly follow thyroidectomy and hyperthyroidism. Our homoplastic thyroid grafts maintained the hypophysis of the recipient in a normal condition. In the one thyroidectomized rat in which the graft failed to take, the typical thyroidectomy changes occurred in the anterior hypophysis. One rat, furthermore, showed hyperthyroid changes in the hypophysis, and an examination of the thyroid graft revealed an exceptionally large gland in a hyperactive state.

Those rats which were not sacrificed at one month for cytological examination have now reached an age of from 3 to 6 months. Their appearance and reactions are completely normal. They show no indications of any thyroid disturbances. They will be under observation in experiments now in progress, at the end of which a final report on the entire thyroid transplant series will be made.

From these series of auto- and homo-thyroid grafts, it is obvious that in our Long-Evans colony of rats the thyroid of an infantile animal may be grafted into a thyroidectomized rat of any age with the expectancy of 100% viable and functional grafts, which persist indefinitely.

The next stages in the experiment will be attempts to transplant the infantile rat thyroid into rats of an unrelated strain and if these attempts are successful, heterografts will then be attempted.

8581 C

Multi-plane Chest Electrocardiography.

JOSEPH WEINSTEIN. (Introduced by M. A. Rothschild.)

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Recent investigations in the field of electrocardiography have been directed towards methods for the more accurate detection and localization of myocardial lesions. The 3 conventional leads frequently fail to detect alterations consequent to a lesion and they have recently been supplemented by chest and precordial leads introduced by Wolferth and Wood,[1, 2, 3, 4, 5] Hoffman and Delong,[6]

1 Wolferth, C. C., and Wood, F. C., *Am. J. M. Sc.*, 1932, **183**, 30.

2 Wolferth, C. C., and Wood, F. C., *M. Clin. North America*, 1932, **16**, 161.

3 Wood, F. C., and Wolferth, C. C., *J. Clin. Invest.*, 1932, **11**, 815.

4 Wood, F. C., and Wolferth, C. C., *Arch. Int. Med.*, 1933, **51**, 771.

5 Wood, F. C., Bellet, S., McMillan, T. M., and Wolferth, C. C., *Arch. Int. Med.*, 1933, **52**, 752.

6 Hoffman, A. M., and Delong, E., *Arch. Int. Med.*, 1933, **51**, 947.