positive with normal progression of lesions. A definite allergic reaction. Neutralization: serum 1:5, virus 1:10,000 to 1:1,000,000; after 3 days 1:10,000+, 1:100,000 and 1:1,000,000—, controls on same rabbit positive at all points; after 6 days all points positive, reaction delayed; slight neutralization.

Rabbit 456—skin test not carried out because animal died. Neutralization test with serum same as 489.

Rabbit 301—heated eluate, 7 injections; each time 5 cc. i.p. and 0.2 cc. i.c. at intervals of 2 days. Eluate positive in dilution of 1:1,000,000. Neutralization test: whole serum 1:10 and virus 1:10,000 negative. Blood taken 6 and 10 days after last injection. Neutralization test: whole serum and 1:10 with virus 1:10,000; on second day control positive, test negative; on fifth day control +++, test only slight infiltration ±. Skin test: virus 1:10,000 negative. This animal had definite skin immunity and its serum considerable neutralizing power.

8320 C

Effect of Sodium Fluoride upon Experimental Thyroid Poisoning.

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Several authors[1-4] have reported beneficial effects from the oral and intravenous exhibition of the fluorides in the treatment of hyperthyroidism, rationalizing the procedure, in some instances at least, upon the well-known enzyme inhibiting action of this halogen. Laboratory findings offer a scientific basis for this treatment, since moderate doses of the fluorides produce *(a)* a diminished tissue respiration[5] and anaerobic glycolysis[6] in excised organs, *(b)* a decreased oxygen consumption and lactic acid production in muscle,[7] and *(c)* a sharp decrease in the oxygen consumption[2] and the carbon dioxide[8] production in the intact animal. Goldemberg[2] states that

1 Woakes, E., *Lancet*, 1881, **1**, 497.
2 Goldemberg, L., *Semana Medica*, 1932, **39**, 1659.
3 Gorlitzer, V., *Med. Klin.*, 1932, **28**, 717.
4 Reveno, W. S., *J. Michigan State Med. Soc.*, 1934, **33**, 359.
5 Phillips, P. H., and Stare, F. J., *J. Biol. Chem.*, 1934, **104**, 351.
6 Dickens, F., and Simer, F., *Biochem. J.*, 1929, **23**, 936.
7 Lipmann, F., *Biochem. Z.*, 1928, **196**, 3; 1929, **206**, 171.
8 Gorlitzer, V., *Arch. f. exp. Path. u. Pharm.*, 1932, **165**, 443.

thyroxine is precipitated *in vitro* by fluorides in alkaline medium. He attributes the beneficial effects of the drug in toxic goiter to an *in vivo* inactivation of thyroxine and an inhibition of oxidases and other tissue ferments.

If this depression of metabolism results from an inactivation of thyroxine and its precursors in the body, it seems logical to postulate that the administration of a fluoride should protect an experimental animal from the toxic action of orally administered desiccated thyroid glands.

TABLE I.
The Effect of Sodium Fluoride upon Thyroid-Fed Rabbits.

Drug	Dosage	No. Animals	Died	Aver. Survival Period
	mg./Kg.			days
Untreated Controls		16	0	
Sodium Fluoride	2.5	12	0	
	5	11	0	
	10	3	0	
Desiccated Thyroid	100	11	9*	41
Sodium Fluoride Desiccated Thyroid	5 100	12	9*	31
Sodium Fluoride Desiccated Thyroid	10 100	9	6*	41

*Survivors killed for histologic examination.

The accompanying data (Table I), obtained from the daily intravenous administration of 1% sodium fluoride to 21 adult rabbits which were also poisoned with 100 mg. per kg. per diem of desiccated thyroid glands, given orally in capsule, show no significant variation in the rapidity of weight loss or the life span of the fluoride treated animals from the thyroid controls. Histologic examination of the thyroid glands of both groups likewise showed that fluoride did not prevent the characteristic flattening of the acinal cells produced by thyroid feeding. The quantity of sodium fluoride used (5 to 10 mg. per kg.) was slightly larger than the 1 to 4 mg. per kg. dosage recommended by the clinician. To determine whether these dosages would induce fluorine cachexia in the rabbit, and whether the route of administration of the drug would influence its toxicity, the weight curves of the fluoride controls, groups of which received the drug either orally (stomach tube), intramuscularly, or

intravenously, were compared with untreated controls over the 5-month experimental period. No significant change was found in the weight curves following 2.5 to 5 mg. orally, whereas intravenous administration of these doses actually induced a more rapid weight increase than in the controls. Intramuscular administration retarded weight gain, probably as a result of local tissue injury. Toward the latter part of the experiment, those animals on 10 mg. per kg. intravenously failed to gain weight in the normal fashion. These results would indicate intravenous administration of daily doses of less than 5 mg. per kg. to be relatively free from toxicity for the adult animal.

These findings do not lend support to the hypothesis of an *in vivo* thyroxine inactivation and a concurrent inhibition of the ferments concerned in metabolism, providing a constant supply of thyroxine is available by thyroid feeding. Neither do they necessarily condemn the therapeutic use of fluorides nor preclude the possibility that fluorides may prevent the elaboration of excessive thyroxine, or its precursors, by the hyperactive gland of thyrotoxicosis, either by a specific inhibitory action on the glandular cells or by a diminution of the iodine content or interference with the iodine utilization of the gland, as recently postulated by Reveno.[4]

8321 C

Normal Curve of Leucocyte Count of the Albino Rat Over a 24-Hour Period.

DOUGLAS WARNER. (Introduced by Dr. Francis Gilchrist.)

In cooperation with the Department of Zoology, Pomona College, Claremont, Calif.

Those who have reported on the rhythm of leucocyte count in man are not in complete agreement. The following work pertains to the blood of man: Reinke,[1] Galambos,[2] Mauriac and Cabouat,[3] Stetson,[4] and Medlar,[5] agree that there are variations within the day of the leucocyte count which can be considered normal. Japha,[6]

1 Reinke, J., *Beitr. z. path. Anat. u. z. Allg. Path.*, 1889, **5**, 439.
2 Galambos, A., *Folia Haemotologica*, 1912, **33**, 153.
3 Mauriac, P., and Cabouat, P., *Paris Med.*, 1921, **39**, 407.
4 Stetson, R. P., *Arch. Int. Med.*, 1927, **40**, 488.
5 Medlar, E. M., *Am. J. Med. Sci.*, 1929, **177**, 72.
6 Japha, A., *Jahrb. f. Kinderhlk*, 1900, **52**, 242.