Single doses of 0.005 gm. to 0.020 gm. per kilo of body weight were followed by a pronounced diuresis. In addition to an increased water output, the urine chlorides and nitrogen were strikingly increased. The control urine was acid, but, after sodium fluoride, it was strongly alkaline to litmus and this alkalinity persisted for approximately one week after the injection. The non-protein nitrogen of the blood has not been fully studied, but in one animal the only change noted was an increase from an average of 31 mg.% to 36 mg. % during the diuresis. This is possibly due to dehydration and blood concentration. Examination of the urine, including a catheterized specimen, revealed no albumin, sugar, casts, leukocytes or erythrocytes. The kidneys of dogs that had received varying doses of NaF, including one animal that had been given 0.02 gm. per kilo of body weight daily for 41 days, showed no microscopic evidence of damage to either glomeruli or tubules. In the animal that had received daily doses for almost 6 weeks, the glomeruli were mildly hyperemic.

6330

## Iodine Content of Certain Pathological Bloods in a Goiterous Region.

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The conflicting findings of previous investigators as to what actually constitutes a normal iodine concentration in the blood and the various opinions regarding pathological iodine led us to study the iodine in diabetic patients, those suffering from thyroid disease, and of a number of pathological cases not directly associated with the endocrine system. Diabetic cases were considered because of the close similarity of this disease, experimentally and clinically, to hyperthyroidism.

The results of iodine estimation on 101 pathological bloods are presented as estimated by the author's method[1]. The investigation includes determinations on 13 diabetic in patients, 54 diabetic out patients, 15 hyperthyroid cases, 4 hypothyroid cases, and 15 miscellaneous cases. Of the diabetic in patients 46.1% are within the

[1] Turner, R. G., *J. Biol. Chem.*, 1930, **88**, 497.

normal range, averaging 10.7 γ %, 23.1% are subnormal, averaging 7.5 γ %, and 30.8% are above normal, with an average of 29.2 γ %. Of the diabetic out patients 25.9% show values in the normal range, averaging 11.3 γ %, 46.3% below the normal range, averaging 6.3 γ %, and 27.8% above normal, averaging 60 γ %. In the hyperthyroid cases 33.3% fall within the normal range with an average of 11.5 γ % and 66.7% of the cases show a supernormal value, averaging 86.8 γ %. Of the 4 hypothyroid cases all gave figures within the normal range with an average of 10 γ %. In the miscellaneous pathological cases, 60% have a normal blood iodine concentration, averaging 11.6 γ %, 26.7% are below normal, averaging 6.1 γ %, and 13.3 % above normal, averaging 66.8 γ %. Of the 101 cases studied 53.1% are within the normal range with an average figure of 11.0 γ %, 32% are subnormal, averaging 6.7 γ %, and 34.6% above the normal range, averaging 60.7 γ %. All normal or non-pathological cases were within the normal range, averaging 11.0 γ %.

A number of investigators have described cases of exophthalmic goiter and diabetes mellitus in the same patient. A review of the literature, however, convinces one that this combination is not common. Joslin[2] observed that exophthalmic goiter preceded diabetes in 5 out of 28 cases. In his series he found that hyperthyroidism preceded the diabetes more commonly when it was primary (exophthalmic goiter) than when it was secondary (toxic adenoma). Lawrence[3] and Thomson[4] treated cases of acute Grave's disease with insulin and noted a marked improvement, the thyroid decreased in size and other clinical symptoms disappeared. Sturm[5] showed that the thyroid gland liberates iodine into the arterial blood intermittently and that sympathetic stimulation increases the circulation. Logically one would assume that this is what occurs in diabetes when high iodine values are encountered. The opinion is expressed that the subnormal values found are not considered pathological but probably result from a change in the iodine content of the diet. The diabetic out patients as well as in patients are placed on special diets. A study has not been made of the iodine content of these diets as compared to the average diet of a normal individual. Scheringer[6]

[2] Joslin, E. P., "The Treatment of Diabetes Mellitus," 4th edition. Lea and Febiger, Philadelphia. 1928. 878.

[3] Lawrence, R. D., *Brit. Med. J.*, 1924, **2**, 753.

[4] Thomson, A. P., *Brit. Med. J.*, 1924, **2**, 876.

[5] Sturm, A., *Deutsch. Arch. klin. Med.*, 1928, **161**, 129.

[6] Scheringer, W., *Deutsch. Med. Woch.*, 1931, **22**, 883.

found the iodine content of the blood of normal persons receiving iodine-poor diets to average 8 γ %. Our findings show an average of 6.7 γ % for all pathological cases studied that showed a blood iodine concentration of less than our normal finding, 9 to 15 γ %. The subnormal values found are believed to be due to lowered exogenous iodine.

In hypothyroid or hyperthyroid cases the patients are not placed on special diets for long periods of time. None of the 19 cases examined showed a subnormal iodine content of the blood. Of the goiter cases only 33% were within the normal range, the remainder showing levels greater than 9 to 15 γ %. The findings show that in exophthalmic goiter cases the blood iodine content ranges 2 to 3 times the normal, in toxic adenoma with hyperthyroidism it may range as high as 5 to 20 times the normal, in simple colloid goiter the iodine content is normal, while in hyperthyroidism not clinically showing protrusion of the eye balls the iodine content may be normal, or above normal, depending on the toxicity of the goiter. No relationship between the iodine content of the blood and the basal metabolic rate could be found.

From the results presented it is believed that the blood iodine test may be of value in clinical diagnostic work, especially in differentiating between mild hyperthyroidism, exophthalmic goiter, and toxic adenoma. High blood iodine values in diabetic cases indicate hyperthyroidism accompanying or preceding the onset of clinical diabetic symptoms.