

## THE THYROID AND CARBOHYDRATE METABOLISM.

Every observer who has had a wide experience with diseases of the thyroid gland has been impressed by the fact that in hyperthyroidism and hypothyroidism there is marked disturbance in the carbohydrate metabolism in many of the cases. F. Kraus, Ludwig, Chvestock, and others have observed that spontaneous glycosuria is not uncommon in exophthalmic goitre. Moreover, it has been shown that the administration of small amounts of carbohydrates in this condition often cause an alimentary glycosuria. In other words, in over-activity of the gland the tolerance for carbohydrates is reduced. Glycosuria in animals is not uncommon as a sequel to ether administration. Gray and De Sautelle have shown that when the thyroid is removed the amount of glucose put out in the urine, under the above conditions, is strikingly less, demonstrating that when the restraining influence of the thyroid is thus removed the pancreas is more efficient for carbohydrate metabolism.

On the other hand, in hypothyroidism, myxedema, the occurrence of spontaneous glycosuria is so rare as practically never to occur. Hirschl found that in an outspoken case of myxedema the administration of 200 to 500 grams of grape sugar did not produce alimentary glycosuria. This would seem to show that the tolerance for carbohydrates in this disease is increased 2 to 5 times. Knöpel-macher has confirmed these findings and has shown that the limit of sugar tolerance sinks to the physiological level as improvement takes place under treatment with thyroid.

King has recently conducted some interesting experiments which seem to adequately explain how the thyroid gland influences carbohydrate metabolism. Following the line of Cohnheim's experiments, he added together weighed amounts of crushed muscle, pancreas and dextrose. He then carried out three series of experiments. He first added a weighed quantity of normal thyroid gland and found that there was a decided lessening of the breaking down of dextrose by muscle and pancreatic juice as compared with the control. The same experiment was carried out with boiled thyroid with identically the same action as with the unboiled gland, *i.e.*, a very definite retardation. This showed that the substance is not a ferment, but is thermostabile in that it resists boiling. The next series of experiments was made with the active principle of the gland, the iodothyron of Baumann, and revealed the fact that the retarding effect on the breaking down of the glucose was even more striking than when the whole gland was used. To use King's words, "These results therefore show that the thyroid gland influences definitely the carbohydrate-destroying mechanism of the body,