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The effect of thyroid gland from young calf upon the blood sugar in depancreatized dogs.

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Every clinician must have observed from time to time the appearance of sugar in the urine after prolonged use of thyroid extract in patients.

Magnus-Levy[1] writes that glycosuria may be noted from large dosages of thyroid in man as well as in dogs. Since glycosuria may occur as a result of thyroid feeding, it was thought that the high percentage of iodine in the gland of the ox might be the determining factor in the appearance of sugar in the urine after prolonged use of the drug.

According to Hammarsten[2] the thyroid of man contains 0.34 per cent. iodine; the thyroid of ox contains 0.86 per cent. It was thought that thyroid which is iodine free must have the reverse effect on the blood-sugar contents. It is a well established fact that the thyroid of newborn animals does not contain iodine. Thyroids from such calves were procured from the slaughter house immediately after killing and extracts from the weighed glands prepared. The alcoholic extracts in Ringers solution were injected intravenously or subcutaneously or administered by the stomach tube to dogs. The extracts were prepared in the same manner as the pancreatic extracts by Banting and Best.

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1 Magnus-Levy, Kraus und Brugsch, *Specielle Pathol. u. Therapie*, 1919, i, S.

2 Hammarsten, "Physiological Chemistry," 1909, Fifth Edition, John Wiley and Sons, New York. English translation by John A. Mandel.

After weighing the thyroids they were cut in very small pieces and placed in 0.2 per cent. HCl in 95 per cent. alcohol and allowed to stand for two days. They were then macerated with quartz and filtered, or when using large amounts first macerated and then put in a press and filtered. The clear filtrate was evaporated to dryness in a warm air current. On the next day or on the third day the dry residue was emulsified with 25 c.c. Ringers solution. 25 c.c. of this solution contained the thyroid residue from 10, 20 or 50 grams gland.

The blood-sugar was determined before injection or oral administration and two or three hours later. The dogs were starved at least 24 hours before the experiments. For one experiment a normal dog was injected first with calf's pancreas prepared by the same method.

Dog 168. Male. Weight, 8 kilos.

January 3, 1923	Bloodsugar 89 mg. in 100 c.c.
January 8, 1923	Bloodsugar 89 mg. 12 M.
January 8, 1923	Bloodsugar 45 mg. 2 P. M. after injection of 5 c.c. residue from whole pancreas.
January 26, 1923	Bloodsugar 100 mg. 12 M.
January 26, 1923	Bloodsugar 80 mg. 2 P. M. after intravenous injection of 10 c.c. Ringers solution which contained a residue from 8 grams thyroid gland.
Control—	
January 28, 1923	Bloodsugar 98 mg. 1:30 P. M.
	Bloodsugar 100 mg. 3:30 P. M. after intravenous injection of 10 c.c. Ringers solution *per se*.

Dog 169. Male. Weight, 12.2 kilos.

January 10, 1923	Partial pancreatectomy. Glycosuria absent.
January 12, 1923	Bloodsugar 133 mg: 2 P. M.
	Bloodsugar 123 mg. 4 P. M. after intravenous injection of 10 c.c. Ringers solution which contained residue from 4 grams thyroid.
January 13, 1923	Bloodsugar 128 mg. 2:15 P. M.
	Bloodsugar 117 mg. 4:15 P. M. after subcutaneous injection of 10 c.c. Ringers solution which contained residue from 4 grams thyroid.

Dog 175. Male. Weight, 11.6 kilos.

March 10, 1923	Bloodsugar 80 mg. 12:30 P. M.
	Bloodsugar 71 mg. 3:30 P. M. after administration through stomach tube of 10 c.c. Ringers solution which contained residue from 4 grams thyroid gland.

Dog 171. Male. Weight, 19.8 kilos.

January 31, 1923	Total pancreatectomy.
February 15, 1923	Incomplete thyroidectomy. Persistent intense glycosuria until March 7, when disposed of.
February 7, 1923	Bloodsugar 333 mg. 2:25 P. M.
	Bloodsugar 312 mg. 4:25 P. M. after oral administration of 10 c.c. Ringers solution which contained residue from 8 grams thyroid.

February 12, 1923	Bloodsugar 312 2:15 P. M.
	Bloodsugar 277 4:15 P. M. after oral administration of 25 c.c. Ringers solution which contained residue from 50 grams thyroid.
Control—	Bloodsugar 250 mg. 3:15 P. M.
February 23, 1923	Bloodsugar 250 mg. 5:15 P. M. after oral administration of 25 c.c. Ringers solution *per se.*

Dog 176. Male. Weight, 9 kilos.

March 22, 1923	Almost complete pancreatectomy. Persistent intense glycosuria. Dog was found dead April 3, 1923.
April 2, 1923	Bloodsugar 164 mg. 2 P. M.
	Bloodsugar 127 mg. 4 P. M. after oral administration of 25 c.c. Ringers solution containing residue from 50 grams.

Dog 167. Female. Weight, 7.4 kilos.

December 21, 1922	Pancreatic ducts were ligated and cut.
January 25, 1923	Bloodsugar 93 mg.
	Bloodsugar 89 mg. 1:30 P. M.
	Bloodsugar 71 mg. 3:30 P. M. after oral administration of 10 c.c. Ringers solution containing residue
January 29, 1923	from 8 grams thyroid.

These experiments tend to show that there is in the normal as well as in the depancreatized dog a reduction in blood-sugar after intravenous, subcutaneous or oral administration of thyroid gland of young calf. It is evident from these experiments that extracts prepared from larger amounts of thyroid were more effective in reducing the blood-sugar contents than when prepared from smaller amounts. It must be admitted that the experiments are too few to draw any definite conclusions. The fact that the thyroid gland from newborn calves has a marked influence in lowering the blood-sugar contents in depancreatized dogs when given by mouth, is important since the oral administration of insulin has no effect on the blood-sugar contents.

Further experiments along these lines are in progress.