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The presence of insulin in chicken tissues.

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Koppanyi, Ivy, Tatum and Jung[1] recently found that when the pancreas of the chicken is removed, a Von Mering-Minkowski diabetes mellitus is present for seven or eight days only. After this period the blood sugar returns to normal and sugar disappears from the urine.

Since it was not known whether or not the pancreas and other tissues of the chicken contained insulin, it was decided to assay some of the tissues of the normal chicken for insulin content. Such knowledge would be necessary before one could arrive at any interpretation of the insulin content of the tissues of depancreatised chickens. Also, this question is involved in any explanation that might be offered for the above strange and interesting observation.

Through the co-operation of Dr. Jones and Mr. Templeton of the Research Division of Swift and Company, we were able to remove the pancreas, liver and kidneys from one hundred chickens within one hour after death.

Insulin was prepared from these tissues by Fisher's[2] modification of the Doisy-Shaffer[3] method.

Three hundred and thirty grams of pancreas, 240 grams of kidney, and 712 grams of liver were extracted, the liver containing a high percentage of lipins was more difficult to work with. After filtering off the toxic portion, the insulin was precipitated, dried, weighed and made up to the following volumes: 1.8 gram of precipitate from the pancreas was made up to a volume of 42 cc. 1.5 gram of precipitate from the kidney and 1.8 gram of precipitate from the liver were dissolved in 52 cc. of distilled water respectively. The solutions were preserved with cresole.

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[1] Koppanyi, T., Ivy, A. C., Tatum, A. L., and Jung, F. T., *Am. J. Physiol.*, lxxvi, 212, 26.

[2] Fisher, N. F., *Am. J. Physiol.*, 1923, lvii, 57.

[3] Doisy, E. A., and Shaffer, P. A., *J. Biol. Chem.*, 1923, lv, 31.

In order to determine the strength of the insulin preparations different amounts were injected into rabbits. The rabbits had been starved for 24 hours.

The following tables illustrate some typical results obtained:

TABLE NO. I—PANCREAS.

4-16-26.

5 cc. pancreas at 10:30.

Normal 9:15	0.101
11:10	0.041
Convulsions at 11:10	
Injected 20 grams of glucose	
Injected again at 2:00	
Injected again at 5:00	

TABLE NO. II—LIVER.

3-4-26.

5 cc. liver at 2:00.

Normal 2:00	.125
3:00	.0454
4:00	.044
5:00	.048
6:30	.068

TABLE NO. III—KIDNEY.

3-6-26.

10 cc. kidney injected at 10.00

Normal 10:00	0.13
12:00	0.108
1:15	0.10
3:15	0.050
5:00	0.068

TABLE NO. IV.

Lilly insulin injected at 10:15.

3 cc. of U 10		2 cc. of U 10	
Normal 10:00	.116	Normal 10:00	0.12
12:00	0.053	Convulsions at 11:40	
1:15	0.050	Blood at 11:40	0.041
5:00	0.048	Given sugar, recovered	

By comparing the above results it will be noticed that 5 cc. of the solution prepared from the pancreas produced convulsions and lowered the blood sugar of a rabbit to 0.041 in two hours. Five cc. of the pancreas solution was found to be equal to 30 clinical units of Lilly's insulin, under the same conditions. The yield of insulin from the chicken pancreas calculated in terms of units per kilo of pancreas would be equal to 760. Since 12.5 cc. of the kidney solution produced similar results to 5 cc. of the pancreas, the yield of insulin per kilo of kidney is 554 units. 7.5 cc. of the liver solution was found to be equal to 5 cc. of the pancreas. The yield of insulin from the liver, per kilo of liver, would be equal to 295 units. These comparisons are, of course, rough because we had only small quantities of material with which to work.

These results show that the pancreas of the chicken contains approximately as much insulin as has been reported to occur in the pancreas of calves and that the kidney and liver of the chicken contain relatively large amounts of insulin.