

Insulin Hypoglycemia in Chick Embryos.*

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Landauer^{1,2} has found that certain morphological abnormalities may be produced by injecting insulin into the yolk of 0-5-day chick embryos. In the course of an investigation into the carbohydrate metabolism of insulin-treated embryos we have found that a persistent hypoglycemia is produced by insulin applied in this manner. This phenomenon is interesting because the hormones usually related to insulin activity are probably not present during the first 7-8 days of embryonic life.

The only certain information about the pituitary gland concerns the onset of cytological differentiation. Rahn³ has shown that acidophiles and basophiles do not appear before the 10th day (though both are preceded by a general basophilic tendency starting on the 8th day). The adrenal cortex (Okuda⁴) is not formed until the 6th day; when cortin first appears is uncertain. Islets of Langerhans are not differentiated until 8-9 days and detectable amounts of insulin do not appear until the 11th day. Needham⁵ has emphasized that there is no significant glycolytic system in embryonic chick tissues during the earlier stages.

Two units of insulin (Iletin, Lillie) were injected into the yolk sac of 5-day embryos.

Blood was obtained directly from the extra embryonic blood system by means of suction through micro cannulae inserted into the vessels. Different groups of embryos were bled on successive days following the injection. Analyses for sugar were made on .01 ml samples with a modified Folin-Malmros technic. The average error for 45 samples of a standard (100 mg % glucose) solution with this procedure was 5.4 mg; standard error was 8.8 mg. The data are presented in Table I. It can be seen that the hypoglycemia is pronounced 24 hours after the injection and that there is a recovery from the insulin effect some time between the 12th and 14th days (7-9 days after injection). Various authors have claimed that normally the embryo's insulin becomes an important factor in control of blood sugar level at this time (Needham⁶).

There is some evidence that a hypoglycemia may be produced at still earlier stages. Insulin (2 units) was injected into the yolk sac of 30-hour embryos. Blood samples were taken 2 days later. At this stage it was necessary to pool blood from two embryos to obtain a .01 mg sample. The average blood sugar value for 4 such samples was 106.9 mg % while that for controls was 145.7 mg %.

TABLE I.
Average of Blood Sugar Values in mg %: 2 units of insulin injected at 5 days.
(No. of cases in parentheses.)

Days of incubation	6	7	8	9	10	12	14	16
Uninjected controls	135 (11)	145 (8)	145 (8)	147 (6)	134 (9)	146 (6)	160 (10)	157 (5)
Insulin treated	80 (16)	70 (10)	76 (8)	49 (6)	58 (8)	53 (5)	135 (8)	141 (3)

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¹ Landauer, W., *J. Exp. Zool.*, 1945, **98**, 65.

² Landauer, W., *J. Exp. Zool.*, 1947, **105**, 145.

³ Rahn, H. J., *Morph.*, 1939, **64**, 483.

⁴ Okuda, M., *Endocrinol.*, 1928, **12**, 342.

⁵ Needham, J., *Biochemistry and Morphogenesis*, 1942.

⁶ Needham, J., *Chemical Embryology*, 1931.