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Effect of Adrenalectomy During Gestation on the Size of the Adrenal Glands of Newborn Rats.

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The object of this study was to determine the extent to which the adrenal cortices of the fetal rat are responsive to a condition of adrenal insufficiency produced in the mother.

Albino rats of the Wistar strain, each weighing 180 to 190 g at the time of mating, were used. Of 10 animals, the adrenal glands were removed on the seventh day of pregnancy and of 15 animals, on the fourteenth day of pregnancy. Eighteen additional pregnant animals were not subjected to operation. On the twenty-first day of pregnancy the young were taken for weighing either immediately after delivery or by cesarean operation. The adrenal glands of the newborn were removed and carefully cleaned of fat and connective tissue. The glands from the animals of the same sex from each litter were combined and weighed in a closed bottle by one of us who was unaware of the identity of the mother. The procedure used in obtaining glands for weighing was carefully standardized and we believe that it was sufficiently accurate to insure reliability of the differences observed. The data are summarized in Table I.

TABLE I.
Data on Newborn Rats; Averages and Range.

Mother adrenal-ectomized	No. of litters	No. in litter		Body wt, g		Adrenal wt (each gland), mg	
		Male	Female	Male	Female	Male	Female
14th day of pregnancy	15	3.7	3.2	4.96	4.78	1.23	1.18
		1-6	1-6	3.98-5.42	3.91-6.17	.94-1.44	.90-1.41
7th day of pregnancy	10	4.7	4.0	4.70	4.51	1.17	1.13
		2-7	2-6	3.17-5.48	3.08-5.42	.92-1.53	.90-1.33
Normal	18	3.8	3.2	5.34	5.03	0.90	0.82
		2-6	1-6	3.64-6.07	4.12-5.52	.72-1.19	.45-1.05

The average values for the weights of adrenal glands of the newborn from adrenalectomized mothers were significantly above normal in each group represented. All of the adrenal weights for the experimental animals were above the means for normals. Histo-

logic comparison of the glands indicated that the differences in size were owing to an increase in the amount of cortical tissue in the glands from the experimental animals.

We have no proof that the glands of the fetus protected the mother against adrenal insufficiency. Mild symptoms of adrenal insufficiency were common among the pregnant mothers and we have observed, in other unpublished experiments, that a severe state of insufficiency is easily produced in these animals by mild stress, such as chilling, a 24-hour fast, and so on.

The mechanism by which the cortical hyperplasia is induced in the fetal adrenal gland was not studied in this experiment. There may be a hormonal stimulus arising from the pituitary body of the adrenalectomized mother or the stimulus may arise in the fetus itself in response to other abnormal changes in the fluids provided to the fetus by the mother.

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Capacity of Skeletal Muscle of Castrated Female Rats for Sustaining Work Output.

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In a previous experiment,¹ I have made a comparison of normal and castrated male rats in respect to the capacity of the gastrocnemius muscle for performing work when made to contract by faradic stimulation. In the present experiment, normal and castrated female rats were studied in a similar manner.

Albino female rats were closely matched into 10 pairs on the basis of weight and one animal in each pair was castrated during the second month following birth. Each rat was prepared for the work test when it reached a weight ranging from 185 to 195 g.

The animal was anesthetized with phenobarbital sodium, its gastrocnemius muscle was weighted with 100 g and was stimulated directly to contract 3 times per second until the muscle became "fatigued," or for 120 hours. The amount of work performed was recorded automatically. Each rat received 6 cc of a physiologic solution of saline by subcutaneous injection every 12 hours. A

¹ Ingle, D. J., unpublished data.