

The Effect of Stilbestrol on the Ovary of the Immature White Leghorn Pullet¹

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The past few years have witnessed the unfolding of a new concept in the field of endocrinology. This idea is that a hormone may have an effect on the gland which secretes it. Estrogens, a group of hormones from the ovary, have been known for many years to affect the secondary sex characteristics of the female animal. Recent experimentation, chiefly on mammals, has shown that the estrogens may also act directly on the ovary. This was suggested by Bradbury (1) who noted that there was an increase in ovarian weight when estrogen was given to immature female rats. Estradiol-benzoate, when given to hypophysectomized rats, was shown by de Wit (2) to stimulate mitosis in the granulosa cells and also to produce cell enlargement. The effect of stilbestrol, a synthetic estrogen, on the ovary of the immature hypophysectomized rat appeared to be true stimulation as it was characterized by an abundant production of medium sized follicles, Payne and Hellbaum (3). These authors also noted a direct relationship between dosage and ovarian weight. The purpose of this paper is to present some information regarding the effect of large doses of stilbestrol on the ovary of the immature pullet.

Materials and Methods: The experimental animals used in this investigation were Single-Comb White Leghorn pullets. Stilbestrol was suspended in sesame oil, which, accordingly, was also injected into the control birds. The stilbestrol and sesame oil were administered subcutaneously and concentrations were made up so that each bird received 0.1 c.c. of the oil daily. In this particular study stilbestrol, in amounts of 2.0 mg., 4.0 mg., and 8.0 mg., was injected into pullets starting at 20 days of age and continuing for 8 and 12 days. Twenty-four hours after the last injection the birds were killed by decapitation, the desired glands were quickly removed and were placed in Bouin's fixing solution. The tissues were stained in the usual manner with Harris' haemotoxylin and eosin.

Results: The stilbestrol caused significant decreases in comb weights and significant increases in oviduct weights for both age groups of birds. The ovarian weights (Table I) were not changed significantly although in the older birds the ovarian weights were slightly lower than those observed in the controls. To further study the possible action on the ovary by stilbestrol, the diameters of ovarian follicles were measured. The results are presented in Table I and they indicate

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TABLE I
Effects of Stilbestrol on the Ovary

Series	Total Treatment	Ovary Weight ¹	Follicular Area
Series 1-4	Injected 8 days:	(20 to 28 days of age)	
1	Controls—oil	30.2 ± 6.4 ²	19,010 ± 9,000
2	2.0 mg. Stil.	30.5 ± 12.8	33,340 ± 6,920
3	4.0 mg. Stil.	27.1 ± 6.1	35,999 ± 6,480* ³
4	8.0 mg. Stil.	30.6 ± 8.4	30,730 ± 5,670
Series 5-8	Injected 12 days:	(20 to 32 days of age)	
5	Controls—oil	34.7 ± 6.0	31,000 ± 7,880
6	2.0 mg. Stil.	34.2 ± 6.0	35,274 ± 10,720
7	4.0 mg. Stil.	33.2 ± 6.4	35,800 ± 10,140
8	8.0 mg. Stil.	32.6 ± 9.0	54,000 ± 11,120* ³
Series 9-12	Injected 8 days:	(32 to 40 days of age)	
9	Controls—oil	26.4 ± 3.0	68,903 ± 13,600
10	2.0 mg. Stil.	29.7 ± 3.1	88,802 ± 18,200
11	20 IU PMS	30.9 ± 4.9	102,814 ± 11,900
12	2.0 mg. Stil. + 20 IU PMS	27.1 ± 6.4	83,375 ± 16,000

¹ All values expressed as milligrams per cent body weight.

² Standard deviation

³ Significant at the 5.0% level

that stilbestrol treated birds have larger ovarian follicles than do the ovaries of normal control birds of the same age. Thus, even though the effect on ovarian weight was negligible, all dosage levels of stilbestrol appeared to have a stimulatory effect on the follicles. Series 3 and 8 show an increase in average follicular size which is statistically significant at the 5% level by the "t" test.

The question arises as to whether or not this follicular stimulation by stilbestrol is direct or indirect; that is, does the stilbestrol make the follicle more sensitive to gonadotrophic action or does it act directly on the follicle? This was tested by administering to 32-day-old pullets a total dosage of 2.0 mg. stilbestrol and 20.0 International Units of the gonadotrophic substance pregnant mare serum (PMS) separately and in combination over a period of 8 days. The results are shown in the last three lines of Table I. The hormones, alone and in combination, all slightly augmented ovarian weights. The birds which received the hormones in combination developed larger follicles than did the controls but follicle size was somewhat smaller than those in the birds which were given the hormones alone. This would seem to indicate that stilbestrol does not make the follicle more sensitive to gonadotrophin—at least to exogenous gonadotrophin.

Summary

Large doses of stilbestrol, a synthetic estrogen, were given to immature White Leghorn pullets. Although there was little effect on ovarian weight, the average diameter of ovarian follicles of the treated birds was larger than the follicle diameters of the control birds. Pregnant mare serum, a gonadotrophic substance, also increased follicular size but this action was not augmented by stilbestrol. These results would indicate that stilbestrol does act directly on the ovary of the immature pullet.

Literature Cited

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