10. THE INEFFECTIVENESS OF OESTROGENS IN PREVENTING POLYNEURITIS

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(Received 21 November 1939)

CERTAIN phenanthrene derivatives have been reported [Rodriguez & Sarda, 1937] to be effective in delaying the onset of polyneuritis and in prolonging the lives of pigeons placed on a vitamin B₁-free diet. The substances reported to have this action were the male and female sex hormones (hombreol and progynon B) and vitamin D (vigantol), while the closely related corpus luteum hormone (proluton) was without effect. We have repeated the study with the female sex hormones, but have been unable to confirm the above observations. In our experience the administration of oestrogenic hormones has no effect whatsoever on the development of vitamin B₁ deficiency in pigeons.

EXPERIMENTAL

Two groups of 40 pigeons were each placed on a diet of polished rice for 30 days. One group was injected intramuscularly during this period with various esters of oestrone (acetate and benzoate) and oestradiol (dipropionate²); the other group served as a control. The results are shown in Table 1.

Table 1. *Lack of effect of oestrogens on the development of polyneuritis in pigeons on a vitamin B₁-free diet*

	Pigeons injected with oestrogens	Control pigeons
Total no. of pigeons studied	40	40
No. unaffected (except wt. loss) within 31 days	9	10
No. developing head retraction	20	18
Day (av.) of appearance of H.R.	19.3	21.4
Wt. loss (av.) at time of H.R.	31.3%	36.9%
No. dying without symptoms or before treatment	11	12
Day (av.) of death	24.6	27.2

The table shows a striking similarity between the control birds and those injected with oestrogens; there is no support for the belief that oestrogens protect the pigeons from vitamin B₁ deficiency. It is apparent that only 50% of the birds in either group developed the typical head retraction symptoms; this is more or less the usual experience in the routine preparation of avitaminous pigeons in this laboratory, and emphasizes the need for a large group of animals in such an experiment as this to prevent erroneous conclusions.

The pigeons that developed head retraction were placed in a warm room and given glucose orally; if the symptoms failed to improve, a standard preparation of vitamin B₁ was administered via the crop. The first dose of vitamin B₁ was effective in allaying the head retraction symptoms for an average of 9.2 days in the birds injected with oestrogens and 8.0 days in the controls.

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² The oestradiol dipropionate was generously supplied by Ciba, Ltd.

Subsequent doses of vitamin B₁ were effective for 5.0 days in the injected birds and 5.3 days in the controls.

Tissue respiration studies were carried out with minced pigeon cerebrum in Warburg manometers by the technique generally used in this laboratory [Passmore *et al.* 1933]. Na lactate was added as the substrate since it was also an indirect measure of pyruvate oxidation [Peters & Thompson, 1934]. For comparative purposes the brains of normal pigeons, pigeons that showed a marked vitamin B₁ deficiency, and avitaminous pigeons that had received a prolonged treatment with oestrogens were included, and in each case the effect of adding 1 μ g. of oestradiol to the respiring tissue was simultaneously determined.

Table 2. *O₂ consumption of pigeon cerebrums from normal, B₁-deficient, and oestrogen-injected B₁-deficient pigeons*

Tissue alone and also in the presence of 1 μ g. oestradiol *in vitro*. Measurements at 15 or 30 min. intervals in μ l. O₂ per g. wet tissue per hr.

Time min.	Normals		B ₁ -deficient		B ₁ -deficient oestrogen-injected	
	Control	+ Oestradiol <i>in vitro</i>	Control	+ Oestradiol <i>in vitro</i>	Control	+ Oestradiol <i>in vitro</i>
15	2135	2250	2000	2105	2115	2140
30	1980	2065	1815	1920	1940	1970
45	1860	1965	1670	1775	1750	1790
60	1770	1880	1545	1640	1620	1650
90	1615	1755	1310	1400	1405	1430
120	1470	1565	1145	1220	1240	1260

The results are shown in Table 2. In all cases the oestrogen appeared to have a slight stimulating effect, but the differences were statistically insignificant. No significant difference could be detected in the O₂ utilization of the cerebrums of avitaminous pigeons whether or not they had been previously injected with oestrogens. Thus oestrogen *in vivo* failed to prevent the significant decrease in respiration due to vitamin B₁ deficiency. There was likewise no significant increase in the respiration of avitaminous cerebrums upon the addition of oestradiol *in vitro*, such as is given by vitamin B₁ in the catatorulin test.

SUMMARY

The administration of oestrogenic hormones was without effect upon the development of polyneuritis in pigeons on a vitamin B₁-free diet.

There was no significant increase in the respiration of avitaminous cerebrums when oestrogen was added *in vivo* or *in vitro*.

The author wishes to express his thanks to Prof. R. A. Peters for suggesting this research and for the necessary aid in carrying it out.

REFERENCES

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