

SPECIFIC AND NON-SPECIFIC SERUM CHOLIN- ESTERASE IN CATS BEFORE AND AFTER TREATMENT WITH STILBOESTROL

BY

R. E. DAVIES AND K. N. OJHA*

*From the Medical Research Council Unit for Research in Cell Metabolism, Department
of Biochemistry and the Department of Pharmacology and Therapeutics,
University of Sheffield*

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Ojha and Wood (1950) have shown that daily intramuscular injections of stilboestrol for 6–15 days can largely inhibit the secretion of hydrochloric acid by the cat stomach in response to histamine. Since Sawyer and Everett (1946) and Everett and Sawyer (1946) found changes in the serum cholinesterase of rats after the injection or removal of oestrogens it seemed of interest to find out whether similar changes were occurring in the cats treated with stilboestrol. A great increase in the serum cholinesterase activity could conceivably lead to inhibition of hydrochloric acid secretion by the stomach. Determinations of specific and non-specific serum cholinesterase activities have been made in nine cats treated with stilboestrol, and in three untreated cats, two of which had been ovariectomized.

METHODS

Estimation of enzyme activities.—Before treatment with stilboestrol approximately 10 ml. blood was removed from the cats by cardiac puncture under ether anaesthesia. After treatment the blood was taken from the carotid artery under ether anaesthesia.

Specific (true) and non-specific (pseudo) cholinesterase activities were measured in the serum from the rate of evolution of CO_2 at 40°C . in Warburg manometers by the method of Mendel and Rudney (1943) and Mendel, Mundell, and Rudney (1943). Duplicate runs were made with 1.0 ml. serum in a solution containing 0.025 M- NaHCO_3 and 0.03 M-acetyl- β -methylcholine (total volume 6 ml.) to estimate the specific enzyme; and with 0.2 ml. serum in a solution containing 0.025 M- NaHCO_3 and 0.006 M-benzoylcholine (total volume 3 ml.) to estimate the non-specific enzyme. Both solutions were gassed with 5% CO_2 + 95% N_2 . Duplicates always agreed within the error of the method ($\pm 5\%$).

A sample of the serum was dried overnight at 110°C . and the enzyme activity calculated as $\mu\text{l. CO}_2/\text{mg. dry wt. serum/hr.}$

Estimation of the secretory response.—The method used was that described by Ojha and Wood (1950).

*Government of India scholar.

TABLE I
GASTRIC SECRETORY RESPONSES AND SERUM CHOLINESTERASE LEVELS

Cat No.	Sex	Wt. kg.	Treatment with stilboestrol		Day on which secretory response was determined	Secretory response to infusion of 15 µg. histamine/min.		Day on which blood was taken for estimations	Enzyme activities		Dry wt. of 1 ml. serum mg.
			mg./day	days		Steady rate of secretion of juice ml./10 min.	Concn. of HCl in juice (at steady state) mM.		Specific serum cholinesterase µl. CO ₂ /mg. dry wt./hr.	Non-specific serum cholinesterase µl. CO ₂ /mg. dry wt./hr.	
85	F	2.0	None		21	2.10 average in normal females* 1.74 ± 0.22 (13)	123 average in normal females* 105 ± 5.5 (11)	1 5 9 13 15 21	6.0 2.4 1.9 1.8 2.0 2.5	1.7 3.9 3.1 4.0 4.1 4.8	94.5 83.7 85.9 83.2 84.0 77.0
71	F	2.2	0.15	3-11	12	2.28	130	1	1.1	1.8	102.1
77	F	1.7	0.20	2-10	11	1.32	119	12	2.0	3.3	86.3
78	F	2.0	0.20	2-10	11	1.38	120	11	2.6	4.9	65.7
86	F	2.3	0.20	1-15	16	0.30	0	11	4.1	1.8	87.0
87	F	3.0	0.20	1-14	15	0.43	0	11	3.1	6.5	85.6
89	F	2.0	0.20	1-13	14	0.42	32	11	3.0	5.3	90.6
81†	F	2.0	None		37	3.04	123	3	2.2	2.3	92.2
83†	F	1.8	None		38	3.76	152	16	2.4	2.1	83.3
								5	2.2	3.4	92.1
								15	1.8	1.3	97.0
								6	1.8	3.5	91.6
								14	2.9	2.6	83.5
								14	1.8	4.3	89.6
								21	2.1	3.6	85.0
								13	1.8	4.8	88.1
								20	2.0	4.8	93.3
73	M	2.6	0.20	3-11	12	0.43 average in normal males* 3.27 ± 0.31 (13)	115-0† average in normal males* 125 ± 6.5 (10)	1 12	1.4 4.0	3.0 3.4	83.0 88.3
79	M	2.2	4.0	3-6	7	2.00	65	1	2.4	4.6	75.9
80	M	2.2	4.0	2-3	4	1.20	70	7 1 4	2.4 2.4 1.7 2.3	5.2 4.1 4.1 2.6	85.2 79.7 80.6

* Ojha and Wood (1950). † Ovariectomized on day 1. ‡ No steady level; concentration fell off steeply to zero.

RESULTS

Cholinesterase activities in the serum before and after treatment with stilboestrol and in some untreated controls are shown in Table I.

It is clear that although the gastric secretory response was reduced no significant changes occurred in the serum-enzyme level during or after treatment. The activities were similar to those found in two cats by Mendel, Mundell, and Rudney (1943), but the results show the large variations within the species and also the large variations in the same individual from time to time. There was also no consistency in the ratio of the specific to the non-specific enzyme activity.

DISCUSSION

The results show that the inhibition of gastric secretion which follows chronic treatment with stilboestrol in cats cannot be ascribed to changes in the levels of specific or non-specific serum cholinesterase activity. There appears to be a species difference between cats and rats because Sawyer and Everett (1946) found that the serum enzyme levels in rats were increased after the injection of oestrogens and reached a maximum in 5-7 days. This did not occur in these experiments on cats.

SUMMARY

1. Estimations have been made of specific and non-specific serum cholinesterase activities in cats before and after treatment for 9-14 days with 0.15 or 0.2 mg. stilboestrol daily by intramuscular injection or for 2 to 4 days with 4 mg. daily.
2. There were large differences between cats and between the same cat at different times both in the levels and in the ratio of the two enzyme activities. There were no significant changes after the treatment or after ovariectomy.
3. The inhibition of gastric secretion which follows chronic treatment with stilboestrol is not due to changes in the activities of the serum cholinesterases.

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