ation interactions with the range of antacid constituents listed. Although these data clearly elucidate the involvement of these mechasims in the reported interaction, further work is required to explore the other possible interaction mechanisms outlined.

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Effect of acetylcholine acetyl-hydrolase (E.C. 3.1.1.7) inhibition on the accumulation of pp' DDT in various brain regions of rats[1,2]

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Summary. The concentration of pp' DDT given intraperitoneally in rats was determined in different brain regions. Maximum accumulation of pp' DDT was found in the corpus striatum, followed by cerebellum and cerebral cortex in that order; following pretreatment with paraoxon the concentrations of pp' DDT were increased in all brain regions studied.

The widespread use of DDT (dichlorodiphenyl trichloroethane) has presented a potential health hazard to mammalian organisms including man. The commonly used technical DDT consists of 2 isomers, op' DDT and pp' DDT[3]. The symptoms of acute DDT poisoning - hyperexcitability tremors or convulsions - are caused by the effect of pp' DDT on the central nervous system[4], the severity of the symptoms being directly related to the concentration of the compound in the brain[5]. Tremors which appear early during the course of acute poisoning are believed to be caused by the accumulation of pp' DDT in the cerebellum[6,7], which is important in the regulation of motor function. Corpus striatum is another area of the brain which has a high concentration of certain neurochemical substances[8-10] and is also important in the regulation of motor activity. Further, prior administration of certain anticholinesterases has been reported to modify or alter the pharmacological effects or concentration of certain drugs and chemicals in the brain[11,12]. The present report is concerned with determining the concentration of pp' DDT in the corpus striatum and other brain regions of rats after treatment with pp' DDT alone or with anticholinesterases.

Methods. Adult male albino rats, 100± 10 g, were used. pp' DDT was dissolved in peanut oil. The animals were fasted for 18 h before use, since preliminary experiments indicated that more uniform results were obtained in this manner. The animals were divided into 4 groups. The animals of group 1 served as controls and received the oily vehicle. The animals of group 2 received pp' DDT (10 mg/kg, i.p.). The animals of group 3 received paraoxon (0.1 mg/kg, s.c.) while those of the group 4 were treated with paraoxon (0.1 mg/kg, s.c.) followed after 10 min by pp' DDT (10 mg/kg, i.p.).

The animals were decapitated 1 h after treatment with pp' DDT. The various brain regions were quickly separated. Corpus striatum was dissected according to the method of Glowinski and Iverson[13]. pp' DDT was extracted with hexane and assayed on GLC according to the procedure described by Maunder et al.[14]. The level of acetylcholinesterase in various brain regions was determined spectrophotometrically by the method of Ellman et al.[15]. Rat brain has been reported to contain almost exclusively the acetylcholinesterase[16,17]. It was further identified by using inhibitors and the substrates acetylthiocholine and butyrylcholine (which is not hydrolyzed by the acetylcholinesterase of rat brain[15]) as described elsewhere[16]. The acetylcholinesterase activity of rat brain was similar to that reported by others[18], and the values were in agreement with the values reported by us elsewhere[19,20].

Results. The level of acetylcholinesterase in different brain regions of paraoxon- and pp' DDT-treated animals is given in the table. Paraoxon induced a significant inhibition of acetylcholinesterase activity in all the brain regions. The concentration of pp' DDT was higher in corpus striatum than the cerebellum and cortex; pretreatment with paraoxon increased the concentration of pp' DDT in all the brain regions (table).

Discussion. The present study showed that brain concentrations of pp' DDT are increased in rats previously exposed to the organophosphorous compound paraoxon. Since paraoxon, a matabolite of parathion[21], is a potent inhibitor of acetylcholinesterase activity (table), the increase of brain concentration of pp' DDT is tentatively explained by cholinesterase inhibition, although the exact mechanism of this phenomenon is not clear. It was previously reported that pretreatment of animals with physostigmine caused greater penetration of certain chemicals and drugs[11,12] (e.g. barbital) through the blood-brain barrier resulting in their enhanced pharmacological effects or accumulation in the brain. Thus the level of acetylcholinesterase activity may influence in some way the permeability of the blood-brain barrier or the accumulation of drugs or chemicals in the brain.

Our results further indicate that the accumulation of pp' DDT in rats was significantly greater in corpus striatum than cortex or cerebellum. It was previously reported that the concentration of pp' DDT in the cerebellum was directly related to the production of tremors, which is an early manifestation of DDT toxicity[6,7]. Since the corpus striatum is an area of the brain which is important in the regulation

Accumulation of pp' DDT in certain brain regions of normal and paraoxon treated rats. The concentration of pp' DDT is expressed as μg/g of brain. Acetylcholinesterase activity is expressed as moles of substrate (acetylthiocholine) hydrolyzed/min/g × 10^{-6}. Each group consists of 6 animals

	1 Controls		2 pp'DDT		3 Paraoxon		4 Paraoxon + pp'DDT	
	pp'DDT (μg/g) mean ± SE	Cholin-esterase mean ± SE	pp'DDT (μg/g) mean ± SE	Cholin-esterase mean ± SE	pp'DDT (μg/g) mean ± SE	Cholin-esterase mean ± SE	pp'DDT (μg/g) mean ± SE	Cholin-esterase mean ± SE
Corpus striatum	N.D.	40.51 ± 2.21	2.68 ± 0.04	39.18 ± 1.44	N.D.	11.31[a] ± 0.97	3.01[b] ± 0.05	10.65[a] ± 0.85
Cortex	N.D.	5.95[c] ± 0.51	1.01[d] ± 0.02	6.12[c] ± 0.38	N.D.	3.06[a,c] ± 0.17	1.21[b,d] ± 0.01	2.87[a,c] ± 0.21
Cerebellum	N.D.	34.43[c] ± 1.43	1.77[d] ± 0.03	33.77[c] ± 1.32	N.D.	14.71[a,d] ± 1.21	2.07[b,d] ± 0.04	15.37[a,c] ± 1.02

N.D. = Not detected. [a]Statistically significant difference when compared to corresponding values of group 1 or 2; $p < 0.01$. [b]Significantly different from corresponding values of group 2, $p < 0.05$. [c]Significantly different from the values of brain regions in the same group (1-4), $p < 0.01$. [d]Significantly different from the values of brain regions in the same group (1-4), $p < 0.05$.

of motor function and neurochemical changes or lesions of corpus striatum are associated with certain motor dysfunctions[22-25], it is likely that the accumulation of pp' DDT in this brain region may also be involved in certain toxic effects of pp' DDT. Since the toxic effects of pp' DDT have been reported to be directly related to the concentration of the compound in the brain[5] which is increased by the inhibitor of cholinesterase, it is likely that the central effects of pp' DDT may be enhanced by the prior administration of an organophosphorous compound.

1 pp' DDT (1,1,1-trichloro-2,2-bis(4'-chlorophenyl ethane), used in the above studies was generously supplied by Montrose Chemical Corporation of California, USA.

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An electrophoretic study of proteins secreted by the rat submandibular gland in response to autonomic agonists[1]

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Summary. Proteins secreted by the rat submandibular gland after administration of autonomic agonists have been fractionated by sodium dodecyl sulphate (SDS) - polyacrylamide gel electrophoresis. α-adrenoceptor, β-adrenoceptor and muscarinic agonists were all found to cause the secretion of different protein populations.

In the rat submandibular gland, studies in vivo have shown that activation of α-adrenoceptors, β-adrenoceptors and muscarinic receptors leads to secretion[3]. The composition of the saliva produced may depend upon which receptor is activated. β-Adrenoceptor exitation leads to the production of a saliva characteristically rich in bicarbonate, potassium and protein, with only moderate amounts of sodium[4-6]. Whilst the secretion caused by α-adrenoceptor and muscarinic agonists has lower concentrations of bicarbonate, potassium and protein and more sodium[6,7].