References

AHTEE, L., SHARMAN, D.F. & VOGT, M. (1970). Acid metabolites of monoamines in avian brain; effects of probenecid and reserpine. *Br. J. Pharmac.*, **38**, 72–85.

MURPHY, G.F., ROBINSON, D. & SHARMAN, D.F. (1969). The effect of tropolone on the formation of 3,4-dihydroxyphenylacetic acid and 4-hydroxy-3-methoxyphenylacetic acid in the brain of the mouse. *Br. J. Pharmac.*, **36**, 107–115.

SHARMAN, D.F. (1967). A discussion of the modes of action of drugs which increase the concentration of 4-hydroxy-3-methoxyphenylacetic acid (homovanillic acid) in the striatum of the mouse. *Br. J. Pharmac. Chemother.*, **30**, 620–626.

TAGLIAMONTE, A., BIGGIO, G., VARGIU, L. & GESSA, G.L. (1973). Free tryptophan in serum controls brain tryptophan level and serotonin synthesis. *Life Sci.*, **12**, 277–287.

Some observations on human brain monoamine oxidase

A.J. CROSS, VIVETTE GLOVER, R. LOFTHOUSE & F. OWEN (introduced by T.J. CROW)

Division of Psychiatry, Clinical Research Centre, Watford Road, Harrow HA1 3UJ; and Bernhardt Baron Memorial Research Laboratories, Queen Charlotte's Maternity Hospital, Goldhawk Road, London W60 XG

Johnston (1968) classified monoamine oxidase (MAO) into type A and type B on the basis of studies with the MAO inhibitor clorgyline. Clorgyline is a specific inhibitor of type A MAO (Johnston 1968) and deprenyl of type B MAO (Knoll & Magyar 1972). 5-Hydroxytryptamine (5-HT) is preferentially deaminated by type A MAO (Johnston 1968) and benzylamine by type B MAO (Christmas, Coulson, Maxwell & Riddell, 1972). During a study of the distribution of MAO activity in human brain, using 5-HT and benzylamine as substrates in the assay procedure, we observed that the activity of the enzyme towards 5-HT was relatively greater in the cerebral cortex than in the hypothalamus, caudate, putamen and nucleus accumbens – suggesting a higher proportion of type A MAO in the cortex. By using the specific inhibitors clorgyline and deprenyl we attempted to verify this suggestion on samples of occipital cortex and caudate. The activity of MAO towards 5-HT and benzylamine in the occipital cortex and caudate is presented in Table 1. Tissue samples were homogenized in approximately 20 volumes of 0.05 M phosphate buffer, pH 7.2, with 8 passes of a motorized teflon pestle. MAO activity was assayed by a radiometric technique similar to that described by Robinson, Lovenberg, Keiser & Sjoerdsma (1968).

However, with clorgyline as the specific inhibitor and with tyramine as substrate we were unable to demonstrate a different proportion of type A MAO in six samples of occipital cortex compared with six samples of caudate. Moreover, when inhibitor concentration was plotted against MAO inhibition several of the resulting inhibition curves did not exhibit the expected plateaus and were single sigmoid curves. This result was confirmed with deprenyl. When double sigmoid inhibition curves were obtained with clorgyline as the specific inhibitor they were also obtained with deprenyl. When single sigmoid curves were obtained with clorgyline they were also obtained with deprenyl.

These observations suggest that studies of the characteristics of MAO, using specific inhibitors, on samples of human brain collected and stored under usual conditions may produce results which are difficult to interpret in terms of the type A/type B classification of the enzyme.

Table 1 MAO activity in human cortex and caudate with 5-HT and benzylamine as substrates
Results expressed as n mole product mg protein^{-1} h^{-1} (mean ± s.d.)

	5-HT	*Benzylamine*	*Benzylamine/5-HT*
Occipital cortex ($n = 10$)	56 ± 16	46 ± 11	0.8
Caudate ($n = 10$)	47 ± 6	86 ± 15	1.8

References

CHRISTMAS, A.J., COULSON, C.J., MAXWELL, D.R. & RIDDELL, D. (1972). A comparison of the pharmacological and biochemical properties of substrate-selective monoamine oxidase inhibitors. *Br. J. Pharmac.*, **45**, 490–503.

JOHNSTON, J.P. (1968). Some observations upon a new inhibitor of monoamine oxidase in brain tissue. *Biochem. Pharmac.*, **17**, 109–119.

KNOLL, J. & MAGYAR, K. (1972). Some puzzling pharmacological effects of monoamine oxidase inhibitors. *Adv. Biochem. Psychopharmac.*, **5**, 393–408.

ROBINSON, D.S., LOVENBERG, W., KEISER, H. & SJOERDSMA, A. (1968). Effect of drugs on human blood platelet and plasma amine oxidase activity *in vitro* and *in vivo*. *Biochem. Pharmac.*, **17**, 109–119.