DEMONSTRATIONS

Changes in the MAO activity with age in the rat vas deferens

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The activity of monoamine oxidase (MAO) in many animal tissues alters with age and hormones. In the rat heart the changes in activity are influenced by the particular substrate used (Lyles & Callingham, 1974). This may be explained by the presence of at least two possible forms of MAO, called 'species A' and 'species B' (Johnston, 1968).

In the rat vas deferens, use of the irreversible MAO inhibitor clorgyline, has shown that 5-HT is metabolized by species A, benzylamine by species B and tyramine by a mixture of A and B (Jarrott, 1971). In this tissue it has been reported that the MAO activity does not alter with age (Sampath & Clarke, 1972). However, tryptamine was used as the only substrate. Three other substrates, 5-HT, benzylamine and tyramine, have now been used to determine whether any changes in MAO activity with age can be detected or not and to see if any such change could be accounted for by alteration in the proportions of species A and B.

MAO was assayed radiochemically using [^{3}H]-5-HT, [^{3}H]-tyramine and [^{14}C]-benzylamine, and expressed as nmol substrate consumed (mg protein)$^{-1}$ h^{-1}. Male Wistar rats were used in groups with body weights of about 40, 60, 110, 160, 210, 300 and 500 g. The vasa deferentia from two rats were homogenized in 1 mM potassium phosphate buffer, pH 7.8. The values represent the mean of 3-4 of these pooled homogenates in each body weight group (i.e. n = 6-8 animals).

Total vas deferens weight was found to increase steadily throughout the growth of the rat. The specific activity of MAO with all three substrates was found to increase between 40-60 g, and then to decline with age. However, the rate of this decline depended upon the substrate used. It was most rapid at the early age (60-160 g) using benzylamine, slowest with 5-HT and intermediate with tyramine. Conversely, at older ages (160-500 g) the rate of decline was faster with 5-HT than with benzylamine, with tyramine again being intermediate in rate.

MAO activity was measured in the presence of clorgyline concentrations of 5×10^{-11} to 5×10^{-4} M, for each of the various age groups. At all ages studied, 5-HT and benzylamine gave inhibition curves confirming their metabolism by enzyme A and B respectively. Tyramine gave a biphasic inhibition curve with a plateau region; the position of this plateau varies with age, suggesting variable proportions of enzyme A and B. Proportions of enzyme A at different body weights were: 60 g-65%, 110 g-73%, 160 g-78%, 500 g-57%.

From these results it would appear that the MAO activity measured with all three substrates, after reaching a peak, declines with age. However, the rate of decline is determined by the particular substrate and it also corresponds with the changes that occur with age in the proportions of species A and B MAO in the rat vas deferens.

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