These experiments indicate some of the complexities associated with the estimation of MAO activity and some of the difficulties which may arise when attempting to correlate the results of different workers in different laboratories using a wide variety of techniques.

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Substrate specificity of monoamine oxidase activity in various mouse and rat tissues

Adrenalectomy causes a rise in the activity of monoamine oxidase (MAO) in the rat heart (Avakian & Callingham, 1968), but there is no change following adrenalectomy in the activity of mouse heart MAO using either tyramine or benzylamine as substrate (Laverty, unpublished). Rat heart MAO also differs from mouse heart MAO since its activity increases rapidly with age (Horita, 1967). It was therefore decided to compare the substrate specificity of homogenates of mouse and rat hearts and other tissues from these animals in an attempt to see if other differences exist.

Tissues from adult male albino rats (300–350 g) and mice (30–35 g) were homogenized in 0·001M potassium phosphate solution at pH 7·8, and diluted to a 1:20 suspension. MAO activity was measured radiochemically (McCaman, McCaman & others, 1965; Callingham & Laverty, 1973) using [^{3}H]tyramine, [^{3}H]dopamine, [^{3}H]5-hydroxytryptamine or [^{14}C]benzylamine (1 mM in 0·1 M potassium phosphate solution, pH 7·8) as substrates, or fluorimetrically (Kraml, 1965; Squires, 1968) using kynuramine (0·15 mM) as substrate.

The absolute MAO activities of rat and mouse tissues to the five substrates are shown in Table 1. In both species, the maximum activity with all substrates was found in the liver with least in the spleen. The pattern of activity between the substrates was similar in mouse and rat liver, brain and spleen, with the exception that

Table 1. *Comparison of MAO activities on various substrates of homogenates of tissues from adult rats and mice.* Activities are expressed in nmol substrate reacted (mg protein)$^{-1}$ h^{-1}, as means (± s.e.) of 6 tissues.

Substrate	Species	Heart	Liver	Brain	Spleen
Tyramine	*Rat*	430 ± 26	636 ± 67	147 ± 6·1	35·7 ± 2·2
Kynuramine		146 ± 20	231 ± 17	60·8 ± 5·4	10·5 ± 1·7
Dopamine		211 ± 17	238 ± 37	53·3 ± 6·2	16·7 ± 2·3
5-HT		395 ± 20	309 ± 32	94·3 ± 3·9	26·8 ± 6·9
Benzylamine		15·5 ± 1·4	162 ± 13	42·8 ± 6·6	5·6 ± 1·2
Tyramine	*Mouse*	240 ± 11	508 ± 41	141 ± 4·2	22·0 ± 2·6
Kynuramine		93 ± 12	226 ± 24	57·2 ± 7·2	7·8 ± 2·2
Dopamine		69·8 ± 5·0	160 ± 17	53·8 ± 2·8	8·3 ± 1·1
5-HT		23·2 ± 1·2	47·3 ± 3·8	69·5 ± 3·4	21·6 ± 2·3
Benzylamine		110 ± 5·1	181 ± 14	49·8 ± 2·1	5·0 ± 1·2

rat tissues, particularly the liver, contained more activity against 5-hydroxytryptamine than mouse tissues.

However, the pattern of substrate specificity varied much more dramatically between rat and mouse heart. In the rat heart MAO activity with tyramine, dopamine and 5-HT was high whereas benzylamine oxidase activity was low. In the mouse heart, tyramine and benzylamine oxidase activities were high whereas activities with dopamine and, more particularly, 5-HT were quite low. Thus it would appear that rat heart MAO differs from mouse heart MAO not only in its response to adrenalectomy and age but also in its pattern of substrate specificity.

It is not possible at this stage to suggest whether there is a relation between the change in substrate specificity pattern in the rat heart and its difference in response to age and adrenalectomy. This work does emphasize that it is necessary to consider the activity of monoamine oxidase towards more than one substrate when making comparisons between tissues, or between species. Other studies have shown that the nature of the incubation buffer can also affect the relative MAO activities to different substrates and in different tissues (Browne, Laverty & Callingham, 1973). Thus the absolute level of MAO activity as determined experimentally depends on a variety of conditions of which substrate and buffer are two; failure to take this into consideration may explain many of the seemingly discrepant results found in the literature.

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