LETTER TO THE EDITOR

Histidine Decarboxylase in Rat Hepatoma

SIR,—As part of the programme designed to test the theory of Kahlson (1960) that the histamine-forming capacity of rat tissues is related to the processes of growth, regeneration and repair, we have studied the growth of a transplantable rat hepatoma. This was kindly supplied by Professor A. Haddow of the Chester

TABLE I

COMPARISON OF THE PROPERTIES OF HISTIDINE DECARBOXYLASE FROM THREE LOCATIONS IN THE RAT

Location of enzyme	Weight of tissue (g.)	Histidine decarboxylase			5-Hydroxy-tryptophan decarboxylase (μg.)
		Activity (μg.)	Optimal pH	Benzene required	
Hepatoma (day 10)	0·4	474	6·5	No	3·0
Foetal liver (day 15)	0·03	68	6·5	No	0·1
Adult liver	7·0	70	8·0	Yes	910·0

Beatty Research Institute, London, and has already been shown by Mackay, Marshall and Riley (1960) to possess a high histidine decarboxylase activity.

Female rats of the August strain and of the same age were implanted subcutaneously with the hepatoma and determinations of the histamine-forming capacity of the tumour were made at intervals using the method of Waton (1956) as modified by Telford and West (1961a). The tumour enzyme showed an optimal

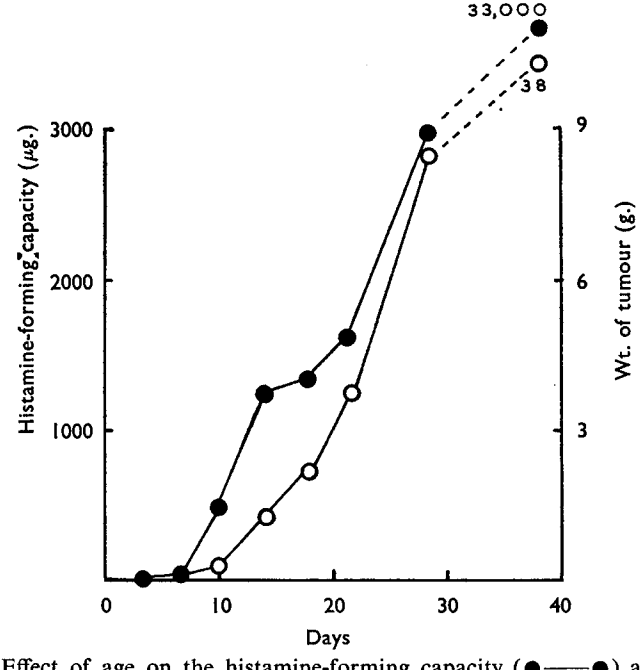

FIG. 1. Effect of age on the histamine-forming capacity (●——●) and weight (○——○) of the rat heptoma.

activity at an acid pH (6·5) and did not require the presence of an organic solvent, conditions which are similar to those already reported by Telford and West (1961b) for rat foetal liver. Both the tumour and the foetal liver had feeble 5-hydroxytryptamine-forming capacities when these were estimated by the method of Price and West (1960). These results are shown in Table I and compared with the corresponding properties of the enzyme in the adult liver. There is an inverse relation between the histidine decarboxylase and 5-hydroxytryptophan decarboxylase activities of these three tissues.

The histamine-forming capacity of the hepatoma steadily increased after grafting and high activities were found after 14 days. When portions of the tumour became necrotic (after about 20 days), activity increased still further. These results are shown in Fig. 1. Urinary excretion of histamine closely followed the changes in enzyme activity.

Similar results have been obtained after transplanting the same tumour into rats of the Wistar strain, although after grafting into several generations the histidine decarboxylase activity was reduced. Semicarbazide and α-methyl-DOPA in concentrations of 10^{-4} did not inhibit enzyme activity *in vitro*, and injections of cortisone also failed to inhibit tumour growth *in vivo*.

The results show that for this hepatoma there is an association between histamine-forming capacity and growth. However, little or no histidine decarboxylase activity has been found in other rapidly growing experimental tumours of rat and human origin. The rat hepatoma therefore seems to be a tumour arising from the foetal type of cell. Whether the function of its histidine decarboxylase is to produce histamine and so dilate blood vessels to increase the blood supply to the tumour tissue remains a question for future enquiry.

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