Table 1. RELEASE OF ACID PHOSPHATASE FROM PARTICULATE FRACTIONS OF RAT ADRENAL, KIDNEY AND LIVER

	Conc. (μ g/ml.)	Incuba- tion time (min)	Percentage release of acid phosphatase		
			Adrenal	Kidney	Liver
7-Hydroxymethyl-12-methyl- benzanthracene	100	15	23	—	5
7-Hydroxymethyl-12-methyl- benzanthracene	100	15	27	10	—
12-Hydroxymethyl-7-methyl- benzanthracene	100	15	7	—	—
DMBA	100	15	13	15	—
DMBA	100	30	22	—	6
DMBA	50	30	14	—	0
DMBA	10	15	9	7	—
Methylcholanthrene	100	15	5	0	—
Methylcholanthrene	10	15	2	0	—
Retinol	50	30	26	—	36
Control	—	15	2	3	—
Control	—	30	4	—	2

final DMS concentration was 2.5 per cent (v/v). At the end of the incubation period the preparation was centrifuged at 10,000*g* for 15 min and the free acid phosphatase estimated in the supernatant with *p*-nitrophenylphosphate as substrate. In some experiments retinol, a derivative of vitamin A known to increase permeability of lysosomal membranes⁶, was used as a control. Other controls had the solvent alone. The percentage enzyme release is expressed as a fraction of that released by Triton X-100.

The results of several experiments, some of which are summarized in Table 1, show that retinol causes considerable release of enzyme from both adrenal and liver lysosomes, whereas 7-OH-12-MBA had a well-marked effect on adrenal lysosomes, but only a slight action on those of liver or kidney. 12-OH-7-MBA and 20-methylcholanthrene brought about no significant release of enzymes from either adrenal or kidney lysosomes. DMBA had some effect on adrenal lysosomes, especially after the longer incubation period shown in Table 1. The effect was, however, much less than that of 7-OH-12-MBA, and the possibility of metabolism of DMBA in this system has not been excluded.

It is clear that the membranes of lysosomes from different organs do not respond uniformly to the presence of chemicals. The membranes of rat adrenal lysosomes are highly sensitive to 7-OH-12-MBA, but less so to the isomer 12-OH-7-MBA, to DMBA, or to other hydrocarbons. Thus the *in vitro* results parallel the sensitivity *in vivo*, and it seems very likely that the adrenal necrosis observed in rats treated with DMBA is due to the concentration of 7-OH-12-MBA in adrenal cortical lysosomes with release of sufficient lytic enzymes to destroy the cells. There is other evidence that release of enzymes from lysosomes can irreparably damage cells⁷.

The relationship of these results to carcinogenesis by DMBA and other hydrocarbons is not yet clear, but it has been suggested^{3,7} that gradual release of enzymes from lysosomes over long periods may be implicated in malignant transformation. This process is likely to be different, quantitatively if not qualitatively, from the sudden and massive release of lysosomal enzymes which is probably involved in adrenal necrosis.

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PHYSIOLOGY

Behaviour of Carbonic Anhydrase in the Uterus of Hens during Moul

THE carbonic anhydrase present in the uterus of hens is involved in the calcification of the egg-shell¹. The activity of this enzyme in the uterus seems to be greater in 'good' than in 'poor' layers or in non-layers². Recently we pointed out that this enzyme is located at the apical pole of the cells of the tubular glands³ (Fig. 1). We succeeded in demonstrating, by a histochemical method⁴, that the reactivity of carbonic anhydrase is reduced in the uterus gland cells in moulting hens, whereas moulting has no influence on the carbonic anhydrase activity in the erythrocytes (Fig. 2). These results suggest an enzyme activation or an induction of enzyme synthesis similar to the effect of progesterone on the carbonic anhydrase in the endometrium of mammals^{5,6}.

Fig. 1. Carbonic anhydrase activity in the tubular glands of the uterus of a laying hen. ($\times 270$)

Fig. 2. Reduced carbonic anhydrase activity in the tubular glands of a moulting hen. Capillaries filled with enzyme-active erythrocytes. ($\times 270$)

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