evidence that thrombin is itself a lysyl esterase is the finding that, regardless of the state of purification or type of preparation, the ratio of the activity of (I) to lysine methyl ester or ethyl ester remains constant. Thus, a 100-fold increase in purity resulted in only minor changes in the magnitude and shape of the *p*H – lysine methyl ester activity curve. The same holds true for the *p*H–(I) activity curves for these preparations[3].

In conclusion, thrombin has lysine esterase activity but, as discussed elsewhere[11], the lysine esterase site probably differs from the hydrolytic site for (I) and for fibrinogen. Further studies on thrombin are in progress.

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Vanadium Inhibition of Phospholipid Synthesis and Sulphydryl Activity in Rat Liver

THE effect of various transition elements on lipid and sterol metabolism has received attention in recent years[1]. For example, both vanadium and members of the rare-earth group are capable of producing a fatty infiltration of the liver. Furthermore, vanadium can cause a marked reduction in cholesterol and phospholipids[1,2]. In this connexion, work has been directed towards investigating a possible prophylactic action of vanadium against atherosclerosis[2]; it has been suggested that disruption of the endogenous balance of the transition elements in the liver could underlie the pathogenesis of this disease[1].

The increased *in vitro* oxidation of the fatty acid moiety of phospholipids occurring in the presence of vanadium[3] may account for the decreased phospholipid levels in animals fed vanadium, but it has not ruled out the possibility of an independent effect of vanadium in retarding liver phosphatide synthesis. This possibility was tested *in vivo* by measuring the incorporation of phosphorus-32 into liver phospholipids of rats shortly after injection of labelled phosphate.

Since Mountain *et al.*[4] have previously reported interference of sulphur amino-acid metabolism in vanadium toxicity, an additional group of animals was used to ascertain the effect of vanadium on the incorporation of L-methionine-^{35}S into liver protein, and on the amount of sulphydryl soluble in trichloracetic acids in the liver.

The Sprague–Dawley rats weighing approximately 170 gm. used in these studies were maintained on a 5 per cent casein diet[5] for 11 days. Animals were injected intraperitoneally with a vanadyl sulphate solution (0·75 mgm. vanadium in 0·5 ml. saline/100 gm. body-weight)[1] or saline (0·5 ml./100 gm. body-weight). The isotope (10 μc. of $NaH_2{}^{32}PO_4$ or 15 μc. of L-methionine-^{35}S) was administered by the same route immediately after the animals received the vanadium or saline. The rats were killed 3 hr. later. The livers, after being rapidly excised and weighed, were analysed in a manner similar to that described previously for phospholipid[5] and sulphur[6] turn-over. The relative specific activity of the phospholipids and the specific activity of total protein sulphur were calculated from the chemical and radioactive measurements.

Table 1. EFFECT OF VANADIUM ON PHOSPHOLIPID SYNTHESIS AND SULPHUR TURN-OVER IN LIVER OF RATS

	Saline controls	Treated with vanadium
No. of rats	6	6
Phospholipid relative specific activity*	0·101 ± 0·015	0·075 ± 0·018§
Protein sulphur specific activity†	12·8 ± 1·8	16·8 ± 1·0§
Sulphydryl compounds, mgm.‡ (TCA soluble)	0·37 ± 0·05	0·26 ± 0·03§

* Relative specific activity = $\frac{\text{specific activity of phospholipid-phosphorus}}{\text{specific activity of inorganic phosphorus}}$

where the specific activity of phosphorus is defined as $\frac{\text{(counts/min. phosphorus-32)}}{\text{(mgm. phosphorus) (counts/min. of dose injected} \times 100)}$

† Sulphur specific activity = $\frac{\text{(counts/min. sulphur-35) dekagm. of body-weight)}}{\text{(mgm. sulphur) (counts/min. of dose injected)}}$

‡ Reported as mgm. of cystine per gm. of wet weight.

§ $P < 0.05$ calculated from the *t* test of significance. The figures preceded by the ± are the standard deviation.

The results are reported in Table 1. They suggest that the decreased phospholipid values observed in animals fed vanadium[2] result from inhibition of phospholipid synthesis and are probably augmented by oxidative degradation[3]. An alteration in sulphur metabolism is also apparent from the reduction of the sulphydryl content of the liver soluble in acid and from the increased turn over of protein sulphur in the animals which received the vanadium.

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