The presence of pyruvate carboxylase (total activity 7.8 units/g. wet wt.) and NAD-malate dehydrogenase (total activity 307 units/g. wet wt.) in the superovulated rat ovary suggests that the pyruvate-malate cycle, previously described in liver (Lowenstein, 1961; Shrago & Lardy, 1966; Walter, Paetkau & Lardy, 1966) and in adipose tissue (Kornacker & Ball, 1965; Ballard & Hanson, 1967), may operate in this tissue. This cycle provides a means by which mitochondrial or cytoplasmic NADH may be converted into cytoplasmic NADPH for steroidogenesis.

The effect of glucose on steroidogenesis from acetate could be the result of glycolytic pyruvate priming the pyruvate-malate cycle. The effects of lactate and pyruvate can also be explained in these terms. The intracellular concentration malate is increased in the presence of glucose from 16 to 364 μ M. The effect of isocitrate may be due to its metabolism by NADP-isocitrate dehydrogenase.

Ballard, F. J. & Hanson, R. W. (1967). *J. Lipid Res.* **8**, 73.
 Flint, A. P. F. & Denton, R. M. (1969). *Biochem. J.* **112**, 243.
 Kornacker, M. S. & Ball, E. G. (1965). *Proc. nat. Acad. Sci., Wash.*, **54**, 899.

Lowenstein, J. M. (1961). *J. biol. Chem.* **236**, 1213.
 Shrago, E. & Lardy, H. A. (1966). *J. biol. Chem.* **241**, 663.
 Walter, P., Paetkau, V. & Lardy, H. A. (1966). *J. biol. Chem.* **241**, 2532.

Absorption and Tissue Uptake of α -Tocopherol in the Rat

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Tracer doses of DL-[5-Me- ^{3} H] α -tocopherol were administered orally to groups of six rats housed individually in metabolic cages with precautions to prevent coprophagy. The net absorption (determined from faecal radioactivity) and tissue contents of radioactivity were measured after 7 days.

The effects of (1) the vitamin status of the animal, (2) the vehicle (Tween 80, alcohol or arachis oil) and (3) decreased serum lipoprotein concentrations on the absorption and tissue distribution of radioactivity were studied.

Rats deficient in vitamin E had the same net absorption as supplemented animals, but significantly more radioactivity in liver ($P < 0.02$) and kidneys ($P < 0.005$).

Net absorption of the vitamin was the same whether given in Tween 80, alcohol or arachis oil. The amounts of radioactivity in the liver but not in kidneys of groups given the vitamin in alcohol or arachis oil were significantly different ($p < 0.05$). When Tween administration was compared with

arachis oil the resulting tissue contents of radioactivity with Tween were very much greater ($P < 0.001$).

Prior lowering of serum lipoprotein concentrations in rats by prolonged dietary orotic acid did not affect net absorption, but radioactivity in adrenals ($P = 0.05$), adipose tissue ($P < 0.01$) and liver ($P < 0.001$) were significantly greater and in heart significantly lower ($P < 0.025$) than in control animals.

It is concluded that, although net absorption remains unchanged, the vitamin E status of the animal, the nature of the vehicle in which α -tocopherol is administered and the serum lipoproteins concentrations affect the tissue distribution of the ingested vitamin.

The Distribution of Vitamin D₃ Metabolites in Human Serum and Tissues

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In an earlier communication Mawer & Stanbury (1968) described the persistence for several months of more-polar metabolites in human serum after the injection of isotopically labelled vitamin D₃ (cholecalciferol).

Methods have now been developed that allow the separation of the 'polar metabolite fraction' into its several components (Mawer & Backhouse, 1969).

In the present communication the changes with time within the polar metabolite fraction of human serum will be described. Initially the principal component was peak ivb, which is eluted with diethyl ether and co-chromatographs in our silicic acid system with authentic 25-hydroxycholecalciferol (Blunt & DeLuca, 1969). This peak possesses biological activity in the rat line test approximately equal to that of cholecalciferol. Three other peaks of radioactivity were observed, none of which possessed biological activity and only one, peak vi, eluted by methanol-ether (1:1, v/v), increased in concentration with time and continued to increase after peak ivb had started to decrease.

The concentration of peak ivb and its rate of appearance in serum may be related to the previous vitamin D status of the subject. When the serum vitamin D activity, as assayed in the rat line test, was low, peak ivb was produced more rapidly and represented a higher proportion of the injected dose.

Results will also be presented describing the metabolite pattern in the tissues of a leg amputated 4 days after the subject had received intravenous [4- ^{14} C]cholecalciferol. The percentage of the injected dose present in each tissue when extra-