DL- α -tocopheryl acetate. No success met our efforts to use the dialuric acid test as a quantitative assay, but it appears, as has been previously found with other non- α tocopherols^{8,9}, that ζ -tocopherol is much less active than α -tocopherol in the dialuric acid test.

Some comments on the composition of the vitamin E-free diet for the rat assay are worth recording. The use of a standard diet consisting mainly of vitamin-free casein, starch, sugar and yeast, and containing 1 per cent of olive oil, B.P., did not produce satisfactory deficiency in rats. It was shown, by paper chromatographic assay, that the diet contained 1 μ gm./gm. of total tocopherols (nearly all α) and that the olive oil contained 72 μ gm./gm. of tocopherol (100 per cent α). It may be noted that Mason and Harris¹⁰, recommending a standard diet for vitamin E assay, considered 10 per cent olive oil a suitable alternative to 10 per cent lard. It may be assumed, therefore, that either olive oil of commerce varies considerably in its tocopherol content, or that large amounts of olive oil in a diet free from vitamin E can only be tolerated if the vitamin A supplement is given as cod liver oil. In our diets, vitamin A was given as a high-potency concentrate, adding practically no fat to the ration. When 1 per cent lard replaced 1 per cent olive oil in our diets, consistent vitamin E deficiency was obtained. The lard used was found to contain less than 0.03 μ gm./gm. of total tocopherols.

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A Second Major Constituent of the Blood oxidized at the Brain

GLUTATHIONE was suspected to be involved in respiratory or redox processes even before its structure was known. Among the very extensive subsequent work¹ there appears, however, to have been little attempt to appraise such a role in animals by direct determination of the levels of the oxidized and reduced forms of glutathione in arterial and venous blood, which is rich in glutathione.

A newly developed glyoxalase method² has now been applied to determining the two forms of glutathione in arterial and cerebral venous blood from the conscious rabbit (Table 1). The venous blood was obtained at the junction of the superior longitudinal and lateral sinuses (Rodnight, R., unpub-

Table 1. CONSTITUENTS OF ARTERIAL (A) AND CEREBRAL VENOUS (V) BLOOD OF THE RABBIT

Samples were taken simultaneously; values in mgm./100 ml. Hæmatocrits, also determined, showed no arterio-venous difference

Animal ; specimen	Reduced glutathione	Oxidized glutathione	Glucose
I : 1	A, 26.4 ; V, 20.0	A, 10.7 ; V, 16.9	A, 121 ; V, 108
I : 2	A, 20.9 ; V, 12.3	A, 16.0 ; V, 24.6	A, 98 ; V, 89
II : 1	A, 25.8 ; V, 19.9	A, 11.1 ; V, 16.9	A, 95 ; V, 85
Mean and S.D., 8 specimens	A - V, 7.2 $\pm$ 2.6	V - A, 7.5 $\pm$ 2.4	A - V, 11.3 $\pm$ 3.6

lished work), and the arterial blood from the central artery of the ear. Reduced glutathione is seen to be oxidized at the brain. The change in glutathione is by weight two-thirds of that in glucose, and involves the oxidation of 30 per cent of the reduced glutathione supplied to the brain: a much greater proportional change, therefore, than in glucose.

It is very interesting and surprising to find such large changes in glutathione at the brain, for calculation from data regarding its respiratory and carbohydrate exchange *in vivo* has shown this to give an almost exact balance in terms of oxygen, glucose, lactate, pyruvate and carbon dioxide³. However, present results do not seriously disturb this balance, as the change of -SH to -SS-glutathione uses only 1/41 of the oxygen needed for complete oxidation of the same weight of glucose. Nevertheless, this qualitatively very different type of oxidation at the brain may contribute to the failure to maintain the organ by perfusion with simple solutions, the necessity for including erythrocytes in perfusion systems, and the advantage accruing in such experiments from passing the erythrocyte suspensions through the liver⁴. For presumably the glutathione oxidized at the brain is reduced elsewhere in the body (McIlwain, H., Martin, H., Rodnight, R., and Tresize, M. A., unpublished work); as the substance does not appear to leave the red cell rapidly⁵, carrier systems or diffusible oxidizing agents in the plasma must be implicated.

The changes in glutathione recorded in Table 1 have been confirmed by iodometric titration, by recovery of glutathione added to blood, and by different precipitations and pretreatments of the blood samples analysed.

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