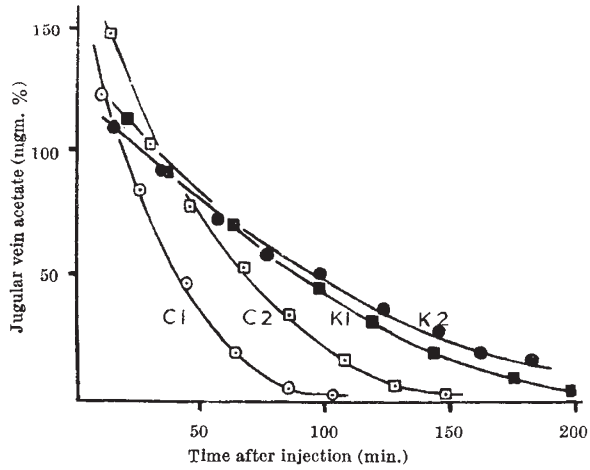

Disappearance of injected acetate. *C*1 and *C*2 give extreme findings in sixteen normal sheep during pregnancy. *K*1 and *K*2 are from two animals with ketosis in late pregnancy

Acetate has frequently been shown to be a precursor of ketone bodies. The injection into sheep of large amounts of acetate results in a small rise in the level of circulating ketone bodies[1]: in the control ewes of this series this was very reproducible both as regards magnitude and duration. In the ketonæmic animals, the acetate injection produced a different response, in that the rise in circulating ketone bodies was both delayed and smaller in amount to an extent which varied with the degree to which the metabolism of acetate was impaired. In these sheep the greater the degree of ketonæmia the less was the apparent conversion of exogenous acetate to ketone bodies.

There is a possible relationship between this derangement and the decreased rate of production of carbon dioxide from isotopically labelled acetate demonstrated *in vivo* in the fasting rat by Coniglio, Anderson and Robinson[2]. The significance of these findings in the sheep, in which the metabolism of absorbed acetate provides an important part of the energy requirements, and their possible relationship to the problem of ketosis, are the subjects of further investigation.

P. Storie Pugh
(Wellcome Research Fellow of the Animal Health Trust)
R. Scarisbrick

Department of Animal Pathology,
University of Cambridge.
May 27.

[1] Schultz, L. H., Smith, V. R., and Lardy, H. A., *J. Dairy Sci.*, **32**, 817 (1949). Jarret, I. G., and Potter, B. J., *Nature*, **166**, 515 (1950).

[2] Coniglio, J. G., Anderson, C. E., and Robinson, C. S., *Fed. Proc.*, **11**, 198 (1952).

Relation between Total and Exchangeable Sodium in the Body

Early workers, who studied the fate of sodium-24 administered to animals, showed that the isotope exchanged with the sodium of the tissues[1]. They assumed that all the body sodium participated in this exchange. That this assumption is incorrect was suggested by recent results obtained with dogs[2] and humans[3-5], in which 20–35 per cent of the body sodium was estimated to be non-exchangeable with plasma sodium-24.

In order to study directly the relationship between total sodium and exchangeable sodium, sodium-24 was injected intravenously into six adult, well-nourished rabbits. Blood samples were taken periodically and analysed for their radioactivity and sodium content. After varying times (6–96 hr.), the rabbits were killed and small samples of tissues were taken. The bodies were then minced. The tissue samples and portions of the well-mixed minces were dissolved in nitric acid and their radioactivity and sodium content determined[6].

The exchangeable sodium, obtained from analysis of blood samples, was 48 ± 0·75 (s.e.) m.mol. sodium/kgm. body-weight, the value given by analysis of the minces being 46 ± 1·13 m.mol. sodium/kgm. body-weight. These figures are not significantly different, and show that the usual clinical method of measuring exchangeable sodium, as the ratio of the total radioactivity in the patient to the specific activity of the plasma, gives valid results. The total sodium of the rabbits was 62 ± 1·5 m.mol. sodium/kgm. body-weight, that is, the exchangeable sodium was 69 ± 1·7 per cent of the total sodium. The non-exchangeable sodium of the rabbits therefore was 16 ± 1·9 m.mol./kgm. body-weight.

Studies of the exchange of plasma sodium-24 with the sodium of bone in dogs[2] and humans[4,5] have shown that 55–70 per cent of the bone sodium is non-exchangeable. In rabbits[5] this figure is 61–68 per cent. Since the average sodium content of the rabbit bones was 270 m.mol./kgm. bone, the non-exchangeable sodium of bone was about 170 m.mol./kgm. bone; and, as direct measurements exclude the presence of any other major store of non-exchangeable sodium in the rabbit, this means that the bones constituted approximately 10 per cent of the total body-weight, a figure in good agreement with direct determinations[7].

These experiments therefore show that virtually all the non-exchangeable sodium of the rabbit is located in bone and is about 28 per cent of the total body-sodium.

R. E. Davies
H. L. Kornberg*

Medical Research Council
Cell Metabolism Research Unit,
Department of Biochemistry,
University, Sheffield.

G. M. Wilson

Department of Pharmacology
and Therapeutics,
University, Sheffield.
Aug. 27.

* John Stokes Research Fellow.

[1] Hahn, L. H., Hevesy, G. C., and Rebbe, O. H., *Biochem. J.*, **33**, 1549 (1939). Greenberg, D. M., Campbell, W. W., and Murayama, M., *J. Biol. Chem.*, **133**, 35 (1940). Manery, J. F., and Bale, W. F., *Amer. J. Physiol.*, **132**, 215 (1941).

[2] Edelman, I. S., James, A. H., and Moore, F. D., *Fed. Proc.*, **11**, 40 (1952).

[3] Forbes, G. B., and Perley, A., *J. Clin. Invest.*, **30**, 558 (1951).

[4] Edelman, I. S., Olney, J. M., James, A. H., Brooks, L., and Moore, F. D., *Science*, **115**, 447 (1952).

[5] Davies, R. E., Kornberg, H. L., and Wilson, G. M., *Biochim. Biophys. Acta* (in the press).

[6] Davies, R. E., Kornberg, H. L., and Wilson, G. M., *Biochem J.* (in the press).

[7] Custor, J., *Arch. Anat. Physiol., Leipzig*, 478 (1873). Skelton, H., *Arch. Intern. Med.*, **40**, 140 (1927).