epithelial cells and found in the mucosal solution, mucosal tissue and serosal solution; 3–5% appeared as CO₂. The overall recovery was 94–99% of the glucose absorbed. Half of the CO₂, all of the lactate and all mucosal tissue glucose originated in glucose absorbed from the mucosal solution. The apparent specific radioactivity of glucose entering the serosal solution was 1.37-fold greater than that predicted; a model is proposed to account for these results (Porteous & Pritchard, 1972b).

The minimum free energy required to sustain observed transintestinal glucose and lactate concentration gradients is not more than 1% of the energy available from concomitant glucose catabolism. No obligatory coupling between this energy source and these solute concentration gradients is implied.

The lactate dehydrogenase activity of mucosa is 300-fold greater than the pyruvate dehydrogenase activity. Mucosal lactate dehydrogenase exhibits an isoenzyme pattern like that of skeletal muscle, unlike that of heart. We postulate that the preponderance of lactate dehydrogenase over pyruvate dehydrogenase, and the regulatory responses of a 'muscle-type' lactate dehydrogenase, together ensure the high rate of lactate production by intestine, despite the high O₂ concentration required to sustain concomitant glucose transport.

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Carrier-Mediated Transport across the Erythrocyte Membrane: a Rigorous Test for the Simple Carrier Model

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The study of transport of non-electrolytes across the erythrocyte membrane shows that, in general, the substrate flux is related to the substrate concentration by a simple Michaelis-Menten equation. Values for V and K_m can be determined from several different types of kinetic experiments. These values of K_m present a serious problem of interpretation, since the same substrate can give different values of K_m from each type of experiment. The present communication presents an analysis, based on a simple carrier model, that predicts a definite relationship between the parameters from four different types of experiment.

In entry experiments the inward substrate flux into substrate-free cells is measured, and in exit experiments the outward flux from preloaded cells into substrate-free solution. Exchange experiments involve the measurement of inward fluxes with intracellular and extracellular substrate concentrations equal, and Sen-Widdas experiments (Sen & Widdas, 1962) measure the effect of extracellular substrate on the outward flux from a high and saturating intracellular substrate concentration.

Differences between K_m (entry) and K_m (exchange) can be explained by a simple carrier model with different reorientation rates for loaded and empty carriers (Levine *et al.*, 1965), and similar differences between K_m (entry) and K_m (exit) can arise from differences between carrier concentration or substrate affinity between the two membrane surfaces (Hoare, 1972). However, differences between K_m (Sen-Widdas) and other K_m values have been taken as evidence for a carrier molecule with two types of substrate-binding site with different affinities (Lieb & Stein, 1971).

In the present communication it is shown that the parameters from these four types of experiment are related by eqn. (1):

$$K_m \text{ (Sen-Widdas)} = \frac{K_m \text{ (exchange)}}{1 + \frac{V(\text{exit})}{V(\text{entry})} + \frac{V(\text{exit})}{V(\text{exchange})}} \quad (1)$$

provided that transport is mediated by a simple carrier. There may therefore be no need to postulate a carrier with different types of binding sites to account for K_m (Sen-Widdas) values. Experimental verification of eqn. (1) under a variety of conditions would provide strong support for the simple carrier model.

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Malate Permeation as the Pacemaker for Exogenous Malate Metabolism in *Escherichia coli*

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When *Escherichia coli* strain ML308 is trained to glucose, glycerol or acetate as sole source of carbon and energy in simple defined media it will sub-