gland tissue[3] and erythrocytes[4] from cystic fibrosis patients, Na^+–K^+ ATPase activity has been found to be normal. However a decrease in the ethacrynic acid-sensitive efflux[5,6], a Na^+ exchange mechanism[5], has been reported in cystic fibrosis erythrocytes[6,7]. These findings suggest that there is no fundamental abnormality in the Na^+–K^+ ATPase enzyme in the disease, but there may be a defect in an ethacrynic acid-sensitive transport step. Therefore in order to obtain a better understanding of the cation transport defect one should measure the binding of labelled ethacrynic-acid rather than ouabain.

It is possible, however, that there is no basic abnormality in the mechanism of Na^+ transport in cystic fibrosis but in the action of agents regulating this process[8,9]. Membrane transport of this cation is controlled by hormones and cyclic AMP in a tissue specific manner[10]. Failure of a Na^+ transporting system in exocrine glands to respond to a specific hormone or cyclic AMP could explain why the defect is confined to these organs. Isolated model systems like fibroblasts and erythrocytes might not therefore show up this defect.

Yours faithfully

M. J. DUFFY

Biochemistry Department,
University of Dublin,
Trinity College,
Dublin 2

Drs Quissell and Pitot respond:

Due to the pathophysiology of cystic fibrosis, conclusions derived from data obtained from intact patients with the disease or from biopsy material obtained from CF patients must be carefully scrutinized. Several factors, such as anoxia, infection, malabsorption, liver and pulmonary involvement, and the nutritional and hormonal status of the patient complicate the interpretation of these data.

The Na^+ transport defect could be closely related to the genetic defect or the Na^+ transport defect could be secondary. The small salivary glands and the eccrine sweat glands are affected by the electrolyte defect in cystic fibrosis[11] but the submaxillary and parotid glands secrete normal levels of sodium[2,12].

The decrease in the ethacrynic-acid-sensitive efflux observed in cystic fibrosis erythrocytes[6] is difficult to interpret[13]. Lapey and Gardner[7] observed a normal sodium efflux in heterozygotes and in younger females with cystic fibrosis. The mechanism of action of ethacrynic acid on the overall membrane transport process is not known. In fact, the inhibitory process may involve one or several intracellular metabolic events rather than events on the membrane *per se*[14,15]. Ethacrynic acid does not seem to bind specifically to the membrane but to all cellular fractions[16]. Cystic fibrosis patients seem to have normal kidney function except for a lower metabolic clearance rate and a higher plasma aldosterone level which is probably due to the excessive loss of sodium in the sweat and a subsequent decrease in the intravascular volume[17].

If an alteration in the hormonal response in cystic fibrosis exocrine tissue is observed, the alteration could be intimately related to the primary defect in the disease but the alteration could be secondary to its pathophysiology. Careful evaluation will be required but the results should be very interesting.

Pediatrics Department,
University of Missouri
School of Medicine,
Columbia, Missouri 65201
and
McArdle Laboratory for
Cancer Research,
University of Wisconsin,
Madison, Wisconsin 53706

1 Quissell, D. O., and Pitot, H. C., *Nature*, **247**, 115 (1974).
2 diSant, Agnese, P. A., and Talamo, R. C., *New Engl. J. Med.*, **277**, 1344 (1967).
3 Gibbs, G., Griffin, G., and Reimer, K., *Pediat. Res.*, **1**, 24 (1967).
4 Horton, C. R., Cole, W. Q., and Bader, H., *Biochem. Biophys. Res. Comm.*, **40**, 505 (1970).
5 Dunn, M. J., *J. clin. Invest.*, **49**, 1815, (1970).
6 Balfe, J. W., Cole, C., and Welt, L. G., *Science*, **162**, 689 (1968).
7 Lapey, A., and Gardner, J. D., *Pediat. Res.*, **5**, 446 (1971).
8 Duffy, M. J., and Schwarz, V., *Lancet*, ii, 136 (1972).
9 Duffy, M. J., and Schwarz, V., *Clin. chim. Acta*, **49**, 397 (1973).
10 Orloff, J., and Handler, J., *Am. J. Med.*, **42**, 757 (1967).
11 Weisman, U. N., Boat, T. F., and diSant' Agnese, P. A., *Lancet*, ii, 510 (1972).
12 Weismann, U. N., Boat, T. F., and diSant' Agnese, P. A., *J. Pediat.*, **76**, 444 (1970).
13 Hadden, J. W., Hansen, L. G., Shapiro, B. L., and Warwick, W. J., *Proc. Soc. exp. Biol. Med.*, **142**, 577 (1973).
14 Epstein, R. W., *Biochim. biophys. Acta*, **274**, 128 (1972).
15 Sato, K., *Pflugers Arch.*, **341**, 233 (1973).
16 Epstein, R. W., *Biochim. biophys. Acta*, **274**, 119 (1972).
17 Simopoulos, A. P., Lapey, A., Boat, T. F., diSant' Agnese, P. A., Bartter, F. C., *Pediat. Res.*, **5**, 626 (1971).

obituary

Sir Charles Dodds

SIR CHARLES DODDS, Bt., biochemist and physician, who died on December 16, 1973, was at the time of his retirement in 1965 the senior professor in the University of London, having been elected at the age of 25 to the newly created Courtauld Professorship of Biochemistry at the Middlesex Hospital Medical School. Two years later, when the Courtauld Institute of Biochemistry was built he was its first Director, an appointment that he was to occupy with the highest distinction for 38 years. His originally tiny staff of three graduates expanded steadily so that due to his stimulating and inspiring leadership the Institute has acquired a fine reputation for both teaching and research.

Edward Charles Dodds was born on October 13, 1899, brought up in Darlington and moved with his parents to London, where he was educated at Harrow County School and the Middlesex Hospital Medical School, supporting himself by various scholarships and later by tutorials. He was entirely a 'Middlesex man', who never seemed to wish to work elsewhere. Very early he showed his life-long interest in hormones, developing a method which proved useful for preparing insulin for the Hospital.

When they were both 25, he and F. Dickens wrote *Chemical and Physiological Properties of the Internal Secretions*. Dodds meanwhile was in charge of the Chemical Pathology and pioneered in this country the colorimetric methods of analysis which Folin had recently introduced in the United States. He was called in during the illness of King George V and, then aged 29, received the MVO. With George Beaumont he produced *Recent Advances in Medicine*