BIOCHEMICAL JOURNAL LETTERS

A re-evaluation of GLUT 7

A family of plasma membrane facilitative glucose transport proteins have been found in virtually all mammalian cells [1–4] and were called GLUT 1, 2, 3 and 4 in the order in which they were identified. The facilitative plasma membrane glucose transport proteins have considerable sequence similarity and different tissue distributions, e.g. GLUT 2 is the predominant liver plasma membrane GLUT. Other similar sequences have also been cloned; the first was termed GLUT 5, which has been reported to be a high affinity fructose transport protein [see 5,6]. The next was termed GLUT 6, a pseudogene which is not thought to encode a functional glucose transport protein [3]. There is also considerable evidence that both rat and human liver microsomes contain the capacity for high K_m facilitative glucose transport [see 7–9], which allows glucose produced by glucose-6-phosphatase in the endoplasmic reticulum lumen to reach the cytosol.

A rat liver library was screened [10] using a polyclonal antibody, which had been shown previously to inhibit both glucose-6-phosphatase activity in intact rat liver microsomes and the rate of release of glucose from rat liver microsomes [11]. Both GLUT 2, the liver plasma membrane glucose transport protein, and a novel cDNA clone were isolated [10]. The deduced amino acid sequence [10] of the novel cDNA showed sequence similarities to GLUTs 1–6 and it was most similar to GLUT 2, the high K_m liver plasma membrane transport protein [10]. The clone was therefore called GLUT 7 [10]. Some regions of the GLUT 7 sequence were identical with GLUT 2 but it was not a simple splice variant [10]. The GLUT 7 clone was presumed [10] to encode an endoplasmic reticulum protein rather than a plasma membrane protein because the antibody used to isolate it also cross-reacted with the endoplasmic reticulum in COS cells that had been transiently transfected with the clone [10].

More recently, we attempted to extend the work reported in 1992 [10] by studying the regulation of the human equivalent of GLUT 7. We first tried to clone the human equivalent of the rat clone, termed GLUT 7, from human liver cDNA libraries using appropriate DNA probes. By this method we isolated numerous GLUT 1 and GLUT 2 clones (the identity of the clones was demonstrated by restriction mapping and/or sequencing), and even a GLUT 4 clone from a human fetal liver library, but we failed to isolate a clone equivalent to GLUT 7, even when relatively non-stringent conditions were used. We subsequently tried to use RT (reverse transcriptase)-PCR to isolate portions of GLUT 7 from both human and rat liver RNA using appropriate primers based on the rat GLUT 7 sequence. This also failed; although various conditions were used, no products were obtained with the expected sequence. In contrast, control RT-PCR reactions with GLUT-2-specific primers worked well.

These recent studies demonstrate that neither rat nor human liver RNA normally contain an mRNA equivalent to the clone termed 'GLUT 7'. The clone termed 'GLUT 7' was therefore a cloning artefact and does not, as suggested previously [10], encode a rat liver endoplasmic reticulum glucose transport protein.

I thank B. B. Allan, C. Middleditch and C. J. Hinds for all their help with the recent work.

Ann BURCHELL[1]

Department of Obstetrics and Gynaecology, Ninewells Hospital and Medical School, University of Dundee, Dundee DD1 9SY, Scotland, U.K.

[1] e-mail a.burchell@dundee.ac.uk

1 Bell, G. I., Burant, C. F., Takeda, J. and Gould, G. W. (1993) J. Biol. Chem. **268**, 19161–19164
2 Bell, G. I., Kayano, T., Buse, J. B., Burant, C. F., Takeda, J., Lin, D., Fukumoto, H. and Seino, S. (1990) Diabetes Care **13**, 198–208
3 Kayano, T., Burant, C. F., Fukumoto, H., Gould, G. W., Fan, Y. S., Eddy, R. L., Byers, M. G., Shows, T. B., Seino, S. and Bell, G. I. (1990) J. Biol. Chem. **265**, 13276–13282
4 Gould, G. W. and Holman, G. D. (1993) Biochem. J. **295**, 329–341
5 Shepherd, P. R., Gibbs, E. M., Weslau, C., Gould, G. W. and Kahn, B. B. (1992) Diabetes **41**, 1360–1365
6 Burant, C. F., Takeda, J., Brot-Laroche, E., Bell, G. I. and Davidson, N. O. (1992) J. Biol. Chem. **267**, 14523–14526
7 Marcolongo, P., Fulceri, R., Giunti, R., Burchell, A. and Benedetti, A. (1996) Biochem. Biophys. Res. Commun. **219**, 916–922
8 Marcolongo, P., Banhegyi, G., Benedetti, A., Hinds, C. J. and Burchell, A.(1997) J. Clin. Endocrinol. Metabol. **83**, 224–229
9 Meissner, G. and Allen, R. (1981) J. Biol. Chem. **256**, 6413–6422
10 Waddell, I. D., Zomerschoe, A. G., Voice, M. W. and Burchell, A. (1992) Biochem. J. **285**, 173–177
11 Waddell, I. D., Scott, H. M., Grant, A. and Burchell, A. (1991) Biochem. J. **275**, 363-367

Received 25 February 1998