DIFFERENTIAL EXPRESSION OF MONOCARBOXYLATE COTRANSPORTER PROTEINS IN PREIMPLANTATION EMBRYOS

S. Jansen*, *M. Pantaleon*, *P. Kaye

Physiology and Pharmacology, University of Queensland, St Lucia, QLD, Australia

During preimplantation development mouse embryos demonstrate a switch in substrate preference. Pyruvate consumption, high during the first few cleavage stages, declines as the morula develops to a blastocyst, when glucose becomes the preferred substrate. Whilst pyruvate utilisation has been well characterised, changes in the function and expression of pyruvate transporters during this crucial period remain unclear. Pyruvate, lactate and other monocarboxylates are transported across mammalian cell membranes via a specific H^+-monocarboxylate cotransporter (MCT). Fourteen members of this family have been identified of which MCT1, MCT2 and MCT4 are well characterised. Although mRNA expression profiles are known during early mouse development (1,2), the specific roles of each protein isoform are unknown. In order to understand these, the expression pattern for each isoform and their cellular localisation during preimplantation development have been determined. Mouse embryos were freshly collected from superovulated Quackenbush mice at 24, 48, 72 and 96 h post-hCG and expression of MCT1, MCT2 and MCT4 analysed by confocal laser scanning immunohistochemistry. Our results confirm that all three MCT proteins are expressed in preimplantation embryos. Immunoreactivity for MCT1 and MCT2 appears diffuse throughout the cytoplasm of cleavage stage embryos. As development proceeds, MCT1 localised to the basolateral membranes of morulae and blastocysts, whilst stronger MCT2 expression was found on the apical trophectoderm as well as the inner cell mass. MCT4 immunoreactivity on the other hand is apparent at cell-cell contact sites in cleavage stage embryos and morulae, but it is not apparent in the blastocyst. The demonstration of different expression patterns for MCT1, MCT2 and MCT4 in mouse embryos implies specific functional roles for each in the critical regulation of H^+, pyruvate and lactate transport during preimplantation development.

(1) Harding EA, Day ML, Gibb CA, Johnson MH, Cook DI (1999) The activity of the H+-monocarboxylate cotransporter during pre-implantation development in the mouse. *Eur. J. Physiol.* **438**, 397–404. (2) Hérubel F, El Mouatassim S, Guérin P, Frydman R, Ménézo Y (2002) Genetic expression of monocarboxylate transporters during human and murine oocyte maturation and early embryonic development. *Zygote* **10**, 175–181.

10.1071/SRB04Ab236