Regulation of the rat glutamine transporter SNAT3

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Glutamine is the most abundant amino acid in the blood plasma and cerebrospinal fluid. It plays an essential role in neurotransmitter recycling in the brain, ammonia detoxification in the liver, and the compensation of metabolic acidosis in the kidney (Mackenzie & Erickson, 2004). In these organs, the uptake and release of glutamine is primarily carried out by the Sodium Neutral Amino Acid Transporter 3 (SNAT3) (Chaudhry *et al*., 1999). Due to this pivotal role played by SNAT3, an understanding of its regulation has high physiological relevance. Glutamine transport by SNAT3 is known to be accompanied by the co-transport of a sodium ion and the antiport of a proton in *Xenopus laevis* oocytes (Bröer *et al*., 2002). In this study, the regulation of the rat SNAT3 transporter by Protein Kinase C (PKC) was investigated. Activation of PKC by the treatment of oocytes expressing rSNAT3 with the phorbol ester PMA resulted in the rapid down-regulation of rSNAT3 activity. Mutational analysis of putative PKC phosphorylation sites showed that this down-regulation was not due to the phosphorylation of rSNAT3 at PKC specific sites. In order to investigate the cause of the down-regulation of rSNAT3 activity, confocal microscopy on oocytes expressing eGFP-rSNAT3 was performed. These studies revealed that the PMA-mediated regulation of the transporter was due to the retrieval of the fusion protein from the oocyte plasma membrane. Preliminary data indicate that this retrieval occurs through a dynamin-independent pathway.

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