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P–C5–09

THE 2-HYDROXY-CARBOXYLATE TRANSPORTER FAMILY

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The homologous gene family consists of three known secondary transporters: the Na^+-dependent citrate carrier of *K. pneumoniae* (CitS), the malate transporter of *L. lactis* (MleP) and the citrate carriers of lactic acid bacteria (CitP). Substrates of the transporters present the motif HO-C-COOH. Physiological substrates are citrate, malate and lactate.

CitS functions as an uptake system for citrate under anaerobic conditions and is driven by the proton and sodium ion motive force. MleP and CitP are involved in secondary metabolic energy generation. Transport of the substrates results in the generation of a membrane potential.

The family forms a distinct structural class of secondary transporters. Topological studies with CitS indicate that the protein is folded in 9 transmembrane segments with the N-terminal in the cytoplasm and the C-terminal in the periplasm.

P–C5–10

MERC, A MEMBRANE PROTEIN INVOLVED IN TRANSPORT OF MERCURIC IONS.

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Purpose: Some mercuric ion resistant bacteria have one inner membrane mercuric ion resistance protein, while others have two. *E.coli*, which normally has MerT and MerC, seems to detoxify Hg^{2+} when MerC is absent. We therefore wanted to investigate the properties and function of MerC.

Methods: MerC was cloned and overproduced in *E.coli*. The protein was purified using two chromatography steps. Transport was studied in whole cells and vesicles.

Results: Cells expressing MerC were able to transport Hg^{2+}: cysteine residues were shown to be functionally important. Transport was also observed in MerC-containing vesicles. Triton X-100 solubilized MerC was purified to homogeneity.

Conclusions: MerC appears to play a transport role in the detoxification of Hg^{2+}.

P–C5–11

SPECIFIC BINDING OF THE STILBENE DERIVATIVE TO THE MITOCHONDRIAL ADP/ATP CARRIER

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Purpose: Determination of the effect of 4, 4'-diisothiocyano-2, 2'-stilbene disulfonate (DIDS) on the mitochondrial ADP/ATP carrier (AAC).
Methods: Bovine heart mitochondria and their inverted vesicles were treated with various concentrations of DIDS for 10 min at 25 ℃.
Results: DIDS inhibited ADP uptake via AAC of inverted vesicles, but not mitochondria. Of the mitochondrial membrane proteins, DIDS was found to interact specifically only with AAC. Treatment of the vesicles with DIDS inhibited the specific labeling of Cys^{159} by eosin-5-maleimide (EMA), although DIDS modified only Lys^{22}. In addition, labeling by DIDS was completely inhibited by pretreatment of the vesicles with bongkrekic acid, which is a transport inhibitor acting from the matrix side, but not affected by treatment with carboxyatractyloside, which is a transport inhibitor acting from the cytosolic side, did not affect labeling by DIDS.
Conclusions: DIDS specifically labeled Lys^{22} located in the putative first transmembrane segment of AAC from the matrix side. As Cys^{159} is located in the second loop facing the matrix space (loop M2), the inhibition by DIDS of the labeling of Cys^{159} by EMA suggests that the region containing Lys^{22} in this segment interacts with loop M2.

P–C5–12

THERMODYNAMIC PROPERTIES IN CELL MEMBRANES

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Purpose: We consider nonlinear solitary waves (solitons) which may result from local membrane disorder in the presence of an electric field across the cell membrane. The thermodynamic properties of cell membrane such as critical temperature and specific heat is investigated.

Methods: In this paper, the soliton statistics method is applied to explain the thermodynamic properties in cell membrane. Our theoretical analysis points out the possible existence of several kinds of orientation waves in a liquid-crystalline structure of a cell membrane. It is also proved that the structure of a cell membrane satisfies the Sine-Gordon field form. The critical temperature and the coefficient of linear specific heat of cell membrane are studied from the soliton statistics.

Results: The theoretical values of thermodynamic properties in cell membrane is obtained by statistics approach. We have compared with the experimental values, and find the theoretical and experimental values is consistent.

Conclusions: The agreement between theoretical and experimental values for cell membrane suggests that the soliton model gives a reasonable explanation of cell membrane.