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Bacterial flagella contain membrane-embedded stators, Mot complexes, which harness the energy of either transmembrane H^+ or Na^+ gradients to power motility. Most bacterial stator-force generators have been shown to be coupled to the flux of H^+ whereas those of extremely alkaliphilic *Bacillus* species use Na^+ and cannot use H^+ in support of flagellar motility. There are bacteria that have two stator-force generator types (i.e. Mot complexes), one of which is coupled to H^+ while the other uses Na^+ but there have been no reports of a stator-force generator that uses both H^+ and Na^+. The genome of alkaliphilic *Bacillus clausii* KSM-K16, which is motile in a pH range from 7 to 11, encodes only one Mot (BCl-MotAB). Assays of swimming by the alkaliphile suggested that BCl-MotAB switches from proton- to sodium-coupling at high pH. This was confirmed using ion selective inhibitors of motility in swimming assays of a stator-less *Bacillus subtilis mutant expressing BCl-motAB*. By introducing distinct pairs of mutations into BCl-MotB, we constructed mutant stator forms of BCl-MotAB that no longer switch cation coupling but use either H^+ or Na^+. This work extends the range of energy-coupling options found for bacterial motility and identifies amino acid determinants of coupling-specificity.

doi:10.1016/j.bbabio.2008.05.128

S3.32 Solute transporters from the *Arabidopsis* photosynthetic membrane

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The aim of this study was to identify and functionally characterize solute transporters from the chloroplast thylakoid membrane of *Arabidopsis thaliana*. As compared to chloroplast envelope transporters, much less information is available for transport processes across the thylakoid membrane, which is mostly studied as the site of light-driven photosynthetic reactions coupled to ATP synthesis. Although there are many reported examples of transport activities, only a few thylakoid transporters have been identified at the gene level. Using bioinformatics analyses, we have predicted the existence of approximately fifteen thylakoid transporters, including one ATP/ADP carrier, two phosphate transporters and one potassium channel. For experimental validation, we have carried out immuno-localization studies using peptide-specific antibodies, functional analyses in a heterologous system and phenotypic analyses of knockout mutants. The identified thylakoid ATP/ADP carrier and phosphate transporters are proposed to participate in the nucleotide metabolism in the thylakoid lumen as well as to balance the *trans*-thylakoid proton electrochemical gradient storage, whereas the potassium channel may be involved in maintaining the ionic strength of the membrane. Our data are highly relevant to understand the transport network of the thylakoid membrane and its role in photosynthesis and adaptation to environmental stress.

doi:10.1016/j.bbabio.2008.05.129

S3.33 Mitochondrial large conductance potassium channel in endothelial cell

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It is well established that endothelial dysfunction contributes to ischemia–reperfusion injury of the cardiovascular system. This phenomenon can be limited by the ischemic preconditioning. Recently, it was shown that mitochondrial ATP regulated potassium channel activation induced ischemic preconditioning of the endothelium in humans *in vivo*. In our study a single channel activity was measured after patch-clamp of the mitoplasts isolated from endothelial cell line (EA.hy926). Mitoplast samples were prepared by addition to a hypotonic solution causing the cristae of the inner membrane to unfold and breaking of the outer membrane. Isotonicity was restored by addition of hypertonic solution. A potassium selective current was recorded with a mean conductance of 270±10 pS in symmetrical 150 mM KCl solution. Patch-clamp single channel studies showed properties of the large conductance Ca^{2+}-regulated potassium channel (BK_{Ca} channel): it was activated by calcium and NS1619 an activator of BK_{Ca} channel at micromolar concentration range. These effects were blocked irreversibly by iberiotoxin (IbTx), an inhibitor of BK_{Ca} channel. Additionally, we showed that the inhibitor of mitoK_{ATP} channel (ATP/Mg^{2+} complex) have no effects on the observed activity of the ion channel. We conclude that large conductance Ca^{2+}-regulated potassium channels are present in mitochondria isolated from endothelial cell line.

This work was supported by the Polish Mitochondrial Network MitoNet.pl and grant N30105331/1676.

doi:10.1016/j.bbabio.2008.05.130

S3.34 Mitochondrial permeability transition pore (mPTP) in different yeast species is dissimilarly regulated

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The cyclosporin A-sensitive mPTP is considered as a major player in apoptosis in animal cells. Information about a mPTP-like pore in yeasts is scarce and contradictory. In mitochondria from the *Saccharomyces cerevisiae* yeast, the existence of unspecific channel (YMUC) inhibited upon ATP depletion was reported (see, Gutierres-Aguilar et al., 2007). The goal of this study was to investigate mPTP-like pore induction in mitochondria from the *Endomyces magnusii* and *Yarrowia lipolytica* yeasts, possessing, in contrast to *S. cerevisiae*, the fully competent respiratory chain. We failed to induce a pore mediated by Ca^{2+}-phosphate, Ca^{2+} and fatty acids, prooxidants, anaerobiosis, depletion of adenine nucleotide pools and deenergization of mitochondria. The only pore found was a regulated K^+-channel (ymitoK^+_{ATP}) of "animal type" that, in contrast to YMUC, was closed in response to ATP. Thus, mPTP in different yeast species is variously regulated.

This work was supported by RFBR (grant no. 06-04-49687).

doi:10.1016/j.bbabio.2008.05.131