Identification of the common osmosensor in the prokaryotic and eukaryotic cell

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Summary

For the purpose of isolation of animal osmosensor genes, 20 human and mouse cDNAs were selected from gene databases by computer homology search to bacterial and fungal osmosensor kinase domains. For the screening of protein kinase activity, these cDNAs in NaCl-induced expression vectors were transfected into E coli cell. After high osmotic stimulation on the transfected cells, protein phosphorylation pattern of cell lysate were examined. A human gene, named PTP1, was found to increase the protein phosphorylation of E coli and suppress these cell growth. Both *in vitro and vivo,* PTP1 protein enhanced the acid-stable phosphorylation of 55Kd protein of E coli. PTP1 mRNA encodes a protein of 700 amino acids that has the motif of myosin tail and ATP binding site. Among all E coli protein, a mechanosensitive channel that functions as a osmoprotective channel in cells, shows the highest homology to PTP1. PTP1 protein expressed from cloned cDNA in E coli., migrated as a single band with the molecular mass of 100Kd. Western blot analysis using the anti-PTP1 antibody for human cerebellum tissue demonstrated a single band with the same size, 100Kd. RT-PCR amplified PTP1 specific bands from all rat organ tissues surveyed. *In situ* hybridization to brain sections revealed the high level expression of PTP1 mRNA in cerebral cortex, hippocampus and cerebellum.