No. 1218

# Analysis of an Osmo-Sensing System That Is Involved in Salt- and Osmo-Tolerance in Yeast

Kazuo Tatebayashi and Haruo Saito

Division of Molecular Cell Signaling,
Institute of Medical Science, the University of Tokyo

Summary

Adaptation to high salt and high osmolarity conditions is a fundamentally important biological response of all types of cells, ranging from bacteria, fungi, plants, and animals. In yeast, for example, external high salt and high osmolarity conditions activate the HOG (High Osmolarity Glycerol) MAP kinase (MAPK) pathway, which is essential for yeast to adapt to and survive on those conditions. MAP kinase cascades are conserved signaling modules composed of three sequentially activated kinases (MAPKKK, MAPKK, and MAPK). The HOG pathway can be activated by either of two upstream pathways, termed the SHO1 or SLN1 branches. However, the osmosensing mechanism in the SHO1 branch has not been clearly defined.

Sho1 is a tetramembrane-spanning protein to play a crucial role in osmo-sensing in concert with osmosensors Hkr1/Msb2 in the SHO1 branch. As reported last year, Sho1 molecules are associated at two distinct interphases of TM (transmembrane)1/4 and TM2/3 to form a homomultimer. In this study, several pairs of amino acids in the Sho1 TM regions were shown to be within proximity at the interphases of TM1/4 and TM2/3 based on their capability to form disulfide bonds spontaneously when replaced by Cys residues. These findings provided structural insight into the Sho1 homomultimer. In addition, we isolated a mutation that abrogated not only a trimer formation of Sho1 at the TM2/3 interphases but also the activation of the SHO1 branch by the expressions of the active Hkr1/Msb2 mutants. The results indicated that the multimer formation of Sho1 is required for the activation of the SHO1 branch.