Reprogramming of proteolytic pathways brought upon by cold temperatures in yeast

Speaker: Cody Gay

University of Kentucky

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It has long been thought the proteasome-ubiquitin signaling pathway is involved in the temperature stress response in yeast. The dynamics of the ubiquitylome during cold response has recently been studied. In this work, the authors quantitatively compared the cold response ubiquitylomes of reference yeast strains to a strain deficient in proteasome substrate recruitment. Using LC-MS/MS, western blot, and immunoprecipitation it was determined in the proteasome mutant a sizeable group of proteins showed increased ubiquitylation at low temperatures made up of reverse Ty-phenotype 5 (Rsp5) regulated plasma membrane proteins. Their data show that at low temperature the proteasome is determinant for the internalization and degradation of plasma membrane proteins. At 30 °C the proteasome is expendable in this process. These results indicate that during a cold temperature incubation there is a proteolytic cellular reprogramming in which the proteasome acquires a role in the endocytic pathway.

Reference:

Isasa, M., & Suñer, C. (2016) Cold Temperature Induces the Reprogramming of Proteolytic Pathways in Yeast. J. Biol. Chem. 2016 291: 1664-1675.