





"Coordinated control of gene expression and cell cycle progression by stress-activated protein kinases"



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Abstract:

Exposure of cells to osmostress results in the activation of the Hog1/p38 family of stress-activated protein kinases (SAPKs). Activation of these highly conserved MAP kinases is required to generate a set of osmoadaptive responses essential for survival. Adaptation to osmostress requires the induction of a large number of genes as well as the control of cell cycle progression. Upon stress, in yeast there is a major downregulation of gene expression that is bypassed specifically in stress-responsive genes by the action of the Hog1 SAPK which acts in multiple stepts of mRNA biogenesis. In addition to regulate transcription, SAPKs control cell cycle progression. For instance, in yeast and mammals, SAPKs modulate the G1/S transition by targeting core components of the cell cycle machinery such as the Sic1 and p57 CDK inhibitors respectively. Cell cycle control is not restricted to G1, a novel checkpoint in S phase controlled by SAPKs is critical to coordinate transcription and replication allowing for full stress-responsive transcription during S phase without affecting DNA integrity. All together highlights the relevance of these MAPK signaling pathways in controlling several aspects of the cell physiology to maximize cell survival in the presence of stress.

Host: Dr. Jason Moffat