

## **Acquired Stress Resistance in Yeast: Multiple Means to the Same End**

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Many organisms exist in inherently variable environments. Stressful environmental changes can occur suddenly and across gradients, in specific combinations, or in rapid succession. Therefore, the ability to prepare for severe stress upon early signs of a problem likely presents a significant selective advantage for creatures living in natural environments. Like many organisms, yeast cells exposed to a mild dose of stress can acquire resistance to what would otherwise be a lethal dose of the same or a different stress. We originally proposed that this phenomenon is explained by the environmental stress response (ESR), a large gene expression program commonly activated by stress. However, activation of this common stress response is not sufficient to explain the phenomenon. Using genomic techniques, we are identifying genes involved in acquired tolerance of severe hydrogen peroxide treatment after a mild dose of either osmotic shock, heat stress, or DTT treatment. There is strikingly little overlap in the genes required for hydrogen peroxide resistance induced by each mild stressor, revealing that the mechanism of tolerance to the same severe stress is different depending on the pretreatment. This raises many questions about the mechanism, regulation, and evolution of acquired stress resistance in yeast and other organisms.