Analyzing Novel Functions of Arb1 Ribosome Biogenesis Gene in Saccharomyces cerevisiae: A Suppression Analysis

Khanolkar, Priya

Arb1 is an essential yeast protein associated with the protein production machinery in the cell known as the ribosome. This study will help to determine the ability to dynamically balance protein production, folding, and degradation -- which is heavily relied on quality-controlled machinery -- to detect when protein folding malfunctions occur. Because of this study prevention or cure of diseases such as; ALS, Alzheimer's, and Parkinson’s Disease, which are directly connected to the protein misfolding and protein quality control machinery, will be possible. Using a high copy suppression analysis of a YEp24 plasmid, the molecules each carrying fragments from the yeast genome, the library was transformed into the arb1 degron. Tranformants which rescued or enhanced the slow growth phenotype of the arb1 mutant were selected, the DNA was isolated, and reintroduced to the arb1 mutant. Plasmids which reproduced the original phenotypes were sequenced. The genes FHL1, ULS1, and HUL5 were the interests from the plasmids and were chosen to be further researched to identify which one of the genes is the one enhancing the slow growth phenotype. The genes were subcloned into a yeast shuttle vector, and were reintroduced into an arb1 mutant strain. I conclude that no genes were found that were able to substitute for the Arb1 function therefore, Arb1 may have a unique role in the cell. There are many genes that when overexpressed exacerbate the slow growth phenotype, which will be used to further investigate Arb1’s function. This study of novel protein chaperone activities has important health implications in finding a way to prevent or cure diseases such as ALS, Alzheimer’s, and Parkinson’s Disease.

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