Abstract

In the yeast *S. cerevisiae*, differentiation into U (upper) and L (lower) cell subpopulations takes place during development of colonies formed by the laboratory strain BY4742. U and L cells differ in morphology and metabolism. After the transition of the colony to the alkaline phase, *ATO3* gene expression occurs only in U cells. The protein Ato3p involved in the release of ammonia, which the colonies release into their surroundings to signal a nutrient deficiency to the surrounding colonies.

Based on previous studies, 14 transcription factors have been identified that could affect *ATO3* expression: Ace2p, Adr1p, Aft1p, Bas1p, Cad1p, Hac1p, Hcm1p, Met32p, Mig1p, Sip4p, Stb5p, Stp3p, Sum1p and Xbp1p.

A total of 14 transformants with deletion of one of the selected genes were prepared and verified. Subsequently, the constructed strains were characterized in terms of yeast colony growth, cell morphology and Ato3p-GFP protein production by fluorescence microscopy images. Microcolony growth experiments and Ato3p-GFP expression were used to determine suitable sampling days for subsequent western blotting. The results suggest that Adr1p may be a positive regulator of *ATO3*. Furthermore, it is likely that Ace2p and Sip4p also have a positive effect on *ATO3* expression. The effect of Bas1p on *ATO3* expression is unclear because of the different behavior of yeast in acidic and alkaline phases.

Key words: *ATO* proteins, colony differentiation, fluorescence microscopy, immunodetection, *Saccharomyces cerevisiae*, yeast colony, U cells.