

## Abstract

The yeast species *Saccharomyces cerevisiae* is a suitable model for studying many biological processes, including adaptation to stress conditions. Over the past 40 years, multiple signaling pathways have been uncovered to play an important role in the response to acute stress induced by high temperature, osmotic stress, or high concentrations of metals in *S. cerevisiae*. The effect of sublethal dose of stressor is rather neglected.

The advantage of the *WHI3* deletion strain used in this work is its sensitivity to the presence of stressor in the solid medium not only by reducing the growth rate but also by changing the colony morphology. The Whi3 protein stimulates not only flocculin Flo11 production but also the activity of the general transcription factors Msn2 and Msn4.

The diploma project aimed to determine whether changes in the expression of genes coding for stress proteins induced by sublethal doses of the stressor were dependent on the genotype *WHI3*, *YAP6*, and *MPT5*. Transcription factor Yap6 and RNA binding protein Mpt5 are both involved in stress response and cause repression of *FLO11*. Their levels depend on Whi3.

To induce mild stress, low concentrations of NaCl and CdSO<sub>4</sub> have been applied to colonies for 4 and 6 days. Their genotype varied in the *WHI3*, *YAP6*, and *MPT5* genes. Our experiments indicate that even under mild stress, the stress response is activated and the morphology of colonies is altered.

While in the absence of a stressor, all five analyzed stress genes are stimulated by the Whi3 protein, the effect of the Whi3, Yap6, and Mpt5 proteins on the stressor genes expression is dependent on the presence of stressor type. In colonies deleted in both *WHI3* and *YAP6*, the expression of *FLO11* and *TS1* increases in the presence of 0.5 μM Cd<sup>2+</sup>, in contrast to other genotypes. The change in Yap6 activity due to cadmium has not yet been described.

**Key words:** yeast colony, structured morphology, stress conditions, gene expression, *FLO11*, *WHI3*, *MPT5*, *YAP6*