Study of the biological function of the Alternative Oxidase (AOX) from *Moniliophthora pernicious* (witches' broom fungus) in *Saccharomyces cerevisiae*

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**Introduction:** *Moniliophthora pernicious* is a basidiomycete fungus that causes witches-broom disease of cocoa. A number of techniques to control the disease has been applied and tested, including the use of fungicides which are inhibitors of the main respiratory chain, specific to the fungi. However, *M. pernicious* has proved to be resistant to these drugs and a possible explanation for this resistance is the activity of an alternative oxidase (AOX).

**Objective:** this work aims to characterize the morphological and biochemical changes related to the heterologous expression of the *M. pernicious* AOX gene in a biological system by transforming the *S. cerevisiae* with this gene.

**Methodology:** A plasmid containing *Mp-AOX* gene was a kindly gift from Dr. Gonçalo A.G. Pereira. *Mp-AOX* was cloned into the pYES2/CT vector (Invitrogen) for galactose induced expression in *S. cerevisiae*. *Mp-AOX* gene was sequenced using the ABI platform for gene integrity verification. The strain W303-1b was transformed with pYES2/CT+*Mp-AOX* and with empty pYES2/CT as a control.

**Results:** We report the difference in the biomass formation of W303-1b strain transformed with *Mp-AOX*p grown in galactose containing medium compared with the same strain grown in glucose, suggesting that the induced expression of *Mp-AOX*p causes a decrease in cell formation. Reinforcing this suggestion, in the same culture media (galactose) the cells expressing *Mp-AOX* gene produced lower amounts of biomass than the cells containing the empty vector.

**Conclusion:** *Mp-AOX* gene expression leads to lower amounts of biomass probably caused by electron transport deviation and consequently low concentration of ATP (hypotheses which will be next investigated).

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**Keyword:** mitochondria, alternative oxidase, reactive oxygen species