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Jean-Luc Legras, C. Erny, Y. Adolphe, C. Le Jeune, Marc Lollier, Bruno Blondin, Francis F. Karst

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Phenotypic analysis and transcriptome profiling of *Saccharomyces* response to medium chain fatty acids

Legras JL, Erny C, Adolphe Y, Le Jeune C, Lollier M, Delobel P, Blondin B and Karst F

(1) UMR1131 Santé de la Vigne et Qualité du Vin, INRA, Université Louis Pasteur de Strasbourg, Colmar - France
(2) LVBE, Université de Haute Alsace, 33 rue de Herrlisheim, BP 50568, 68008 Colmar Cedex – France. Phone : 33(0)389203136 - claude.erny@uha.fr
(3) UMR1083 Sciences pour l’Oenologie, AgroM, INRA, Université Montpellier 1, Montpellier - France

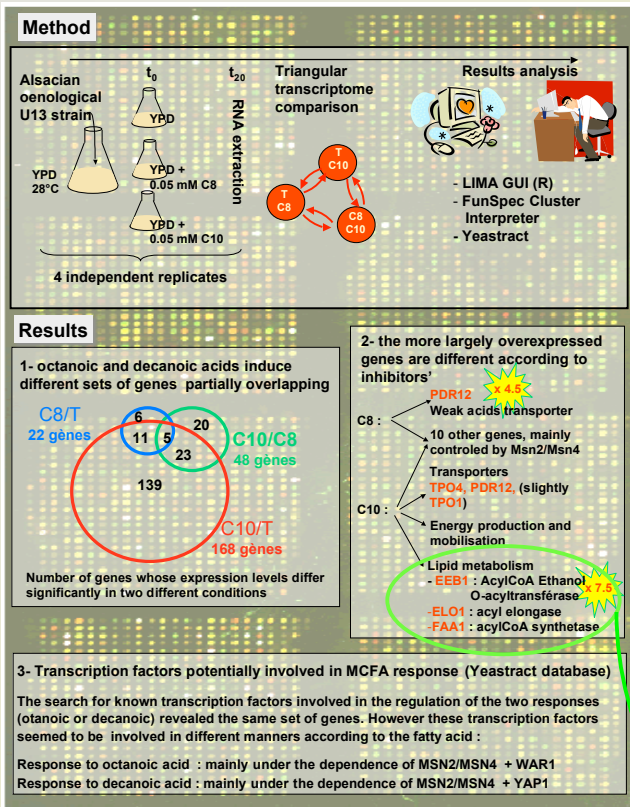
Introduction

Medium chain fatty acids (MCFA) produced by *Saccharomyces* during fermentation are well known fermentation inhibitors, which toxicity is enhanced by ethanol and low pH encountered in wine making process (1). On the one hand the accumulation of medium chain fatty acids during wine fermentation is considered as a contributor to sluggish fermentation but on the other hand, fatty acid ethyl esters do contribute positively to the sensory aspect of wine. When exposed to these acids, *Saccharomyces* acquires greater resistance. For example, octanoic acid induction results in the synthesis of a membrane transporter not characterized until now (2). To investigate the *Saccharomyces* genes involved in the response to octanoic and decanoic acids we combined both transcriptome profiling and phenotypic analysis.

Results

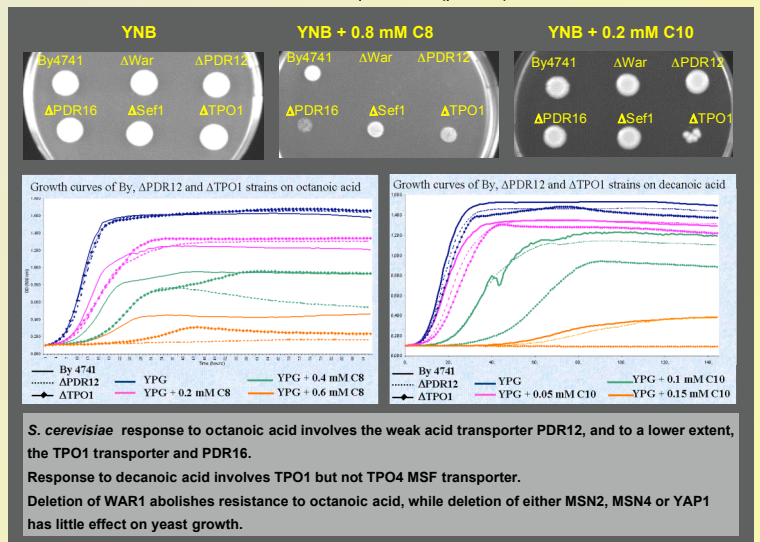
Transcriptome profiling

The transcriptome of the oenological resistant *S. cerevisiae* U13 strain was studied after exposure to octanoic or decanoic acid.



Phenotypic analysis

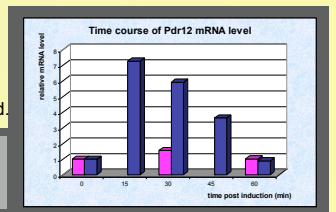
The ability of 80 knocked-out strains to grow on YPG media containing octanoic or decanoic acid was tested on solid or liquid YPG (pH 4.5).



Analysis of PDR12 mRNA levels

PDR12 mRNA levels were measured by Real Time PCR after exposure to 0.1 mM octanoic acid.

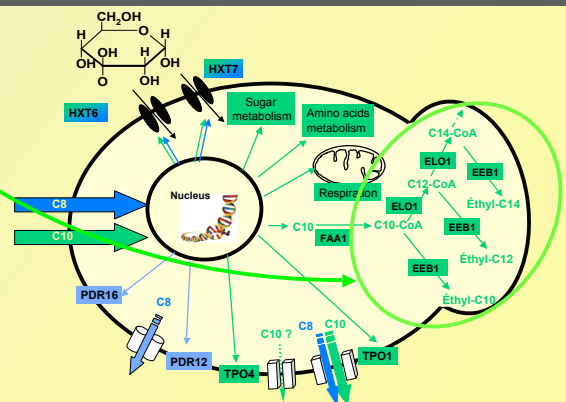
PDR12 mRNA levels are maximal 15' after exposure and back to basal level after 1 hour.



Conclusion

Octanoic and decanoic acids induce different sets of gene partially overlap. *Saccharomyces cerevisiae* response to octanoic acid share common features with weak acid response (3), essentially with activation of Pdr12 transporter. Moreover, Tpo1 transporter is also involved in octanoic acid expulsion. Adaptation to decanoic acid is more complex, including expulsion of C10 by the Tpo1 transporter, and activation of a metabolic pathway able to detoxify decanoic acid and to generate flavour-producing ethyl-esters.

check activation of a new metabolic way to detoxify decanoic acid and produce ethyl-esters



References

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