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Genetic control and regulation of the biosynthesis of isoprenoids in the red yeast *Xanthophyllomyces dendrorhous*

Isoprenoids are natural compounds fulfilling diverse biological roles. They are structurally conformed by isoprene units, being isopentenyl-pyrophosphate (IPP) the active form that is synthesized by the mevalonate pathway in non-photosynthetic organisms. Carotenoids and sterols derive from IPP, being astaxanthin and ergosterol the final products of both biosynthetic pathways in the red yeast *Xanthophyllomyces dendrorhous*. These products are biotechnologically attractive because astaxanthin has antioxidant properties and is used as colorant, while ergosterol is precursor of vitamin D. Thus, the main goal of our group is to study common genetic elements involved in control and regulation of the synthesis of carotenoids and ergosterol. According to our results, *X. dendrorhous* mutants unable to synthesize ergosterol overproduce carotenoids and other sterols, suggesting that ergosterol regulates its own synthesis by a negative feedback mechanism affecting the overall synthesis of isoprenoids in this yeast. Sterol regulatory element binding proteins (SREBPs) are a family of membrane-bound transcription factors that are activated by proteolytic cleavage depending on sterol levels to release the N-terminal domain that activates the transcription of the target genes. SREBPs have been identified in fungi, named as Sre1, being Sre1N the active form. Our studies indicate that *X. dendrorhous* has an orthologous sterol-regulated SREBP activation pathway that regulates sterol and carotenoid biosynthesis as the production of both is affected in *sre1*-mutants. Moreover, the expression of only the Sre1N domain, increases sterol and carotenoid production, suggesting that Sre1 is responsible for the carotenoid and sterol overproducing phenotype in mutants unable to produce ergosterol.

Biography

Jennifer Alcaíno was graduated in Molecular Biotechnology Engineering from the University of Chile in 2001. In 2009, she received her Doctorate degree in Sciences, Microbiology also from the University of Chile. She is currently an Associate Professor of the Department of Ecological Sciences, Faculty of Sciences, University of Chile. She has published about 30 articles in reputed journals and several book chapters on microbial isoprenoids including carotenoids, yeast genetics, yeast genetic strain improvement, and psychrophilic yeasts biodiversity and physiological adaptations. She is mainly interested in yeast genetics and products that may have potential for biotechnological applications.

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