

Modeling the interfacial interactions between CrtS and CrtR from *Xanthophyllomyces dendrorhous*, a P450 system involved in astaxanthin production

Alcaíno, Jennifer

Fuentealba, Matías

Cabrera, Ricardo

Baeza, Marcelo

Cifuentes, Víctor

Xanthophyllomyces dendrorhous is a natural source of astaxanthin, a carotenoid widely used in the food industry. In this yeast, astaxanthin is synthesized from β -carotene by a cytochrome P450, CrtS, which depends on CrtR, the four-domain cytochrome P450 reductase (CPR). Although *Saccharomyces cerevisiae* has an endogenous CPR (ScCPR), expression of CrtS does not result in astaxanthin production unless it is coexpressed with CrtR. Assuming that CrtS could interact with the FMN-binding domain of either CrtR or ScCPR (XdFMNbd and ScFMNbd, respectively), the aim of this work was to identify possible interaction differences between these alternative complexes by protein modeling and short molecular dynamics simulations. Considering the recently proposed membrane orientation of a mammalian P450, our CrtS-CrtR model predicts that both N-terminal ends stand adjacent to the membrane plane, allowing their anchoring. Compared with the possible interface between CrtS and both FMNbd, the Xanthophyll