

Enantioselectivity of *Ustilago maydis* lipases on glycidyl esters

Robles, M.M., Martin del Campo, M.F., Zamora, E.O., Camacho, M.A., Mateos, J.C.,
Rodriguez, J.A.

Biotecnología Industrial, Centro de Investigación y Asistencia en Tecnología y
Diseño del Estado de Jalisco, Zapopan, Jal., Mexico.

INTRODUCTION: Lipases (EC 3.1.1.3) are enzymes widely used in biotechnology; they can act in aqueous and organic media with a high selectivity and a wide variety of substrates. *Candida actarctica* lipase B (CALB) is one of the most used in organic synthesis and racemic resolution of enantiomers, while *C. actarctica* lipase A (CALA) has the ability to act on secondary positions. The genome of *Ustilago maydis* contains two sequences of high homology with CALA (lipase A-like, UMLA, 71%) and CALB (lipase B-like, UMLB, 69%); thus offers the opportunity to compare their enantioselectivity on glycidyl esters, where the *R*-enantiomer is useful as synthon in the synthesis of β -blockers (cardio-vascular drugs).

OBJETIVE: Determinate the enantioselectivity on *R* and *S*-glycidyl butyrate of *U. maydis* lipases (UMLA and UMLB) and compare them with those of *C. antartica* (CALA and CALB).

MATERIAL AND METHODS: The cDNA of *U. maydis* and *C. antarctica* lipases were synthesized by Genscript® and subcloned into expression vector pGAPZ α A to transform the yeast *P. pastoris* SMD1168H. Enzymes recovered from culture media were purified by chromatographic methods by following the activity on tributyrin. The estimation of enantioselectivity was performed by the hydrolysis of *R* and *S*-glycidyl butyrate without competition. All activity measurements were performed in a microplate format.

RESULTS: UMLB hydrolyzed preferentially the *R*-glycidyl enantiomer as well as CALB, while UMLA hydrolyzed preferentially the *S*-glycidyl enantiomer as well as CALA; both cases with different value of *S*/*R* ratio. The activity of B lipases was similar on tributyrin and *R*-glycidyl butyrate confirming the high activity on C4 acyl-chain substrates. In contrast, the activity of A lipases on *S*-glycidyl butyrate was lower compared with tributyrin, demonstrating a preference on C4 acyl-chain triglycerides.

CONCLUSION: The display of the same enantioselectivity on *S* or *R* enantiomers for A or B lipases, respectively, can be attributed at its high homology.

Keywords: lipases, *Ustilago maydis*, *Candida antarctica*
Funding: SEP-CONACYT C. básica 2014-242544.