Uniqueness of Microbial Cutinases in Hydrolysis of *p*-Nitrophenyl Esters

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Abstract

Using fungal (*Fusarium solani* f. *pisi*) and bacterial (*Pseudomonas mendocina*) cutinases, the initial hydrolysis rate of *p*-nitrophenyl esters was systematically estimated for a wide range of enzyme and substrate concentrations using a 96-well microplate reader. Both cutinases exhibited a high substrate specificity: i.e. a high hydrolytic activity on *p*-nitrophenyl butyrate(PNB), yet extremely low activity on *p*-nitrophenyl palmitate (PNP). When compared to the hydrolysis of PNB and PNP by other hydrolases (lipases and esterases derived from different microbial sources, such as bacteria (*Pseudomonas cepacia*, *Pseudomonas flurescens*, *Bacillus stearotheromophilus*), molds (*Aspergillus niger*, *Mucor miehei*), and yeasts (*Candida rugosa*, *Candida cylindraces*)), the above substrate specificity would seem to be a unique characteristic of cutinases. Secondly, the hydrolytic activity of the cutinases on PNB appeared much faster than that of the other hydrolytic enzymes mentioned above. Furthermore, the current study proved that even when the cutinases were mixed with large amounts of other hydrolases, the initial hydrolysis rate of PNB was only determined by the cutinase concentration for each PNB concentration. This property of cutinase activity would seem to result from a higher accessibility to the substrate PNB compared with the other hydrolytic enzymes. Accordingly, these distinct properties of cutinases may be very useful in the rapid and easy isolation of various natural cutinases with different microbial sources, each of which may provide a novel industrial application with a specific enzymatic function

References

1. Kim, Y. H., J. Lee, and S. H. Moon (2003), Uniqueness of microbial cutinases in hydrolysis of *p*-nitrophenyl esters, *J. Microbiol. Biotechnol.* **13**(1), 57-63.