Effects of synthetic peptides and lipopeptides designed to be surfactin analogs on the activity of two commercial lipases.


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Lipases and surfactants find growing market on several industrial, medical, and biotechnological applications. In parallel, the quest for biodegradable surfactants is poised by a demand on green processes. With this aim, eight designed linear decapeptides derived from surfactin (from Bacillus subtilis strains) were chemically synthesized through FMOC solid-phase synthesis. We isolated 8 peptides and evaluated their effects on two commercial lipases (Pseudomonas sp. and A. niger). The lipase activity was measured continuously using the chromogenic pseudosubstrate PNPA (p-nitrophenylacetate) at 2 mM, with 11 mU of Pseudomonas sp. lipase and 5U of A. niger lipase added, 10 mM Phosphate buffer pH 7.5. The peptide concentration was screened from 0.1 up to 1 µM. Hydrolysis of PNPA was followed in 96-well plates in an ELISA reader set at 405 nm, at 37°C. Our results with the lipase from Pseudomonas sp. showed that within the eight peptides tested, peptide 8 presented a biphasic profile (20% activation, followed by inhibition); peptides 1, 3, and 4 were slightly inhibitory (around 10%), peptides 2 and 4 were efficient inhibitors (within 35%-40% inhibition); finally peptide 6 had no effects. The classic surfactants CTAB and SDS were all inhibitors of this lipase activity (under the same concentration range). With the A. niger lipase only peptides 6 and 8 were dose-dependent inhibitors (up to 40% inhibition at 1 µM peptide). Our results show that the synthetic decapeptides presented interesting modulatory effects on the lipases tested, and might open promising perspectives for the development of simple, biodegradable surfactant peptides which additionally modulate this enzyme activity.

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