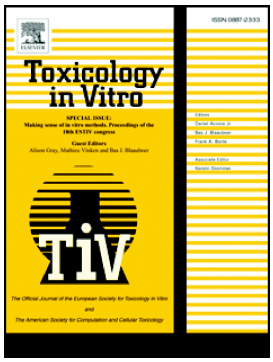

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Regioselective ester cleavage of di-(2-ethylhexyl) trimellitates by porcine liver esterase

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Abstract

In a comparative study the ester hydrolysis of the plasticizers di-(2-ethylhexyl) phthalate (DEHP) and tri-(2-ethylhexyl) trimellitate (TEHTM) as well as of the diester isomers 1,2-di-(2-ethylhexyl) trimellitate (1,2-DEHTM), 1,4-di-(2-ethylhexyl) trimellitate (1,4-DEHTM) and 2,4-di-(2-ethylhexyl) trimellitate (2,4-DEHTM) was investigated by a newly developed in vitro experimental design using porcine liver esterase (PLE). The substrates were incubated with PLE for 48 h at 25°C in borate buffer and samples were taken at predetermined intervals during the experiment. The samples were processed using liquid-liquid extraction and analyzed using LC-MS/MS. The results demonstrated a rapid and extensive hydrolysis of the diester DEHP to the monoester mono-(2-ethylhexyl) phthalate (MEHP) during the incubation with PLE. The isomers of DEHTM were also hydrolyzed by PLE to a high extent, whereas TEHTM showed a high stability against enzymatic hydrolysis. The regioselective analysis revealed that the monoester isomers 1-MEHTM and 2-MEHTM were predominantly produced during the degradation of DEHTM isomers, indicating a preferred hydrolysis at the para-position. These findings are eminent for planning further investigations on the human TEHTM metabolism, as the extent, rate and route of metabolism are of crucial importance for a toxicological assessment.