Employing metabolic engineered lipolytic microbial platform for 1-alkene one-step conversion

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Employing metabolic engineered lipolytic microbial platform for 1-alkene one-step conversion

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Abstract

1-Alkenes are traditionally used as basic chemicals with great importance. Biosynthetic 1-alkenes also have the potential to serve as biofuels. In this study, we engineered a *Pseudomonas* lipolytic microbial platform for 1-alkene production using hydrophobic substrate as sole carbon source. Fatty acid decarboxylase UndA and UndB were cloned and expressed, which successfully produced 1-alkenes. Optimal culturing temperature and the interruption of competitive pathway were proven to be beneficial to 1-alkene synthesis. Chromosomal integration of UndB conferred 177.8 mg/L 1-alkenes (mainly 1-undecene) in lauric acid medium and 128.9 mg/L 1-alkenes (mainly 1-pentadecene) in palm oil medium. Thioesterase expression, adjustments of fatty acid degradation pathway and a second copy of UndB improved 1-alkene titer to 1102.6 mg/L using lauric acid and 778.4 mg/L using palm oil. All in all, this study offers the first demonstration of lipolytic microbial 1-alkene producing platform with highest reported 1-alkene product titer up to date.