Technology Offer

Peptides and methods for carbon-carbon bond formation

Ref.-No.: 0706-5856-IKF

One of biotechnology's central goals is the synthesis of multicarbon compounds under mild and sustainable conditions from renewable resources. This requires biocatalysts and methods that enable selective C-C bond formation (carboligation) between two carbon units.

Moreover, optically active compounds can be used for optically resolving agents of medical or agriculture supplies such as 2-amino-1-butanol which is a starting material of the antituberculous drug ethambutol, diltiazem hydrochloride which is a coronary vasodilator and tetramizol which is effective as an anthelmintic. Furthermore, optically active compounds can be applied as starting materials or intermediates for synthesis of optically pure therapeutic agents.

Technology

Scientists from the Max-Planck-Institute for terrestrial Microbiology explored the biocatalytic potential of the thiamine- diphosphate-dependent (ThDP) oxalyl-CoA decarboxylase (OXC)/2-hydroxyacyl-CoA lyase (HACL) superfamily that naturally catalyzes the shortening of acyl-CoA thioester substrates through the release of the C1-unit formyl-CoA. They showed that the OXC/HACL superfamily contains promiscuous members that can be reversed to perform nucleophilic C1- extensions of various aldehydes to yield the corresponding 2- hydroxyacyl-CoA thioesters. Improved catalytic properties of Methylorubrum extorquens OXC was obtained by enzyme engineering in combination with two newly described enzymes—a specific oxalyl-CoA synthetase and a 2-hydrox- yacyl-CoA thioesterase. This enzymatic cascade enabled continuous conversion of oxalate and aromatic aldehydes into valuable (S)-a-hydroxy acids with enantiomeric excess up to 99 %.

We are looking for a collaboration partner to further develop this exciting project.

Patent Information

A priority application was filed on 31.08.2019 followed by a PCT application on 29.08.2020.

Publication

Burgener, S., Cortina, N. S., & Erb, T. J. (2020). Oxalyl-CoA Decarboxylase Enables Nucleophilic One-Carbon Extension of Aldehydes to Chiral α-Hydroxy Acids. *Angewandte Chemie International Edition, 59*(14), 5526-5530.

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