BIOTRANS
LA ROCHELLE 2023

N°1021 / PC
TOPIC(s) : Enzyme discovery and engineering

Steric hindrance modification-based substrate specificity evolution of amine dehydrogenases

AUTHORS
Xiaoqing MU / JIANGNAN UNIVERSITY, NO. 1800, LIHU AVENUE, WUXI, P. R. CHINA, WUXI

PURPOSE OF THE ABSTRACT
Chiral amine compounds serve as valuable structural motifs in bioactive compounds, therapeutically useful molecules, and active pharmaceutical intermediates. Direct reductive amination of prochiral ketones is highly attractive in the synthesis of chiral amine, which was ranked second on the chemical reaction list of the most promising to challenge the pharmaceutical industry highlighted by the American Chemical Society. In recent decades, there has been increasing attention to the synthesis of chiral amines catalyzed by amine dehydrogenases (AmDHs) given that its sole expense is ammonia and that water is the only byproduct. However, the prochiral ketone acceptance of the existing natural and engineered AmDHs toolbox is limited, resulting in the synthetic application of AmDHs has remained challenging. Here, we highlight the development of strategies for the substrate specificity evolution of AmDHs based on the steric hindrance effect modification between the enzyme substrate-binding pocket and substrate molecular. These works provide a referable strategy for the divergent substrate acceptance evolution of AmDHs family members and other oxidoreductases with analogous substrate-binding pocket.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

Chiral amines | Amine dehydrogenases | Steric hindrance | Substrate specificity

BIBLIOGRAPHY

[1] T. Wu, Y. Wang, N. Zhang, D. Yin, Y. Xu, Y. Nie, X. Mu, ACS Catalysis 2023, 13, 158-168.
[2] X. Mu, T. Wu, Y. Mao, Y. Zhao, Y. Xu, Y. Nie, ChemCatChem 2021, 13, 5243-5253.
[3] T. Wu, X. Mu, Y. Xue, Y. Xu, Y. Nie, Biotechnology for Biofuels 2021, 14, 207.
[4] L. Yang, X. Mu, Y. Nie, Y. Xu, Metabolic Engineering 2021, 64, 122-133.
[5] J. Li, X. Mu, T. Wu, Y. Xu, Bioresources and Bioprocessing 2022, 9, 33.