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Engineering (S)-selective ω-transaminases for better thermostability

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PURPOSE OF THE ABSTRACT

Chiral amines are one among the most versatile and valuable building blocks employed for the synthesis of diverse amine containing pharmaceuticals as well as agrochemical compounds. In recent years, sustainable development has driven the evolution of biocatalysis as a green technology for the efficient industrial synthesis of different chiral amine-containing drugs. Amine transaminases (ATAs), the pyridoxal 5'-phosphate (PLP) dependent enzymes, which under mild conditions mediate the highly stereoselective transfer of an amino group from an amino donor to a keto group, have attracted tremendous attention as a powerful biocatalyst for production of enantioenriched chiral amines due to their broad substrate acceptance1. However, industrial applicability of ATAs is still limited owing to their low operational stability as biocatalysis sometimes require enzymes to be employed in unnatural conditions. The key to improving the industrial applicability of ATAs lies in enhancing their operational stability at high temperatures and in the presence of organic solvents, which can transform them into ideal candidates for industrial applications while retaining their enzymatic activity in vitro. To this end, we have characterized several (S)-selective ATAs with respect to their thermodynamic and operational stability. This study presents new data on stability improvements achieved through enzyme engineering, based on the previously discovered ATA inactivation mechanism of ATAs2. By improving the operational stability of ATAs, we aim to enable their wider applications in the industrial synthesis of various chiral amine-containing drugs, contributing to the sustainable development of the pharmaceutical and agrochemical industries

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

chiral amine | transaminase | enzyme engineering | biocatalysis

BIBLIOGRAPHY

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