PHARMACY 150 1876 - 2026

Medicinal Chemistry
STUDENT SEMINAR SERIES

Biocatalytic derivatization of amino acids using PLP-dependent enzymes

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11am until 12pm

Chiral amines are common structural motifs found in natural products and pharmaceutically relevant compounds. Amino acid derivatives and non-canonical amino acids (ncAAs) comprise a subset of chiral amines that are an emerging structural feature of peptide therapies such as GLP-1 agonists or macrocyclic peptides. These chiral amines can increase the potency, stability, and bioavailability of peptides, highlighting their therapeutic potential. However, accessing ncAAs and amino acid derivatives through traditional chemical methods can be complicated by poor stereochemical control and the requirement of protecting groups. Biocatalysis offers solutions to these problems by accessing derivatives directly from their amino acid precursors. Enzymatic approaches avoid the use of protecting groups and often confer high degrees of stereoselectivity. Pyridoxal-5'-phosphate (PLP)-dependent enzymes often accept a wide range of amino acid substrates and catalyze a wealth of reaction types, making these enzymes well-suited for amino acid derivatization. By harnessing the potential of PLP-dependent enzymes to catalyze non-native reactions, we have discovered novel methods to access ncAAs and other amino acid derivatives. These reactions include one- and two-electron mechanisms that expand the scope of known chemistry catalyzed by PLP-dependent enzymes. Ultimately, this research will lead to more efficient routes to access important chiral amines that avoid obstacles commonly associated with traditional synthetic methods.