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Phenylalanine/Tyrosine ammonia lyase enzyme catalyzed synthesis of the methyl ester of *para*-hydroxycinnamic acid and its potential antibacterial activity

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Enzymes are molecular machines that are vital to sustain life in biological systems including humans. Enzyme catalysis has revolutionized manufacturing processes in pharmaceutical, chemical and food industries. We have shown that Phenylalanine Ammonia Lyase (PAL) enzyme functions efficiently in both aqueous and non-aqueous media. We have also successfully used PAL in the production of L-phenylalanine (L-Phe) and L-phenylalanine methyl ester (L-PM), fine chemicals with very high demand in chemical and food industries. Recently, we have successfully demonstrated Phenylalanine/tyrosine ammonia lyase (PTAL) catalyzed transformation of L-tyrosine methyl ester (L-TM) to *para*-hydroxycinnamic acid methyl ester (*p*-HCAM) and its antibiotic activity. Different conditions including pH, temperature, speed of agitating reaction milieu, enzyme concentration, and substrate concentration were optimized for the maximal formation of *p*-HCAM. The product (*p*-HCAM) was confirmed using Nuclear Magnetic Resonance spectroscopy (NMR). Fourier Transform Infra-Red spectroscopy (FTIR) was carried out to rule out potential hydrolysis of *p*-HCAM during overnight incubation. Potential antibacterial activity of *p*-HCAM was tested against several strains of Gram-positive and Gram-negative bacteria. In addition to using *p*-HCAM as an antibacterial agent (perhaps as a topical treatment agent or disinfectant), we also intend testing its potential applications as a food additive (inclusion in canned foods to prevent microbial contamination).

Biography

Godwin Basil D'Cunha completed his PhD in Biochemistry from The University of Mumbai, India in 1995 and did his Post-doctoral work in Protein Chemistry and Enzymology from 1995-1997 at The University of Mumbai. He relocated to USA in 1997 and was an Adjunct Assistant Professor (City University of New York, 1999 – 2001), and then relocated to Canada in 2001. He is an Associate Professor in the Department of Chemistry at Cape Breton University (CBU), Sydney, Nova Scotia, Canada (currently in his 14th year of service at CBU). His research group works on fundamental and applied aspects of Phenylalanine Ammonia Lyase (PAL), an enzyme with considerable medical, industrial, and biotechnological significance. He has published 13 papers in peer-reviewed reputed journals and has made 32 presentations of his work at national and international conferences.

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