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Harnessing the potential of L-DOPA from biological sources: Dawn a new era

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Abstract

The Parkinson's disease is a neurological disorder associated with an underproduction of dopamine in the human brain. L-DOPA (3, 4 dihydroxyphenyl-L-alanine) is a well known sympathetic stimulant and being used for symptomatic relief of Parkinson's disease. The conventional process used in the production of this drug generates both optical and chemical impurities that make it unsuitable for medication. Naturally L-DOPA is found in certain plant foods, particularly broad beans which found to replenish brain levels of L-DOPA more rapidly and for longer periods. Different biological sources yielded maximum amount of enantiometrically pure L-DOPA under statistically optimized cultural conditions. Bacterial isolates used in our study showed utmost production of L-DOPA were Bacillus sp. JPJ (11.02 g l-1), Brevundimonas sp. SGJ (3.35 g l-1), Pseudomonas sp. SSA (3.25 g l-1) and Yarrowia lipolytica (4.09 g l-1).While in plants, Mucuna monosperma seeds collected from the local area showed 118 mg g-1 of L-DOPA per gram of dry seed. Similarly, other local species of Mucuna and green leafy vegetables that are consumed regularly showed higher content of L-DOPA can be a promising candidate for the treatment of Parkinson's disease. As these plants were found to contain phenolics that play the important role as antioxidants, antimutagens and scavengers of free radicals produced during the oxidative stress. Biological synthesis of L-DOPA will be the most promising approach to overcome the classical methods used in chemical drugs formulations; natural sources reduces the secondary complications which will helps to delay the progression of the disease. The alternative sources of L-DOPA and a further clinical trial will open the subject of extensive research.