Experimental and bioinformatics study for production of lasparaginase from Bacillus licheniformis: a promising enzyme for medical application

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Abstract

A Bacillus licheniformis isolate with high L-asparaginase productivity was recovered upon screening two hundred soil samples. This isolate produces the two types of bacterial L-asparaginases, the intracellular type I and the extracellular type II. The catalytic activity of type II enzyme was much higher than that of type I and reached about 5.5 IU/ml/h. Bioinformatics analysis revealed that L-asparaginases of Bacillus licheniformis is clustered with those of Bacillus subtilis, Bacillus haloterans, Bacillus mojavensis and Bacillus tequilensis while it exhibits distant relatedness to L-asparaginases of other Bacillus subtilis species as well as to those of Bacillus amyloliquefaciens and Bacillus velezensis species. Upon comparison of Bacillus licheniformis L-asparaginase to those of the two FDA approved Lasparaginases of E. coli (marketed as Elspar) and Erwinia chrysanthemi (marketed as Erwinaze), it observed in a cluster distinct from- and with validly predicted antigenic regions number comparable to those of the two mentioned reference uvtckpu0"Kv"gz j kdkvg f" o czk o w o "cevkxkv{ "cv"62"ÅE."r J ":08."62" o O"curctc i kpg."32" o O" zinc sulphate and could withstand 500 mM NaCl and retain 70% of its activity at 70 ÅE"hqt"52" o kp"gzrquwtg"vk o g0"Kuqnevg"gp | { o g"rtqfwevkxkv{" y cu"k o rtqxgf"d{" i c o o c" irradiation and optimized by RSM experimental design (BoxóBehnken central composite design). The optimum conditions for maximum L-asparaginase rtqfwevkqp"d{"vjg"kortqxgf"owvcpv" ygtg"5;079"ÅE."905;"rJ."42096"j."3;8062"tro." 0.5% glucose, 0.1% ammonium chloride, and 10 mM magnesium sulphate. Taken together, Bacillus licheniformis L-asparaginase can be considered as a promising candidate for clinical application as antileukemic agent

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