

# Experimental and bioinformatics study for production of L-asparaginase 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 L-asparaginases 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"gzjkdkgf"oczko"cevkxkv{"cv"62"ÅE."r J":08."62"o O"curctcikpg."32"o O" zinc sulphate and could withstand 500 mM NaCl and retain 70% of its activity at 70 ÅE"hqt"52"okp"gzrquwtg"vkog"Kuqncvg"gp|{og"rtqfwevkxkv{"ycu"ko rtqxf"d{"icooc" irradiation and optimized by RSM experimental design (BoxóBehnken central composite design). The optimum conditions for maximum L-asparaginase rtqfwevkqp"d{"vjg"ko rtqxf"owcpv"ygtg"5;079"ÅE."905;"r J"."42096"j."3;8062"tr o." 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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