

عنوان مقاله:

L-Asparaginase-producing Rouxiella Species Isolation, Antileukemia Activity Evaluation, and Enzyme Production Optimization

محل انتشار:

مجله تحقیق در پزشکی مولکولی، دوره 6، شماره 3 (سال: 1397)

تعداد صفحات اصل مقاله: 16

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خلاصه مقاله:

Background: L-Asparaginase (L-Asp) is used as an efficient anti-cancer drug, especially for acute lymphoblastic leukemia (ALL). Currently, two bacterial asparaginase isoenzymes are used for cancer treatment. Therefore, this research focused on isolating native bacteria with the ability to produce L-Asp. Materials and methods: L-Asp producing bacteria were isolated from soil samples on ۹K medium supplemented with L-Asp as nitrogen source. Detection of L-Asp activity was performed by observing color change of the agar medium from yellow to orange due to the release of ammonia around the colonies. After the isolation and identification of the bacterium, L-Asp production was first optimized by the one factor-at-the-time (OFAT) technique followed by the response surface method. Next, the enzyme was extracted, purified, and assessed for antileukemia activity on U۹۳۷ and MRC-۵ cell lines. Results: The results revealed that L-Asp produced by Rouxiella sp. AF۱ significantly inhibited the growth of U۹۳۷ cells at a dose of up to ۰.۰۴ IU/ml, while MRC-۵ was not affected at any enzyme doses. The final purification of the enzyme was achieved by column chromatography (Sephadex G-۱۰۰) at approximately ۰.۳۱ mg/ml, and its specific activity was determined to be ۰.۵۱ IU/mg. The OFAT optimization experiments were performed primarily to determine optimal enzyme conditions, which were found to be neutral pH (pH۷), ۳۰ °C temperature, and ۳ % NaCl, ۱ % peptone, and ۱% glucose concentrations. Statistical optimization was based on five factors obtained from OFAT, and response surface method (RSM) analysis introduced a quadratic model for enzyme production at the optimal range of these variables. This model provided an equation for measuring the effect of physiochemical conditions on final enzyme production. Conclusion: We showed that native bacteria may be novel candidates for isolating new metabolites such as L-Asp. Because many bacteria grow in unknown environments with unique ecological properties, the probability of discovering novel bacterial species producing bioactive compounds is high.

کلمات کلیدی:

L-Asparaginase, Antileukemia activity, Rouxiella sp. AF۱, Response Surface Method

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