CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)

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Project Number

S0520

Project Title

Escherichia coli Potassium Binding Protein as a Potassium Ion Inhibitor

Abstract

Objectives/Goals

The purpose of this experiment was to determine if E. coli potassium binding protein (Kbp) could be extracted and purified by SDS-PAGE and if Kbp could be used to inhibit potassium ions in solution, outside of the E. Coli bacteria cell and mechanism.

Methods/Materials

This project had three groups: a negative control where E. coli did not undergo osmotic shock and therefore did not produce Kbp, a positive control where E. coli did undergo osmotic shock but were not purified so that the Kbp was definitely present, and an experimental group where E. coli did undergo osmotic shock and purified by SDS-PAGE. E. coli was grown in exact controls where the only difference was that the positive and experimental cultures had NaCl added after the second day of growth to a LB solution of 0.4 M NaCl. Proteins from each sample were then extracted. The experimental group was used
as samples for SDS-PAGE. All three were then tested for potassium inhibition by being added to approximately 0.75 M solution of KCl and measuring ion levels before and after with an ion electrode. Materials used were from commercial sources such as Thermofisher, Bio-Rad, Vernier, and Santa Cruz Biotechnology

Results

The results showed a statistically significant difference in potassium ion levels after adding the experimental protein samples to solution, with an average difference of 879 mg/L.

Conclusions/Discussion

Adding extracted Kbp, purified through SDS-PAGE, to a KCl solution lowered potassium ion levels. It can be concluded that Kbp can be extracted from the E. coli bacterium and then purified through SDS-PAGE, Kbp can inhibit potassium ions in solution outside of the E. coli bacteria cell body/mechanism, and adding the Kbp protein to a solution of potassium chloride will lower potassium ion levels. This project is a first step project, in which it was necessary to find out if Kbp can be used outside of the e.coli body, which had not been proven before. This project is essentially one part of the development of a treatment for hyperkalemia.

Summary Statement

Escherichia Coli Potassium Binding Protein be purified through SDS-PAGE and be used as an ion inhibitor in solution outside of the E.Coli mechanism/bacterium

Help Received

Swathi Hullugundi, a post-doc at UCSD, answered some questions on SDS-PAGE.