Compensatory Effect of Polyamines on Decrease of Yeast Alcohol Dehydrogenase activity Due to Salt Stress

Samira Darbandsar Mazandarani*; Seyedeh Zahra Moosavi-Nejad

Department of Biology, Faculty of Basic Sciences, Alzahra University, Tehran, Iran

sdarbandsar@yahoo.com

Background & Objectives: Yeast Alcohol dehydrogenases catalyse the interconversion between alcohols to aldehydes and ketones. The enzymes are used in production of different materials and intermediate compounds in the chemical industry, synthesis of chiral compounds, in bioreactors and biosensors. Polyamines are metabolites that help organisms to tolerance against thermal stress. Regarding to biological importance of polyamine in response to salt stress, the effect of polyamines has been investigated on yeast alcohol dehydrogenase activity in salt stress conditions at different temperatures.

Methods: The reaction mixtures contained enzyme solution, 0.01M pyrophosphate buffer (pH 8.5) containing (1.5 M) NaCl or (1.5 M) KCl, PAs (mM 55 for 1,3-diaminopropan, cadaverine spermidine, and spermine, 4 mM for putrescine) after incubation for 5 minute over different temperatures ranging from 5 to 65°C, ethanol (170mM) and NAD+ (1.5mM) were added. The activity was measured by following A340nm and compared with control.

Results: Activity was calculated using the slope of Arrhenius plot in the presence and absence of polyamines (Segel 1975). The results showed that both salts reduce yeast alcohol dehydrogenase activity. The effect of NaCl was more than KCl. In the presence of NaCl, polyaminesdon'thave significant effect on upward direction of the curvebut enzyme activity increase in downward direction of the curve. In the presence of KCl, polyamines increase enzyme activity in both upward and downward directions of the curve.

Conclusion: overall, NaCl and KCl decrease significantly enzyme activity. In the salt stress conditions and at temperatures higher than optimum temperature, polyamines increase and compensate the enzyme activity.

Keywords: Yeast Alcohol Dehydrogenase; Salty Stresses; Polyamines; Arrhenius Plot