



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Shivek Narang	Project Number J0517
Project Title Study of Osmolarity and Fluid Homeostasis Using Saccharomyces cerevisiae: Implications for Regulation of Hypertension	
Abstract Objectives/Goals I wish to understand the impact of Sodium on human body. All organisms must maintain homeostasis and water balance to survive. Water balance is essential for nerves to function properly, as demonstrated by the Sodium Potassium pump. Too much salt (Na ⁺ ions), causes our body to hold extra water thus increasing the blood volume. This adds stress on our heart and blood vessels, leading to hypertension. But why do we need so much water to lower salt concentration? This question relates to salt's effect on osmotic pressure and active transport, which I answered by conducting my experiment. I used yeast for experiment as most metabolic and cellular pathways occur in the same way in humans as in yeast. Methods/Materials Materials used were Packaged Yeast, Salt, Distilled Water, Congo red, Microscope and Slides. Dehydrated Yeast cells were activated in distilled water and then further incubated in different salt solutions (the manipulated variable), including no salt (served as the control group). The salt concentrations used were 0%, physiological concentration of 0.75%, and also hypertonic solutions containing 2% of salt. The rate of budding, active transport of Congo red and the diameter of the yeast cells (all dependent variables) were observed at 0, 2, 4, 6, 8, and 10 min. The results are average of three independent trials. Results As the percentage of salt was increased in the yeast solution, there was an impact on the size of the cell, active transport process as well as cell budding. The cell diameter decreased by 13%. The active transport of Congo red decreased by 45% and the cell budding was also negatively impacted and decreased most by 85%. Conclusions/Discussion All of the responding variables were negatively impacted by the increasing salt, thus supporting my hypothesis. It was surprising that there was not much difference in the cell diameter or active transport between the physiological concentration of salt and the hypertonic conditions of 2% salt. It may be because the physiological concentration for human is already hyperosmotic to the yeast cells. There was also sugar in the activation mixture that would have added to the osmolarity of the solution. Further research will look at what will happen if we repeat the experiment without sugar, wide range of salt solutions and different salt compounds like Potassium Chloride or Calcium Chloride and analyze if they will also have similar effects.	
Summary Statement In summary this project observed the importance of osmolarity of solutions in the homeostasis of water movement, active transport, and growth of Saccharomyces cerevisiae	
Help Received I wish to express my deep gratitude and sincere thanks to my teacher Dr. Anuradha Murthy for her invaluable guidance, constant encouragement, constructive comments and immense motivation, which sustained my efforts at all stages of this experiment.	