



# CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

<b>Name(s)</b> Nathaniel L. Powers	<b>Project Number</b>  34349
<b>Project Title</b> Physiological and Morphological Effects of Reduced Serum Concentration on Chinese Hamster Ovary Cells	
<b>Abstract</b> <b>Objectives/Goals</b> Chinese Hamster Ovary (CHO) cells are commonly used in the biotechnology industry to produce recombinant proteins for therapeutic protein medication. Serum is expensive, so many companies adapt their cell lines to use less serum in the media. This experiment tests the effects of reduced serum concentration on the CHO cells. <b>Methods/Materials</b> Materials: Chinese Hamster Ovary cells producing CTGA4-ig24 construct, Fetal Bovine Serum, DMEM/F-12 Media, Carbon Dioxide Incubator, 10x Penicillin Streptomycin, Trypan Blue, Trypsin, Phosphate Buffer Saline, 25 cm <sup>2</sup> T-flasks, 5ml - 1ml Serological Pipettes and Electric pipettor, Dissolved Oxygen Probe, pH Pen, .45um Filter Units. Methods: Cells were incubated in the T-flasks with 5ml of media with either 10% or 8% serum for 3-4 days, before exchanging the media. Media exchange included trypsinizing the cells to create a cell suspension, and taking 2ml of that cell suspension to continue the cell line, leaving room for new cells to grow. Viability tests were conducted on the cells using 10% media during the final physiological tests, and pictures were taken to document morphological changes over time between cells using 10% and 8% serum. <b>Results</b> Viability tests with Trypan Blue and the Dissolved Oxygen Probe were used to prove that the cells were indeed living, as some cells kept the Trypan Blue at bay showing that they were living, and the oxygen content in the media went down each day of testing, showing that the cells using 10% serum were respiring. The pictures do not document significant change in cell morphology between 10% and 8% serum. <b>Conclusions/Discussion</b> The cells do not show significant change in morphology as they adapted to the 8% serum change. The only notable difference includes increased clumping when the cells were trypsinized. Due to this, I accept the null hypothesis that there was no morphological change in the cells using less serum when compared to cells using 10%. For future work, extra time would be taken to reduce the concentration to a lower amount, and to keep the cells living long enough so that the physiological tests could be done on cells using both the 10% and the 8% serum media.	
<b>Summary Statement</b> I reduced the amount of nutrients (the amount of serum added to media) the Chinese Hamster Ovary cells could utilize and tested the effects of this on their morphology and physiology.	
<b>Help Received</b> Dr. Subhash Karkare donated supplies and taught sterile techniques; Dr. Nikki Malhotra provided lab report proofreading and access to lab supplies; Used lab equipment at Thousand Oaks High School under the supervision of Dr. Malhotra; Received donations from Sigma-Aldrich and Fisher Scientific.	