



CALIFORNIA STATE SCIENCE FAIR

2015 PROJECT SUMMARY

Name(s) Neda Izadyar	Project Number S1215
Project Title Adipose Stem Cell Differentiation to Chondrocytes When Exposed to Various Conditions	
<div>Objectives/Goals<p>The purpose of this experiment was to find out how adipose differentiation to chondrocytes is affected when the adipose stem cells (ASCs) are exposed to various conditions. It is hypothesized that the ASCs will prefer a three dimensional matrix (calcium alginate) and the scattered technique of plating for differentiation to chondrocytes.</p></div> <div>Abstract<p>The ASCs were plated on 96-well plates in four different conditions [scattered/gelatin (S-G), centered/gelatin (C-G), scattered/calcium alginate (S-CA), or centered/calcium alginate (C-CA)] for 16 days. At day 4, 8, 12 and 16, one plate was stained with Alcian Blue and Periodic Acid Schiff (PAS). Alcian blue was released to the media with Guanidine Hydrochloride and the absorbance was then measured at 620 nm using a colorimetric plate reader. PAS was released to the PBS media and was measured at a 550 nm wave length.</p></div> <div>Methods/Materials<p>The ASCs were plated on 96-well plates in four different conditions [scattered/gelatin (S-G), centered/gelatin (C-G), scattered/calcium alginate (S-CA), or centered/calcium alginate (C-CA)] for 16 days. At day 4, 8, 12 and 16, one plate was stained with Alcian Blue and Periodic Acid Schiff (PAS). Alcian blue was released to the media with Guanidine Hydrochloride and the absorbance was then measured at 620 nm using a colorimetric plate reader. PAS was released to the PBS media and was measured at a 550 nm wave length.</p></div> <div>Results<p>The data revealed that the calcium alginate matrix absorbed approximately 20 times more Alcian Blue stain than the gelatin ($P < 0.001$). Progression of chondrogenesis during the experiment showed that the two gelatin conditions absorbed very little Alcian blue as compared to the calcium alginate conditions. The absorbance values of both calcium alginate conditions increased progressively until day 12. Overall, the scattered/calcium alginate condition had the highest absorbance rate from day 8 to day 16. Similar to Alcian Blue, the cells cultured in calcium alginate absorbed approximately 4 times more PAS stain than the gelatin ($P < 0.05$).</p></div> <div>Conclusions/Discussion<p>Overall, the data showed that the scattered/calcium alginate condition was the most successful method for chondrocyte differentiation. The three dimensional structure of the calcium alginate beads may have provided a more natural environment for the adipose stem cells to develop and differentiate into chondrocytes. Also, more space in the scattered beads could provide the environment for the cells to be in the vicinity of each other but yet have enough room to expand. This finding could have implications for increasing the production rate of chondrocytes. Having more chondrocytes in a shorter period of time could potentially offer a higher chance of a successful cartilage transplant for patients suffering with cartilage damage.</p></div>	
Summary Statement <p>The purpose of this experiment was to find out how adipose differentiation to chondrocytes is affected when the adipose stem cells (ASCs) are exposed to various conditions.</p>	
Help Received <p>Used laboratory and lab equipment at PrimeGen Biotech under the supervision of Tracy Wang.</p>	