CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

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Project Number

S1210

Project Title

The Effect of 3T3/NIH Fibroblast Co-Culture on the Growth and Survival of HMEC

Abstract

Objectives

Skin grafts are surgical methods to heal affected areas through the transplantation of skin from one area of the body to another. These grafts are avascular and fail to survive if blood vessels do not grow to supply them with nutrients. This study serves to understand the effect fibroblasts have on the growth of human microvascular endothelial cells in an in vitro co-culture.

Methods

Prior to culturing the cells, the cell lines were first obtained from cryogenic storage. Then the cells were passaged to new tissue culture dishes and were passaged and fed with media until they reached confluency of ~80%.

The interactions were investigated using 3D Cell Culture. The cells were cultured in collagen gels inside polydimethylsiloxane wells. The control of the experiment contained just HMEC and experimental group contained equal numbers of HMEC as the control, but were cultured with additional 3T3 to assess the interactions. The cells were then observed using confocal microscopy and analyzed through the program Fiji Is Just ImageJ.

Results

The 3T3 did indeed serve as a growth factor the the HMEC. The co-culture of HMEC with 3T3 was successful, with an average of 27 HMEC positive cells for the co-culture and 11 HMEC positive cells for HMEC only culture.

Conclusions

Through the co-culture of HMEC with 3T3, the HMEC were able to have better survival and increased growth. The method of 3D cell culture allowed for successful culture of the HMEC, providing data that helps in understanding what effect the fibroblasts have on growth of HMEC. An average of 27 HMEC positive cells were identified in the co-culture condition whereas an average of 11 HMEC positive cells were identified in HMEC only culture.

The hypothesis that the HMEC will increase in growth and survival when co-cultured with NIH/3T3 Fibroblasts was proved to be correct by the quantitative analysis done through the investigation. Previous studies have found that Hepatocyte Growth Factors released by fibroblasts encourages the growth of epithelial cells, but this experiment focused on the growth of endothelial cells considering the fact that epithelial and endothelial cells are similar in some ways. The results of the experiment can be part of a larger study regarding tissue cultures and skin grafting.

Summary Statement

This experiment investigated the role 3T3 Fibroblasts play on the growth and survival of human microvascular endothelial cells in an in vitro co-culture to assess the effect fibroblasts has on the growth of endothelial cells.

Help Received

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