

FGF1 Treatment of Human Embryonic Stem Cells Induce Lung Cell Differentiation

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Introduction

Human embryonic stem cells (hESCs) have the potential to be induced to differentiate into lung tissue using specific growth factors at various time constraints. Specific lung genetic markers such as thyroid transcription factor 1 (TTF1), Nkx2.8, sonic hedgehog (SHH), surfactant proteins B and C (SP-B, SP-C), and clara cell secreting protein (CCSP) will be the markers of lung specific cells. Fibroblast growth factor 1 (FGF1) induces cell proliferation, epithelial growth, and lung bud differentiation in the developing lung.

Aim

In this study, we will test the optimal effective concentration and time frame of FGF1 that will induce lung cell differentiation and expression of specific genetic markers.

Methods

hESCs were grown on matrigel coated plates and underwent definitive endoderm (D.E.) induction for 3 days. FGF1 at concentrations of (0 ng/ml, 50ng/ml, 100ng/ml, 200ng/ml, 400ng/ml) were treated for 4 days and tested for effectiveness using QPCR. Time frame of known FGF1 concentration treatment varied from 1 day to 7 days consecutively. Expression of specific genetic markers, TTF1, Nkx2,8, SHH, CCSP, Pax9, and Sox 2, were tested using QPCR.

Results

hESCs with FGF1 concentration at **50ng/ml** expressed the highest mRNA levels of, TTF1, Nkx2.8, and SHH. hESCs cells with various time frame at a constant concentration of 50ng/ml were inconclusive.

Conclusion

It is hypothesized that hESCs FGF1 treatment of 50ng/ml at 5 or more days of treatment may be optimal. However, it is unverified through the results of the experiment because there were errors during the RNA extraction and cDNA purification steps. It is suggested that this experiment is repeated in order to obtain more conclusive results. It is also suggested that once the optimal time frame for FGF1 treatment is known, the experiment should be repeated testing different growth factors such as FGF2, FGF7, and FGF10, as well as BMP/noggin.

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