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BMP2 Enhances Differentiation into Cardiomyocytes in Human Embryonic Stem Cell

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Human embryonic stem cells (hESCs) have ability to self-renew for prolonged periods and differentiate into all kinds of cell types including cardiomyocytes. Previous studies showed that cardiomyocytes could be generated by spontaneous differentiation from hESCs. However, the efficiency of differentiation was not high enough for the further manipulation. In this study, we used growth factor BMP2 for the efficient generation of cardiomyocytes and confirmed the characteristics.

We used stem cell line, SNUhES3, to induce differentiation into cardiomyocytes. Undifferentiated colonies were detached by Collagenase IV and cultured in suspension to form embryoid body (EB). After 30 days of suspension culture, EBs were transferred to further differentiation. To enhance differentiation, BMP2 was treated. After proper days of differentiation, cells had a morphology of cardiomyocytes and beating clusters were appeared. Beating cluster lasted more than 40 days *in vitro* and showed regular contraction. To characterize cardiac specific features, differentiated cells were examined. Differentiated cells expressed specific transcription factor GATA4, Nkx 2.5, specific proteins cTn I, MHC, cardiac actin, and ANF. Treatment of BMP2 significantly increased the expression level of cardiac specific markers in differentiated cells comparing to that of untreated cells and shortened the periods for differentiation.

In conclusion, we demonstrate that BMP2 efficiently enhances differentiation into cardiomyocytes *in vitro* from hESC.

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