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FIBRIN SCAFFOLD COULD PROMOTE SURVIVAL OF THE HUMAN ADIPOSE–DERIVED STEM CELLS DURING DIFFERENTIATION INTO CARDIOMYOCYTE-LIKE CELLS

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Human adipose-derived stem cells (hADSCs) are capable of differentiating into many cells including cardiac cells. Different types of scaffolds are used for cell differentiation, but the best is yet to be determined. In this study, fibrin scaffold (3D) was fabricated using human plasma fibrinogen compared with culture plates (2D) for the growth and differentiation of hADSCs into cardiomyocyte-like cells. For this purpose, after approving the properties of the isolated hADSCs and fibrin scaffold, four biochemical tests were employed to determine the relative growth rate of hADSCs in 2D and 3D cultures. To examine the effects of two different culture systems on cardiomyogenic differentiation, hADSCs were treated with 10 or 50 µM 5-azacytidine (5-Aza) for 24 h and followed until 10 weeks. The results indicated that the growth of hADSCs in 3D significantly increased after the 7th day ($P < 0.05$). Western blot, qRT-PCR and immunochemistry assays were used to evaluate the rate of cardiac differentiation, which showed significantly higher expression of special cardiac genes such as *NKX2.5, Cx43, MLC2v, βMHC, HAND1, HAND2* and *cTnI* ($P < 0.05$) in the treated hADSCs with 50 µM 5-Aza in the 3D group. However, the expression level of the specific cardiac proteins in 3D was not significant using western blot and immunofluorescence staining. In conclusion, this study suggests that the fibrin scaffold with compressive stress of 107.74 kpa can keep the cells alive for 10 weeks and also allows a higher and sooner differentiation of hADSCs into cardiomyocyte-like cells treated with 50 µM 5-Aza.

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