Fabrication of enriched scaffold by extracellular matrix of mesenchymal stem cells in 3D culture

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Statement of the Problem: We hypothesized that the culture of mesenchymal stem cells (MSCs) in enriched scaffold that is made by extracellular matrix of MSCs in 3D culture can improve stem cells differentiation. With regard to these considerations, the current study aimed to fabricate a biological scaffold by culture of Wharton jelly MSCs in 3D alginate scaffold.

Method: The human MSCs derived from Wharton's jelly were cultured in 3D alginate scaffolds in Dulbecco's Modified Eagle's Medium (DMEM), supplemented with 10% (v/v) Fetal Bovine Serum (FBS), 10 µg/mL Streptomycin and 100 mg/mL Penicillin for 2 weeks. The cell were made extracellular matrix and added to alginate during 2 weeks. Later decellularization and lyophilization has been done on 3D matrixes. Glycosaminoglycans (GAGs) were identified in extracellular matrix of MSCs by Safarnin o and Alcian blue staining. All the scaffolds were evaluated by Scanning Electron Microscope (SEM) and Fourier Transforms Infrared Spectrometry (FTIR). Scaffold porosity was also determined. The differentiation of MSCs into osteocyte and adipocyte was also compared with control group (cell cultured in 2D culture).

Result: FTIR and SEM analysis identified that this scaffold are highly porous with interconnection. This can provide an ideal matrix which is suitable for cell growth and differentiation. The cells were differentiated to osteocyte and adipocyte in this 3D porous scaffolds that can be useful in tissue engineering.

Conclusion: The scaffolds showed a different physical and biological property that is useful in tissue engineering applications.

Biography

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