عنوان مقاله:

Role of Heparin Sodium Salt in the Modulation of Human Umbilical Cord-Derived Mesenchymal Stem Cell Differentiation

محل انتشار:

فصلنامه گزارش های زیست فناوری کاربردی, دوره 6, شماره 4 (سال: 1398)

تعداد صفحات اصل مقاله: 7

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خلاصه مقاله:

Introduction: The present study aims to investigate the role of low molecular weight compound heparin sodium salt (HSS) to control the differentiation of the human umbilical cord (UC) derived mesenchymal stem cells (MSCs) through possible interaction with WWTR1 protein. Materials and Methods: In order to carry out this study, the human UC-derived stem cells were isolated and characterized by stem cell specific markers and the effect of HSS was studied by altering the phenotypes of MSCs. An Insilco approach was employed to reveal the structural determination of the ligand, the WWTR1 protein binding site and to predict the strength of the interaction. After HSS treatment, WWTR1, Oct4, nanog, SOX9 gene expressions were studied using real-time polymerase chain reaction (PCR). Cell staining was performed using alizarin red to confirm the formation of osteocytes. Results: Mineralization indicated by osteocytes was confirmed using alizarin red after the treatment of HSS. Post, HSS treatment, OCT4, Nanog, RUNX2, COL1A1 and WWTR1 gene expressions were positively modulated. Heparin treatment of MSCs lead to the up regulation of WWTR1 along with the down regulation of stemness markers Oct4 and Nanog expression. In silico studies also predicted the possible interaction of WWTR1 with HS. Results indicated that Amino acid residues ASP57, GLN83, GLN109, THR135, and TYR141 came up as a prominent interaction centre; ASP57, GLN83 and THR135 recorded the highest interaction energy – while ASP57 mostly participated in an electrostatic interaction. Conclusions: To conclude, it can be stated that heparin can possibly interact with WWTR1 along with having the capability to direct .cells towards osteogenic lineages

کلمات کلیدی:

Heparin, Mesenchymal Stem Cells, WWTR1, Cell proliferation, Osteocyte Differentiation