

Effect of Stemregenin1 and SB431542 small molecules on ex vivo expansion of umbilical cord blood hematopoietic stem cells on biocompatible polyether sulfone nanofiber scaffolds



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Abstract

Cord blood hematopoietic stem cells (HSCs) with several advantages including low chance of viral contamination and low rate of Graft versus host disease (GvHD) are appropriate candidate for vast medical applications such as transplantation. The main obstacle of cord blood HSCs is the low number cells. To improve ex vivo expansion of umbilical cord HSCs author introduced a new culture system. Isolated HSCs were seeded in three-dimensional (3D) on Polyethersulfone (PES) scaffolds and two-dimensional (2D) culture conditions and treated with SB431542 and Stemregenin1 (SR1) small molecules. On the fifth and tenth days the expanded cells in different groups were investigated for expression of specific markers by flow cytometry, expression of some stemness genes by qRT-PCR and colony formation by methocult medium. SR1 molecule significantly increased expansion of CD34+ cells while SB431542 induced more CD34+/38+ cells. Also SB431542 treated cells showed higher colony formation capacity. SR1 increased the expression of c-Myc, HOXB4 and SALL4 while SB431542 seemed to inhibit HOXB4 expression and increase SALL4. Together this study introduced a new ex vivo culture setting for further medical application of HSCs. Their data showed simultaneous use of these two small molecules can provide appropriate outcome for HSCs transplantation includes both of engraftment and repopulation.

Biography

Soroush Niknamian, done PhD in Cell and Molecular Biology and Oncology and Professor of Cell and Molecular Biology, Oncology and Biological Attacks. He is a Professional Biologist, Senior Research Scientist, Chartered Scientist and Registered His Science Council ID is: A-0008833. He is one of United Kingdom and Indiana Cancer Consortium (ICC) certified. He is a Registered Researcher in the U.S. Government's System for Award Management, Registered Scientist at National Center for Biotechnology Information. He is studying Medicine/Military Medicine at Liberty University (LU), Lynchburg, VA, United States of America. He holds Bachelor's Degree in Mechatronics Engineering, applied Mathematics, Civil Engineering and Management.



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