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SPARC support the expansion of cord blood stem cells *in vitro*

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SPARC (secreted protein, acidic and rich in cysteine) is a multifunctional protein that is associated with morphogenesis, remodeling, cellular migration, and proliferation. SPARC is abundantly expressed in osteoblasts and endothelial cells which contribute to the creation of HSC(hematopoietic stem cells) niches within the bone marrow, however, its function in hematopoiesis is not clear. In this study, we explored the roles and molecular profile of SPARC in regulating hematopoiesis. Exogenous SPARC could markedly promote the formation of BFU-E (erythroid burst-forming units) from cord blood CD34+ cells in a dose-dependent manner, but not CFUGM (colony-forming unit-granulocyte macrophage) and CFU-GEMM (colony-forming unit-granulocyte, erythrocyte, macrophage, megakaryocyte). CD34+ cells were cultured in IMDM containing 10% FBS supplemented with cytokine combination (SCF, TPO, FL and G-CSF) with or without SPARC for 7 days, the total number of nucleated cells were expanded 163.1- and 105.6-fold, and CD34+ cells were expanded 46.4- and 26. 6-fold, respectively; SPARC also significantly promoted the expansion of CD34+-derived hematopoietic progenitors, BFU-E was expanded 19.6- and 9.4-fold with or without SPARC respectively. To understand the possible molecular mechanisms underlying effects of SPARC on hematopoietic cells *in vitro*, gene expression profile was analyzed using Atlas human cDNA expression array after cord blood CD34+ cells were cultured in medium mentioned above for 24 h. The results showed that the expression level of 66 genes were significantly up-regulated, such as those related to the self-renewal and proliferation (c-Myc, C-Rel, SRC1£¬ErbB-3, PGF), hematopoietic differentiation (TGF-beta3, CD40, GATA3, MAL, IL10, IL13), cell adhesion and migration (CXCR4 CD44 HOX4£¬integrin-beta 3), anti-apoptosis signaling pathway (STAT6, caspase 9), and some transcription factors (TYK2, MAP2K6, PAX5, SP1); while the expression of only 3 gene transcripts (IL7R, IFNGR2,GAP43) were significantly down-regulated. These results demonstrate that SPARC could regulate the expression of various genes related to proliferation, differentiation and anti-apoptosis and untimatly resulted in the promotion of proliferation and definitive differentiation, and inhibition of apoptosis of cord blood CD34+ cells. Our results also suggest that SPARC, which is expressed abundantly in bone marrow microenvironment, may play a very important role in hematopoietic hemeostasis *in vivo*.

***Keywords*:** SPARC, niche, HSC, gene expression

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