人類早期胎盤間葉幹細胞的分離及鑑定

Isolation and Characterization of Mesenchymal Stem Cells from Early Human Placenta

中文摘要

間葉幹細胞可以從許多身體組織被培養出來，例如骨髓、肝臟以及臍帶血。爲了尋求其他間葉幹細胞的來源，本研究嘗試從人類早期胎盤來分離出間葉幹細胞，並且成功的建立了三個細胞株。其中一株細胞 PDMSC3 (placenta-derived mesenchymal stem cell 3)，可以在體外穩定的培養到第十代，經歷約 40 次的增倍後族群依然維持其型態特徵。在體外培養時，PDMSC3 呈現貼附生長的特性，族群增倍時間約爲 46 小時。 PDMSC3 可以表現出 SH2，SH4，Thy-1，CD105，CD49e，CD49f，EGFR1，PDGFRa 以及 HLA-ABC 等和骨髓間葉幹細胞相似的表面抗原，但是不會表現出 CD14，CD34，CD45，AC133/2，CD135，VEGFR1/Flt-1，CD31，c-kit，VEGFR2/KDR 以及 Stro-1 等和造血細胞、內皮細胞相關或其他不出現在骨髓間葉幹細胞的表面抗原。在分化的功能上，PDMSC3 在適當的條件下可以成功的分化爲脂肪細胞以及硬骨細胞，但是使用誘導骨髓間葉幹細胞分化的相同條件，並無法使 PDMSC3 分化爲軟骨細胞。在基因的表達方面，運用反轉錄聚合?連鎖反應的分析，發現 PDMSC3 表現出 Rex-1、Oct-4 和 NST 等早期幹細胞標記基因，VEGF、Flt-3L、SDF、LIF、IL-6、HGF 以及 FGF 等和支持造血功能相關的細胞激素/生長因子，以及 PPAR-γ 和 Cbfa 等細胞多重分化功能相關的基因。本篇研究證實，存在人類早期胎盤中的間葉幹細胞，可以藉由貼附生長的特性以及獨特的表面抗原加以分離出來。其表面抗原的呈現以及基因的表達都和骨髓間葉幹細胞相似。這些細胞可以自我更新繁殖，並且具有分化爲脂肪細胞以及硬骨細胞的多重分化能力。

英文摘要

Human mesenchymal stem cells (MSCs) can be isolated from various tissues and shown their own specificity and functional properties. To evaluate a new source of MSCs, this study described the establishment of a single cell derived mesenchymal stem cell clone, PDMSC3, from early human placenta and the characterization of its functional properties. PDMSC3 could be passaged 10 times and maintained their morphology. When cultured in vitro, PDMSC3 attached to the dish and grew with a doubling time of 46 hours. PDMSC3 expressed surface antigens including SH2, SH4, Thy-1, CD105, CD49e, CD49f, EGFR1, PDGFRα, and HLA-ABC but lacked cell markers of CD14, CD31, CD34, CD45, c-kit, AC133/2, CD135, VEGFR1/Flt-1, VEGFR2/KDR and Stro-1. Under differentiation culture conditions, PDMSC3 successfully differentiated into cells of adipogenic and osteogenic lineages, however,

little chondrogenic differentiation could be induced. By RT-PCR analysis, PDMSC3 expressed Rex-1, Oct-4, and NST that were preferentially found in other undifferentiated stem cells. The expression of VEGF, Flt-3L, SDF, LIF, IL-6, HGF and FGF reflected their possible function in supporting the hematopoiesis and angiogenesis that were noted in BM-MSCs. The expression of PPAR-γ and Cbfa further elucidated their multilineage differentiation potential. Our results demonstrated that MSCs in early human placenta could be isolated by their adherent properties and specific surface antigens. Their phenotypes of surface antigen and gene expression were similar to that of BM-MSCs. These cells could be expanded in vitro and induced into adipogenic and osteogenic differentiations.