POTENTIAL EFFECT OF CLONING ON HUMAN CORD BLOOD MULTIPOTENT MESENCHYMAL STEM CELLS

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Abstract:
Background: MSCs are heterogeneous mixture of cells that vary in their extent of proliferation and differentiation. Heterogeneity of MSCs imposes limitations for their in vitro expansion, makes the comparison of results from different research labs very problematic, and accounts for the lack of reproducibility in some clinical studies.
Aim of Work: The isolation and enrichment of clones of homogeneous multipotent and self-renewing MSCs by cloning of CB MSCs were our targets. The selected clones with higher proliferation and differentiation potential could provide a valuable source of regenerative cells to meet various clinical demands.
Methodology: Isolation and cloning by limiting dilution method of CB-MSCs were performed. Mother and daughter clones were characterized by identifying their proliferation rate, immunophenotyping, pluripotency and proliferation genes expression, as well as their differentiation potential.
Results: Mother (A), and Mother (B) were isolated from two CB samples, and cloned by limiting dilution method. The daughter clones of sample 1 (A2&A5) showed a higher proliferation rate, and greater differentiation potential than their Mother (A) cells. However, Mother (B) cells of sample 2 were of greater proliferation and differentiation potential than their daughter clones, except for clone B6 which showed a comparable result to its mother. Conclusion: Cloning of MSCs could provide homogeneous cell populations with higher proliferation and differentiation potentials than their mother cells, for better performance in clinical applications. Moreover, this study draws the attention to the importance of CD105 as a possible MSCs selection marker.

Keywords: Mesenchymal Stem Cells, Cloning, Limiting Dilution Method, Daughter Clones, Proliferation, Differentiation Potential. Immunophenotyping, Pluripotency Genes.