Does the amniotic fluid is a good source of stem cells for tissue regeneration?

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Abstract

Aims:

Human amniotic fluid stem cells (hAFSCs) have become an attractive stem cells source for medical therapy. The aims of this study were the isolation and characterization of human amniotic fluid stem cells.

Material and methods:

The human amniotic fluid was obtained from 23 patients in age from 19 to 45 years, during planned amnionunctions. Patients were divided into the following age groups: 1st - patients in age from 19 to 29, 2nd - from 30 to 39 and 3rd - from 40 to 45. The average of age in the following groups was respectively: 26 years (SD = 3,7), 35 years (SD = 2,7) and 43 (SD = 2,2). The samples were centrifuged at 350g for 10 min. After washing with PBS, cells were gently suspended and plated. When reached confluence the number of isolated cells and their phenotype were assessed. The phenotype was evaluated using: proliferation rate, differentiation potential and clonogenicity.

Results:

Human amniotic fluid-derived stem cells were allowed to adhere to plastic culture dishes and the proliferation rate ranged between 5x10³ to 15x10³ cells during 7 days of culture. Cells cultured in medium supplemented with differentiation factors toward osteogenic lineage showed change of morphology, from fibroblast-like to polygonal, after 5 days. hAFSCs formed an average of 8,2 ± 1,7 colonies. The clonogenicity that correlates with number of stem cells was 0,16%.

The average of cells number was respectively: in the 1st group - 20x10⁴ (SD = 11x10⁴), 2nd - 46x10³ (SD = 15x10³) and in the 3rd - 97x10³ (SD = 38x10³). The average of amniotic fluid amount was respectively: in the 1st group - 1ml (SD = 0,6), 2nd - 1,2ml (SD = 0,5) and 3rd - 2ml (SD = 0). The following results give the 30% of success rate.

Conclusions:

In conclusion, even if further investigations are required, the results obtained in this study support the finding that amniotic fluid contains rapidly growing cells with high differentiation potential. On the other hand, from such an amount of amniotic fluid the number of isolated cells is small, so the effectiveness of culture establishment is to little and limits their application in in vitro and in vivo studies.