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Isolation and Characterization of Mesenchymal Stem Cell Lines from Different Parts of Placenta of the Same Donor

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Two new non-immortalized cell lines from different parts of human term placenta of the same donor – from umbilical cord and distal sites, were isolated and characterized. They were named MSC-PL-1 and MSC-PL-2. The analysis of different characteristics was carried out at the early 6th and the late passages. Significant interline differences in replicative senescence and such growing characteristics as plating efficiency and proliferation activity were identified during long-term cultivation. Karyotypic analysis at early 6th passages showed normal diploid karyotype with minor number of non-clonal rearrangements for both lines. At the late 15th passage MSC-PL-2 retain normal karyotype. Some clonal rearrangements appeared at the 14th passage in MSC-PL-1 cell line during long term cultivation. Repeated karyotypic analysis let us make a conclusion that clonal rearrangement – X, add(X)(p22.3) is a feature of MSC-PL-1 during replicative senescence but it frequency may vary when different cell populations of the same line are cultivated. Both lines were characterized as MSC: the high quantity of CD44, CD73, CD90, CD105, Vimentin, HLA-ABC and low quantity of CD34, CD45, HLA-DR positive cells were detected by flow cytometry at early and late passages. It was shown that cells of isolated lines can differentiate into osteogenic, chondrogenic and adipogenic directions. Differentiation potential decreases significantly during replicative senescence. For example, adipogenic differentiation disappears in the MSC-Pl-1 line and significantly decreases in the MSC-Pl-2 line. There is a correlation between the level of adipogenic differentiation and transcriptional activity of the glut4 gene, studied using RT-PCR analysis. RT-PCR-analysis of nse expression showed low potential of both cell lines to neuronal differentiation. These data is an indirect confirmation of the ontogenetic origin importance. The obtained data allow to suggest that the main reason of interline differences is a physiology feature of organ site there from the cells were isolated.

Keywords: human mesenchymal stem cells, replicative senescence, proliferation activity, cell surface markers, karyotype, differentiation