

# Isolation and Characterization of Mesenchymal Stem Cells from amniotic fluid and chorionic villi

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## Objective:

This study was design to assess the characteristics of amniotic- (AF-MSC) and chorionic villi-derived mesenchymal stem cells (CV-MSC) in order to verify their possible applications for cellular therapy and regenerative medicine.

## Methods:

Starting from 3 mL of amniotic fluid and approximately 5 mg of chorionic villi, the collected samples were analyzed for biological endpoints like: cell viability, proliferation rate, doubling time, immunophenotype by testing the mesenchymal markers expression. The differentiation potential under specific culture conditions, was verified. Finally, the genome stability, by karyotype analysis, genome-wide array-CGH and microsatellite analysis, were also explored.

## Results:

Data obtained from both AF and CV samples showed the presence of cells with features of staminality and differentiation potential towards osteogenic, adipogenic and condrogenic phenotypes. Karyotype and microsatellite stabilities were assessed until the 15<sup>th</sup> and 27<sup>th</sup> culture passages, respectively. The frequency of the chromosomes aberrations at the different culture passages was not significantly different from the basal frequency found in the control primary cultures. Preliminary data obtained from array CGH analysis comparing DNA from early to late passages (3<sup>rd</sup> vs 27<sup>th</sup>) did not show any copy number variations of DNA segments, thus indicating that the *in vitro* culture did not induce any modification of the genome stability. Immunophenotyping of cultured MSC revealed two distinct expression patterns related to the two different prenatal sample sources.

## Conclusion:

Our findings indicate that it is possible to isolate and extensively expand MSC from either AF and CV and that the *in vitro* growth culture does not interfere with the DNA-repair systems since the DNA stability is maintained during *in vitro* expansion. Under these circumstances, AF-and CV-MSC could be suitable for therapeutic proposes. Moreover the use of cell bank technology, on native samples, might represent a life-long available autologous cell source for perinatal or adult regenerative medicine.

Keywords: Mesenchymal Stem Cells, chorionic villi, amniotic fluid, genome instability, array comparative genomic hybridization