Assessment of stem markers and epigenetic environment in amniotic fluid in normal fetuses and fetuses with chromosomal and/or structural abnormalities

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Objective
Human amniotic fluid-derived mesenchymal stem cells (AF-MSCs) can be obtained from a small amount of mid trimester AF during amniocentesis used for prenatal diagnosis of chromosomal disorders. Many factors influence the regulation of AF-MSCs self-renewal and differentiation.

Methods
We have analyzed the proliferation potencies, evaluated cell surface markers, gene expression and epigenetic environment in cultures of AF-MSCs derived from AF of normal fetuses and fetuses with chromosomal and/or structural abnormalities. Typical cell surface and stem markers were detected by flow cytometry. Epigenetic biomarkers were analyzed by immunostaining and immunoblotting procedures.

Results
The comparison of MSCs from AF of normal and abnormal foetuses revealed two distinct cultures by their proliferation potential. Cell populations from normal and one group of abnormal foetuses samples with similar growth characteristics exhibited quite similar cell surface (CD44, CD90, CD105) and stem markers (Oct4, Nanog, Sox2, Rex1) profile varying in slowly growing cultures from the other group of abnormal foetuses samples. Those differences were associated with changes in epigenetic modifications (DNA and histone H3 and H4 modifications).

Conclusion
This study indicates that epigenetic regulatory mechanisms in AF-MSCs cultures in normal and pathological gestation conditions are different dependently on foetus abnormalities.