Chondrogenic differentiation of murine and human induced pluripotent stem cells in vitro: challenges and differences in comparison to ES cells

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Induced pluripotent stem (iPS) cells hold great promise for research and potential therapeutic applications but the question whether iPS cells actually represent an equivalent alternative to embryonic stem (ES) cells regarding its use as an in vitro model system of cell differentiation remains to be answered.

Our data shows that there are remarkable differences with respect to the chondrogenic differentiation capacity as well as the expression of pluripotency markers between undifferentiated murine and human iPS and ES cells.

Murine iPS and ES cells were cultured as cell aggregates, the so called embryoid bodies (EBs), by the hanging drop method. Both cell lines could be differentiated into chondrocytes but iPS cells were found to be significantly less efficient. Further, iPS cell aggregations were smaller and less stable compared to ES cell EBs.

The differentiation of human iPS cells is posing a challenge as established methods failed to produce EBs. EB formation by fragmentation of cell colonies was inefficient and aggregates from single cell suspension disaggregated.