

Growth and differentiation of embryoid bodies derived from mouse embryonic stem cells

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Differentiation of Embryonic stem (ES) cells generally occurs after formation of three-dimensional cell aggregates, known as embryoid bodies (EBs). Even though the formation of an EB in a suspension culture has been adopted as an initial strategy for the ES cells differentiation, not much is known about the characteristics of EB cells. To follow differentiation of EBs *in vitro*, the process of EB formation and genes that were transiently expressed at different stages at 1, 3, 5, 7, 9, 11, 13, 15, 21, 33 and 57-day old EBs were determined. The results showed that various types of differentiated cells, such as neural cells, cardiomyocytes, skeletal muscle cells and adipocytes were found in the EBs and identified. EBs expressed embryonic specific genes in a stage specific manner, *Nestin* and *Neurod* were considered as ectoderm marker, *Flk-1* and *Desmin* as mesoderm marker, *GATA-4* and *AFP* as endoderm marker, which were either up-regulated gradually or immediately, or begin to down-regulate in maturing or fully matured EBs. A more refined analysis showed the EBs contained germ like cells, specific markers as *Oct-3/4*, *c-kit*, *Myh*, *DAZL*, *Stra8* were expressed during the process of EBs *in vitro* differentiation. In conclusion, our results demonstrated the potential of mouse ES cells to differentiate into all three germ layers cells and express proper markers of EBs, and also revealed that EBs can differentiate into fully differentiated cells and form primitive tissues as ovarian-like structure, oocyte-specific markers such as *Fig-a* and *ZP3* were detected. This procedure will be helpful for the human embryonic development research and discrete lineage for the cell-based replacement therapy.

Keywords: embryonic stem cell, embryoid body, embryo, differentiation

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