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Mouse Embryonic Stem Cells as In Vitro Model for Vascular Development

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Embryonic stem (ES) cells serve as a most popular model system to study early mammalian development. The objective of this study is to drive more simple and efficient vascular development without genetically modified ES cells and to examine the specific gene expression pattern during the differentiation, finally to finding biomarker can be applied for toxicological evaluation. To induce vascular development, embryoid body was formed for 3 days by hanging drop culture and replated on gelatin-coated plate in EGM-2 medium containing VEGF, ascorbic acid, bFGF, IGF and EGF. When placed in matrigel, these mouse ES cell-derived endothelial cells formed networks similar to vascular structures and observed the expression of Flk1, PECAM1 and VE-cadherin by immunocytochemical analysis within 4-11 days. The gene expression of Flk1, PECAM1 and VE-cadherin were confirmed by RT-PCR analysis. At different time points during the differentiation process, cell surface differentiation antigen such as Flk1 and PECAM1 expression were analyzed by flow cytometric analysis. When sorted Flk1+ cells were replated in 10% FBS medium containing VEGF (50ng/ml), Flk1+ cells formed vessel-like structure in three-dimensional culture. These preliminary data suggest that Flk1+ cells are suitable candidate for studying specific marker genes during vascular development.

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