

Signaling pathways in the differentiation process of human adult stem cells

Research project team

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Research project summary

Human adult stem cells and induced pluripotent stem cells (iPSC) open various new treatment options in the field of regenerative medicine. therefore, our group started to study the intracellular signaling pathways involved in differentiation and programming of human stem cells. As a first model system, the differentiation process of primary human CD34+ haematopoietic stem cells (HSCs) to myeloid dendritic cells (mDC) was investigated. We show that proliferation and differentiation of HSCs by clinically relevant stimuli such as GM-CSF and IL-4 induces a temporary activation of MAPK/ERK1/2, PKCdelta, JAK-2, STAT-5 and STAT-6. The activity of this signaling modules and differentiation to mDCs is inhibited by cell-permeable inhibitors of MEK, PKC and Janus-kinase, indicating an essential role of this kinase pathways in the differentiation process. The number of formed cell colonies can be tuned by using distinct kinase inhibitors as demonstrated by HSC colony-forming assay technology. Hence, one future approach include the guided modulation of differentiation or programming processes of HSCs and iPSCs through directed interference using specific small interfering RNAs.